UNDERSTANDING SOCIAL CONNECTEDNESS OF OLDER ADULTS WHO LIVE ALONE

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UNDERSTANDING SOCIAL CONNECTEDNESS OF OLDER ADULTS WHO LIVE ALONE

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SUMMARY

Social isolation and loneliness are two distinct forms of social disconnectedness, which are only moderately correlated. Older age is marked by changes in external and internal resources that may affect both objective and subjective forms of connectedness. There are a considerable number of older adults who live alone, some of whom have not yet adopted Internet, a medium that offers opportunities to maintain connectedness "virtually". Such older adults are often considered to be at a high risk of isolation. Therefore, first and foremost, there is a need to assess the extent of objective isolation and subjective loneliness in this group of older adults and thereby determine if isolation is a strong predictor of loneliness for this sub-population. Moreover, there is a need to evaluate other predictors of loneliness and the variables that moderate the relationship between isolation and loneliness for this group of older adults.

The complexities of the experiences of living alone in older age need to be better understood to develop interventions and technologies that are well aligned with the needs for social connectedness. Although there are still many older adult non-users of Internet-based social technologies, the adoption of Internet has been steadily increasing across all ages. Email is still the most commonly used socially-oriented application of Internet, but many older adults are now also adopting other social technologies, such as video-chatting tools (e.g., Skype, Facetime) and social networking websites (particularly Facebook), to connect with younger members of their family and with friends. Facebook is a complex social platform in that it affords various modes and types of interactions. Thus, although in theory, it has potential to fill connectedness gaps in older adults who live alone, empirically, not much is known about older adults' perceived usefulness and nature of use of Facebook especially with respect to other technologies such as email and video-chatting tools.

Thus, this dissertation had two main objectives: a) to investigate the predictors of loneliness for older adults who live alone and do not use the Internet, and b) to understand the social connectedness of older adults who live alone and use the Internet.

The first objective was targeted through multiple regression analysis on archival data of older adults who live alone in the community and use the Internet minimally. The results indicated that isolation (social and physical) and subjective health (general, physical, and emotional) together explained about 50% variance in loneliness. Based on multiple correlation coefficients, only social isolation and emotional well-being emerged as significant predictors of loneliness. Emotional well-being was a stronger predictor than social isolation. Demographics, personality, and technology experience variables did not predict variance in loneliness in this sub-set of older adults beyond that predicted by social isolation and emotional well-being.

To target the second objective, a mixed methodology study was designed wherein structured interviews were conducted with older adults who live alone and use the Internet. The interview focused on three main aspects: the experiences of living alone, interpersonal relationships and group participations, and the role of Internet-based social technologies in maintaining social connectedness. Questionnaires on health, loneliness, isolation, and personality were also used for a holistic understanding of the participants.

Most participants either loved living alone or had mixed opinions about it. However, a few participants had strongly negative feelings about living alone. Loneliness was the most commonly reported challenge associated with living alone and was often described in terms of lack of companionship or someone to share one's feelings with. Only a few participants reported perpetual or chronic levels of loneliness but many experienced it intermittently. The participants weighed the pros and cons of living alone when considering the alternative of living with someone, and most were generally reluctant to give up the benefits of solo-dwelling to escape the challenges that came with

it. Being able to maintain a life-style of one's choice was the biggest advantage that older adults perceived in living alone.

Most adults had diverse networks comprising both family and friends. The size of family networks was generally small although individual differences existed. Furthermore, older adults' interaction efforts were more focused on the inner intimate circle of family. Size of and communication with the outer circle of family tended to be more restricted than the inner circle. Older adults' inner circle of friends was also small; however, they reported large and non-static network of friends in the outer circle. The friends in the outer circle were not considered emotionally close, but were people one often met (e.g., a neighbor) or participated in an activity together (e.g., church friends, book club friends). Moreover, older adults made attitudinal and behavioral adaptations to engage in group-activities at the level that was best aligned with their current health, physical energy, and available time.

The older adult Internet users were appreciative of technology and its potential to support their connectedness needs and to overall help them age successfully while living alone. Facebook users had generally positive or mixed opinions of Facebook and they considered it useful to some extent. Many of the non-users also cited a few positive aspects of Facebook; however, either the perceived benefits were already being fulfilled through other channels (e.g., email and phone) or the perceived costs of using Facebook was higher than the perceived benefits (e.g., exposure to irrelevant or discomforting content, reduced time to engage in activities one enjoys, privacy and security risks). Thus, the older adults seemed wary of the limitations that the current day social media entail and were therefore either altogether deterred from using some technologies such as Facebook or used them in a cautious manner to avoid the pitfalls.

Together these studies provided insights into the social connectedness of older adults who live alone. The findings advanced the understanding of the complexities of living alone in older age and helped identify directions to best address social

connectedness needs while also supporting older adults' desire to continue to age in the living arrangement of their choice. Finally, the gaps in research on older adults' use of social media and its potential to support connectedness for an aging population were also addressed.

CHAPTER 1

INTRODUCTION

Human beings have a basic need to form strong, positive, and lasting relationships with other individuals and groups (Baumister & Leary, 1995). When this need is fulfilled, social connectedness is experienced. In other words, social connectedness is an assuring *feeling of being related to others* through actual or imagined sharing of experiences, emotions, and goals (Hawkley, Browne, & Cacioppo, 2005).

Lack of social connectedness has negative implications for both physical and mental health (Hawkley & Cacioppo, 2010; Heinrich & Gullone, 2006). Therefore, maintaining connectedness throughout life is vital. However, lack of connectedness could emerge from actual or perceived deficiencies in social resources such as not having enough people to interact with, reduced contact with existing relationships, lack of diversity in relationships (e.g., friend-focused or family-focused relationships only), poor quality of interactions, lack of social support, or perceptions of loneliness (Victor, Scambler, Bond, & Bowling, 2000; Wenger, Davies, Shahtahmasebi, & Scott, 1996). These deficiencies are not equally detrimental for the individual. In general, perceptions of disconnectedness (generally referred to as loneliness) are more harmful than actual or objective disconnectedness (also known as social isolation; Hawkley & Cacioppo, 2010).

Old age poses many situational challenges to the sustenance of connectedness. In particular, living alone in older age may change the amount of and/or access to social resources and support, which may eventually thwart the subjective experience of connectedness (Victor et al., 2000). Moreover, loneliness may be experienced for reasons beyond social isolation. For instance, deteriorating health may increase the need for social support and thereby susceptibility to loneliness, if the increased need is unmet (e.g., Creecy, Berg, & Wright, 1985; Newsom & Schulz, 1996, Theeke, 2009). Similarly

certain underlying personality traits are associated with chronic loneliness implying that in the same external circumstances, some individuals experience greater loneliness than others due to person-centric factors (e.g., Cacioppo et al., 2006; Heinrich & Gullone, 2006; Martin, Hagberg & Poon, 1997).

Various predictors of loneliness have been conceptualized and tested in the literature. However, there remains limited understanding of the combination of factors that increase loneliness in older adults, particularly in those who live alone. Moreover, there is a bigger gap in the understanding of the actions or reactions that older adults take to maintain or augment their objective and subjective connectedness. One such reaction explored in this research is the use of Internet for social interactions specifically through communication tools such as email, video-conferencing, and Facebook. Thus, this dissertation was developed to gain a holistic understanding of social connectedness in older adults who live alone, with and without the use of the Internet.

The Importance of Social Connectedness

There are many important functions served by social relationships. For example, they facilitate: expressions of emotions and feelings, sharing of experiences and ideas, enhancement of self-esteem, demonstrations of nurturing behavior, opportunities to receive instrumental, informational, and emotional support and guidance (Berkman, 1984). Importantly, the sense of social connectedness, which emerges from the (actual or perceived) presence of strong and positive social relationships, has implications for physical and psychological health (Hawkley & Cacioppo, 2010).

Lack of connectedness is related to higher rates of mortality and morbidity (Berkman, 1984; Holt-Lunstad, Smith, & Layton, 2010; House, Landis, & Umberson, 1988). In fact, loneliness has been considered as severe a risk for mortality as are the risks associated with smoking and alcoholism (Holt-Lunstad et al., 2010). Moreover, loneliness is a latent predictor of hospitalization and transition to nursing homes in the

older age (de Jong Gierveld, 1998). Chronic loneliness could also lead to personality disorders and adaptation issues such as low self-esteem, alcoholism, and stress (Cacioppo, Fowler, & Christakis, 2009; de Jong Gierveld, 1998; Townsend & McWhirter, 2005). Thus, although the exact mechanisms underlying the associations between social connectedness and health are not known, it is well established that the absence of social connectedness is problematic.

Depending on how loneliness is measured, 15% to 30% adults are found to experience loneliness persistently (Heinrich & Gullone, 2009). Most individuals report having experienced loneliness at some point in their lives (Heinrich & Gullone, 2009). However, loneliness tends to be under-reported in self-report studies, particularly by men, probably due to the social stigma associated with the term "lonely" (Borys & Perlman, 1985; Heinrich & Gullone, 2009; Marangoni & Ickes, 1989; Russell, 1996). Overall, years of research have produced ample evidence to recognize loneliness as a fairly prevalent and critical risk for health and well-being. However, there are gaps in the understanding of the external causes of loneliness and the reasons for inter-individual differences in the perception of loneliness.

Lack of Social Connectedness: Social Isolation and Loneliness

The lack of social connectedness (i.e., social disconnectedness) is indicated by both objective measures and subjective measures. In general, social isolation is considered as the actual or objective deficits in one's social networks (e.g., small network size, lower frequency of contact with network members) whereas loneliness is the *perceived* deficiency in one's social relationships and is accompanied with unpleasant feelings such as sadness and frustration (de Jong Gierveld, 1998; Victor et al., 2000; Wenger et al., 1996). Therefore, social isolation is indicative of the structure of an individual's social life whereas loneliness indicates how the individual *feels about* his or social life. Other definitions of social isolation and loneliness are listed in Table 1.1.

These definitions highlight the differences in the subjective and objective components of social connectedness.

Table 1.1. *Definitions of Social Isolation and Loneliness found in Literature*

Definitions of Social Isolation (i.e., Objective Disconnectedness)	
"Social isolation is the **objective state of deprivation** of social contact and content."	Biordi & Nicholson, 2008; p. 88
"Isolation is an **objective assessment** of a person's relations with the outside world."	Kaasa, 1998; p. 195
"The **objective absence or paucity of contacts and interactions** between an (older) person and a social network."	Cattan, White, Bond, & Learmouth, 2005; p. 43
"Objective state of having **minimal contact** with other people."	Wenger, Davies, Shahtahmasebi, & Scott, 1996, p. 333
Definitions of Loneliness (i.e., Subjective Disconnectedness)	
"Loneliness refers to the **psychological state** of the individual, whereas social isolation relates to the sociologic status. Although it is true that social isolation might lead to loneliness, loneliness is not, in itself a necessary condition of social isolation."	Biordi & Nicholson, 2008; p. 88.
"Loneliness is a **situation experienced** by the individual as one where there is an **unpleasant or inadmissible lack of (quality of) certain relationships**."	de Jong Gierveld, 1998; p. 73
"Loneliness is the **unpleasant experience** that occurs when a person's network of social relationships is deficient in some important way, either quantitatively or qualitatively."	Perlman & Peplau, 1981, p. 31
"Loneliness refers to the **subjective state of negative feelings** associated with perceived social isolation, a **lower level of contact than that desired** or the **absence of a specific desired companion**."	Wenger, Davies, Shahtahmasebi, & Scott, 1996, p. 333.

Note: Emphasis (bold) added.

Indicators of Social Isolation

Extent of social isolation is typically measured through social network variables at the interpersonal and collective levels (Cornwell, Laumann, & Schumm, 2008; Hawkley et al., 2005). The interpersonal social network variables relate to the dyadic ties with friends and family and are measured via network size, proximity of network members, and frequency of contact with network members (Fiori, Smith, & Antonucci, 2007). Collective connectedness relates to identifying with the larger social milieu (i.e., with a group, neighborhood, or community). Therefore, collective connectedness variables typically include frequency of neighborly socializing, religious service attendance, and involvement in volunteering activities and organized groups (Cornwell et al., 2008).

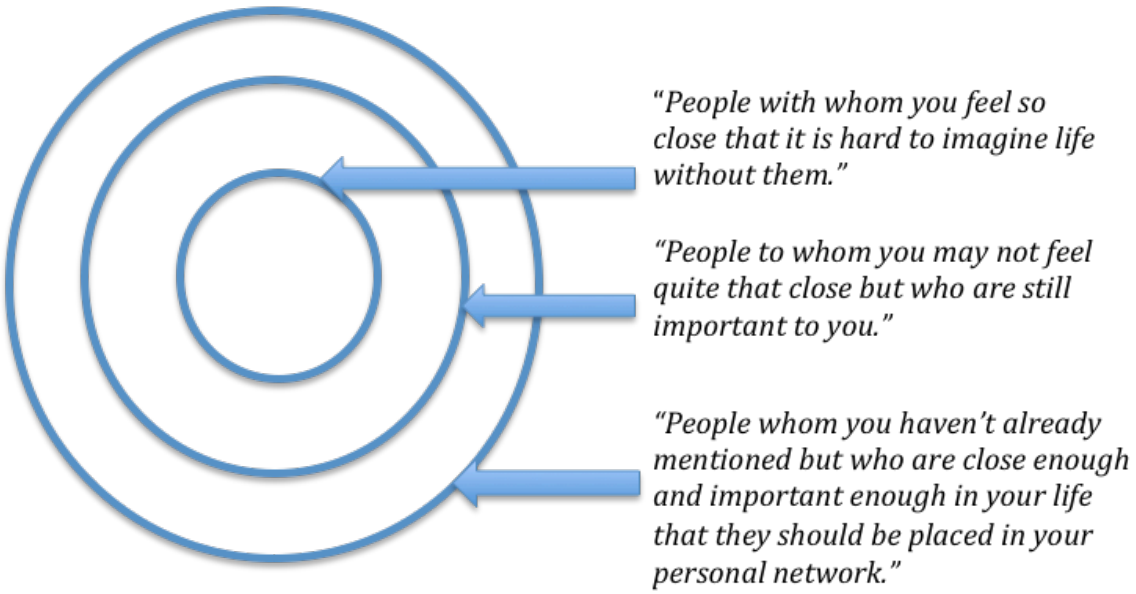


Figure 1.1. Method proposed by Antonucci and Akiyama (1987) to assess network size of an individual based on closeness with network members.

There is some inconsistency in how network variables are assessed. For example, network size has been measured in different ways: Antonucci and Akiyama (1987) developed a procedure to demarcate network members in terms of closeness on three

concentric circular rings (Figure 1.1). The level of closeness increases from the outside to inside circles. Participants list their network members by placing them on these rings. An alternative measure of network size is the number of people with whom important matters are discussed (Cornwell et al., 2008). Other indicators of network size include a count of relatives/friends seen or heard from at least once a month, and relatives/friends you feel close to (i.e., feel at ease with, can talk about private matters, or can call for help (Lubben, 1988).

Social isolation can also be indicated by the extent to which the ties in one's social network are supportive. Social support is defined as "a social network's provision of psychological and material resources intended to benefit an individual's ability to cope with stress" (Cohen 2004; p. 676). The type of resource provided by a social relationship could be instrumental, informational, or emotional in nature (House & Kahn, 1985). Instrumental support involves provision of any material help (e.g., help with transportation, financial help); informational support is the provision of useful information, ideas, or advice; and emotional support can be offered by expressions of love, care, sympathy, trust, and similar other-centered emotions.

The extent of instrumental, informational, and emotional support received from a network depends on the type of relationship. According to the functional specificity theory proposed by Weiss (1974), different relationships fulfill different types of social functions although the salience of those functions might vary across persons and situations. For example, older adults (depending on their functional ability) receive more instrumental support from family than from friends, whereas friendship relationships are more emotionally supportive, especially in contexts such as bereavement (Adams & Blieszner, 1995). Overall, access to all types of social support is assumed to increase one's connectedness. Hence, it is not just the presence of many ties but also diversity in terms of types of ties (comprising friends, family, neighbors, etc.) that differentially affect an individual's level of connectedness (Fiori, Antonucci, & Cortina, 2006). People

with more diverse networks (who maintain contacts with both friends and family) tend to have better mental health than those in family-focused or friend-focused networks, who in turn have better mental health than people in more restricted social networks (non-family or non-friends; Fiori et al., 2006, 2007; Litwin & Shiovitz-Ezra 2011).

Indicators of Loneliness

Indicators of loneliness include affective (feeling-based) and cognitive (thought-based) reactions. Loneliness is generally understood as a *situation* marked by negative feelings resulting from a "perceived discrepancy" between the individual's actual and desired level of social relationships (de Jong Giervald, 1998; Peplau & Perlman, 1981). The perceived discrepancy could be in terms of the quantity or quality of relationships, although it is the poor quality of social relationships that is more strongly linked with the loneliness feeling.

Loneliness is linked with displays of anger and hostility, feelings of negativity and hopelessness, and a host of other negative emotions and depressive symptoms (Cacioppo & Hawkley, 2009; Heinrich & Gullone, 2006; Perlman & Peplau, 1981). This form of loneliness is aversive; and is not to be confused with other, less discussed, positive forms of loneliness, such as solitude, or existential loneliness (defined as "an inevitable part of the human experience, involving periods of self-confrontation and providing an avenue for self-growth", Perlman & Peplau & 1981; p. 33). This research will only consider loneliness as a negative and undesirable feeling.

It is not well understood how internal dispositional traits interact with external situational factors in the experience of loneliness, making it difficult to classify loneliness as a state or as a trait (Marangoni & Ickes, 1989; Perlman & Peplau, 1981). Majority of empirical studies that assess loneliness as an outcome variable assume it to be an affective state (Creecy et al., 1985; Schnittker, 2007). In this case, feelings of loneliness are considered to be rather temporary and dependent on changes in one's social

environment (e.g., loss of intimacy in a marriage, relocation to an unfamiliar city). Though there is evidence that most individuals when put in strong, loneliness-producing situations feel lonely, a supplemental theory suggests that only a certain category of individuals, called trait-lonely individuals, will experience loneliness in a self-destructive way, whereas others (i.e., the state-lonely individuals) will use coping mechanisms to recover from their loneliness (Cutrona, 1982; Heinrich & Gulone, 2006).

Recently, Cacioppo and Hawkely (2009) delved further into chronic loneliness as an affective *trait.* They argue that chronically lonely individuals have latent personality attributes that make them *creators* of their perpetual loneliness. Trait-lonely individuals perceive hostility in their social environments. They tend to evaluate themselves and others negatively, and are cold and aloof in their conduct. Not surprisingly, their attitudes and behaviors evoke less positive social returns resulting in a self-fulfilling prophecy about the world being a threatening, vindictive place.

Loneliness is also considered to spread through "contagion" in that being friends with lonely people makes one feel lonely (Cacioppo et al., 2009). Thus, loneliness has a social stigma associated with it, which seems to lock trait-lonely people into a constant state of loneliness; lonely people are avoided and being avoided reinforces feelings of loneliness. The temporal aspect of loneliness experience and the social stigma against "the lonely" pose challenges for the development of reliable and valid measures of loneliness (Marangoni & Ickes, 1989; Russell, 1996; Van Baarsen, Snijders, Smit, & Van Duijn, 2001).

The Distinction between Social Isolation and Loneliness

It is often assumed that isolating conditions trigger feelings of loneliness. However, loneliness is only moderately correlated with social isolation, implying that a person may be lonely without being socially isolated and vice versa (Marangoni & Ickes, 1989; Schnittker, 2007; Victor et al., 2000). In fact, theoretically, individuals can fall in

any of the four quadrants shown in (Figure 1.2; Andersson, 1986). However, empirical findings suggest that loneliness is a worse problem that objective isolation. That is, compared to social isolation, loneliness is a stronger predictor of poor health and psychological outcomes (Luo, Hawkley, Waite, & Cacioppo, 2012). Although the causal mechanisms of loneliness, particularly when it occurs in the absence of isolation are not clearly understood, it is possible that subjective feelings of loneliness mediate the relationship between objective isolation and health outcomes. That is, isolation poses significant mortality and morbidity risks only when it causes loneliness.

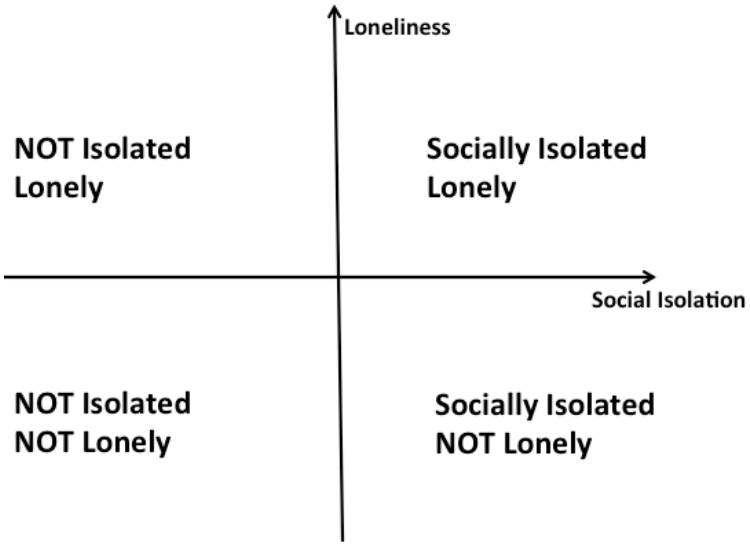


Figure 1.2. The two dimensions of social disconnectedness: social isolation and loneliness. (adaptation from Andersson, 1986).

A socially isolated individual may be at an *increased risk* for experiencing loneliness but may not be necessarily lonely. Thus, there is an established theoretical distinction between the two constructs. The challenge is to identify the other predictors of loneliness as well as the moderators that likely modify the impact of social isolation on loneliness. That is, can and to what extent loneliness be predicted by variables other than social isolation? Moreover, which factors make an individual more susceptible to loneliness when they are isolated? Which factors protect against loneliness in isolating conditions?

Isolation and Loneliness in Older Age

Although individuals vary in their needs for social connectedness, and how they seek its fulfillment, particular situational factors may not be conducive for the experience of social connectedness (Cacioppo et al., 2009; Hawkley, et al., 2005). Older adulthood is often accompanied by major life transitions such as declines in health, retirement, relocation to a new living environment, and death of loved ones (Victor et al., 2000). These transitions can increase one's need for social connectedness and also modify the quantity or quality of available social support and relationships. For instance widowhood in late life may increase one's *needs* for instrumental support (e.g., help with household work), informational support (e.g., advice regarding finance management), and emotional support (to share one's thoughts and feelings). In addition, the situation may also force the older adult to live alone, which in turn may limit the provisions of all three types of support (Eshbaugh, 2008; Portacolone, 2013).

Data from various studies indicate that 20% to 40% older adults feel lonely at any given time (Luo et al., 2012). Moreover, the older adult population of America is on a rise. In 2010, adults of ages 65 and above comprised 13% of US population but by the year 2030, their proportion is estimated to reach 19% (US Census Bureau, 2010). Therefore, the issues related to loneliness may increase in prevalence and severity in the next few decades.

Although isolation and loneliness are more prevalent among the very old (Dykstra, 2009; Victor et al., 2000), in general, age *per se* is not a reliable predictor of declines in social connectedness (Cornwell et al., 2008; Theeke, 2009). In fact, some researchers posit a positive relation between aging and social connectedness. For example, recent studies have shown that older adults report more positive interactions and higher satisfaction with their relationships than their younger counterparts (Charles & Piazza, 2007; Luong, Charles, & Fingerman, 2011). Moreover, the number of close contacts is generally constant across age (e.g., Schnittker, 2007), which is aligned with

the contention that older adults selectively retain close contacts over others (Fredrickson & Carstensen, 1990). However, in contrast to these generally positive age-related effects, there is also an indication of older adults experiencing *less* closeness with their network members (e.g., Cornwell et al., 2008). Typically, the size of social network reduces with age but participation in social and religious activities increases (Cornwell et al., 2008). It is possible that aging increases risks for isolation but enriches compensatory mechanisms to deal with the ensuing negative feelings of loneliness.

Moreover, the process of aging is not consistent across individuals; older adults live in different living arrangements and encounter different levels of declines in health, which affects not only their needs but also the provision of social support and connectedness. In addition, older adults may deal with the same problems differently. Some older adults are better than others in using strategies that lead to successful aging (Baltes & Baltes, 1990; Heckhausen & Schluz, 1995). Therefore, in addition to assessing the predictors of loneliness in older adults, it is also imperative to identify ways through which connectedness experiences are sought and strengthened.

Living Alone in Older Age: A Special Life Circumstance

Although relatively few studies have focused on the effects of living alone in older age, it is a life circumstance that many older adults face, often after the death of a spouse (Wenger et al., 1996). In 2013, 28% of non-institutionalized older adults in the US (aged 65 and above) were living alone (US DHHS, 2013). The proportion of non-institutionalized older women who live alone is even higher and was reported to be 35% in 2013. Widowhood is a notable predictor of living alone in later life. The probability of widowhood increases in older age, which in turn increases the likelihood of living alone, particularly for women. The probability of becoming and remaining a widow(er) is much higher for older women than men (Martin-Matthews, 2011; U.S. DHHS, 2013).

Although living alone may reduce in-person social contact with network members, especially if they live far away (Buys, 2001), it is not the same as "being alone" (Victor et al., 2000). Those who live alone could also be socially active and involved. In fact, for many older adults, living alone might be a choice they make willingly to maintain their autonomous life-styles (Eshbaugh, 2008; Yeh & Lo, 2004). Such older adults may even enjoy living alone (Eshbaugh, 2008). Moreover, older adults living alone are less lonely if they have frequent contacts with family and neighbors, and are satisfied with the amount of contact (Bondevik, & Skogstad, 1996). Thus, living alone is not a direct predictor of isolation or increased loneliness (Yeh & Lo, 2004). However, the caveat is that those who are isolated are quite likely to be living alone (Victor et al., 2000).

For certain individuals, living with others can trigger greater loneliness than living alone. Greenfield and Russell (2011) compared loneliness reported by community-dwelling adults (aged 57- 85) across six different living arrangements: living alone, living with a spouse/partner only, living with a spouse/partner and children, living with a spouse/partner and other relatives/friends, living with children only, and living with relatives/family only. The data were drawn from the National Social Life, Health, and Aging Project (NSHAP; Suzman, 2009). Living with an intimate other, such as a spouse or a romantic partner, provided the best protection against loneliness. Living with others (children, friends, or relatives) without a spouse or a partner posed as high a risk for loneliness as did living alone. Moreover, men who lived alone were lonelier than women living alone. Thus, single men who lived with their children were less lonely than women in the same arrangement. However, single men living with friends or relatives were lonelier than single women in similar setting. Thus, connectedness benefits of living with someone are not uniform across all older adults and are also dependent on *whom* the older adult is living with.

For some older adults, living alone may be an undesirable but inevitable situation, especially when it happens unexpectedly (e.g., following a sudden demise of spouse). A study conducted with community dwelling older widows living alone found that negative perceptions of living alone were reported by women who had a lack of companionship, unmet need for help with housework and decision-making, and a fear of falling or getting hurt (Eshbaugh, 2008). However, this study included only females. Few studies in the US have focused on the experiences of living alone for both male and female older adults specifically from the perspectives of social connectedness. Moreover, there is a dearth of research on understanding the nature of social networks of older adults living alone and the methods used to meet social connectedness needs under the constraints of their living arrangement.

Predictors of Loneliness in Older Adults who Live Alone

Social Isolation

The complexities of living alone-loneliness relationship have been acknowledged in the literature but the major predictors of loneliness in this sub-set of older adults have not been quantitatively investigated. Based on the findings in the extant literature, I posit that loneliness in older adults who live alone is normally distributed (i.e., only a few older adults experience extremely low and extremely high levels of loneliness). Moreover, consistent with the literature, social isolation should be a moderate-level predictor of loneliness in this population. That is, the more deficient a social network (as determined by the size of friend and family networks and the frequency of contact with the network members) the greater will be the loneliness experienced. However, social isolation is hypothesized to only have a moderate impact in that it does not explain all the variance in loneliness. Therefore, the effects of other personal and situational variables on loneliness will also be systematically assessed.

Physical Isolation

So far, isolation has only been considered from a social view-point. However, isolation can also be conceptualized in terms of physical space (e.g., Stalvey, Owsley, Sloane & Ball, 1999). Thus, physical isolation implies being restricted to a limited physical environment for long periods of time. Although living alone is not a direct predictor of loneliness for older adults, being confined alone to one's bedroom (or one's home) for multiple days is likely to reduce opportunities for social contact and increase risks for loneliness (Cohen-Mansfield, Shmotkin, & Hazan, 2012).

Health

Health decline is a consistent correlate of loneliness (de Jong Gierveld, 1998; Victor et al, 2000). In path analyses conducted on American older adults' survey data (N = 2979), self-reported health had a direct influence on the reported level of loneliness (Creecy et al., 1985). Moreover, self- reported health issues were also predictive of less engagement in social activities, which in turn exacerbated loneliness. This study incorporated only self-reports of health and the responses were dichotomized based on whether or not health problems were reported. The differential effects of objective and subjective health on loneliness were assessed in later research.

Theeke (2009) conducted regression analyses to assess the effects of four health variables on American older adults' loneliness. The older adult sample was above the age of 65 and was drawn from the American Health and Retirement Study (HRS), a longitudinal survey that began in 1992. The health variables were: self-report of health (assessed on a Likert scale), number of chronic illnesses, self-reported functional status (separated by number of gross and fine motor impairments), and healthcare utilization (indicated by number of in-person or phone contacts made with a healthcare provider). A single indicator of loneliness was used. Participants were asked to respond on a dichotomous scale (yes/no) if they felt lonely in the previous week. The analysis revealed

that self-reported poor health and self-reported functional status were significant predictors of loneliness. Chronic illness was found to be a partial indicator of loneliness whereas healthcare utilization was not significantly related to loneliness.

Thus, self-reported health is a stronger predictor of loneliness than objective assessments such as number of health conditions or healthcare visits (Adams, Sanders, & Auth, 2004; Theeke, 2009). Moreover, self-reported functional limitations are associated with reduced social participation (such as volunteering, church attendance, socializing; Cornwell et al., 2008; Li and Ferraro, 2006) and increased loneliness (Savikko, Routasalo, Tilvis, Strandberg, & Pitkälä, 2005; Theeke, 2009).

In comparison to physical health status, emotional well-being has a more proximal relationship with loneliness (Russell, 1996). Emotional well-being is defined as "the emotional quality of an individual's everyday experience - the frequency and intensity of experiences of joy, fascination, anxiety, sadness, anger, and affection that make one's life pleasant or unpleasant" (Kahneman & Deaton, 2010, p. 6489). Therefore, infrequent moments of happiness and/or perpetual sadness may evoke the need for emotional support and trigger loneliness, particularly when one's social network is already deficient.

Personality

Although chronic loneliness is considered to be a trait (Cacioppo & Hawkely, 2009), the findings on personality predictors of loneliness remain inconclusive (de Jong Gierveld, 1998; Pinquart & Sorensen, 2001). In general, extraversion and emotional stability are negatively correlated with loneliness implying that the risks of loneliness are higher for those who are introverted or neurotic than for those who are on the other end of these personality spectrums (Cacioppo et al., 2006; Heinrich & Gullone, 2006; Martin et al., 1997; Perlman & Peplau, 1981; Russell, 1996). The effect of extraversion on loneliness is largely mediated by social network variables (Stokes, 1985). That is,

extraverted individuals tend to have larger social networks and frequent contact with them, thereby reducing their risks for loneliness. There is also some evidence that agreeableness, conscientiousness, and openness to experience are negatively associated with loneliness (e.g., Cacioppo et al., 2006) but not many studies have replicated these effects.

Demographics Variables

The effects of demographics variables (particularly age and gender) on loneliness have been assessed in multiple studies but have produced inconsistent results. As described earlier, in general age is not a reliable predictor of loneliness but loneliness risks are high among the very old (Creecy, 1985; Dykstra, 2009; Cornwell et al., 2008; de Jong Gierveld, 1998; Theeke, 2009; Victor et al., 2000).

Similarly, gender differences in loneliness are not clear. Overall, women report higher levels of loneliness although it is argued that men tend to underreport their loneliness on assessments that use the word "lonely" (Borys & Perlman, 1985; Heinrich & Gullone, 2009; Marangoni & Ickes, 1989; Russell, 1996). If living arrangement is taken into account, older men who live alone are found to be lonelier than their female counterparts (Greenfield & Russell, 2011). Moreover, among solo dwelling older adults, unmarried men are lonelier than unmarried women and widowers are lonelier than widows (Pinquart, 2003). It is plausible that living alone is a different experience for males and females, particularly for the current cohort of older adults, who have experienced wider gender differences in roles than their younger cohorts.

Education and race have also been assessed in the literature as loneliness correlates although the underlying mechanisms are not fully understood. In general, those with less education are found to be lonelier than those with higher levels of education (Hawkley, Thisted, Masi, & Cacioppo, 2010; Savikko et al., 2005) and the relationship is likely mediated by quality of life (Ross &Van Willigen, 1997) Moreover, if *desired*

levels of social connectedness vary across races (or sub-cultures), similar living arrangements and levels of objective isolation would produce dissimilar loneliness experiences for people from different races. Thus, racial groups that value collectivism and inter-dependence are more susceptible to loneliness than those that value individualism and independence (Johnson & Mullins, 1987).

Breadth of Technology Experience

Adoption of a wide array of technologies for various purposes such as communication, health management, recreation, transportation, and other everyday tasks could help deal with the challenges of living alone, and offer a greater sense of control and meaningfulness to older adults' lives (Peek et al., 2015). Therefore, older adults who live alone but are using a variety of technologies might be coping better with loneliness than older adults who use fewer technologies but this hypothesis remains to be tested.

Role of Internet in Changing Connectedness in Older Age

Although society is aging, it is also becoming technologically advanced, overall. The adoption of Internet has been increasing across all age-groups (Pew Research, 2014; Zickuhr & Madden, 2012; see Figure 1.3). Internet-enabled devices such as computers, tablets, smart phones, have opened immense possibilities for users to communicate with people across the globe through synchronous (real-time) or asynchronous channels. They offer opportunities to older adults to not only "stay connected" with current friends and family but to also seek new relationships and rekindle old ties (Bargh & McKenna, 2004; Coget, Yamauchi, & Suman, 2002). However, the effect of adoption of Internet on social connectedness is rather complex because Internet is also used for various non-social or solitary activities such as reading, streaming news and videos, shopping, banking, searching for information, or browsing social networking websites *without* necessarily engaging in social interactions. Therefore, this research is also focused on understanding

ways and extent to which Internet based social media support connectedness needs in older adults who live alone.

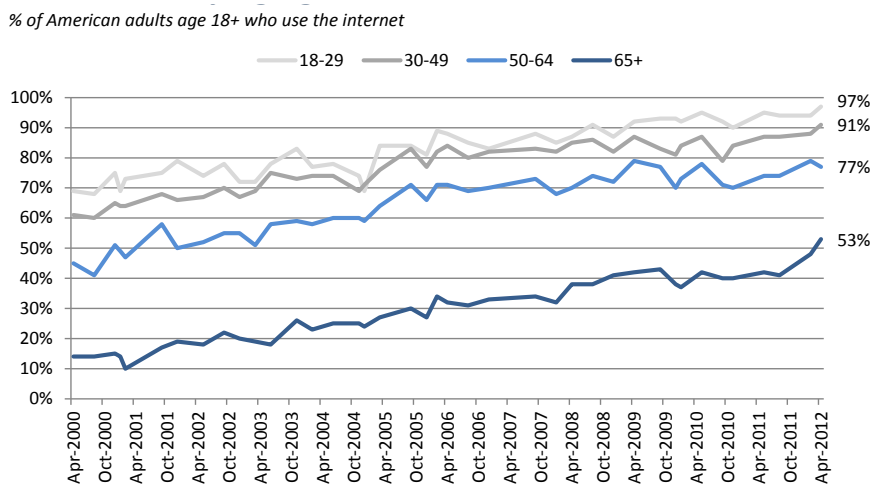


Figure 1.3. Increase in Internet use across four age groups from 2000 to 2012 (Reprinted from Older adults and Internet Use, by K. Zickuhr and M. Madden, 2012. Retrieved from http://www.pewinternet.org/2012/06/06/main-report-15/)

Internet Based Social Media

Overall, social use of Internet can occur through various modes: emails, instant messaging (text chatting), audio/video chatting, and social networking websites (e.g., Facebook, Twitter). Although all these modes are used for social interactions, the communications that occur and relationships that form or sustain through these modes are not all alike, and particularly differ in the extent to which they resemble "offline" or in-person interactions (e.g., Bargh, McKenna, & Fitzsimons, 2002). Whereas most online modes play a supportive role in strengthening offline relationships, some modes may bypass face-to- face interactions and serve as a primary medium of communication with some contacts (Zhao, 2006).

Emailing

Email is the most commonly reported social use of Internet (Hampton, Sessions, Her, & Rainie, 2009; Purcell, 2011). Among older adults who use Internet, 87% reported that they send or read emails and 46% do so on a daily basis (Purcell, 2011). In general,

email is used to stay in touch with close others, with whom one has bonded through offline interactions as well (Zhao, 2006). It is rarely utilized as a primary medium to initiate and maintain relationships, perhaps because of its asynchronous nature (IJsselsteijn, van Baren, & van Lanen, 2003). Email systems are not designed for real time conversations. Compared to a verbal dialogue between two individuals, email exchange is less instantaneous and provides more time for deliberation, careful selection of words, and opportunities to revise the message before sending it to the receiver. Despite these reasons, or perhaps because of them, emailing is the most common social activity on Internet.

Instant Messaging and Audio/Video Chatting

Instant messaging and chat systems are tools that allow for real-time interactions with others either through text, voice, or a combined audio-video mode. Examples include Skype, and Google Talk, iChat, Facetime. In general, these chat and messaging tools make it possible to interact with others quickly and on a person level (Zhao, 2006). However, relative to email use, chat tools are less popular among older adults and their use is limited to interacting with remotely located family members. In particular, video chatting is used to communicate in real time with very young grandchildren (aged 5-9 years; Sayago, Sloan, & Blat, 2011).

Although live video chats through Skype or Facetime resemble face-to-face interactions, certain nuances of in-person interactions are still absent in these conversations (IJsselsteijn et al., 2003). Typically, video-chats provide a constrained view of the other person's physical space and bodily expressions unlike in-person interactions, wherein the physical context shared is more detailed and rich in non-verbal cues. Moreover, physical modes of social communication such as shaking hands, patting on the back, and hugging cannot be utilized in virtual, technology-mediated interactions (Nie,

2001). Therefore, there has been skepticism about the adequacy of these tools to form and sustain deep, interpersonal relationships (Mesch & Talmund, 2006; Nie, 2001).

Social Networking Websites

Recently developed social networking websites (also known as social media), such as Facebook, are increasingly being adopted by older adults. In 2014, 56% of older adult Internet users reported using Facebook, 21% used LinkedIn, 17% used Pinterest, 10% used Twitter, and 6% used Instagram (Duggan, Ellison, Lampe, Lenhart, & Madden, 2015). Compared to other social networking media, Facebook is, thus, by far the most well adopted site across all ages (Duggan et al., 2015).

Social networking websites differ in their goals, terminology use, and types of interactions allowed. For example, Facebook provides both asynchronous and synchronous tools of communication. Users can interact with others asynchronously by posting publically visible comments, pictures, and videos or by sending private messages to a specific person or group. Synchronous interactions are supported on Facebook through an instant messaging tool and video chat features. Other social networking sites are more specific in the type of interaction afforded. For instance, Twitter's micro-blogging platform is meant for writing brief messages (called "tweets"), which others can read and comment on. Despite such differences existent across social networking sites, they can be generally defined as *"web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system"* (Boyd & Ellison, 2008; p. 211). Thus, the overarching purpose served is the same: to allow people to connect with each other (Boyd & Ellison, 2008).

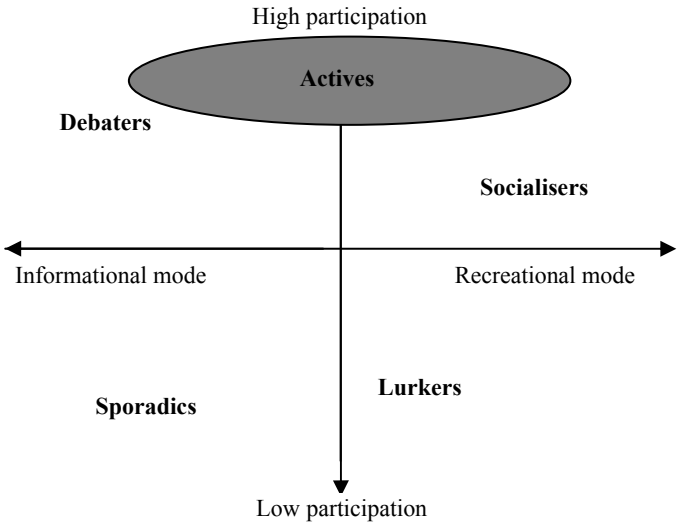


Figure 1.4. Adapted from Brandtzæg and Heim (2011) to show five types of social media users based on their participation level and reason for participation.

In general, social networking sites have potential to strengthen interactions with one's pre-existing ties, re-connect with old friends, establish connections with people who are geographically separated but have similar backgrounds and interests, and even provide opportunities to communicate with out-group members such as those with different political views or religious beliefs (Boyd & Ellison, 2008; Hampton et al., 2009). In fact, use of social networking sites (e.g., Facebook, MySpace, LinkedIn) is associated with increased diversity in one's social network (Hampton et al., 2009). However, Facebook has features that allow for both social and asocial activities. Whereas social use of Facebook involves using various tools on the website to initiate interactions and respond to others' posts, asocial use involves simply viewing various activities without contributing to them, or playing solitary games on the website. Brandtzæg and Heim (2011) have identified five types of social media users based on their level of participation (high versus low) and their participation objective (seeking information versus seeking recreation). The five types identified were sporadics, lurkers, socializers, debators, and actives. These are shown in Figure 1.4.

Certain disadvantages of social networking sites are also noteworthy. Their use is correlated with reduced participation in local activities, and knowledge about and interaction with neighbors (Hampton et al., 2009). Additionally, there are issues related to trust, identity, privacy, and anonymity that affect adoption of social networking sites (Bargh & McKenna, 2004; Gross & Acquisti, 2005; Leist, 2013; McCormick & McCormick, 1992). Moreover, the typical user-group that uses social networking sites for interaction with close network members is younger adults between 18-22 years in age (Hampton et al., 2009). The potential of social networking sites to enhance social connectedness of other age groups, particularly of older adults, has not been fully explored.

In general, older adults and more mature users perceive benefits of social networking websites for connectedness, particularly to stay connected with family, especially with younger children and grandchildren (Bell et al., 2014; Nef, Ganea, Müri, & Mosimann, 2013; Zickuhr & Madden, 2012) but they have greater concerns about privacy issues and identity theft (Gibson et al., 2010; Hope, Schwaba, & Piper, 2014; Leist, 2013; Nef et al., 2013). In addition, the social norms of interactions on social networking websites tend to differ from face-to-face interactions (Hope et al., 2014; Leist, 2013; Pfeil, Arjan, & Zaphiris, 2009). Interactions on social networking sites tend to be more informal and self-centered and less socially regulated irrespective of the audience (Leist, 2013). Informal conduct is normative in face-to-face interactions only among friends and family. Therefore, older users who are accustomed to certain ways of offline social interactions disapprove of the informal tone of interaction on social networking websites (Hope et al., 2014; Leist, 2013; Pfeil et al., 2009). Some older adults also feel that the *content* shared on social media is often too personal, too trivial, or lacking in quality and credibility (Hope et al., 2014, Lüders & Brandtzæg, 2014).

Older Adults on Social Media: Implications for Social Connectedness

Among older users of Internet, many positive benefits are noted. Internet use in older age is linked with decrease in loneliness (Cotten, Anderson, McCullough, 2013). In addition, older adults who use Internet frequently tend to be satisfied with the social support received from people they communicate with online (Wright, 2000). Moreover, older adults use Internet more for companionship than for explicit support or help (Wright, 2000). Companionship relationships enhance emotional well-being because they are egalitarian and reciprocal (Nussbaum, 1994). On the other hand, supportive relationships are based on explicit informational, instrumental, or emotional needs of one party (i.e., the receiver) and could therefore feel more utilitarian and less enjoyable (Wright, 2000).

Yet, Internet use does not have a uniform effect on everyone's social connectedness. Instead, there is support for the "rich getting richer" model, which implies that those who are already more extraverted and better connected with others use Internet to maintain and strengthen their social ties (Kraut et al., 2002; Nie, 2001). But Internet does not make an individual more sociable nor does it considerably expand the social network of an isolate (Nie, 2001). Moreover, social networks play a role in the diffusion of technologies such as the Internet (Valente, 1996). Therefore, those older adults who are connected to many Internet adopters (through friendship and familial ties) are more likely to adopt Internet than those older adults whose social networks are small and comprise few Internet users (Melenhorst, Rogers, & Bouwhuis, 2006).

Given that many older adults are adopting social media, Facebook in particular, it is important to learn if the adopters perceive these tools as beneficial in enhancing their connectedness experiences. Specifically, older adults' perceived usefulness of Facebook for fulfilling social needs with respect to other types of Internet-based social media (e.g., email and video-chatting) has not been explored. There is a plethora of research on young adults' use of the Internet for social interactions. However these findings may not be

generalizable to older adults. Age-related transitions bring about remarkable changes in one's social connectedness but age-related adaptations and compensatory strategies may make older adults react differently to these changes than their less experienced counterparts (Baltes & Baltes, 1990; Blanchard-Fields, Stein, & Watson, 2004; Carstensen, 1995; Heckhausen & Schluz, 1995). For example, forming new relationships with people who are remotely located is not typical in older age (Fredrickson & Carstensen, 1990), and therefore, older adults, of all generations, may not be interested in using social media for this purpose. Instead, the goal may be to stay in touch with emotionally close network members such as family and friends, and to participate in local social activities (e.g., socializing with neighbors, attending church, volunteering). Therefore, it is likely that the pros and cons of using Internet-based social media are different in older age, resulting in selective use of certain features and tools, and selective non-use of others.

Older adults are also better than younger adults at emotion regulation (Blanchard-Fields et al., 2004). They are able to better assess which circumstances are ideal for expressing versus withholding emotionally-laden reactions. Therefore, the type of content that older adults share and the ways in which they manage relationships and interactions on various social media may be different from younger adults' preferences and behaviors.

Thus, it is evident that Internet-based tools such as email, video-calling (e.g., Skype, FaceTime), and social networking websites (e.g., Facebook) support human-human interactions; however the nature of interactions afforded varies across these media. Adoption of one or more of such social media by older adults living alone may help them in maintaining the type and extent of social relationships they desire. On the contrary, such technologies may be perceived as deficient in some ways in comparison to the conventional methods of social interactions (e.g., face-to-face, phone calls), thereby only partially fulfilling or even amplifying the needs for connectedness. Even though Internet adoption has increased among older adults (Pew Research, 2014; Zickuhr &

Madden, 2012), little is known about the facilitators and barriers to the "social" use of the Internet by older adults who live alone, and the perceived strengths and limitations across different social media.

Summary and Dissertation Overview

Social isolation and loneliness are two distinct forms of social disconnectedness, which are only moderately correlated. Older age is marked by changes in external and internal resources that may affect both objective and subjective forms of connectedness. There are a considerable number of older adults who live alone, some of whom have not yet adopted Internet, a medium that offers opportunities to maintain connectedness "virtually". Such older adults are often considered to be at a high risk of isolation. Therefore, first and foremost, there is a need to assess the extent of objective isolation and subjective loneliness in this group of older adults and thereby determine if isolation is a strong predictor of loneliness for this sample. Moreover, there is a need to evaluate other predictors of loneliness and the variables that moderate the relationship between isolation and loneliness for this group of older adults.

The complexities of the experiences of living alone in older age need to be better understood to develop interventions and technologies that are well aligned with the needs for social connectedness. Although there are still many older adult non-users of Internet-based social technologies, the adoption of Internet has been steadily increasing across all ages. Email is still the most commonly used socially-oriented application of Internet, but many older adults are now also adopting other social technologies, such as video-chatting (e.g., Skype, Facetime) and social networking websites (particularly Facebook), to connect with younger members of their family and with friends. Facebook is a complex social platform in that it affords various modes and types of interactions. Thus, although in theory, it has potential to fill connectedness gaps in older adults who live alone, empirically, not much is known about older adults' perceived usefulness and nature of

use of Facebook especially with respect to other technologies such as email and video-chatting tools.

To sum it up, the goals of this dissertation were:

1. To investigate the predictors of loneliness for older adults who live alone and do not use the Internet.
2. To understand the social connectedness of older adults who live alone and use the Internet.

The first goal was targeted in Study 1 through multiple regression analysis on archival data of older adults who live alone in the community and use the Internet minimally. To target the second goal, a mixed methodology study was designed wherein structured interviews were conducted with older adults who live alone and use the Internet. Email use was considered a proxy for Internet use. Half of the participants were Facebook users and half were non-users. The interview focused on three main aspects: the experiences of living alone, interpersonal relationships and group participations, and the role of Internet-based social technologies in maintaining social connectedness. Additional questionnaires on health, loneliness, isolation, and personality were also used to gain a holistic picture of each participant. Together these two studies provided insights into the social connectedness of older adults who live alone.

CHAPTER 2

METHOD FOR STUDY 1

In the literature, social isolation is found to be only moderately predictive of loneliness. However being isolated while living alone and not using the Internet could be more highly associated with loneliness. Therefore, the first goal of this study was to assess the levels of social isolation and loneliness in older adults who live alone and do not use the Internet and to assess the extent to which isolation predicts loneliness in this sample. Moreover, besides social isolation, the effects of other variables (e.g., demographics, health, personality, breadth of technology use) on loneliness have been unclear. Therefore, the second goal of Study 1 was to identify other predictors of loneliness and moderator variables that modify the effects of isolation on loneliness. To this end, an archival analysis was conducted on the baseline data of a clinical field trial known as Personal Reminder Information and Social Management (PRISM; Czaja et al., 2015).

The PRISM study was focused on older adults who are at a high risk of isolation because of their living arrangement (living alone) and technology use (minimal exposure to computer and Internet). The overarching goal of the PRISM study was to examine the effects of an Internet-based system, custom-designed for older adults, on social connectedness, loneliness, perceived social support, and engagement. After baseline assessments, participants in the trial were randomly assigned to the PRISM computer system (experimental group) or to a printed binder condition (control group). Both the groups were similar in demographics, health, and technology experience. Because the archival analysis focused only on the baseline data, the binder and computer groups have been combined for this analysis.

Participants

Participants were 300 older adults between the ages of 64 and 98 years (M = 76.15, SD = 7.4). They were recruited at three different sites: Georgia Institute of Technology (Atlanta, N = 116), University of Miami (Miami, N = 140), and Florida State University (Tallahassee, N = 44).

Table 2.1. *PRISM Participant Characteristics (adapted from Czaja et al., 2015)*

	Total N = 300
Age: *M, SD*	76.15, 7.4
Range	64-98
Gender: *%*	
Male	22.0
Female	78.0
Education: *%*	
High School or less	39.0
Some College	38.7
College Graduate	13.0
Post Graduate	9.3
Ethnicity: *%*	
Hispanic	9.0
Non-Hispanic White	54.0
Non-Hispanic Black	32.7
Household Income: *per annum*	
Less than $30,000	86.6
$30,000 – $59,000	11.9
$60,000 or more	1.5
Other	4.3

To participate in the study, participants were screened based on the following inclusion/exclusion criteria: they were required to live alone in an independent community setting, have minimal use of computer and Internet in the past three months, and not spend more than 10 hours/week at a senior center or formal organization. They also had to have been planning to continue living alone in the same area during the trial. Participants were required to speak English, have at least 20/60 vision with or without correction and be able to read at the 6th grade level. Those who were blind or deaf, or had severe cognitive impairment were not included in the trial.

The characteristics of the sample are shown in Table 2.1. As is evident, the sample was primarily female and from the low-income group (less than $30,000 per annum) but fairly diverse in terms of ethnicity. Education level was relatively low: 39% reported receiving only high-school level education or less.

Measures

In the PRISM study, a large number of quantitative assessments were conducted at the baseline (see Czaja et al., 2015, for the complete list). I report here only the measures that are relevant for the analysis in this dissertation.

Loneliness

"Loneliness is a situation experienced by the individual as one where there is an unpleasant or inadmissible lack of (quality of) certain relationships" (de Jong Gierveld, 1998; p. 73). Loneliness was assessed via Version 3 of the UCLA Loneliness Scale (Russell, 1996), which is a commonly used measure of loneliness in the literature. It is a 20-item scale designed to assess subjective feelings of loneliness with 9 positively and 11 negatively worded items. For each item, participants indicate how often they feel the way described. The response options are: Never, rarely, sometimes, and always. The positively worded items are reverse scored. Scores range from 20 to 80; higher the score, greater is the loneliness. The scale is highly reliable (Cronbach's $\alpha = .91$).

Social Isolation

Social Isolation is defined as "the objective absence or paucity of contacts and interactions between an (older) person and a social network" (Cattan et al., 2005; p. 43). In this study, social isolation was measured via Lubben Social Network Index (Lubben, 1988). It is a 12-item scale that measures social network size and support. More specifically, it assesses family networks (3 items, 2 relate to network size and 1 to frequency of contact), friend networks (3 items similar to family network), confidant

relationships (2 items on frequency of contact), helping others (1 item – 2 parts), and living arrangements (1 item). The 8 items related to friend, family, and confidant networks were used as an indicator of social isolation (i.e., an aggregate score was calculated on these 8 items). The possible score range was 0 to 40 with a lower score indicating greater isolation.

Physical Isolation

Physical isolation relates to the geographical aspects of isolation. Being physically isolated implies being restricted to a limited physical space or surrounding Physical isolation in the study was assessed via Life Space Questionnaire (Stalvey et al., 1999). Participants were asked to indicate in a yes/no format if they have been to the described places in the last 3 days. A total of 9 places were described in increasing order of distance starting from another room in the same house to a place outside the US. Physical isolation score was calculated as the total number "yes" responses. Higher number of agreements (i.e., yes responses) indicated less physical isolation. Scores can range from 0 to 9.

Health

Three types of subjective health measures were used in the study: general health, physical functioning, and emotional well-being. Their definitions and assessment methods are described below.

<u>General Health</u>

General health is defined as a person's general perception of his or her health. It was assessed via a single item on the Functional Health and Well-Being Questionnaire (SF-36; Ware & Sherbourne, 1992). The item was worded as - In general, would you say your health is:" and participants responded on a 5-point scale ranging from 0 (=excellent) to 5 (=poor). Thus, a lower score on the item implied better general health.

Physical Functioning

Physical functioning was self-reported (lack of) limitations in motor activities and was assessed via the SF-36 questionnaire through its physical functioning dimension (Cronbach's $\alpha = .91$). The item asked about limitations experienced with 10 daily physical activities (e.g., lifting or carrying groceries, walking several blocks): "The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?" Participants responded on a 3-point scale (0=No, not limited at all, 1=Yes, limited a little, and 2=Yes, limited a lot). For each activity, the original responses of 0, 1 and 2 were recoded as 100, 50, and 0 respectively. Functional limitation score was the average of the recoded scores on the 10 activities, and ranged from 0 to 100. A higher score implied greater physical functioning.

Emotional Well-being

Emotional well-being is a person's perceptions of his or her emotional state. It was measured through the SF-36 questionnaire (emotional well-being dimension; Cronbach's $\alpha = .80$). Participants read the following description: "These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling." Participants responded to 5 questions related to negative and positive emotional states (e.g., Have you felt so down in the dumps that nothing could cheer you up? Have you been a happy person?) on a 6-point scale ranging from 0 (=all of the time) to 5 (= none of the time).

To calculate emotional well-being score, participants' responses were first recoded. For the three items related to negative emotions, scores of 0, 1, 2, 3, 4 and 5 were recoded in the increments of 20 (i.e., 0, 20, 40, 60, 80, and 100 respectively). The responses on positive emotion questions were recoded similarly but in the reverse manner (i.e., 0-5 were recoded as 100-0 with decrements of 20). The recoded scores on the 5

items were averaged to calculate the emotional well-being score for each participant. The score range was 0 to 100 with a higher score implying greater emotional well-being).

Demographics (Age, Gender, Education, Race)

Demographics variables were assessed via a background and health questionnaire developed by Czaja et al., 2006. Age information was gathered in years. Gender was a dichotomous variable: Male or Female. Education level was marked on an 8-point scale ranging wherein 1 implied no formal education and 8 represented doctoral degree or equivalent. Participants marked their primary racial group by selecting a response from the following list: no primary group, White Caucasian, Black/African American, Asian, American Indian/Alaska Native, native Hawaiian/Pacific Islander, multi-racial, and other. For the purpose of analyses, racial information was recoded into a dichotomous race variable: White and Non-White.

Personality

A Ten-Item Personality Inventory (TIPI) was used to assess personality across the "Big Five" personality dimensions of extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience (Gosling, Rentfrow, & Swann, 2003). Personality score on each dimension is assessed through two items. On each item, participants are presented with a pair of adjectives (e.g., for extraversion dimension: extraverted, enthusiastic; reserved, quite) and are asked to indicate the extent to which the pair of adjectives applies to them. The participants select their response from a 7-point scale (1= disagree strongly; 7 = agree strongly). Extraversion score is calculated as the sum of score on extraversion item 1 (extraverted, enthusiastic) and the reversed score on extraversion item 2 (reserved, quite). The other four dimensions are similarly scored.

As a note, because TIPI is a very short scale, it can be administered much more quickly than the standard Big Five measures. However, it is generally used where

personality is not the main focus of research and has relatively low reliability (Cronbach's alphas: extraversion = .26, agreeableness = .19, conscientiousness = .20, emotional stability = .48, and openness to experience = .25).

Breadth of Technology Experience

Breadth of technology experience was an assessment of the number of technologies that participants used irrespective of the frequency of use. It was assessed through a Technology Experience Questionnaire (Czaja et al., 2006). Participants were presented with a list of 33 technologies (representing communication technology, computer technology, everyday technology, health technology, recreational technology, and transportation technology) and were asked to indicate their familiarity with each on a 5-point scale where 1=not sure what it is, 2=never used, 3=used once, 4=used occasionally, and 5=used frequently. To calculate technology breadth score, responses were first recoded to generate binary scores of 0 (=use) or 1(=do not use) for each item. That is, scores of 1 and 2 were recoded as 0 whereas 3, 4, 5 were recoded as 1. Technology breadth score was then calculated as the sum of 1's on the 33 items. Possible score range was 0 to 33 with higher score implying greater technology breadth.

Procedure

Various recruitment methods were used at all three sites to inform prospective participants about the PRISM study (see Czaja, 2015). Interested older adults were asked to contact their respective site through phone. Participants were telephone-screened to assess if they met the eligibility criteria (age, living arrangement, and computer/internet experience, etc.) Those who were eligible and were willing to participate were mailed a consent form, and a set of questionnaires including demographics and health, technology experience, personality, life space, and personality. Next, trained personnel made home-visits to the participants during which participants signed the consent form and were

given a battery of baseline assessments, which included but were not limited to the questionnaires described in the materials section. Participants were then randomly assigned to the computer or PRISM condition and were trained accordingly. Further assessments were conducted after 6, 12, and 18 months. However, the analysis presented in this dissertation is based only on the baseline data.

Hypotheses and Analytic Approach

Hierarchical moderated regression analyses were conducted to test the following hypotheses on main effects and interaction effects on loneliness for older adults who live alone and do not use the Internet (see Figure 2.1 for a summary of the hypothesized model):

H1: Social Isolation [H1a] and physical isolation [H1b] positively predict loneliness.

H2: Subjective health negatively predicts loneliness. Specifically, positive perceptions of one's general health [H2a], positive perceptions of one's physical functioning [H2b], and emotional well-being [H2c] negatively predict loneliness.

H3: Person characteristics rooted in demographic variables predict loneliness. Specifically, age positively predicts loneliness [H3a]. Male older adults are significantly lonelier than female older adults who live alone [H3b]. Non-white older adults are lonelier than white older adults who live alone [H3c]. Education negatively predicts loneliness [H3d].

H4: Person characteristics rooted in personality predict loneliness. Specifically, of the big five personality dimensions, extraversion [H4a], and emotional stability [H4b] negatively but most strongly predict loneliness. Agreeableness, openness to experience, and conscientiousness negatively predict loneliness [H4c-e].

H5: Breadth of technology experience negatively predicts loneliness.

H6: Health moderates the relationship between social isolation and loneliness. Specifically, positive subjective perceptions of general health, functional health, and emotional well-being reduce the effect of social isolation on loneliness [H6a-c].

H7: Demographics variables modify the relationship between social isolation and loneliness. Specifically, age heightens the effect of social isolation on loneliness [H7a]. Social isolation predicts loneliness more strongly for males than for females [H7b]. Education lowers the effect of social isolation on loneliness [H7c].

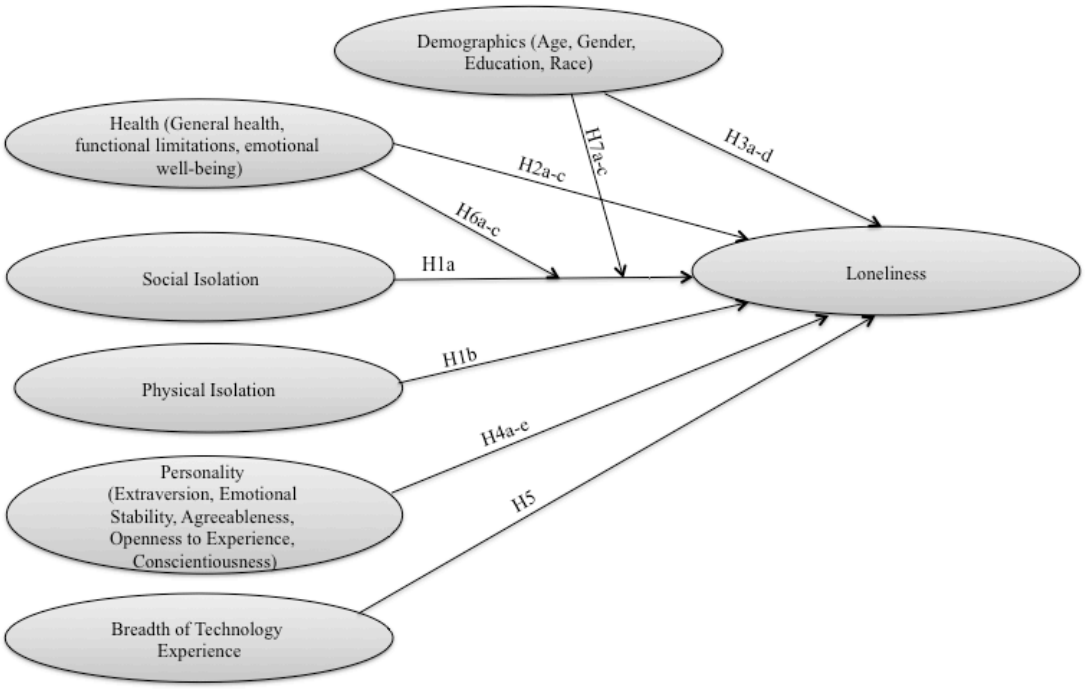


Figure 2.1. Hypothesized model to be tested through hierarchical regression analysis.

All continuous predictor variables were mean-centered for meaningful interpretation of the first-order coefficients in the equations containing interaction terms. Interaction terms were calculated by multiplying mean-scores on mean-centered moderator variable (or the original dichotomous categorical variable) with the mean-centered predictor scores. For example, to test the interaction effect of general health and social isolation on loneliness, a new predictor was created by multiplying mean-centered scores on general health by mean-centered scores on social isolation. Note that the

categorical variables of gender and race were already dichotomous (with levels 0 and 1) and therefore, were not required to be dummy-coded or mean centered.

The hypothesized model was tested through hierarchical multiple regression. The hierarchy of predictors and moderators was decided based on the literature: known important predictors were entered first whereas the less known or debatable predictors were entered last in the model to determine if their addition significantly improves the fit of the model (Field, 2009). Social isolation and physical isolation predictors were entered first in block 1, followed by the three health predictors in the second block, demographics and personality predictors in block 3, breadth of technology experience in block 4, health and social isolation interactions in block 5 and finally, demographics and social isolation interactions in block 6.

CHAPTER 3

STUDY 1 RESULTS

Loneliness Scores

Comparisons with Previous Studies

Recall that the current study was focused on understanding loneliness in older adults who live alone and do not use the Internet. Loneliness scores in the sample ranged from 20 to 73 (M= 39.40, SD = 9.97). However, there is no cut-off score on the UCLA loneliness scale that separates lonely from the non-lonely. Therefore, to better interpret the magnitude of loneliness reported in the present sample, it was compared with that reported in other aging studies, which also used the UCLA loneliness scale (Version 3). Refer to Table 3.1 for a summary.

Table 3.1. *Loneliness Levels Reported in Various Studies on Older Adults*

Study	***N***	***Age***	***Female (%)***	***Living independently…***	***Loneliness Range***	***Loneliness M (SD)***
Russell (1996)	284	65+	60	in the community	20-59	31.50 (6.92)
Cohen et al. (2006)	166	65+	79	in the community	20-63	36.57 (9.17)
Adams et al. (2004)	223	60-98	74	in retirement communities	20-61	38.57 (8.70)
Current Study	293	64-98	78	in the community (*living alone*)	20-73	39.40 (9.97)

In comparison to the present sample, older adults in Russell's (1996) study reported a significantly lower level of loneliness (t = 10.9, p < .001). However, the sample in Russell's study was primarily white, well-educated, and included only those older adults that were in good physical and mental health (see Russell & Cutrona, 1991). Moreover, this sample also included older adults who did not live alone.

The current sample was also significantly lonelier than other general US older adult samples living independently in the community (e.g., Cohen et al., 2006; $t = 3.01$, $p < .01$). However, loneliness of the current sample was comparable to that of the older adult sample reported in Adams et al. (2004; $t = 0.98$, $p > .05$). The latter study focused on older adults who lived independently in retirement communities, but not necessarily alone. Moreover, unlike the present study, almost all the participants in Adams' study were White.

Assumption of Normality

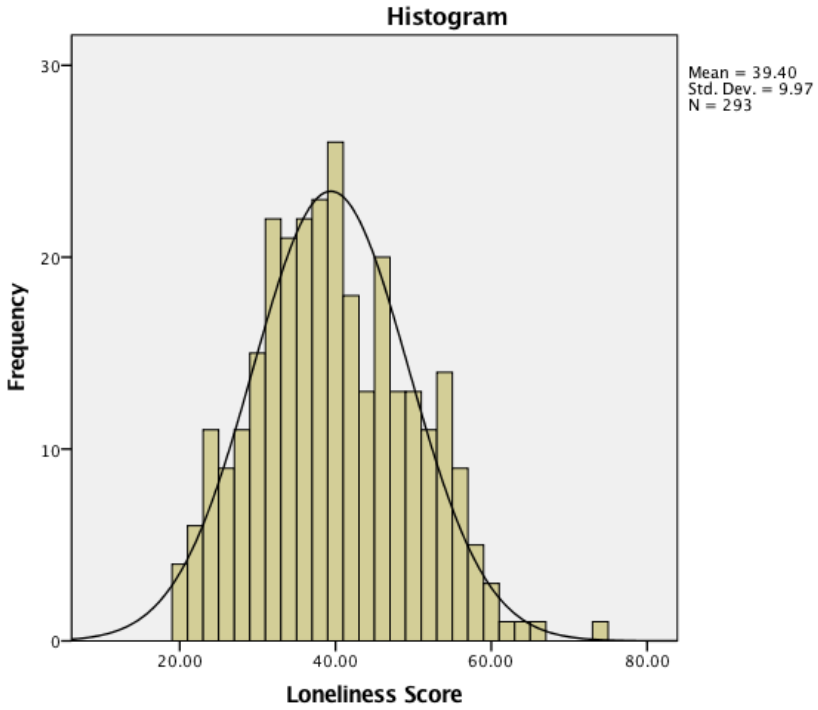


Figure 3.1. Frequency distribution of loneliness scores in the current sample.

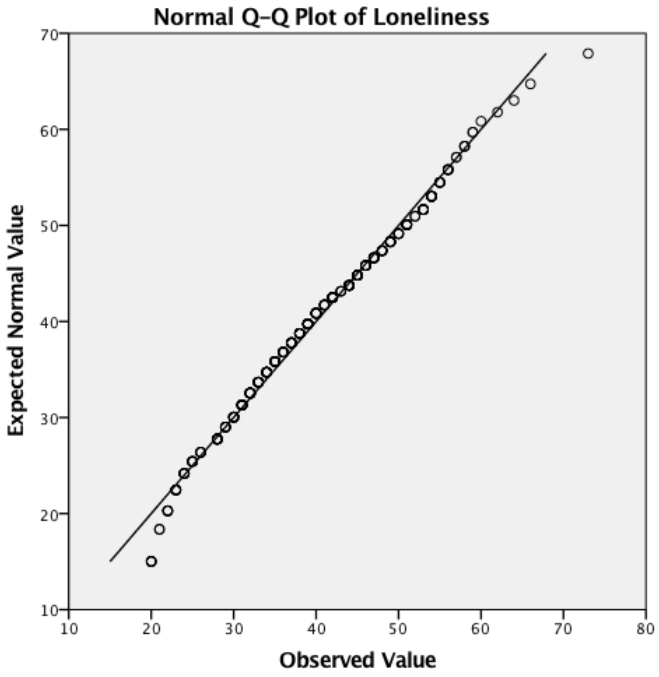


Figure 3.2. Q-Q plot of loneliness scores in the current sample.

Figure 3.1 shows a frequency distribution of the loneliness scores in the sample. A Q-Q plot was also generated to visually test the normality of the distribution (Figure 3.2). A visual examination of the histogram and the Q-Q plot suggested that loneliness was normally distributed. The distribution had skewness of 0.28, (*SE* = 0.14) and kurtosis of -0.31 (*SE* = 0.28). Because skewness and kurtosis values were between -1 and 1, normality was assumed.

Descriptives and Zero-Order Correlations

Descriptive statistics of the predictor variables are shown in Table 3.2. As with loneliness, a range of scores was observed on each continuous predictor variable. All zero order correlations are presented in Table 3.3. No two predictor variables were very highly correlated (i.e., greater than .80). This served as a crude test for (absence of) multicollinearity. Refer to Appendix A for detailed assumption checks for linear regression model.

Table 3.2. *Descriptive Statistics of Loneliness and Hypothesized Predictor Variables*

Variable	*N*	*Range*	*M*	*SD*
1. Loneliness	293	20-73	39.40	9.97
2. Social Isolation	291	2-37	24.08	6.25
3. Physical Isolation	290	0-9	5.75	1.39
4. General Health	298	0-4	1.87	0.88
5. Physical Functioning	298	0-100	61.28	26.63
6. Emotional Well-being	298	20-100	79.27	17.17
7. Age	300	64-98	76.15	7.37
8. Education	300	1-8	4.38	1.57
9. Gender (Female)*	300	-	-	-
10. Race (White)*	300	-	-	-
11. Extraversion	296	2-14	8.89	2.81
12. Agreeableness	296	5-14	12.10	2.02
13. Conscientiousness	295	2-14	12.10	2.22
14. Emotional Stability	295	2-14	10.92	2.84
15. Openness to Experience	295	2-14	11.13	2.45
16. Tech. Breadth	287	4-29	12.78	4.84

**Gender (22% male, 78% female) and race (60.3% white, 39.7% non-white) are dichotomous categorical variables. These are included in this table for consistency with results presented later.*

Table 3.3. *Zero Order Correlations Between All Variables of Interest*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Loneliness															
2. Social Isolation	-.45**														
3. Physical Isolation	-.17**	.13*													
4. General Health#	.31**	-.22**	-.17**												
5. Physical Funct.#	-.30**	.10	.24**	-.53**											
6. Emot. Well-being	-.62**	.23**	.17**	-.32**	.36**										
7. Age	.004	-.004	-.13*	.002	-.17**	.01									
8. Education	-.03	.003	-.08	-.07	-.02	-.01	.02								
9. Gender (Female)	-.08	.26**	-.13*	-.02	-.12*	-.05	.15**	-.10							
10. Race (White)	.01	-.03	-.17**	-.09	-.04	-.13*	.41**	.20**	.06						
11. Extraversion	-.25**	.26**	-.03	-.20**	.13*	.13*	.05	.07	.18**	.17**					
12. Agreeableness	-.14*	.29**	-.02	-.07	-.05	.10	.04	-.03	.22**	-.05	.14				
13. Conscientiousness	-.15*	.13*	.002	-.16**	.03	.24**	.04	.004	-.02	-.06	.10	.21**			
14. Emot. Stability	-.32**	.15*	.14*	-.25**	.15*	.45**	-.03	.05	-.09	-.17**	.10	.32**	.27**		
15. Openness to Exp.	-.09	.13*	.04	-.16**	.08	.09	-.15*	.14*	-.03	-.07	.16**	.22**	.11	.27**	
16. Tech. Breadth	-.14*	.26**	.22**	-.08	.15*	.02	-.20**	.12*	-.04	-.12*	.12*	.13*	.01	.07	.21**

*$p < .05$; **$p < .01$

Loneliness is the outcome variable. Variables 2-16 are predictors.

#Note that higher scores on social isolation measure implied less isolation. Higher scores on general health measure implied worse health.

Summary of Zero Order Correlations with Loneliness

Social and Physical Isolation

Loneliness was positively and significantly correlated with social isolation and physical isolation. Social isolation-loneliness correlation was comparable to that reported in Adams et al. (2004), which also used Lubben Social Network as the measure of Social isolation ($r = -.48$).

Health

Loneliness was significantly negatively correlated with all the measures of health (general health, physical functioning, and emotional well-being). Adams et al. (2004) used the same assessment of general health and also found it to be significantly correlated with loneliness. In the current study, however, the correlation was even stronger than that seen in Adams' paper ($r = -.23$).

Physical functioning was significantly correlated with loneliness in the current study. However this relationship has not been consistently observed in previous studies. For example, Russell (1996) reported a very weak correlation between the two measures ($r = .05$), but Savikko et al. (2005) and Theeke (2009) found otherwise. The discrepancy exists possibly due to differences in the measurement of physical functioning and loneliness.

Of the three health measures assessed in the current study, emotional well-being was most strongly (negatively) correlated with loneliness.

Demographics variables

All the demographics variables (age, gender, race, and education) were negligibly correlated with loneliness, as was also the case in some previous studies (e.g., Theeke, 2009).

Personality

With the exception of openness to experience, all the personality dimensions were significantly (negatively) correlated with loneliness. Consistent with the literature, correlations with extraversion and emotional stability were the strongest (e.g., Heinrich & Gullone, 2006; Russell, 1996).

Breadth of Technology Experience

Technology experience breadth was negatively correlated with loneliness. This implied that older adults who interacted with a greater number of technologies (not counting Internet-enabled devices) were less lonely than those who interacted with fewer technologies.

Hierarchical Multiple Regression Analyses

Table 3.4. *Multiple Correlations in the Hypothesized Models of Loneliness Predictors*

Model	R	R^2	Adjusted R^2	SE of Estimate	R^2 Change	F Change	df1	df2	*p*
1	.47	.22	.21	8.67	.22	35.51	2	254	< .01
2	.72	.51	.50	6.90	.29	50.07	3	251	< .01
3	.73	.54	.51	6.85	.02	1.39	9	242	.20
4	.73	.54	.51	6.86	.00	0.04	1	241	.84
5	.73	.54	.50	6.89	.00	0.26	3	238	.85
6	.74	.54	.50	6.92	.00	0.51	3	235	.68

Note: Models 1-4 test main effects; models 5-6 test moderation effects.
Variables were entered in the following order *(each successive model was generated by adding a block to the previous model):*
Block 1: social isolation and physical isolation;
Block 2: general health, physical functioning, and emotional well-being;
Block 3: age, gender, education, race, extraversion, agreeableness, emotional stability, conscientiousness, openness to experience;
Block 4: breadth of technology experience
Block 5: social isolation x general health, social isolation x physical functioning, social isolation x emotional well-being;
Block 6: social isolation x age, social isolation x gender, social isolation x education.

Table 3.5. *Regression Coefficients of the Hypothesized Predictors of Loneliness*

Variable	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	β	*p*	β	*p*	β	*p*	β	*p*	β	*p*	β	*p*
Social Isolation	-.45	< .01	-.32	< .01	-.29	< .01	-.29	< .01	-.29	<. 01	-.39	< .01
Physical Isolation	-.09	.09	-.01	.84	-.03	.54	-.03	.56	-.03	.59	-.02	.61
General Health			.05	.35	.03	.58	.03	.57	.03	.55	.03	.56
Functional Limitations			-.04	.44	-.03	.60	-.03	.61	-.03	.60	-.03	.60
Emotional Well-being			-.53	< .01	-.54	< .01	-.56	< .01	-.54	< .01	-.55	< .01
Age					.08	.12	.08	.13	.08	.13	.08	.14
Gender (Female)					-.08	.08	-.08	.08	-.09	.08	-.07	.17
Education					-.02	.64	-.02	.66	-.02	.61	-.03	.59
Race (White)					-.06	.25	-.06	.24	-.06	.25	-.07	.22
Extraversion					-.09	.05	-.09	.06	-.09	.06	-.09	.06
Agreeableness					.03	.49	.04	.49	.04	.49	.04	.43
Conscientiousness					.03	.56	.03	.57	.03	.59	.03	.53
Emotional Stability					-.03	.59	-.03	.59	-.03	.57	-.03	.57
Openness to Experience					.03	.51	.03	.50	.03	.52	.03	.50
Breadth of Technology Experience							-.01	.84	-.01	.88	-.01	.86
Social Isolation X General Health									-.02	.76	-.02	.75
Social Isolation X Physical Functioning									.03	.54	.04	.48
Social Isolation X Emotional Well-being									< .01	.93	.00	.99
Social Isolation X Age											-.04	.35
Social Isolation X Education											-.02	.75
Social Isolation X Gender											.10	.35

Note: All continuous predictor variables were mean centered. β = Standardized beta weights.

Multiple hierarchical regression analyses were conducted to test the hypothesized main effects and interaction effects on loneliness. The interaction terms were entered into the model after assessing the main effects. Social isolation and physical isolation were entered first into the model and they predicted 22% variance in loneliness (Table 3.4). All three health variables (i.e., global health, physical functioning, and emotional well-being) were entered next. They accounted for an additional 29% variance. Thus, isolation and health variables together predicted 51% variance in loneliness.

Adding other variables (main effects and interaction terms) did not improve the predictive power of the model (Table 3.4). Thus, demographics, personality, and breadth of technology experience did not account for any significant variance in loneliness beyond that explained by isolation and health predictors. The variance in loneliness accounted for by the interaction terms was not a significant addition to that already explained by the main effects.

The standardized regression coefficients shown in Table 3.5 indicate the relationship between each predictor/interaction term with loneliness for each model tested controlling for other predictors. In the final model wherein all predictors and interaction terms are included, beta weights for social isolation (-.39) and emotional well-being (-.55) are statistically significant. Thus, for a non-white, male older adult with average physical isolation, health, age, education, personality, and technology experience, one standard deviation *increase* in social isolation (or a decrease of 6.25 on the Lubben Social Network index) produced 0.39 standard deviation *increase* in loneliness (or an increase of 0.39 x 9.97 = 3.89 on UCLA loneliness scale). Similarly, for a non-white, male older adult with average social and physical isolation, general health, physical functioning, age, education, personality and technology experience, one standard deviation *decrease* in emotional well-being (or a decrease of 17.17 on emotional well-being dimension of SF-36) produced .55 standard deviation *increase* in loneliness (i.e., an increase of 0.55 x 9.97 = 5.48 on UCLA loneliness scale).

It is worth noting that the beta value associated with extraversion was marginally significant. No other coefficients were statistically significant. In sum, model 2 (i.e., isolation and health variables) was the best predictor of loneliness. It explained 51% variance in loneliness. Moreover, the regression coefficients indicated that emotional well-being was the strongest predictor followed by social isolation (Table 3.5, Figure 3.3).

Extraversion emerged as a marginal predictor in the current analysis. However, the personality measure (TIPI) used in the current study has low reliability in comparison to the standard Big Five measures. Follow-up research is required to assess if a more reliable measure of extraversion predicts loneliness in older adults who live alone.

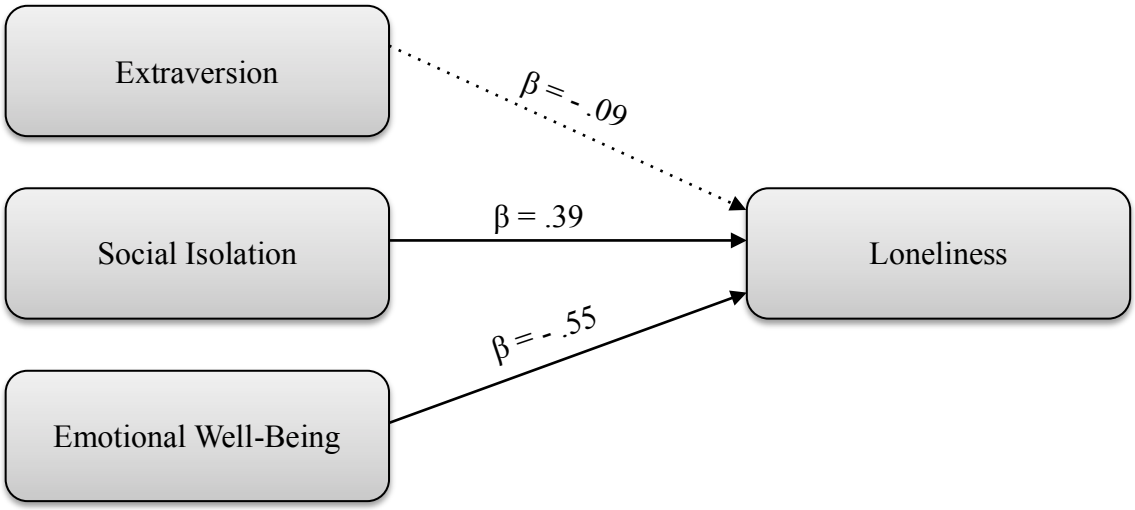


Figure 3.3. Predictors of loneliness based on hierarchical multiple regression analyses.

CHAPTER 4

STUDY 1 DISCUSSION

Study 1 was designed to understand the extent of loneliness and its predictors in older adults who live alone and do not use the Internet. The results indicate that the average loneliness reported in this sub-set of older adults is greater than the loneliness reported in general older adult samples (e.g., Cohen et al., 2006; Russell, 1996) but is comparable to older adults in retirement communities (e.g., Adams et al., 2004). However, despite living alone and not using the Internet, the sample was not severely lonely. Instead loneliness was almost normally distributed in that most older adults experienced some loneliness but very few were never or always lonely. However, it is important to note that the UCLA loneliness scale (Version 3) used in the study required older adults to report their frequency of loneliness and connectedness experiences on a 4 point scale labeled as: never, rarely, sometimes, and always. The gap between "sometimes" and "always" appears too large and it is plausible that the scale could not differentiate people who were sometimes lonely from those who were "often" lonely.

As with the criterion variable loneliness, a range of scores was observed for each of the predictor variables. Various predictor variables were significantly correlated with loneliness when the effects of other variables were ignored (i.e., based on bivariate correlations). These included social and physical isolation, self-reported health (general health, physical functioning, and emotional well-being), personality measures (of extraversion, emotional stability, agreeableness, and conscientiousness), and lastly, breadth of technology experience.

Based on the extant literature, age is not a reliable predictor of loneliness but those in very advanced ages are found to be more susceptible to loneliness risks (Dykstra, 2009; Victor et al., 2000). In the current study, however, age was negligibly correlated

with loneliness (r = .004) implying that despite living alone, the oldest old were not significantly lonelier than the younger older adults. Similarly, gender, race, and education were not linked with loneliness.

Hierarchical regression analyses were conducted to assess if and how strong a predictor of loneliness was objective isolation in this population of older adults, and to also identify predictors that explained variance in loneliness above and beyond that explained by isolation. The results indicated that isolation (social and physical) and subjective health (general, physical, and emotional) together explained half the variance in loneliness. Based on multiple correlation coefficients, social network measures (social isolation) and emotional well-being emerged as significant predictors of loneliness and explained almost half the variance in loneliness (20% and 29% respectively when only these two predictors were added in a hierarchical regression model).

Social isolation is a consistent correlate of loneliness but the relationship is typically a moderate one (e.g., Adams et al., 2004). This finding was replicated in the current study. That is, even in older adults living alone and not using the Internet, social isolation was only moderately related to loneliness further emphasizing the need to investigate other sources of variance in loneliness. Emotional well-being was identified in the present study as an even stronger and unique predictor of loneliness. Feeling perpetually unhappy and low could be a sign of loneliness in older adults who live alone.

It is important to note the distinction between emotional well-being and loneliness. Whereas the former indicates how positive or negative a person has been feeling over an extended period of time, the latter is a measure of negative feelings emerging from perceived deficiency in *social* resources. Thus, emotional well-being is a global measure of emotional health whereas loneliness is specifically tied to evaluations about one's social life. In older adults who live alone, negative emotional states could trigger greater needs for emotional support but living alone may also hinder provision of desired levels of emotional support thereby increasing dissatisfaction with the available

social resources. On the contrary, greater emotional well-being would reduce needs for emotional support and safeguard older adults who live alone from negatively evaluating their social resources and feeling lonely. In the current study, emotional well-being was tested only as a predictor of loneliness; however, the directionality of the relationship cannot be proved in a regression analysis. By its definition, emotional well-being is also an outcome of loneliness; being dissatisfied about one's social life will negatively impact emotional well-being.

No other variables were significantly related to loneliness when other predictors were controlled for. Extraversion was a partial predictor of loneliness (β = -.09; p = .06). However, more reliable measures of personality need to be used in future studies to test if extraversion is a unique predictor of loneliness beyond social isolation. In previous research, extraversion-loneliness relationship has been found to be largely mediated by social network variables (Stokes, 1985). Those who are extraverted have larger and more interactive social ties, which thereby safeguard against loneliness.

None of the hypothesized interaction terms were significant predictors of loneliness. It is plausible that the demographics and health variables indeed do not modify the effect of social isolation on loneliness. Alternatively, the current study did not have sufficient statistical power to detect the moderation effects. Although statistically significant moderation effects are frequently found in experiments, they are much more difficult to detect in field studies due to relatively low statistical power in the latter (McClelland & Judd, 1993). One possible reason is that when predictor variables are multiplied to produce an interaction term, measurement errors in the predictor variables are further magnified. It is a bigger problem in field studies where the predictor variables are measured whereas in experiments, participants are *assigned* to different levels of the independent variables. McClelland and Judd (1993) have also shown that whenever the predictor and moderator variables have restricted ranges or variances, it further restricts

the range of the product term, thus reducing the statistical power of the model. The problem is further exacerbated when the predictor and moderator co-vary.

Overall findings of Study 1 showed that social isolation and emotional well-being are important indicators of loneliness in older adults who live alone and do not use the Internet. Therefore, to reduce loneliness risks in solo dwelling older adults, interventions need to be designed that are targeted at strengthening objective connectedness (i.e., social networks of important others), providing lasting positive experiences, and reducing sources of negative affect. Technology-mediated interventions can be effective but will have to be designed keeping in mind the needs, abilities, and preferences of this demographic. Moreover, regular monitoring of health complaints, particularly emotional states over extended days, could help family members, friends, and health care providers be wary of the loneliness risks for the solo-dwelling older individuals. Furthermore, providing more opportunities for older adults to feel positive and happy (such as by making it easier for them to engage in activities they relish and find meaningful) could be effective against loneliness.

The present study focused on older adults who have not yet adopted the Internet. However, the adoption of Internet could potentially help in supporting regular social contact with important others even when living alone. Internet adoption is increasing among older adults but the role of currently available Internet based social media in fulfilling connectedness needs is not known. Moreover, the current study examined the predictors of loneliness in older adults who live alone; however, the experiences of living alone and the desire to be in that living arrangement in older age need to be better understood to determine how to best support social connectedness needs. To address these open questions, Study 2 was designed.

CHAPTER 5

METHOD FOR STUDY 2

This study was designed to holistically understand the social lives and experiences of older adults who live alone and to identify the role and potential of Internet tools in sustaining their connectedness needs. To this end, a structured interview and questionnaire assessments were conducted with older adults currently living alone in the Atlanta metropolitan area. All participants were email users but only half of them were Facebook users. The interview focused on three main aspects:

1. To understand the experiences of living alone in older age.
2. To understand how older adults who live alone maintain their connectedness at the interpersonal and collective levels.
3. To understand the current role and potential of three types of Internet-based social media in maintaining social connectedness: email, video-calling tools, and Facebook.

Participants

Forty-eight older adults aged 65-86 (M = 75.19, SD = 6.14) were recruited from the community in the Atlanta Metropolitan area to participate in this study. To be eligible for this study, all participants were required to be currently living alone in a community setting. In addition, they could not be employed or volunteer for more than 5 hours a week or spend more than 10 hours a week at a senior center or a formal organization. Participants should also had to have used a computer and/or the Internet within the last month and have an active email account for at least six months at the time of the study.

Table 5.1. *Number of Participants by Age Group, Sex, and Facebook Use*

Age-group	***Facebook Users***			***Facebook Non-Users***		
	Female	Male	Total Users	Female	Male	Total Non-users
65-75	8	4	12	7	5	12
76-86	9	3	12	7	5	12
Total	17	7	24	14	10	24

To assess if living alone poses greater challenges for the much older participants than for their younger counterparts, half of the sample comprised *young* older adults (aged 65-75; $M = 69.92$, $SD = 2.90$) and the other half consisted of *old* older adults (aged 76-86 years, M = 80.46, SD = 3.26). In addition, to understand Facebook's role in supporting connectedness needs, half the participants in both the age groups were Facebook users whereas the other half were non-users of Facebook. To be considered a Facebook user, the participant should had to have a personal profile page on Facebook for at least 6 months and been visiting his or her Facebook page at least a few times a month. A cross-tabulation for age group, sex, and Facebook use is shown in Table 5.1.

Based on the aforementioned criteria, a telephone script was created to screen prospective participants for eligibility. This script is shown in Appendix B. Participants were compensated $30 for their time.

Facebook user and non-user samples were well educated and racially diverse as shown in Table 5.2. About half of the Facebook users and non-users lived in communities specifically designed for seniors (i.e., 55 and older) but were independent living. All participants were fluent English speakers.

Table 5.2. *Study 2 Participant Characteristics*

	Facebook Users (N=24)	***Facebook Non-Users (N=24)***
Age: *M, SD*	69.92, 2.90	74.29, 6.00
Range	65-86	66-85
Gender: *%*		
Male	29.2	41.7
Female	70.8	58.3
Education: *%*		
High school or less	4.2	0.0
Vocational training or some college	50.0	45.8
College Graduate	20.8	37.5
Post Graduate	25.0	16.7
Race: *%*		
Black/African American	29.2	37.5
White	62.5	58.3
More than one race/other	8.3	4.2
Marital Status: *%*		
Single	12.5	37.5
Divorced or separated	58.4	25.0
Widowed	29.2	37.5
Live in Senior Housing: *%*		
Yes	54.2	50.0
No	41.7	50.0
Not sure	4.2	0.0

Materials

The materials for Study 2 include a variety of questionnaires and a structured interview script.

Questionnaires

All the questionnaires described in Study 1 were also used in this study. These were: Demographics and Health Questionnaire, Technology Experience Questionnaire, UCLA Loneliness Scale, Lubben Social Network Index, Life Space Questionnaire, Functional Health and Well-being Questionnaire, and Ten Item Personality Inventory (TIPI). The Demographics and Health Questionnaire was modified to add a question about the type of housing participants live in. The Technology Experience Questionnaire was also revised and now assessed familiarity and experience with 36 currently available

technologies across six different domains: communication technology, computer technology, everyday technology, health technology, recreational technology, and transportation technology.

In addition to these questionnaires, participants' data were gathered using the following materials:

Internet Acceptance Questionnaire

This 30-item questionnaire has been adapted from technology acceptance questionnaires: Technology Acceptance Model (TAM; Davis, 1989), Unified Theory of Acceptance and Use of Technology (UTAUT; Venkatesh, Morris, Davis, & Davis, 2003) and the Almere model (Heerink, Kröse, Evers, & Wielinga, 2010), and a Facebook attitudes scale (Lin & Lu, 2011). This questionnaire assesses acceptance of the Internet across seven primary dimensions: perceived usefulness, perceived ease of use, attitudes toward using the Internet/perceived enjoyment, social influence, facilitating conditions, self-efficacy, and anxiety (Table 5.3). Four items correspond to each dimension. The items are statements related to the dimension and participants respond in terms of the applicability of the statement to their lives (7-point Likert scale, 1 = extremely unlikely; 7 = extremely likely). The questionnaire also includes a single item on the intention to keep using the Internet in the future and a final item on the intention to recommend other people of similar ages to use the Internet.

Before completing the questionnaire, participants were instructed to think of the Internet broadly (inclusive of web-pages, search engines/tools, email, social media, and video-calling tools). The dimension names were removed from the questionnaire and the items were randomized (refer to Appendix C for the format in which the questionnaire was presented to the participants).

Table 5.3. *Internet Acceptance Questionnaire Items*

Perceived Usefulness
1. I find the Internet useful in my life.
2. Using the Internet enables me to share information.
3. Using the Internet enables me to connect with people.
4. Using the Internet has improved the quality of my life.
Perceived Ease of Use
1. My interaction with the Internet is clear and understandable.
2. It is easy for me to become skillful at using the Internet.
3. I find the Internet easy to use.
4. Learning to operate the Internet is easy for me.
Attitudes toward Using the Internet/Perceived Enjoyment
1. Using the Internet is a good idea.
2. The Internet makes life more interesting.
3. Using the Internet is fun.
4. I like using the Internet.
Social Influence
1. People who affect my behavior think that I should use the Internet.
2. People who are important to me think that I should use the Internet.
3. My friends who use the Internet encourage me to use the Internet
4. My family members who use the Internet encourage me to use the Internet.
Facilitating conditions
1. I have the resources necessary to use the Internet.
2. I have the knowledge necessary to use the Internet.
3. The Internet is compatible with other technologies I use.
4. Someone is available for assistance with the Internet difficulties.
Self-efficacy
1. I could use the Internet successfully if there was no one around to tell me what to do as I go.
2. I could use the Internet successfully if I could call someone for help if I got stuck.
3. I could use the Internet successfully if I had a lot of time to spend on it.
4. I could use the Internet successfully if it had a built-in help facility for assistance.
Anxiety
1. I feel apprehensive about using the Internet.
2. It scares me to think that I could lose a lot of information using the Internet.
3. I hesitate to use the Internet for fear of making mistakes I cannot correct.
4. The Internet is somewhat intimidating to me.
Intention to Continue Use in Future
1. I intend to keep using the Internet in the future.

Intention to Recommend Use to Others
1. I intend to recommend other people of my age to use the Internet.

Communication via Internet Checklist

This checklist was created to assess which of their social ties participants communicated with via three types of Internet tools: email, video-calling, and Facebook. Participants were presented with a list of possible contacts (e.g., family members of own generation, family members of a generation older, current friends) and were asked to put a check mark against the Internet tool(s) they used to communicate with each of the listed contacts (see Appendix D).

Social Media Use Questionnaire

This questionnaire was revised from a previous version used in a social networking use study conducted by the HFA lab (Bixter, Prakash, Blocker, Mitzner, & Rogers, in prep). The purpose was to assess the frequency of use of various social networking websites (in addition to Facebook), email, and video-calling tools. Moreover, the questionnaire included items to evaluate perceived barriers and facilitators for the use of these tools (Appendix E).

Interview Script

A semi-structured interview script was developed with three sections, each section focusing on a specific research question (see Appendix F for the complete interview script). The first section corresponded to research question 2, and was thus aimed at gaining an in depth understanding of the participants' social lives and their methods of maintaining connectedness at the interpersonal and collective levels without being prompted about the Internet or any other types of communication tools. At the beginning of the interview, participants were asked to report the size of their social network of friends and family separately through a hierarchical mapping technique

(Antonucci, 1986; Figure 5.1). They were then asked to discuss how they stay connected with their network members at the two levels of closeness (inner circle and outer circle).

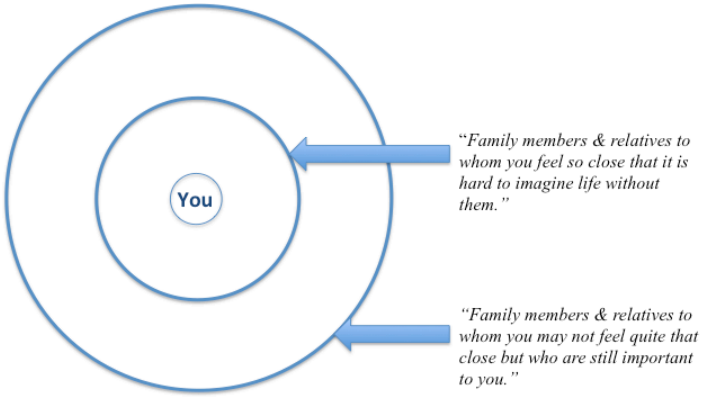


Figure 5.1. Two hierarchical mapping diagrams (for friends and family network) were used to capture network size and trigger discussion for how connectedness is maintained with members in the inner and outer circle.

In this section, participants were also asked if and how they reconnected with old contacts, developed new friendships, and were involved in broader social activities and groups such as neighborhood socializing and religious services. Thus, the purpose of the first part was to understand the extent of dyadic and polyadic connectedness experiences of older adults who live alone and the factors that support or weaken either forms of connectedness.

The second section of the Interview addressed research question 3 related to the role of Internet-based social media in supporting connectedness. Participants were asked about their perceptions and use of email, video-calling tools (e.g., Skype, Facetime, Google hangout), and Facebook for social interactions and connectedness. For each tool, participants described their type and extent of use, the underlying reasons for the described usage, and their perceived pros and cons of the tool. The specific goal of this section was to evaluate the extent to which social connectedness needs are being fulfilled by each of these three tools and to also assess the barriers and facilitators in their use for social interactions.

Table 5.4. *Personas Based on Facebook User Types (Adapted from Brandtzæg & Heim, 2011)*

Never tried (Non-user) Mr. A has never tried using Facebook.
Lapsed (Non-user) Mr. B tried using Facebook but does not use it anymore.
Sporadic Mr. C has a few people in his profile but has been in contact with only one other person during the past week. Mr. C joined Facebook to keep in touch with friends and family. He likes to check his page once in a while to see if someone contacted him. But, he is not interested in posting things on Facebook.
Lurker Mr. D thinks that Facebook is for entertainment but less so for keeping in touch with others. He has a few people in his friend-list. He visits Facebook regularly. He does not comment or post things on Facebook but likes mainly to watch or read what others have posted.
Socializer Mr. E is an active member of Facebook and uses the site to actively keep in touch with friends and family. He has many people in his Facebook friend list. He comments on their pictures and posts, and also uploads pictures himself. In the last week, he has been in touch with several people on Facebook. He thinks that Facebook gives him better contact with family and friends.
Debater Mr. F likes to discuss and express himself in writing. He uses Facebook to get informed about events, and topics that interest him, and to form new contacts and have discussions with other people.
Active Mr. G is very active on Facebook. Facebook is very important to him. When he is logged on, he engages in many activities, ranging from socializing, reading posts and discussions on other people' pages to posting comments, music or videos, gaming and initiating discussions. In short, he uses Facebook for recreational, social, and informational purposes.

Note: The personas were matched to the participant gender.

The second part of the interview also aimed at examining if Facebook, being a "social networking" tool, offered any distinct advantages for enhancing social connectedness compared to email and video-calling. Moreover, do all older adult Facebook users perceive and use Facebook similarly? To evaluate this, during the discussion on Facebook, participants were presented with personas of two types of non-users: never tried and lapsed; and five types of Facebook users: sporadic, lurker,

socializer, debater, and active (adapted from Brandtzæg & Heim, 2011; Table 5.4). The genders in the descriptions were matched to the participant gender and were presented without the persona labels. Participants read these descriptions on separate laminated cards and were asked to select a card that was most similar to how they used Facebook.

The last section of the interview was tied to the first research question: understanding the experiences of living alone in older age. Participants were asked about the duration for which they had been living alone and how they felt about it. Even when participants expressed strong positive or negative feelings for living alone, they were probed about the specific pros and cons of being in that living arrangement. Because of the sensitive nature of the topic, this section of the interview was deliberately placed towards the end when participants became more accustomed and comfortable with the interviewer and the study environment. The concern was that for some of the older adults, living alone could be an emotionally laden topic, having resulted from the death of a spouse and/or being an unwelcome life transition.

Procedure

Prospective participants were first contacted via phone and were screened for eligibility based on the criteria presented in Appendix B. If eligible and willing to participate, they were invited to Georgia Tech's Human Factors and Aging Laboratory for the study. However, depending on participants' preference and/or transportation availability, they were also offered the option to be interviewed at a quiet place at or near their residence.

On the day of the study, participants were first asked to read and sign an informed consent. Following this, they filled out the Demographics and Health questionnaire on a computer provided by the researcher. Participants were then given a general overview of the interview process. The interviews were audio-recorded. The interview began with the first section of the interview script, which focused on understanding social relationships

and connectedness (Appendix F). Next, participants completed Technology Experience Questionnaire and Internet Acceptance Questionnaire on the computer. The interview resumed with the second section focusing on perceptions and use of Internet tools for social interactions and connectedness. At the end of this section, participants completed two more questionnaires: Communications via Internet Checklist and Social Media Use Questionnaire.

A ten-minute break was built into the schedule prior to the third section of the interview although participants were offered the flexibility to pause or take a short break at any other point if they felt the need for it. The interview concluded with questions on perceptions of living alone. Finally, participants completed the following questionnaires on the computer: Lubben Social Network Index, UCLA Loneliness Scale, Functional Health and Well-being, Life Space Questionnaire, and Ten Item Personality Inventory. They were then debriefed and compensated for their time.

Overview of Interview Analysis

All audio-recorded interviews were transcribed verbatim. Transcripts were first segmented based on responses relevant to the three research questions. An initial coding scheme was developed consisting of important themes identified in the existing literature on the interactions among aging, living alone, social connectedness, and technology adoption. The specific articles that served as the foundation for each of the topics in the coding scheme are listed in Table 5.5.

Table 5.5. *Reference Articles for Coding Scheme Development for Interview Analyses*

	Topic	***Reference Articles***
1.	Experiences of Living Alone in Older Age	Eshbaugh (2008)
2.	Social Connectedness in Older Age	Allan and Adams (1989); Antonucci (1986), Carstensen (1995); Cornwell & Waite (2009a, 2009b); Hartrup and Stevens (2007); Hawkley et al. (2005)
3.	Adoption of Internet Tools for Connectedness	UTAUT Model; Venkatesh et al. (2003)

The coding scheme comprised a total of 49 items with possible response categories generated from the literature. The items included single-response and multiple-response questions. An example of a single-response question is: What is the (participant's) overall perception of living alone? The researcher selected a single answer from this list: ***generally positive, generally negative, mixed or neutral, unclear response***. An example of a multi-response question is: What are the perceived negative aspects of living alone? In this case, all the answers applicable to the participant were selected from this list:

- **Lack of help/support with non-health related instrumental tasks** (e.g., with chores, cleaning, getting to places, etc.)
- **Health concerns** (e.g., when I am sick, I have no one to take care of me)
- **Loneliness** (e.g., feeling lonely, alone, or left out, perceived lack of companionship, having no one to talk to)
- **Boredom** (e.g., feeling bored, not having much to do)
- **Safety concerns** (e.g., fear of a break-in, fear of falling)
- **Other** (please specify)

One of the 48 interview transcripts was selected to test and refine the coding scheme and to establish inter-rater reliability in coding. The primary researcher analyzed the selected interview using the initial version of the coding scheme. If a response in the transcript did not map onto any of the categories in the coding scheme, a new category

was added to represent that class of participant response. The scheme was thus revised until all the response segments in the transcript could be subsumed under the categories in the coding scheme. A second researcher then independently categorized the segments of the interview using the revised coding scheme developed by the primary coder. Inter-rater reliability between the primary and second coders was calculated as the percentage of items where their codes matched perfectly (i.e., for multiple-response questions, agreement was counted only when both coders selected the same answer categories from the coding scheme).

First round of independent analyses by the two coders led to only 63% reliability. Therefore, discrepancies were discussed and the scheme was revised for more clarity. The process was repeated with another interview transcript. The second round of analyses produced 77.5% inter-rater reliability. The coding scheme was further revised; definitions of terms were made clearer; and multiple examples were included where necessary. Finally, the two coders reached 98% agreement in their analyses of the third interview. This version of the coding scheme was used to analyze all the interviews (see Appendix G for the final iteration of the coding scheme). The primary researcher analyzed two-thirds (i.e., 32) of the interviews and the secondary researcher coded the remaining (16).

CHAPTER 6

STUDY 2 RESULTS

Comparison of Study 1 and Study 2 Participants

Study 2 participants were recruited with the same inclusion/exclusion criteria as in Study 1 with the only exception that Study 2 participants were Internet users with active email accounts whereas Study 1 participants did not use the Internet. Therefore, Study 1 participants' loneliness, isolation, health, demographics, personality, and technology use were used as benchmarks and compared with Study 2 participants. The results are presented in Appendix H.

In summary, the two study samples were not significantly different in loneliness and social isolation despite the difference in their Internet use. The samples also did not differ significantly across personality and emotional well-being measures. However, Study 2 sample was significantly more educated, consisted of more male participants, reported better general health and physical functioning, and was physically less isolated. The remaining of this section will focus on Study 2 sample.

There are three main questions that form the focus of Study 2. To address each of the research questions, relevant data from the interview and the questionnaire portions of the study are presented together.

What are the Experiences of Living Alone in Older Age?

Duration Lived Alone

The current sample included older adults who have been living alone for 2.5 to 44 years. One participant did not specify the duration lived alone in terms of years but used a qualitative descriptor – "a very long time". All other participants either mentioned the year since when they have been living alone or provided an estimate of the duration in

number of years. These data have been summarized in the form of a frequency distribution in Table 6.1. The distribution of years lived alone seemed similar across the two age groups (i.e., duration lived alone was independent of the age-group; χ^2 (3, N= 47) = 2.26, $p > .05$).

Table 6.1. *Frequency Distribution Table for Duration Lived Alone*

Number of Years Lived Alone	***Number of Young Older Adults***	***Number of Old Older Adults***	***Total Number of Participants***
<= 5 years	1	4	5 *(10.4%)*
6-10 years	8	6	14 *(29.2%)*
11-15 years	4	3	7 *(14.6%)*
>=16 years	10	11	21 *(43.8%)*
Years not specified	1	0	1 *(2.1%)*
Total	**24**	**24**	**48 *(100%)***

Table 6.2. *Examples of Participants' Feelings about Living Alone*

Overall Perception	***Example Quotations***
Generally Positive	*"I love it! I love to be independent. Come and go, and not have to…but then when I need something, or when they need me, or whatever, I am available and that works really nice."* *"I love it. I like to eat crackers in bed and stay up late at night."*
Generally Negative	*"I don't like it… I miss my wife, so I get lonely. That's the main thing. I don't do as many things as I did when I was married.'* *"I hate it. It's hard to live alone."*
Mixed or Neutral	*"I like it and I don't like it."* *"I have mixed feelings. I enjoy it because I know where everything is and how things are going to be done, and that I rely on me… I dislike it because…I am concerned about it because a lot of times in-home socialization is good for the health - mentally and physically, or to discuss things… I also dislike it because you become very self-centered and everything is mine – me and mine."*

Overall Perception of Living Alone

Participants were asked how they felt about living alone. Their responses were categorized into the following categories: generally positive (42%), generally negative (17%), and mixed/neutral (42%). Examples of participants' reactions and their categorizations are shown in Table 6.2. Participants with negative or mixed perceptions talked about living alone being an adjustment process for them, for instance, "*...it's a progression of a different lifestyle that is going through. How well you adapt to it is an interesting experience. You can fight it, you can argue and be depressed and go to drinking, go to drugs, and I don't want either one of those. So anyways, it's still an adjustment. It's an evolving of a lifestyle, to adapt to a single lifestyle – a single life.*"

A chi-square test of goodness-of-fit was performed to determine if an equal number of participants had positive, negative, and mixed/neutral perceptions. Perceptions were not equally distributed in the population, (χ^2 (2, N= 48) = 6.00, p = .05) implying that significantly fewer participants held negative perceptions of living alone than those who had positive or mixed/neutral perceptions.

Chi-square tests of independence were performed to examine the relation between living alone perceptions and age group (χ^2 (2, N= 48) = 0.40, p > .05), and living alone perceptions and gender (χ2 (2, N= 48) = 3.52, p > .05). As is also apparent in Figure 6.1 and Figure 6.2, the distribution of living alone perceptions was not significantly different across age groups and across participant gender.

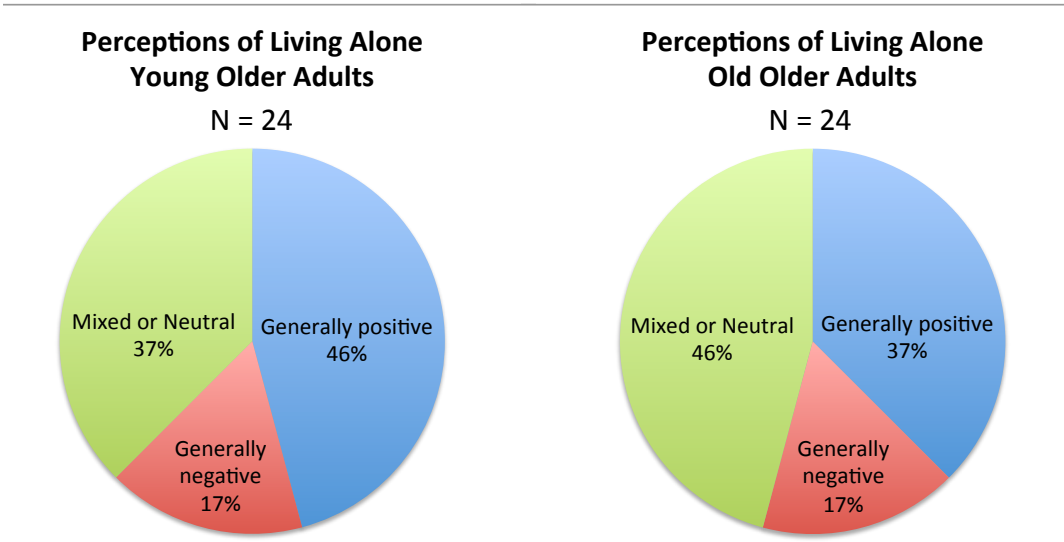


Figure 6.1. Distribution of positive, negative, and mixed/neutral perceptions of living alone across young (aged 65-75) and old older adults (aged 76-86).

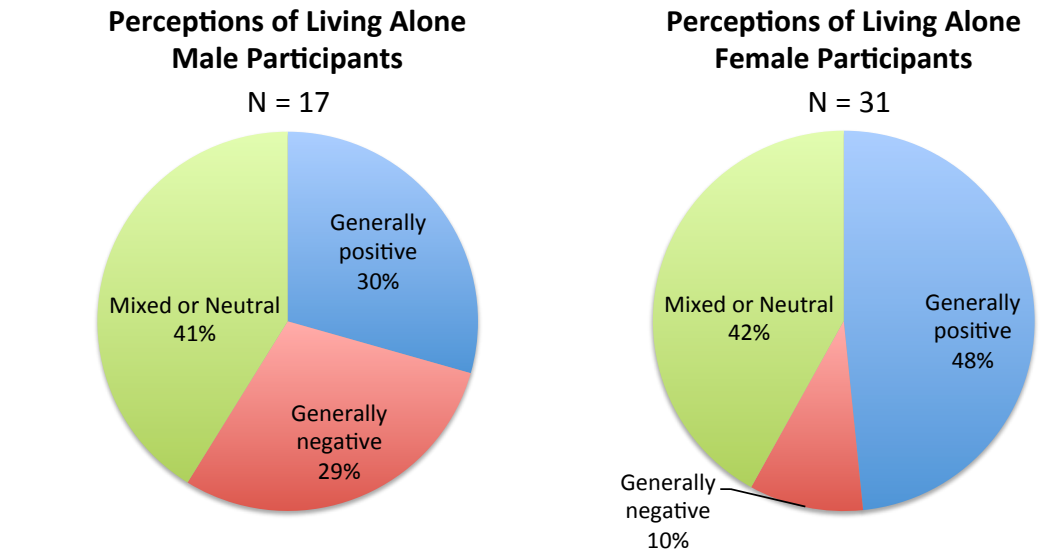


Figure 6.2. Distribution of positive, negative, and mixed/neutral perceptions of living alone across male and female older adults.

Positive Aspects of Living Alone

All participants, irrespective of their overall perception of living alone, were asked if there was anything that they liked about living alone. The graph in Figure 6.3 shows those positive aspects that were mentioned by at least two participants and represents 74 positive comments in total. A large majority of the participants (85%) described that living alone provided them the freedom to pursue a life-style of their own choice, and this was the primary reason why they liked it. Other perceived advantages of living alone were peace and quiet in the home, privacy, reduced responsibility of others, and less dependence on others (Figure 6.3) A few participants also mentioned that living alone was less stressful, more relaxing, and fraught with less interpersonal conflict. Example quotations are shown in Table 6.3.

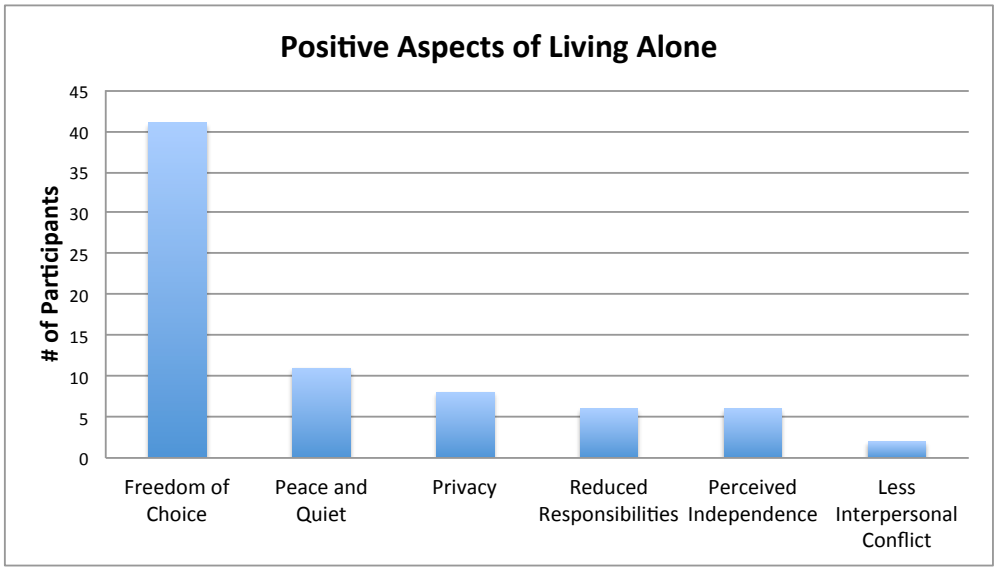


Figure 6.3. Frequency distribution of the positive aspects of living alone mentioned by the participants.

Some older adults described their living arrangement to be particularly functional for them because of their good health, ability to make use of their time, and adequate social support from family, friends, and/or neighbors. For example, *"I'm comfortable living alone because I'm still able to get out and go and do what I need to do or not. I*

have enough relatives around to visit and I just know how to keep myself busy." Another participant shared a similar experience, *"I have a lot of visitors. I can pick up the phone, and if I needed help with anything, I can drive myself. I'm still in good health".* Thus, the individual's circumstances in terms of physical health, ability to engage in activities that the person finds meaningful, and access to desirable forms and extent of social interaction and support determined greater satisfaction with living alone.

Table 6.3. *Positive Aspects of Living Alone and Example Quotations*

Positive Aspects of Living Alone	***Example Quotations***
Freedom of Choice	*" I have the freedom to come and go – do what I want to do within reason…and if I don't want to do something, I don't have to do it."*
Peace and Quiet	*"I like the quietness because I do a lot of writing and you know concentrating."*
Privacy	*"My own privacy. And that's one advantage because when you live with someone, you forget the privacy to a great extent, depending upon the relationship."*
Reduced Responsibilities of Others	*"I just focus on taking care of myself, and I don't have to be concerned about taking care of other people. It's nice to be able to do that."*
Perceived Independence	*"The pro is that you have to become very reliant on yourself for everything. If it gets done, you do it. And there is no "I forgot or I didn't have money, or you didn't tell me, you didn't like that… - those kinds of things."*
Less Interpersonal Conflict	*"When I see couples fighting for space and they want to do it this way or that way…I don't have that, so it's nice."*

Negative Aspects of Living Alone

Participants were also inquired about what they disliked about living alone. Figure 6.4 represents 65 negative comments about living alone. Only those comments were counted that were mentioned by two or more participants.

Most participants reported loneliness to be the primary negative aspect. Feelings of loneliness were often described in terms of absence of a companion or someone to talk to or share thoughts and feelings with (e.g., *"I still can't get a hundred percent used to it*

[living alone]. The companionship – not there"; "*You just don't have somebody to talk to, or to see something that you see, pretty or whatever, you know, or to ask a question* "; "*Every once in a while it'd be nice to express what I'm thinking or how I'm feeling or whatever*"; "*Well, there are things we cannot share because there is nobody to share it here*.") For the widowed participants, feelings of loneliness also emerged from missing the person to whom they were married for many others (e.g., *I miss my wife tremendously. We've been married for 56 years"; "I kind of miss having the romantic companionship that I had for 41 years before that"*).

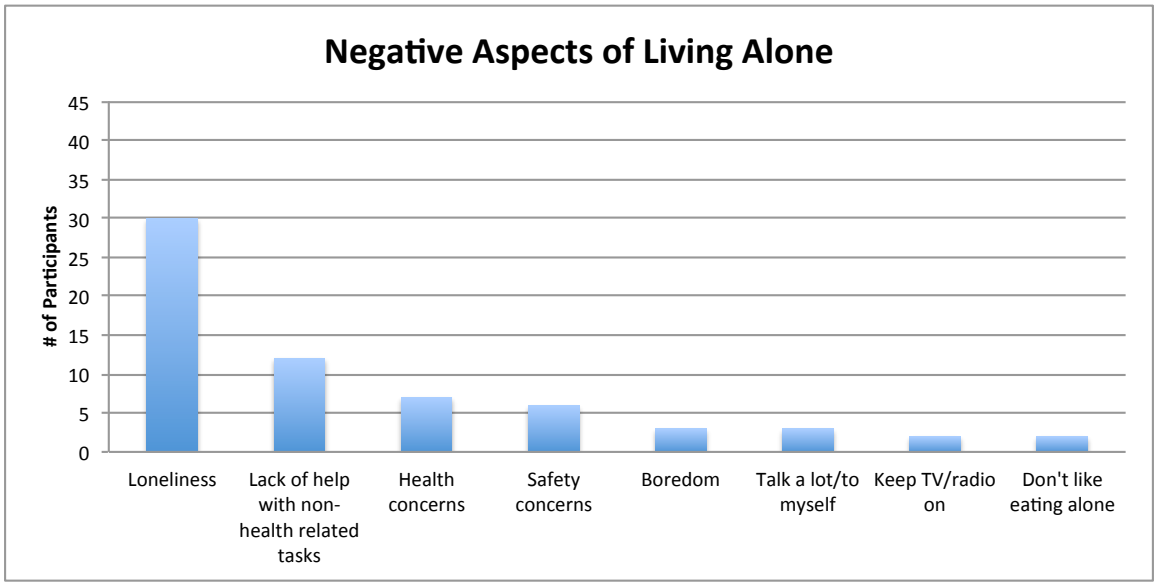


Figure 6.4. Frequency distribution of the negative aspects of living alone mentioned by the participants.

Other problems included lack of help with non-health related tasks (e.g., chores, cleaning, getting to places), health-related issues, safety concerns, and boredom (Figure 6.4). Moreover, a few participants reported a tendency to talk too much or to themselves as an outcome of living alone, and/or keeping the television or radio on to replace lingering silence with human voices. A couple of participants also expressed their dislike for having to eat their meals alone, which was a downside of living alone. Refer to Table 6.4 for examples of participants' comments on various negative aspects of living alone.

Table 6.4. *Negative Aspects of Living Alone and Example Quotations*

Negative Aspects of Living Alone	***Example Quotations***
Loneliness	*"Absence of conversation, somebody to talk to or with about something that might be on my mind or current events or what have you. Every once in a while it'd be nice to express what I'm thinking or how I'm feeling or whatever."*
Lack of help with non-health related tasks	*"The only thing that I didn't like is being unable sometimes to have the help to do different things…to do a lot of handyman kind of things, to change up on light bulb. I can do those things but it would kind of be helpful to have somebody sometimes."*
Health concerns	*"Like if you got a bit of virus, you got sick or something, there's nobody right there in my apartment."*
Safety concerns	*"What I don't like about living alone is not having that extra person in case somebody breaks in. So my rock hammer is by my bed… I try not to let anybody know I'm alone."*
Boredom/inactivity	*"After a very, very busy life with a large family, traveling all over the world, moving house and house of goods and children, it's a boring life in some ways. Nothing changes."*
Talking a lot/to oneself	*"Yeah, I like to talk to people and I find myself talking to myself a lot. No, not a lot but I'd talk to myself occasionally… I go out of my way now to communicate with people more than I did when I was married."*
Keeping TV/radio on	*"I find myself, when I walk into the apartment, turning the television so I can hear another human voice. So, I do find myself keeping the television on longer, and more than I normally would were there another person with me."*
Dislike for eating alone	*"I do not like the fact that I have to have my meals by myself. One of the joys of having friends is to be able to have meals."*

Preference to Live Alone Versus With Someone

Participants were asked about their preference to continue to live alone or live with someone. A little over half of the sample (N=25) expressed the desire to continue living alone whereas 15 preferred to live with someone. The preference was unclear for the remaining 8 participants.

Many participants expressed their preference as a conditional response. That is, the decision to live alone or with someone in the future was based on: the **considerations of who to live with or not live with** (N=19; e.g., "*if I was going to not live alone, I would prefer it to be a spouse"; "I really, I wouldn't live with my children, you know,*

because they've got their own lives to live"; "I wouldn't want to live with somebody just to have somebody to live with. I mean there would have to be something in it for me, and something for the other person. And if there's compatibility then I think I'd enjoy that very much."), the **specifics of the living arrangement** (N=11; e.g., *"I would prefer to live with someone as long as we can have our own little spaces, like our own den"*), and **concerns about increased needs for assistance in future due to health-related declines** (N=6; "*That depends on my health. You know, my daughter seems to think that she has to be right there with me because you know your health has issues, you know and I say that yes, I know, but until I have to have you here, I am gonna be alone."*)

Thus, living with someone was not always considered a better alternative to escape the challenges associated with living alone. Participants tended to be particularly selective about whom they wanted to share a place with, and would rather live alone than with someone they did not desire to be with all the time.

How do Older Adults who live Alone maintain their Social Connectedness?

As noted in the previous section, 62.5% participants reported feeling lonely as an aspect they disliked about living alone. The extent of loneliness experienced was measured via the UCLA Loneliness scale (version 3). Loneliness scores in the sample ranged from 20 – 55 (M = 37.73, SD = 7.74; higher score implies greater loneliness).

An independent sample t-test was conducted to compare loneliness between the participants who during the interview reported loneliness as a negative aspect of living alone and those who did not. A significant difference was found (t = 3.05, p < .01) such that those who spoke about loneliness to be an issue associated with living alone (from hereon referred to as the "lonely group") also reported greater loneliness on the UCLA loneliness questionnaire (M = 40.17, SD = 6.48) than those who did not list loneliness as a living alone issue (from hereon referred to as the "non-lonely group"; M = 33.67, SD = 8.15). Thus, it was apparent that living alone did not homogenously impact older adults'

loneliness experiences. Participants' social networks and their methods of keeping contact with their network members were analyzed to assess if they were related to differences in loneliness/connectedness experiences.

Interpersonal Connectedness

Participants were asked about their social networks of family and friends separately, both at two levels of closeness: the inner circle represented those people to whom the participant felt so close that it was hard to imagine life without them; and the outer circle described those people to whom the participant may not feel quite that close but who are still important to him/her. Descriptive statistics on the size of family and friend networks are presented in Table 6.5. See Appendix I for frequency distributions of sizes of friend and family networks at the two levels of closeness.

Comparisons of network sizes and communication methods between lonely and non-lonely groups did not produce any significant differences. Therefore, the subsequent analyses have been combined for the entire sample.

Table 6.5. *Size of Participants' Family and Friend Network*

Type of Network	***Range***	***Mean (SD)***	***Median***	***Mode (frequency)***
Family/Relatives Inner Circle	0-37	7.04 *(7.96)*	4.0	2 *(9)*
Family/Relatives in Outer Circle	0-75	7.23 *(12.42)*	3.0	0 *(12)*
Friends in Inner Circle	0-50	6.35 *(9.83)*	3.0	0 *(10)*
Friends in Outer Circle	0-60	14.33 *(15.42)*	9.5	3 *(7)*

Family Network

Family Network Size

The size of participants' inner family circle ranged from 0 to 37; however, about half the participants (52%) reported four or fewer family members who are close enough to be considered in their inner circle. An even larger range was noted for the outer family circle size (0-75), however, about half the participants (52%) reported three or fewer family members in this circle and a fourth (25%) reported zero.

Family Network Communication Methods

Almost all participants (94%) mentioned using phone to keep in touch with their *inner circle* family members. Other commonly mentioned methods were in-person visits (from or to the family member; reported by 69%), email (38%), and texting (29%; Figure 6.5).

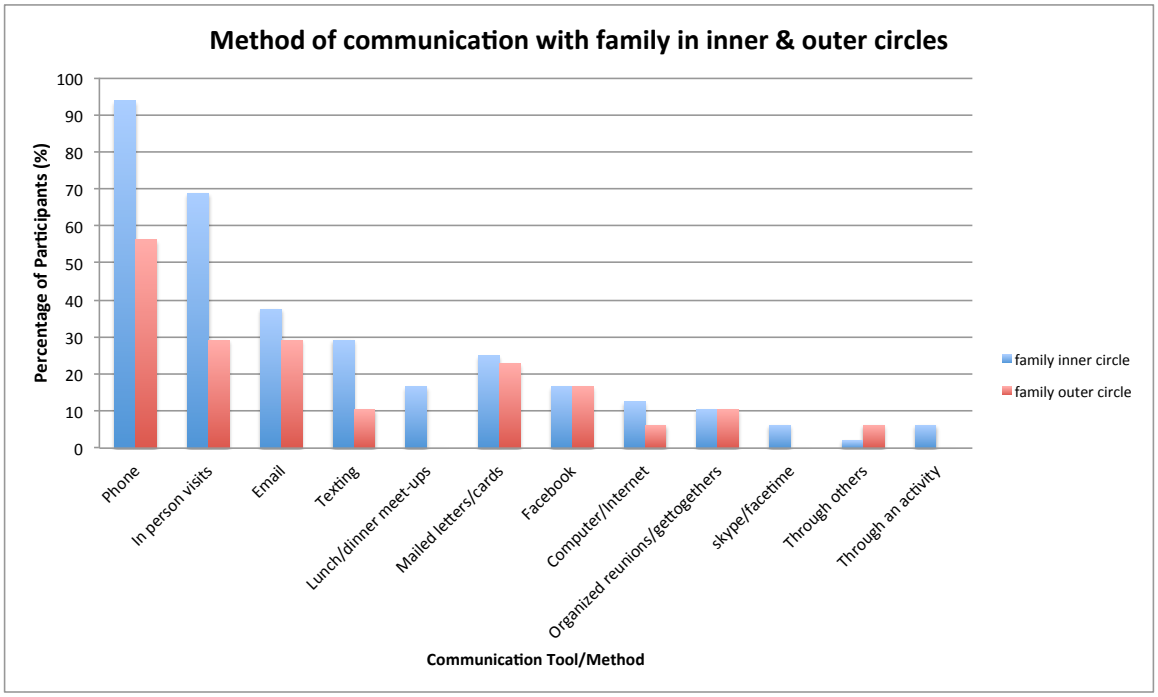


Figure 6.5. Methods of communication used to keep in touch with family in inner and outer circles.

Participants reported that their contact with their outer family circle was less frequent than with the inner circle: "*the same mode of communication, the closer I am the more often I do. The close close like my sons, I talk to them several times a day. But, the mode of communication is basically the same. But it is more frequent. The larger my circle, the less I interact."* When they did contact their family in the outer circle, it was mostly through phone calls (reported by 56% participants), in-person visits (29%), email (29%), and mailed letters or cards (23%). Thus, texting was not as popular a method for communicating with the outer family circle. Moreover, lunch/dinner meetings were not mentioned by any of the participants as a way of keeping touch with this layer of family.

Friend Network

Friend Network Size

As noted in Table 6.5, the size of inner friend circle ranged from 0-50 (M = 6.35, SD = 9.83). About half of the participants (52%) placed only 3 or fewer friends in their inner circle, and 21% participants had no friend whom they considered this close. On the contrary, on average, participants reported a much larger outer circle of friends although the variance was high as well (M = 14.33, SD = 15.42, range = 0-60). About half the participants placed 10 or more friends in their outer circle.

Friend Network Communication Methods

The most commonly used methods for staying in touch with inner circle friends were: phone calls (reported by 69% participants), in-person visits (52%), email (31%), and by engaging in an activity together (such as praying, playing a game, volunteering, or participating in a book club; 27%; Figure 6.6).

Participants generally used the same methods of contact with the outer circle of friends as they did with the inner circle. However, the outer circle of friends tended to consist of people who lived in the neighborhood and/or with whom participants shared an

interest or performed an activity together (e.g., "friends I play cards with", "friends from my book-club", "friends from my church", "friends who live in the same building"). Therefore, participants met or interacted with these set of friends often but the nature of interaction was not as intimate as with the inner circle. The most common ways participants kept in touch with their outer circle friends were through phone calls (reported by 67%), participating in an activity together (48%), in-person visits (42%), and email (29%; see Figure 6.6).

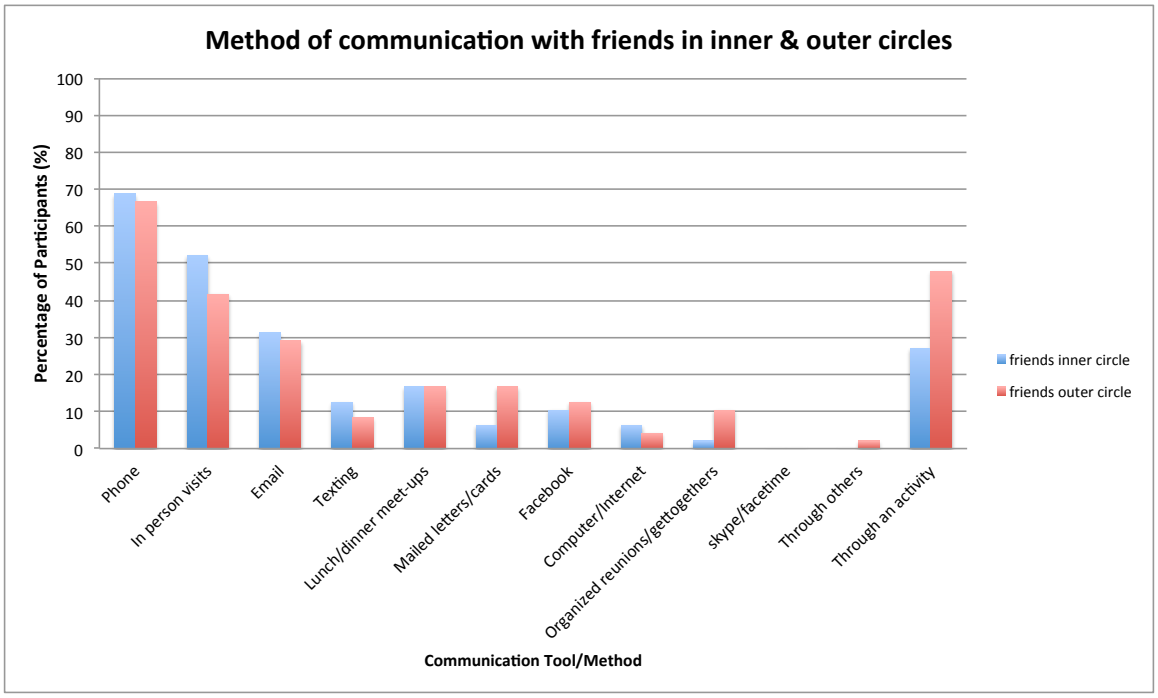


Figure 6.6. Methods of communication used to keep in touch with friends in inner and outer circles.

New Friendships and Reconnections

Participants were also asked if they made any new friends in the last year or so, and if so, to describe how the friendship developed. About 92% of the older adults said that they had made new friends although for many, these new friendships were not close relationships but felt rather acquaintance-like. In the words of a participant, *"a friend is a person that goes out and eats with you, goes to movies, you check with each other on a*

regular basis, you talk to them about your personal business. Folks that I've been meeting up last 5 or 6 years are just acquaintances. You know, we talk about the weather, 'how's your family?' and keep it moving."

The lack of personal closeness in newly developed friendships surfaced in many comments from participants. For instance, a male participant elaborated on his new friendships as, "*[there is] no sense of closeness or personal relationship at all. Just an acquaintance with similar interests."* Similarly, a female participant thus shared her feelings about her new friends, "*Yeah, you know they come into your life. They are not intimate friends; they are just social friends…I was just saying, a Facebook friend that I do not know much about. Or people that I meet at these meetings. And at the book club, we brought in new people as other people have left. It's not really that personal a connection, just a friendly connection."*

Two-thirds of the participants (63% of lonely, 72% of non-lonely) made new friends through co-participation in an activity or through shared interests (e.g., church groups, groups at senior centers, book clubs, neighborhood events). Geographical proximity with those living in the same apartment complex or in the same neighborhood also facilitated development of new friendships (mentioned by 27% participants; 20% of lonely and 33% of non-lonely individuals). Internet tools such as Facebook were rarely mentioned as a way through which a new friendship developed.

Participants were also asked if and how they reconnected with someone in the last year or so. Nearly 69% participants responded in positive. This comprised 70% of the lonely and 67% of the non-lonely individuals. Most reconnections were reported with friends from the past (mentioned by 27% participants), followed by estranged family members/relatives (15%), and ex-classmates (13%). Reconnections happened through phone calls/texts (reported by 31% participants), in-person visits (17%), emails (13%), Facebook (8%), mailed letters/cards (8%), through someone else (8%), Google searches (4%), organized reunions (4%), at funerals (4%), and through chance meetings (4%).

Thus, the older adults' social networks were not static but were changing via reconnections with prior contacts and through additions of new friends. A variety of methods enabled rekindling of old ties although having a shared interest or sharing a neighborhood were the primary facilitators for the development of new friendships. Moreover, new friendships tended to be functional in that they offered opportunities to interact and engage in activities together but were not necessarily based on emotional intimacy.

Collective Connectedness

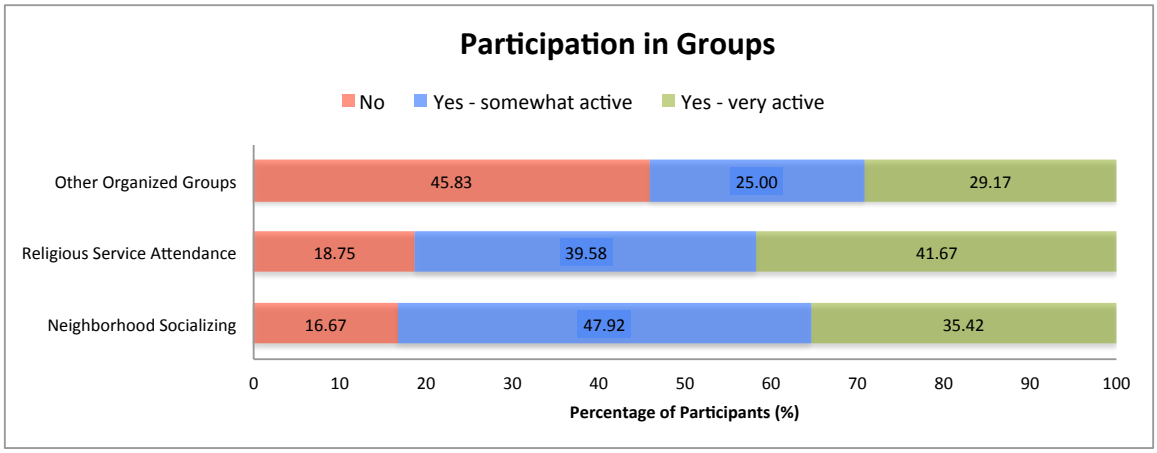


Figure 6.7. Participants' involvement in neighborhood socializing, religious activities, and other organized groups.

In addition to their dyadic interpersonal relationships, participants were also interviewed about their associations with groups and organizations. Majority of older adults (83%) were affiliated with at least one type of formal or informal organization such as a church/prayer group, a senior center, hobby clubs, or groups in their apartment buildings or in the neighborhood (see Figure 6.7). However, about 46% of the participants were not involved in any other organized groups besides their religious and neighborhood groups.

Many older adults reported that their level of social involvement had declined over time and they were now less active in their participation or more selective in the

number of organizations they were involved in because of changes in health and physical energy. Here is a sample quotation from an 81 year-old female, "*I was doing a lot, I've just done so much here, and I'm getting older now. So, I need to rest more, so it won't interfere with the activities that I really want to do. I don't get involved except for passing out the newsletters and going to activities here."* A male participant narrated a similar experience*, "…I am just kind of too tired and [it takes] too much effort to go to all of those things. Years ago I used to be involved in everything. Kind of bringing it down to…listen, as you get old, what is essential?"*

Do Internet-Based Social Media Support Connectedness Needs of Older Adults?

Internet Acceptance

Participants' acceptance of the Internet technology was assessed through the Internet Acceptance Questionnaire along the dimensions of: perceived usefulness, perceived ease of use, attitudes toward using the Internet/perceived enjoyment, social influence, facilitating conditions, self-efficacy, and anxiety. Four items represented each of these dimensions. Dimension scores were calculated by averaging responses on the corresponding four items. The questionnaire also assessed, through single items, participants' intentions to continue using the Internet in the future and to recommend its use to others of their age.

As is evident from the descriptive statistics in Table 6.6, in general participants most strongly agreed with the Internet being useful and enjoyable for them (mean response was between "quite agree" and "strongly agree". For ease of use, participants' mean response fell between the labels "slightly agree" and "quite agree" implying that even though the perceptions of ease of use were positive, they were not as positive as the perceived usefulness and enjoyment aspects of the Internet. Participants were in slight agreement about social influence being a factor in their use of the Internet (average

response indicated "slight agreement" with social influence items). Participants also acknowledged the presence of facilitating conditions such as necessary resources to use the Internet and assistance with Internet difficulties.

Table 6.6. *Descriptive Statistics of Internet Acceptance Scores*

	N	**Minimum**	**Maximum**	***Mean***	***SD***
Perceived Usefulness	48	4.75	7.00	6.48	0.58
Perceived Ease of Use	48	2.50	7.00	5.58	1.09
Perceived Enjoyment	48	5.00	7.00	6.46	0.63
Social Influence	48	1.50	7.00	5.22	1.48
Facilitating Conditions	48	4.25	7.00	5.92	0.71
Self-Efficacy	48	1.75	7.00	4.95	1.20
Anxiety	48	1.00	6.25	3.15	1.42
Intent to Continue Use	48	6	7	6.85	0.36
Intent to Recommend	48	1	7	6.27	1.28

Note: The scale was 1 = completely disagree, 4 = neither, 7 = completely agree. Except for Anxiety, higher scores indicate greater acceptance of the Internet.

The average self-efficacy score was noticeably lower than the scores on the other positive dimensions. This was because many of the active Internet users found it difficult to respond to the self-efficacy items. The items were so worded that they connoted an underlying assumption that the person was still learning to use the Internet (e.g., I could use the Internet successfully if there was no one around to tell me what to do as I go). However, participants who already knew how to use the Internet successfully either disagreed with the statements or resorted to the "neither agree nor disagree" response option.

Using the Internet did not evoke much anxiety or fear. On average participants "slightly disagreed" with statements that described Internet use as a source of anxiety

(e.g., the Internet is somewhat intimidating to me). All participants had a strong desire to continue using the Internet and most intended to recommend it to other people of their age. Thus, overall, there was a high level of acceptance of the Internet among the participants.

The extent of Internet acceptance was also compared between Facebook users and non-users (Table 6.7). Significant differences did not exist along any of the dimensions.

Table 6.7. *Comparison of Facebook Users' and Non-Users' Internet Acceptance*

	Facebook Users (N=24)		**Facebook Non-Users** (N=24)		**T-tests**	
	Mean	***SD***	***Mean***	***SD***	***t***	***p***
Perceived Usefulness	6.45	0.64	6.52	0.54	-0.43	.67
Perceived Ease of Use	5.49	1.08	5.67	1.11	-0.56	.58
Perceived Enjoyment	6.42	0.66	6.50	0.61	-0.45	.65
Social Influence	5.22	1.58	5.23	1.39	-0.02	.98
Facilitating Conditions	6.06	0.64	5.78	0.76	1.39	.17
Self-Efficacy	5.13	1.20	4.77	1.19	1.05	.30
Anxiety	3.16	1.30	3.14	1.56	0.02	.98
Intent to Continue Use	6.79	0.41	6.92	0.28	-1.22	.23
Intent to Recommend	6.00	1.56	6.54	0.88	-1.48	.15

Scale: 1 = completely disagree, 4 = neither, 7 = completely agree

Internet Use for Social Connectedness

The previous section on Internet acceptance focused on the Internet as a generic technology. Internet allows for social interactions but can also be used for non-social purposes (e.g., online-shopping on Amazon.com, searching for something on Google.com). The specific focus of this dissertation is to understand the use of the Internet in supporting connectedness needs and goals. Therefore, even though participants held strongly positive views about the Internet, these data do not translate to the acceptance and use of the Internet for social interactions, nor are informative about differential benefits and limitations of different types of Internet-based *social* media. The

next section will address this gap by focusing individually on three types of social media that have the potential to support human-human interaction: email, video-calling tools, and Facebook.

Email

All participants in this study were email users (based on the inclusion/exclusion criteria). Participants were required to have had an active email account for at least six months. However, all the participants reported that they had been using email for more than a year. A large majority (85%) had been using it for more than five years. Participants were also asked about the amount of time they spent on email every week. About 85% of the participants estimated using email for more than one hour every week (see Figure 6.8 for further segmentation).

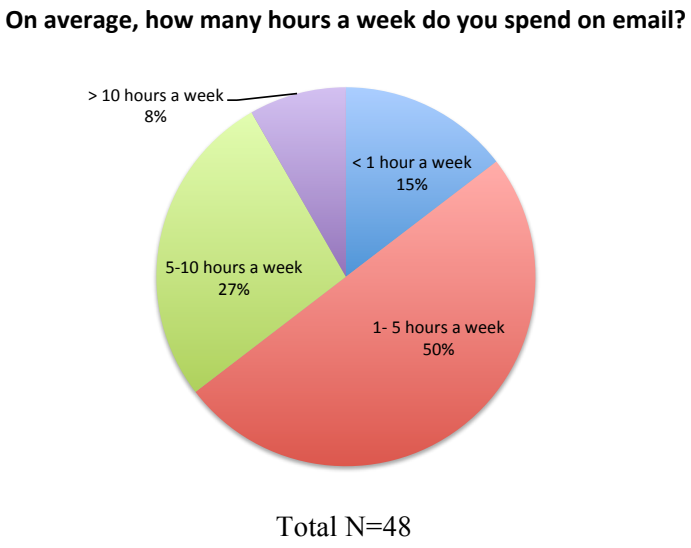


Figure 6.8. Participant segmentation based on the amount of time spent on email.

Purpose of Email Use

During the interview, participants were asked what they generally used email for. Their responses were categorized into one or more of the following reasons: communication, information, and entertainment. About 92% of the participants used email for communication (e.g., keeping in touch with others), 85% used it for information exchange (e.g., sharing or seeking information, facts, schedules), and 31% used it for entertainments purposes (e.g., for reading jokes, watching funny or entertaining videos).

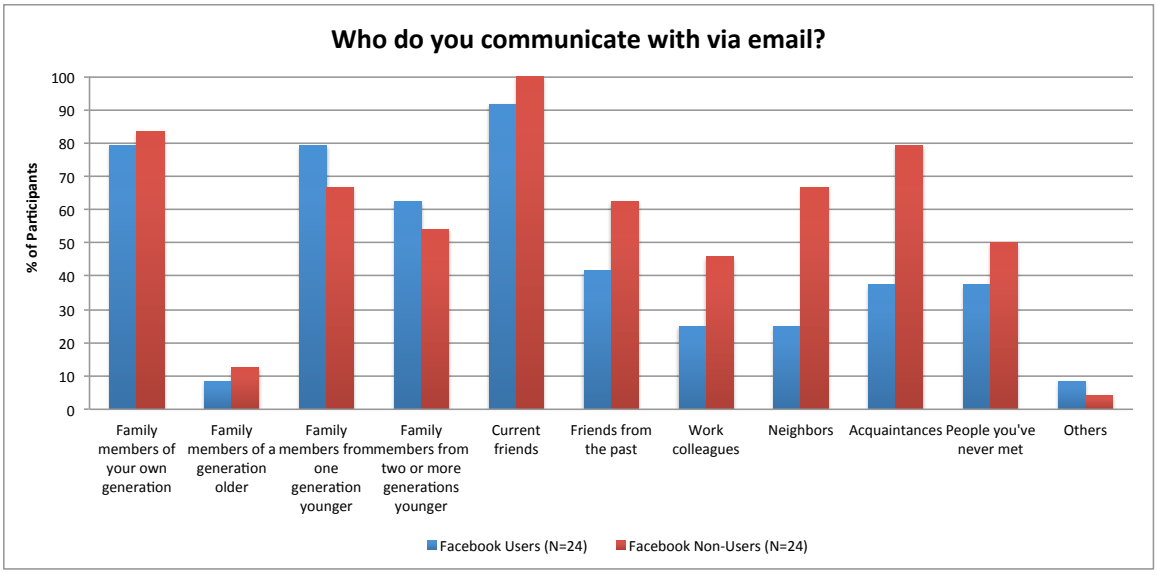


Figure 6.9. People that Facebook users and non-users communicate with via email.

Participants were also asked via a checklist to indicate the groups of people they communicate with via email. The graph in Figure 6.9 delineates ten categories of possible contacts and the proportion of participants (Facebook users and non-users) who use email to communicate with each category. Almost all the participants (96%) used email to communicate with current friends. Other groups that most participants communicated with via email were family members of the same generation (e.g., siblings and cousins; reported by 85% participants) and one generation younger (e.g., children, nephews and nieces; 73%).

It is evident that in comparison to Facebook users, a greater proportion of Facebook non-users used email to communicate with less close contacts such as friends from the past (e.g., high-school or college classmates), work colleagues, neighbors, and acquaintances.

Overall Perception of Email

Participants were interviewed about their general perceptions of email and their responses were categorized as one of the following: generally positive, generally negative, or mixed/neutral. About 85% of the participants had generally positive perceptions of emails, 10% had mixed or neutral opinions, and the remaining 4% (2 participants) were generally negative in their descriptions of email.

Irrespective of their overall impression of email, all participants were asked to discuss their likes and dislikes for email and aspects that facilitated and hindered their email use. Their responses were coded using an adapted version of the UTAUT model (Venkatesh et al., 2003) shown in Table 6.8.

Table 6.8. *Coding Scheme For Categorizing Positive and Negative Perceptions of Email.*

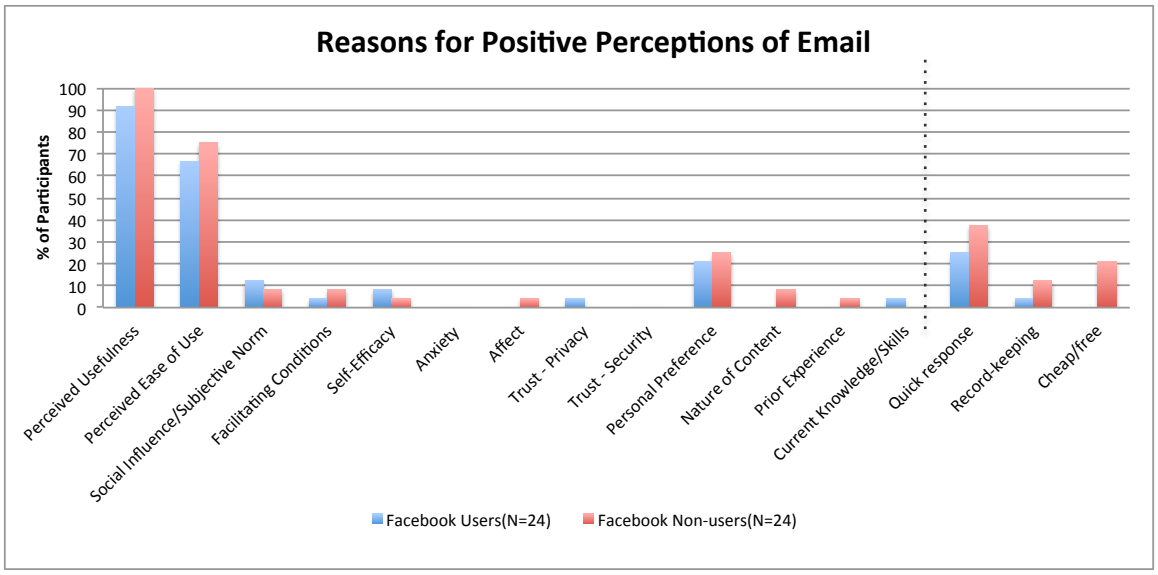
Primary Constructs in UTAUT Model		
Construct	*UTAUT Definition (Venkatesh et al., 2003)*	*Adapted Definition*
Performance Expectancy *(i.e., Perceived Usefulness)*	The degree to which an individual believes that using the system will help him or her to attain gains in job performance.	The degree to which an individual believes that using email will or will not help him or her attain gains in terms of social connectedness, entertainment and/or information sharing.
Effort Expectancy *(i.e., Perceived Ease of Use)*	The degree of ease associated with the use of the system.	The degree of ease associated with the individual's use of email for the purposes of social connectedness, entertainment, and/or information sharing
Social Influence and Subjective Norm	The degree to which an Individual perceives that important others believe he or she should use the new system.	The degree to which an individual perceives explicit or implicit social pressure and/or encouragement to use or not use email.

Table 6.8 (Continued)

Facilitating and Impeding Conditions	The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system.	The degree to which an individual believes that an adequate foundation (e.g., friends, family, tech support) and appropriate technical resources exist to support the use of the email.
Secondary Constructs in UTAUT Model		
Construct	*Definition (Venkatesh et al., 2003).*	*Adapted Definition*
Self-Efficacy	Judgment of one's ability to use a technology (e.g., a computer) to accomplish a particular job or task.	Judgment of one's ability to use or learn to use the various features of email successfully.
Anxiety	Evoking anxious or emotional reactions when it comes to performing a behavior.	The degree of anxiety, fear, or worry associated with email use.
Affect	An individual's liking for a particular behavior (e.g., computer use).	Positive feelings (e.g., happiness, elation, enjoyment) or negative feelings (e.g., sadness, frustration, boredom, anger, hate, disgust) associated with email use.
Constructs of Trust (Adapted from Internet Use Literature)		
Construct	*Definition*	*Adapted Definition*
Trust - Privacy	A feeling of confidence in the integrity and trustworthiness of another party (Gefen, Karahanna, & Straub, 2003; Braun, 2013)	The degree to which a person believes that email users exercise full control over the public exposure of their information and content.
Trust - Security		The degree to which a person believes that email users' personal information and data are protected from possible malicious effects due to phishing, fraud, and cyber harassment.
Other Relevant Constructs (that Emerged from the Interview)		
Construct	*Definition*	
Personal preference	Participant's preferences to use the website a certain way, for a certain purpose, and/or for a certain amount of time.	
Perceived nature of the content or information	Participant's perception of the information as too much, too little, uninteresting, irrelevant, and so forth.	
Prior experience(s)	Prior experience with the same or similar technologies.	
Current knowledge or skills	Participant's knowledge and skill level that affects use and/or perception of the technology.	

Positive Perceptions of Email

Perceived usefulness was the most frequently mentioned positive aspect of email (reported by 96% of the participants; Figure 6.10) and is exemplified in these quotations: "*I like it because it's a way of staying in contact with people that I don't see on a regular basis like my family, friends; a way to set up appointments to have lunch or a social event. It's just a way to stay in touch"*; "*Well it… it facilitates communication. It allows me to expand better than verbal communication."* In addition to considering email as useful for communication, information sharing and entertainment purposes, a few participants also commented on its usefulness for record keeping or as a memory support system, "*It's a good way of keeping record, you don't have to delete it out. You can scroll back a few days ago and see what they said about time and whatever information they were sending to you. That's a plus because you get forget as you get older"*.



Note: Responses to the right of the dashed line emerged in the interview specifically for email.

Figure 6.10. Reasons for positive perceptions of email reported by Facebook users and non-users.

Another major reason for positive perceptions of email was its perceived ease of use (reported by 71% participants). Some participants particularly appreciated email for being a quicker, cheaper, and a more convenient way to communicate than postal mail. A

few participants also described email's advantage over phone in certain contexts because it did not disrupt people's ongoing activities and schedules, "*you know, [you're] carrying conversations with friends everyday through emails because it seems like it is easier to do that and if you are doing something else and finish that then you check it [your email], if you have time for that. So schedule wise it works for a lot of people including me."* Being able to use email as per one's preference triggered positive perceptions of email as is reflected in this quotation: "*I just like that you can do it at any time of the day or night. You can do it at your own discretion…you don't have to stay connected all the time. You can be in and out of it, so I like that a lot."*

Facebook users and non-users were generally similar in their positive perceptions of email. However, only non-users pointed out the economic benefits of using email.

Negative Perceptions of Email

Participants were quite varied in their negative perceptions of email (Figure 6.11). However, the most commonly disliked aspect of email was the profusion of irrelevant or spam emails (e.g., advertisements, subscription emails that participants did not sign up for). One-fourth of the sample also talked about impeding conditions that hindered their use of email or worsened their experience. These included slow computer and Internet issues, no access to Internet at home, lack of resources on how to use all the features of email, difficulty typing on the keyboard, and dealing with multiple email accounts. A few older adults expressed dissatisfaction with their current email accounts and desired to switch to a different one but were concerned about the change of email address and loss of all their existing emails, *"I don't know how anybody can do it. I get emails from people saying, 'oh, I have a new email address.' I think, 'oh good luck with that! How long is that gonna take. Everybody has that email account."*

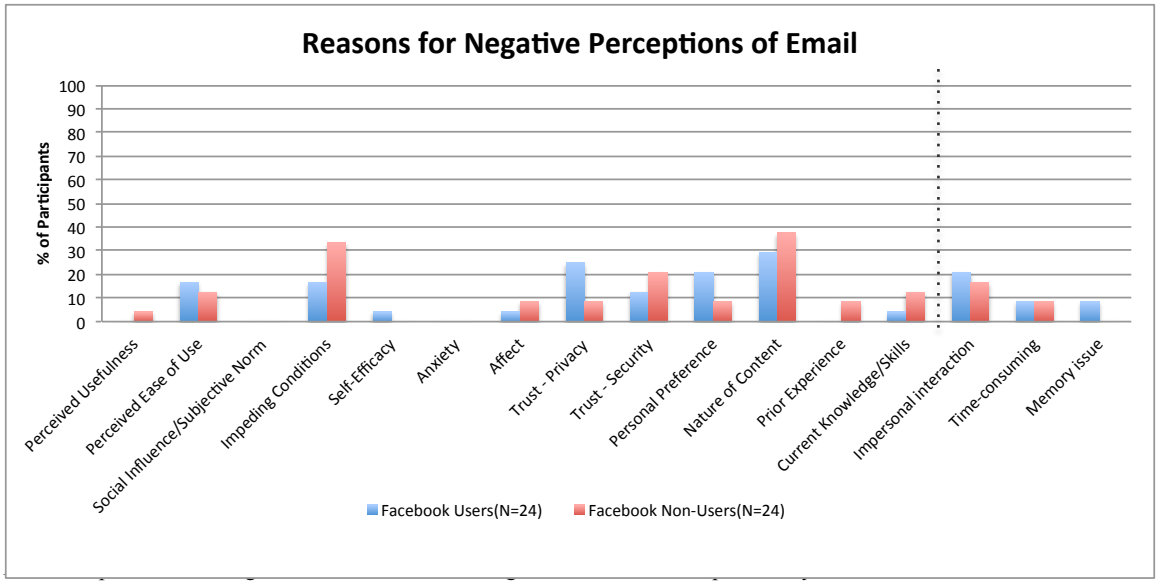


Figure 6.11. Reasons for negative perceptions of email reported by Facebook users and non-users.

In addition to the impeding conditions described above, certain ease of use issues were also reported with regards to email use. For instance, too much spam made it difficult to identify the important emails from the unimportant ones. Therefore, participants either organized their emails into folders or deleted irrelevant emails, "*There is a lot of stuff up on there that I don't get involved in because I am not sure what to do and I just click-delete it or put it in that folder to the left that says archive*." Moreover, spam filters are not perfectly reliable. One of the participants thus described his effort in sorting his email, "*but I have to go through spam. I get about 150 spams a day. But some of them are not spams. I have got to go through that list – and then that's not spam*." Moreover, some email addresses are difficult to type or remember. It can be frustrating or confusing when emails bounce back due to a slight error in the email address, "*And sometimes if you don't put the right address in, it keeps coming back – fail fail fail, it can be very…a little period missing or a dash missing and you are thinking what am I doing wrong."*

The negative perception was also linked to the impression of email communication as rather impersonal and lacking in emotional depth. In the words of one of the participants who did not like email, "*I think it's impersonal. I don't like it. Because it's like, if you have time to type a word out, you have time to say, "Hello, how are you?"…You've got people writing conversations in emails, why couldn't you just call me and tell me what all this was about."* Another participant echoed the same concern, "*well this is my own perception, it [email] is a way of communicating with me, letting me know things but not calling and or spending a lot of time with me. So I find it somewhat…I feel sad because I don't really hear the voices and it's not an extended thing."*

Some participants also raised privacy and security issues when using email. The privacy issues were related to the email user not perceiving sufficient control over *how much* of their personal information could be shared and *with whom*. That is, participants were not always certain about who could read their emails and find identifying information (including email addresses) that they either intended to not share or share only with a certain group of people. For example one participant's privacy concern centered around the ease with which emails could be forwarded to others without informing the original sender, "*One thing that I dislike about it is that if you put something in an email and send to someone, they can easily forward it to somebody else, which you had not intended for to happen and that can cause some discomfort for somebody, either yourself or the receiver of the forwarded email."*

The other trust issue was related to lack of security in that emails could easily be hacked into and personal information could be misused for theft and fraud. For example, "*If they can hack the President's email then they can hack anybody's email…that's my fear of it so that's why I wouldn't give a lot of personal information*"; *"The ability for other people – the world must be full of nosy people I don't know because I'm not. Just they hack into your stuff and it's not that I do anything that I don't want people to know*

about it's just the idea of them being that nosy"; "I have the concern of security in my mind. I don't want to be hacked. I am cautious about opening certain emails."

Finally, a few participants described that they used email only to a limited extent or in a particular fashion because of their personal preference. For example, "*I'm not a technology person, so I guess that holds me back to a certain extent. I think I kind of use it out of necessity. So, I don't like just being on there to be on there."* Similarly, a few participants who disliked typing and/or preferred talking over written communication used email only for situations where phone conversation was not possible. A few others used email for reading received emails and for sending short messages only. Thus, enhancing the ease of use and trust aspects of email is less likely to affect this group of participants who perceive email as useful and essential but only to a certain extent.

Desirable and Undesirable Email Content

Participants were asked about the type of content (information, messages, or attachments) that they did and did not want to send and receive via email. About 75% of the participants wanted to send and receive information via email on topics that are interesting and relevant to the *receiver*. More than half the sample also liked exchanging personal messages and updates with their family and friends through email. More than a third of the sample wanted to send and receive positive information via email such as motivational quotations, good wishes, words of affection, and congratulatory notes. Other types of content that participants desired to be exchanged through email included funny things (e.g., jokes) and photos of people, places, and things (mentioned by 23% and 21% of the participants respectively).

Most of the participants (75%) were opposed to advertisements, solicitation emails, chain emails, sexual content, and other personally irrelevant or dubious content being sent via emails. Moreover, 25% participants did not consider email to be the right platform for sharing negative or sad information. For example, "*I don't like when*

somebody will send me say a picture of some kind of disastrous things that happened or when we had snow storm…the ice storm, people were sending pictures of the cars crash…no I don't like that kind of stuff"; "I hate it when people tell you that someone died, by email, you know, 'sorry to let you know, but…'You know, aw, geez, that's like you just think that should be a phone call or a note or something, not email. Not in an email."

About a quarter of the sample also avoided exchange of personal and/or emotional information via email. Other types of content that participants found unfitting for email were political discussions (reported by 21%), any provocative or derogatory remarks (13%), and too many or inappropriate jokes (10%).

Video-Calling Tools

During the interview, more than a third of the sample reported having never used a video-calling tool such as Skype, Facetime, or Google Hangout (see Table 6.9). A third of the sample had used it in the past but did not use it any more. Only 15 of the 48 older adults were current users of video-calling. Skype was the most popular video-calling tool; 56% of the sample were current Skype users or had used it in the past. Only 15% of the participants were present or ex-users of Facetime. None of the participants reported using Google hangout.

Of the 15 older adults who currently used video-calling, 4 had been using it for more than five years, 8 for at least a year, and 3 for at least six months. In terms of use on a weekly basis, only 2 of the current users spent on average 1-5 hours a week on video-calls. The remaining spent less than 1 hour a week.

Table 6.9. *Frequency of Video-Call Users/Non-Users by Facebook Users/Non-Users*

		Facebook User or Non-User?		
		User	Non-User	Total *(%)*
Use Video-Calling?	Yes, use currently	7	8	15 *(31%)*
	No, but have used in the past	9	7	16 *(33%)*
	No, never used it	8	9	17 *(35%)*
Total		24	24	48 *(100%)*

It is worth noting that the current, previous, and non-users of video-calling were almost equally distributed across Facebook user and non-user groups (Table 6.9).

Purpose of Video-Calling

For 93% of the current and previous video-call users, communication was the main purpose why they used (or had used) a video-calling tool. A few also used it for seeking or sharing information (12%).

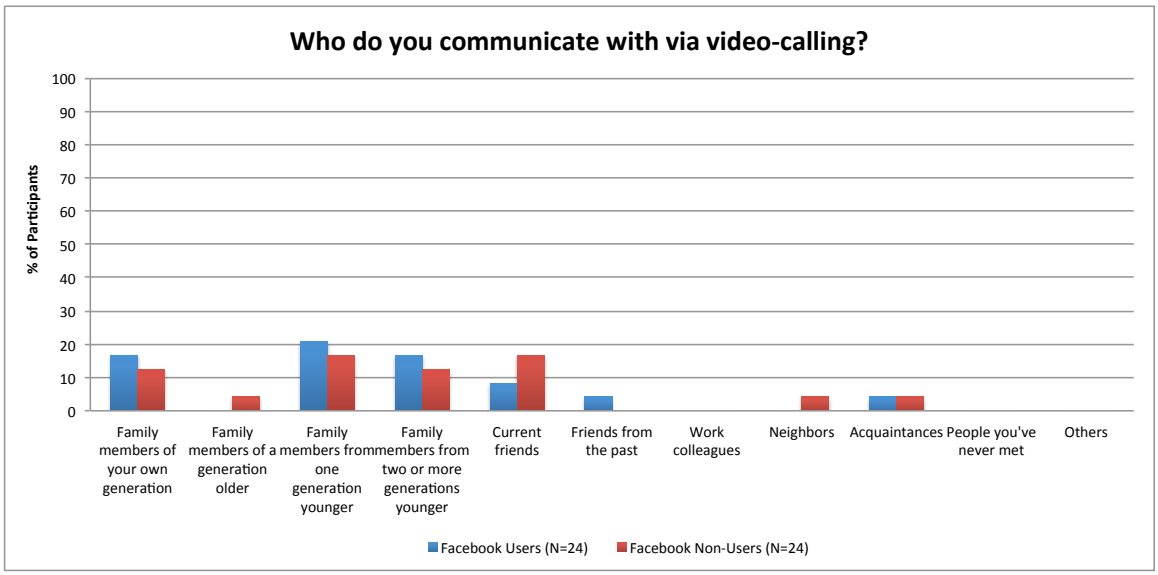


Figure 6.12. People that Facebook users and non-users communicate with via video-calling.

All participants were also asked to indicate on a checklist the people they communicated with via video-calling tools. Figure 6.12 illustrates that video-calling was used primarily for interacting with family members (of present and younger generations)

and current friends. Facebook users and non-users were similar in whom they communicated with via video-calling.

Overall Perception of Video-Calling

Of all the participants (who had used or not used video-calling), approximately half (48%) held generally positive perceptions of this technology. About 35% of the sample had mixed or neutral opinions, whereas the remaining 17% were generally negative in their perceptions of video-calling. Thus, the distributions of positive, mixed, and negative perceptions were unequal for video-calling and email (χ^2 (2, N= 96) = 15.21, $p < .001$). With respect to email, a considerably smaller proportion of the older adults had positive views about video-calling. However, almost all the current users of video-calling had positive perceptions of this technology (see Table 6.10).

Table 6.10. *Frequency of Video-Call Users/Non-Users by Overall Perceptions of Video-Calling*

		Overall Perception of Video-Calling			
		Generally Positive	Generally Negative	Mixed/ Neutral	Total *(%)*
Use Video-Calling?	Yes, use currently	14	1	0	15 *(31%)*
	No, but have used in the past	3	4	9	16 *(33%)*
	No, never used it	6	3	8	17 *(35%)*
Total		23	8	17	48 *(100%)*

As in the case of email, each participant was asked to discuss aspects of video-calling that they liked and disliked and the factors that made it easier or challenging for them to use this technology. Their responses were coded using a similar coding scheme adapted for video-calling as is presented in Table 6.8 for email.

Positive Perceptions of Video-Calling

A large number of participants perceived video-calling as useful for communication, particularly for its provision to support face-to-face interaction (Figure 6.13). The ability to interact in real-time and view non-verbal cues such as facial expressions and bodily gestures were positive aspects of video-calling tools that many participants described as advantages that email and telephone lacked in.

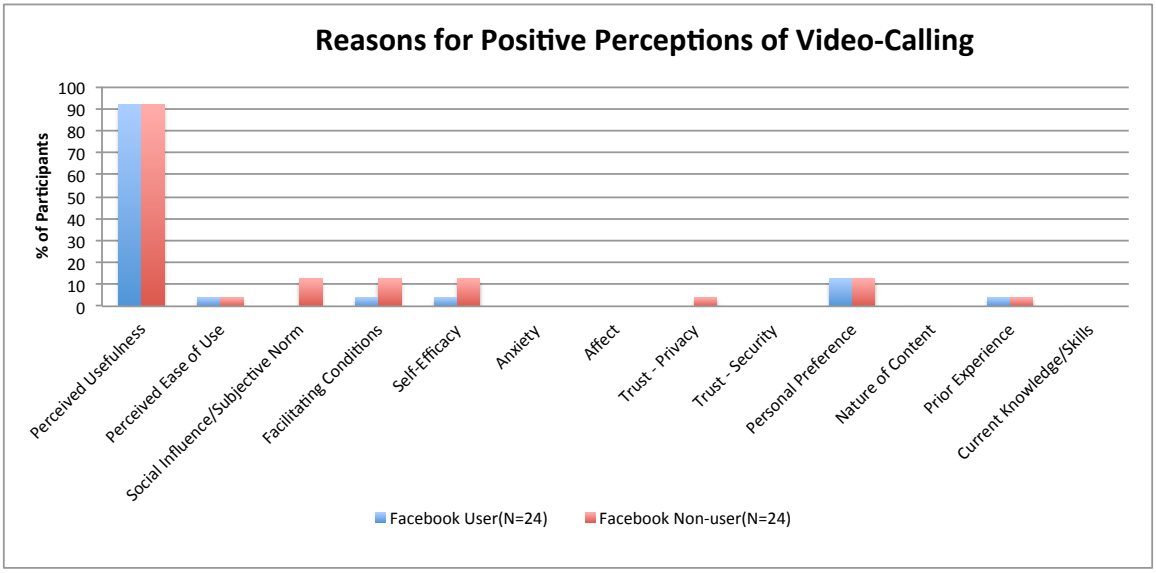


Figure 6.13. Reasons for positive perceptions of video-calling reported by Facebook users and non-users.

A participant narrated an impactful personal experience wherein she was able to communicate via Skype with her son, who was kidnapped and shot in a foreign country, "*He was taken to the hospital and I was ready to go down there and he kept saying, 'no, no it's ok.' He got on Skype and I saw him at the hospital sitting up with the woman from the committee there and she had her arm around him…She said, 'you don't have to worry, he's in good hands.' That visual that he was ok and that he was going to come home in a few days once they gave him clearance - that meant everything to me… To know that he was ok, if he told me that on the phone that wouldn't have been enough. I would have gone down.*"

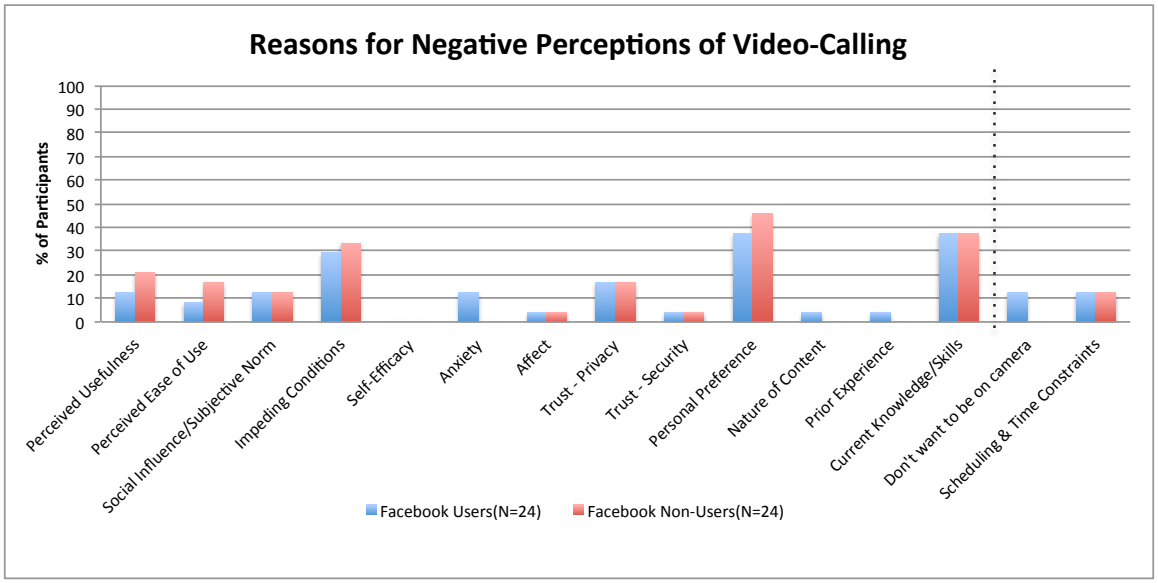
Another participant found Skype useful because it gave her the ability to interact with multiple people at the same time and to infer the other party's sincerity and involvement in an interaction, "*It's like being present, I like the presence. You can pick up how, what really is affecting, you can pick up if someone is really listening to you or you're just babbling [laughs]. And people coming in. I like when one is talking to me and the other brother will come and stand over his shoulder. I like that, I see two people at a time."*

Instead of desiring to use video-calling with everyone in their network, participants considered it useful in specific contexts and with specific others, for instance to emotionally support someone during challenging times, "*I recently talked to someone that was going through a lot medically, and we were able to do Facetime, and that did a lot for her, you know, that lifted her spirits. So, I like using Facetime for things that make you feel better, that's uplifting."* Some participants perceived usefulness of video-calling to communicate with their grandchildren whom they did not meet often, "*Well, you know, I have a granddaughter in Japan. It would be nice to see her face from time to time";* "*Well, you know, I don't get a chance to see my grandkids. With Skype, I could probably set up like a video-conferencing and use it for that."* A different participant used it only to communicate with a friend in Egypt*, "Yes, I have a friend teaching in Egypt and she Skypes me. I don't use it myself, but my friend who is teaching in Egypt Skypes me frequently."* Thus, participants selectively used or perceived usefulness of video-calling for specific cases wherein face to face communication was desired but was not feasible without technology.

Negative Perceptions of Video-Calling

The biggest reason that prevented participants from using video-calling at all or more actively than they currently did was their personal preference (42%; Figure 6.14). Specifically, even though participants believed that video-calling would allow them to

communicate face to face with friends and family that lived far away, many seemed content with their current use (or non-use) of video-calling, *"I have the ability to but I don't do it"; "No, nothing to prevent me and it's nothing to encourage me"; "There isn't any reason that prevents me from doing it, I just don't do it. I just don't wanna spend a lot of time on the computer"; "If I have to do it, I will; but so far, whatever comes in, I can just answer with email."* Furthermore, some participants wanted to see others on camera but did not want to be seen by others, especially when they were in their homes, "*I don't want them to see me half the time…We are not always dressed appropriately"; "It's like I don't like people dropping in on me without letting me know that I could comb my hair, put my lipstick on, so basically dropping in on me when I'm not the.., so I don't like it."*



Note: Responses to the right of the dashed line emerged in the interview specifically for video-calling.

Figure 6.14. Reasons for negative perceptions of video-calling reported by Facebook users and non-users.

Moreover, some older adults did not consider Skype or Facetime conversations to be as naturalistic or personal as in person interactions. Even though more non-verbal cues were visible in video-calls, they did not equal the authenticity of in person

communication, for instance one person thought that people get uncomfortable on the video-camera, "*but so many people once they know that they're on Skype… they got this look in their eyes and no body language whatsoever; they're just stiff, so I don't see the point"*; Another participant found video-conversations to be impersonal, "*I still think it's impersonal… I just feel that we have to, as people, we have to interact as people, not interact as machines or be cross country when I'm over here and we talking like this, which makes it convenient";* Similarly, a participant commented on the overuse of technology-mediated interactions over in person communication, *"Sometimes it's used too much and again it goes back to that whole thing where you know it's taking out everyday communication... it's a good way that you can see them…but you know some people only use that. You need to use both the mechanism."*

Participants' choice to not actively use video-calling also emerged from the perception that such tools were meant for business interactions and not for everyday personal communications, "*I never really had a need for it, you know. I'm retired, I'm not in business. I think it would be a very useful tool for business, save me a lot of time, save me a lot of money."* In addition, participants whose friends and family lived locally perceived little to no use of video-calling, "*I don't have anybody I have to keep in touch with. My family is local; I don't need it... I've got girlfriends, I mean, I don't have to look at them! We see each other!"*

Inexperience with video-calling was also a factor that prevented its active use (reported by 38%; Figure 6.14). In addition, participants had low motivation to learn to use it, "*No, I have no objections to them being used, but I don't know how to do it. And I don't want to take the time or trouble to learn."*; *"I've not learned how to do them, and I don't want to take the time to learn how to do them."*

Certain impeding conditions were also reported, such as no access to a video-calling tool, poor connectivity, technical issues with the video-calling tool (e.g., Skype), and lack of assistance in resolving those issues, as is described by this participant, "*I have*

a cousin that lives in North Carolina and she has Skype and I was trying to get my Skype to work, so that I can talk to her and I can't get it done. …My youngest grandson- he uses Skype all the time. It would be better if he can come in and set it up for me."

Another important factor that negatively impacted participants' perceptions of video-calling was lack of trust regarding privacy settings. A few participants were unsure as to who could see them during a video-call, "*If they could guarantee that it was only you and the person that you have contacted - are the only ones that could see each other, if there was a way for these technology geniuses to do that, I would think that would be, I would feel more comfortable with it."*

Finally, perceptions of little distinct usefulness of video-calling over email and phone, and perceiving video-calling as difficult to learn and use also negatively influenced older adults' adoption of this technology. Moreover, time constraints (e.g., "*I am doing other things and again, my time and the other person's time."*) and efforts in coordinating schedules were also cited as reasons that prevented a few participants from video calling more actively, "*One of them [my kids] does live a distance away but we can communicate by phone or by email easily. So that leaves pretty much my grandchildren, some of whom live distances away. Their schedules and mine are probably very, very different. So that explains why I don't have the desire or need so much."*

Facebook

Based on the inclusion/exclusion criteria, the study sample comprised an equal number of Facebook users and non-users. Among the non-users, 3 were lapsed users in that they had tried Facebook in the past but did not use it anymore; the remaining 21 (88%) had never tried using Facebook.

All the 24 users had had a profile page on Facebook for at least six months (84% of the users had been using a social networking website for more than a year; 59% for more than 5 years). Two-thirds of the users used Facebook daily and the remaining used

it at least once a week. Users were also asked to estimate the number of hours in a week they spent on social networking websites (which was only Facebook for most participants). Their responses are shown Figure 6.15.

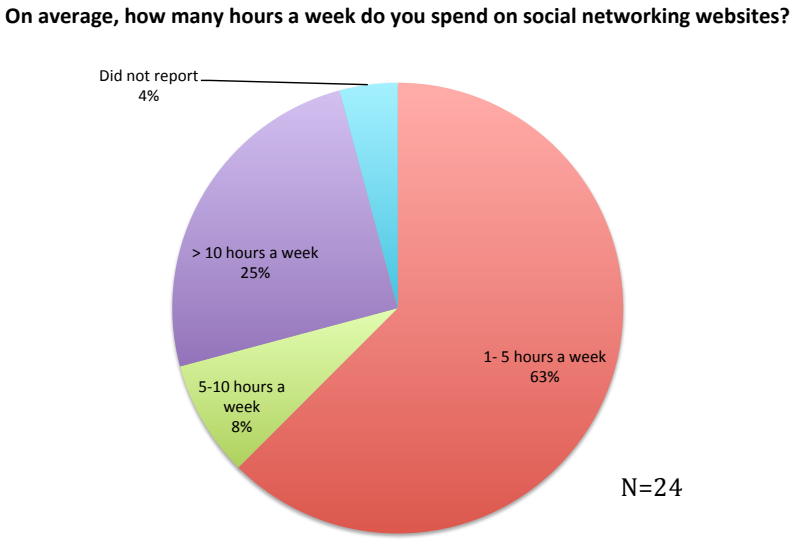


Figure 6.15. Self-report of time spent on social networking websites by Facebook users.

Loneliness of Facebook Users versus Non-Users

Independent samples t-tests were conducted to compare loneliness of Facebook users ($M = 39.71$, $SD = 8.35$) and non-users ($M = 35.75$, $SD = 6.68$). Although the mean loneliness of user sample was greater than that of the non-users, the difference was not statistically significant at alpha = 0.05 (t=1.81, $p = 0.08$).

Purpose of Facebook Use

Facebook users were asked to describe what they generally used Facebook for. All but one of them used it for communication (23 out of 24; 96%). About half of them (54%) also used it for informational purposes, and a similar proportion also used it for entertainment (46%). Facebook users were not a homogenous group when assessed on their self perceptions of how they used Facebook. As seen in Figure 6.16, most users considered themselves socializers in that their participation level on Facebook was high

but for recreational purposes. However, each of the other types of user personas was also identified with.

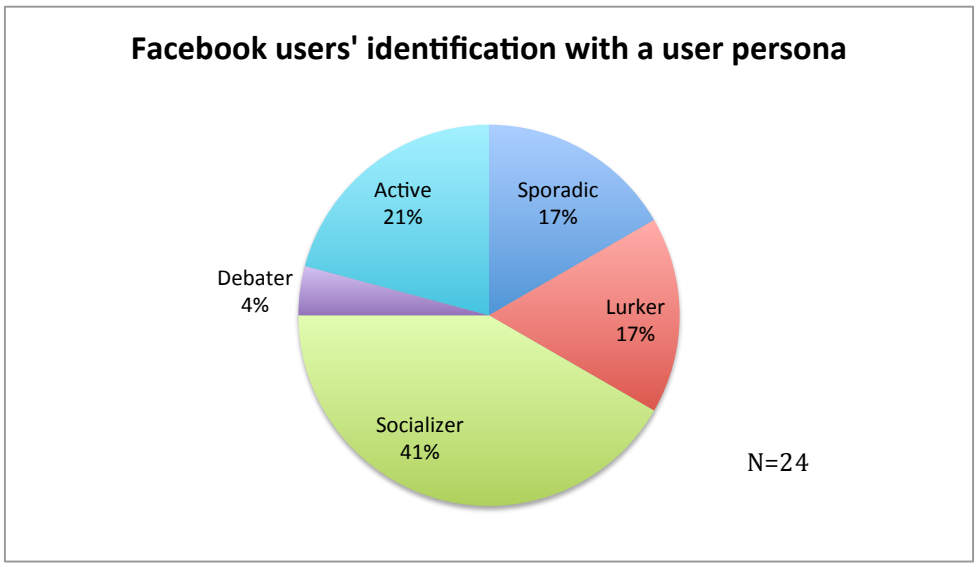


Figure 6.16. User personas that Facebook users most closely identified with.

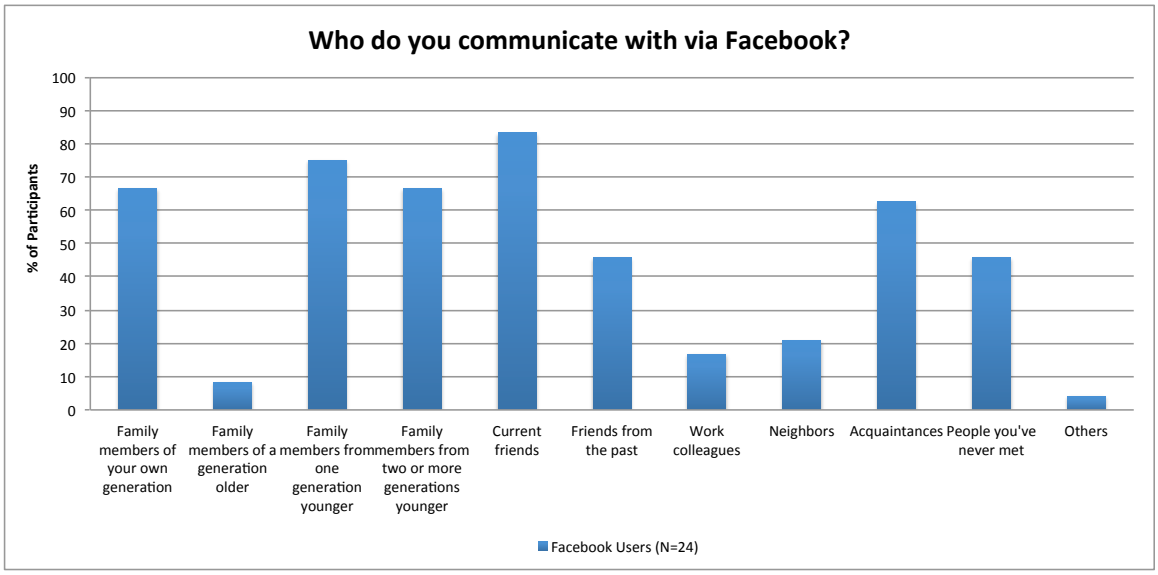


Figure 6.17. People that Facebook users communicate with via Facebook.

Facebook users also indicated on a checklist the people they communicated with via Facebook. Responses are shown in Figure 6.17. Although most participants communicated with their family and current friends on Facebook, a considerable

proportion also used it to communicate with acquaintance, people they had never met in person, and friends from the past (e.g., high school and college classmates).

Overall Perception of Facebook

Both Facebook users and non-users were asked about their overall perceptions of Facebook. Among the non-users, one participant was not familiar with Facebook and tended to confuse it with Facetime. Therefore, his perceptions about Facebook were not clear. Of the remaining non-users, only one had positive perceptions of Facebook whereas most perceived Facebook negatively (Table 6.11). On the contrary, only one user had generally negative opinions of Facebook; two-thirds of the users were positive and the rest were mixed or neutral in their perceptions. Thus, overall perceptions of Facebook were different across user and non-user groups (χ^2 (2, N= 47) = 24.56, p < .001). Moreover, proportions of positive, negative, and mixed/neutral perceptions were significantly different for Facebook and email (χ^2 (2, N= 95) = 24.86, p < .001).

Table 6.11. *Frequency of Facebook Users/Non-Users by Overall Perception of Facebook*

		Overall Perception of Facebook				
		Generally Positive	Generally Negative	Mixed/ Neutral	Unclear Response	Total
Use Facebook?	User	16	1	7	0	24
	Non-user	1	14	8	1	24
Total		17	15	15	1	48

Both users and non-users were asked to discuss pros and cons of using Facebook. Their responses were coded using the coding scheme shown in Table 6.8 but adapted for Facebook.

Positive Perceptions of Facebook

In comparison to the non-users, Facebook users mentioned more positive aspects of using Facebook (Figure 6.18). All but one of the users perceived Facebook as useful

for **keeping in touch with others** (e.g., "*Yeah it connects me to the world, really to all my friends all across*"; "*Well, it's very good because like I said I do not keep real contact with my granddaughter, but she's on Facebook, and I see her all the time. I can see what she's doing and all*"). Many users also found it useful for **sharing or finding relevant information** (e.g., "*It's very educational. You learn different things about cultures and other people*"; "*I get a lot of general information, particularly in the music area. I'm in a group of about 600 people around the world of adult violin players, I get lots of information about apps that I can use.*"), and/or for ***entertainment purposes*** (e.g., *"I do find it entertaining…I do visit it every day for the entertainment value but I rarely post anything and I occasionally look on it - on things others have posted."*). One or more of these benefits were perceived by only 60% of the non-users.

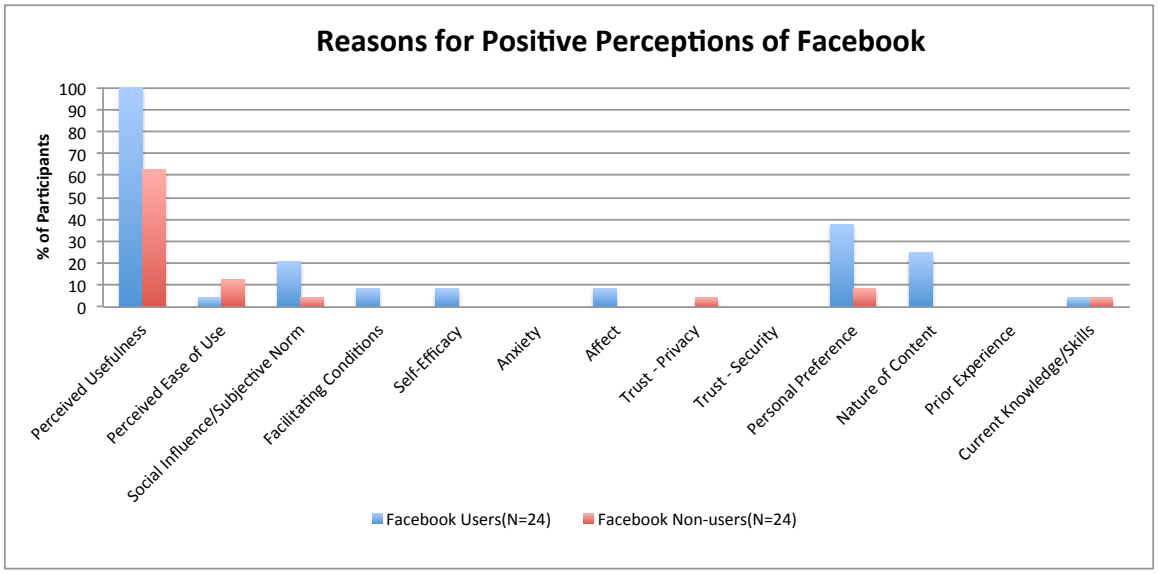


Figure 6.18. Reasons for positive perceptions of Facebook reported by Facebook users and non-users.

Positive perceptions of Facebook were also linked to how the users chose to use Facebook ("personal preference" in Figure 6.18). Many users described their selective and cautious use of Facebook to be able to enjoy the likeable aspects while avoiding the downsides, for example, "*I look at it, but I have to be careful about commenting*

because… before using Facebook, on the phone, I would be talking to a particular person and whatever I said was there. On Facebook, it goes all over, and someone may misunderstand, whom I haven't seen in 20 years…"; "A lot of people went in there and took all their information off, I never have because I don't have anything in there other than my picture and my background, my educational background."

Some of the users also liked Facebook for the content posted on it, particularly pictures shared by family members, for instance, "*Well, you know, I don't do it a great deal, but I really enjoy it because my granddaughters-in-law send me pictures of their children and I love seeing them."*; "*Oh the pictures…I really like seeing the pictures of what a lot of them are doing… Because we don't have pictures anymore like we used to have all the time like albums. So [on] Facebook I can see a lot of pictures."*

Finally, a few participants perceived usefulness of Facebook because of explicit or implicit social influence, for example, "*Well, I basically started off using it to keep in touch with my kids who are not here."; Well, the pros are the fact that I am getting information about people that I would not be getting information any other way because, particularly young people don't communicate in other way than by Facebook."*

Negative Perceptions of Facebook

A variety of reasons were mentioned that prevented participants from using Facebook at all and negatively impacted the experiences of those who used it (see Figure 6.19). The most frequently cited reason by both users and non-users was dislike for inappropriate, irrelevant, excessively personal or trivial content shared on Facebook. For example, a non-user commented, "*but I don't like putting all of my business out there, 'It's 4 o clock, I am going to the bathroom. It's 5 o' clock I am out of the bathroom, and walking down the hall. I don't feel very well today, 'you know all that. I don't see that as a necessity to tell someone every minute of the day what you are doing."* Similarly, a user narrated her annoyance with the content she witnessed on Facebook, "*My general*

feeling about it is it has become very cumbersome, very filled with stuff so unimportant that it has become less of a thing I enjoy doing because you have to go through so much clutter to get to the things you want to see."

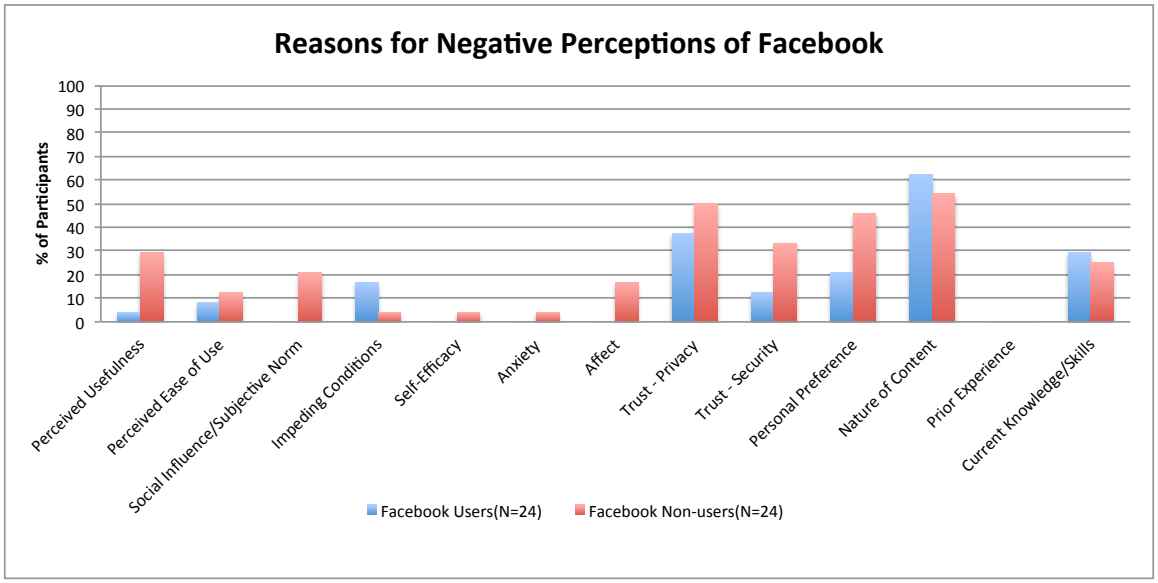


Figure 6.19. Reasons for negative perceptions of Facebook reported by Facebook users and non-users.

The next biggest barrier to Facebook use was the perceived lack of privacy on Facebook, "*I'm just afraid of too much information getting out there that is not necessarily a thing that you would want the public to know about. And they seem to have that access there"; I think they [Facebook] can do more to keep it more private so that you are secure and say what you need to say without the whole world and a lot of folks who you have never even heard of getting the message. I am concerned about that all the time and privacy."* A few participants also believed that Facebook use could be a risk to personal safety and security, "*I think there could be people out there prying – preying and prying. Preying on unsuspecting and prying – trying to get information out of you. I am suspicious and cautious*"; "*well just sometimes I hear a lot of bad stuff where people get the information or know when you're going on a trip then go and break into your*

house. That stuff, I'm just not interested in.". The non-users raised such concerns more often than the users.

For about a third of the participants' (45% of the non-users') decisions to not use Facebook or to use it only to a limited extent was because of their preference to spend their time on things that are more important, as is exemplified in these quotations. "*I think it [Facebook] takes up a lot of time. Everything I do on the Internet is time I don't have to go in my garden, or read a book";* "*There're more things I'm trying to do or whatever and it took more of my time on a computer. Although I like the computer, I just don't want to be on Facebook and all the other things."* Thus, participants were concerned that spending too much time on Facebook would prevent them from engaging in other activities that they enjoyed and valued more.

Finally, lack of knowledge about how to use Facebook and its various features was also mentioned by both users and non-users. For example, "*I don't generally upload pictures. In fact I don't even…I am embarrassed to say this, I don't even know how to do that. I do it so seldom that I would have to read instructions, which I do have written down somewhere."*

Certain negative perceptions were described only or primarily by non-users. These were lack of perceived usefulness, (e.g., *"I just think that it would be a lot of bother for me. I think I'm getting enough interaction with these people with the devices that I have*), social influence/subjective norm (e.g.*, "because it was highly recommended that we, in our line of business, don't use it, or we may lose our job also"; "I don't have any close friend that does it – well, I do, not close friends but friends – the other circle. That's why I don't bother"*), and strong negative affect, (e.g., "*I think it's the worst thing ever invented"*).

Desirable and Undesirable Content on Facebook

Participants were interviewed about their likes and dislikes for the content (i.e., information, messages, news, updates, photos, or videos) shared on Facebook. About 60% of the participants wanted to exchange messages and updates from friends and family members on Facebook. Many participants (46%) also desired to see photos of their children and grandchildren, special events, places traveled to, and of things that exuded beauty or happiness. About a third of the sample was interested in seeing information and (friendly) discussions on topics that were personally relevant (e.g., science, religion, politics). A few participants also wanted to see and share positive information and thoughtful messages on Facebook (23%).

The most commonly disliked content on Facebook was extremely personal information (mentioned by 42%). Other things that participants did not want to be shared on Facebook included negative or sad news (reported by 29%), sexual content (22%), mundane updates on everyday life (20%), personally irrelevant information (18%), abusive or derogatory posts (18%), deceptive or controversial messages (16%), and political discussions (11%).

CHAPTER 7

STUDY 2 DISCUSSION

The aim of study 2 was to holistically understand the social connectedness of older adults who live alone. This involved understanding the subjective experiences of living alone, relationships with friends, family and groups, and how (much) they are sustained while living alone, and assessing the role of technology in supporting connectedness needs. Some clear patterns of preferences and behaviors emerged across all the topics. However, the results also indicate heterogeneity in attitudes and experiences of older adults who live alone.

Experiences of Living Alone

Less than one-fifth of the participants in the study felt strongly negative about living alone whereas most either loved living alone or had mixed opinions about it. The perceptions were not dependent on the gender or age of the participant. In general, older adults for whom living alone did not begin as a preferred choice (e.g., who were forced into it after the death of a spouse) were less happy about being alone and considered it a process that required adjustment and acceptance over time. However, irrespective of the antecedent that led to living alone (i.e., a self-made choice or an unprecedented external factor), most of the older adults associated a greater sense of personal freedom in that living arrangement. In fact, to maintain a life-style of one's choice and to relish other accompanying benefits such as preferred levels of peace and quiet, privacy, and no responsibility of others was why many older adults wanted to continue living alone, despite a few perceived negatives of being in that arrangement. Overall, those who had the mobility to go to desired places and/or were content with the provisions of social interaction and support in their environment were inclined to continue to live alone.

Loneliness was the most commonly reported challenge associated with living alone and was often described in terms of lack of companionship or someone to share one's feelings with. However, only a few participants reported perpetual or chronic levels of loneliness; many experienced it intermittently. These findings are consistent with Eshbaugh's (2008) research on solo-dwelling older women and show that a similar pattern holds for older males.

Some older adults preferred to live with someone but were particular about whom to live with (e.g., someone who has the same interests) and under which situations (e.g., only when their health declined, or when they had their own separate area in the house). In summary, older adults weighed the pros and cons of living alone when considering to live with someone and were generally reluctant to give up the benefits of living alone to escape the challenges that came with it. This finding helps identify the right direction for the development of solutions. Future research needs to hone into the following question: How do we offer greater opportunities to older adults for experiencing connectedness while also supporting their choice to live alone?

Interpersonal and Collective Connectedness

Although individual differences existed in the sizes and compositions of older adults' social networks, on average, participants reported small family networks (both in inner and outer circles) and a small number of close friends in their inner circle. However, older adults' networks of less intimate friends (i.e., the outer circle) were large. These friends were not as close as the inner circle but were still considered important, and often included new local friends or with whom one shared a particular interest or co-participated in an activity.

Older adults used similar methods to keep in touch with their inner and outer family circles although the frequency of contact was higher with the inner circle. The most commonly reported methods were phone calls, in person visits, and emails. These

methods were also commonly used for interacting with inner and outer circle friends. However, participating in an activity together was rarely mentioned as a way to keep in touch with family members but was frequently brought up when discussing friends, particularly those in the outer circle.

These finding are only partially aligned with the selectivity theory, which argues that older adults' life goals are less future-oriented and more focused on the present (Carstensen, 1995). Older adults are, therefore, more motivated to maintain their close and supportive social contacts but are less likely to seek new relationships. Thus, according to the theory, social networks of older adults are small but are composed of more intimate ties. Although this was generally true for family networks in the current study, almost all the older adults reported having made new friends in the last year or so. They also reconnected with old ties whenever circumstances allowed for it. However, the caveat was that the new friendships were not built on interpersonal intimacy but were functional for casual interactions and more importantly, for sharing common interests in religious, recreational, educational, or humanitarian activities. In summary, older adults' outer friends' networks were large and not static, and appeared to support collective connectedness (feelings of association with a group or community) rather than interpersonal connectedness.

Most older adults were involved in at least one formal or informal group such as a church/prayer group, a senior center, a hobby club, or a group in their apartment building or in the neighborhood. However, health declines and constraints of time and physical energy had reduced their participation levels in comparison to their younger days. As proposed in the SOC model of aging (Baltes & Baltes, 1990), older adults were selective about the activities they participated in (e.g., they chose the ones that mattered more to them), optimized their time and energy (e.g., by participating in neighborhood activities thereby reducing traveling/driving), and used compensatory strategies (e.g., passive participation than active).

Role of Technology

Participants were interviewed about their opinions and use of three types of social media: email, video-chatting tools, and Facebook. The older adults had generally positive perceptions of email and used it to interact with a wide variety of people. However, Facebook users used it to a lesser degree than non-users for interacting with less close network ties. Email was perceived to be highly useful for communication and information sharing, and relatively easy to use. For some contexts, email was considered a better alternative to making a phone call because it did not disrupt people's ongoing activities. However, email content was perceived as straightforward, impersonal, and devoid of emotional richness. For this reason some participants did not consider email to be an appropriate channel to communicate sad or negative news. Overall, participants wanted to use email to exchange information that is relevant to the receiver, and personal messages and updates with friends and family that are happy or positively worded.

Despite being familiar with video-chatting tools such as Skype and Facetime, many participants were not active users of any. The reasons ranged from not perceiving it useful in their daily lives (above and beyond email and phone), personal preference to not be on camera, not finding on-camera interactions to be as naturalistic and personal as in person interactions, not having access to such a tool, not knowing how to use it, and concerns related to privacy. The current users had generally positive perceptions of Skype and Facetime because of the ability to interact in real-time and observe non-verbal cues. Those who used these tools used them to interact with family members (of present and younger generations) and current friends. However, overall, video-conferencing was not used as profusely as email and phone but only in contexts where face-to-face communication was highly desired but was not feasible without technology.

Facebook users and non-users were different in their perceptions of Facebook. Two-thirds of the users were generally positive towards Facebook and a similar proportion of the non-users had generally negative views of Facebook. Most others (i.e.,

the remaining two-third) had mixed opinions of Facebook. All the users perceived Facebook as useful for communication, information exchange, or entertainment. It was used to connect with family and current friends and also with emotionally distant network ties such as acquaintances, friends from the past (e.g., high school and college classmates), and people never met in person. But the level of participation (low versus high) and the purpose of use (informational versus recreational) varied across participants. Although a majority of users identified with a socializer persona, other user types (i.e., active, lurker, sporadic, and debater) were also represented in the user sample.

Although users enjoyed seeing updates and photos of family members, particularly of the younger generations in distant locations, the biggest limitation of using Facebook was being exposed to high volumes of inappropriate, irrelevant, excessively personal, or trivial content. Moreover, uncertainty about privacy settings raised concerns for personal safety and information security. Due to these reasons, users were often selective and cautious in their use. Besides, many non-users and some users wanted to ration their time across a range of activities they enjoyed and valued more than Facebook.

Overall, Facebook was considered useful as a platform to exchange written and photo updates with family and friends, to discuss relevant topics with interested others, and to find and share positivity and happiness. However, excessive undesirable content and skepticism about privacy and security lowered its worth for many participants particularly in comparison to the more conventional technologies such as phone and email. Moreover, Facebook users and non-users were not significantly different in their loneliness. Thus, those who used Facebook considered it useful to some extent but the non-users did not seem to miss out on any connectedness benefits that only Facebook offered. Relying more on emails to communicate with network members was one evident way to compensate for Facebook non-use.

In many respects, older adults' perceptions and use of Facebook were different from those typically found in younger adults. For instance, in younger adults, loneliness

results in greater Facebook use (Song et al., 2014). The underlying explanation is that being shy and having less social support predicts loneliness in young adults. Therefore, such shy (often socially anxious) and lonely young adults feel less anxious interacting socially on Facebook as compared to interacting face to face in real-time (McCord, Rodebaugh, & Levinson, 2014; Skues, Williams, & Wise, 2012, Song et al., 2014). Older adults in the current study were in general reluctant to disclose details of their personal lives on Facebook. In contrast, younger adults' expressions on social networking sites tend to be more informal, self-centered, and less socially regulated irrespective of the audience (Leist, 2013; Pfeil et al., 2009). Younger adults also more freely express negative emotions on social networking websites but many older adults in the current study desired to not use Facebook for viewing or sharing negative content. Moreover, most older adults in the current study engaged in some form of neighborhood socializing irrespective of their Facebook use. It is worth noting that in younger adults, the use of social networking sites is correlated with reduced participation in local activities, and knowledge about and interaction with neighbors (Hampton et al., 2009).

The results from this study indicate that Internet-based social technologies do support connectedness needs of older adults but only to a limited extent. Such technologies are often targeted towards a younger audience and fail to take into account older adults social needs, goals, and preferences. Older adults who live alone value their close family ties. Internet-based media help in sustaining relationships with these inner ties, particularly with the ones who are geographically distant. However, older adults also desire opportunities for richer forms of communication and context sharing with an affordance for privacy that is not yet not fully supported by current day technologies. Moreover, shared interests and co-participation in activities are ways through which new friendships are triggered in older age. However, present day social media do not offer easy to use and secure platforms for meeting this goal. There is a clear need to improve discoverability and use of privacy settings across all current social technologies.

Moreover, social networking websites should offer greater flexibility to customize information on the home page so that users are not inundated with content they find irrelevant or discomforting.

In sum, the older adult Internet users are appreciative of technology and its potential to support their connectedness needs and to overall help them age successfully while living alone, as is recapitulated in this quotation from a female participant *"I am grateful that because I've had to learn about it, it has enabled me to stay in touch with friends and acquaintances in a way I never would have, which is a way that it helps me be less lonely in terms of living alone".* Yet, they are wary of the limitations that the current day social media entail and are therefore either altogether deterred from using some technologies such as Facebook or have to use them cautiously to avoid the pitfalls. The same participant thus completed her thought, "*But conversely in doing that, I have learned that it is very dangerous for many people who are not able to use wise decisions about using the social network[ing sites] because it does open up the world to you, and that's why I'm very, very hopeful that the legal system will better get a grip on how to manage the negative parts of this technology*."

CHAPTER 8

GENERAL DISCUSSION

Ample evidence underscores the deleterious effects of loneliness on health and mortality (Hawkley & Cacioppo, 2010; Heinrich & Gullone, 2006; Holt-Lunstad et al., 2010). Therefore, it is important that loneliness risks are identified across all ages and appropriate measures are devised to address those risks. This dissertation specifically focused on understanding loneliness (its extent, variance, and sources of variance) in older adults who live alone and do not use the Internet. Moreover, to understand if Internet adoption can provide greater opportunities for connectedness, a mixed methodology study was designed to gain insights into the social lives of older adults who live alone and have adopted the Internet.

Theoretical Implications

Although almost a third of the US older adult population lives alone, there is a limited body of research focusing on the social connectedness (or lack thereof) in this subset of older adults. This dissertation not only identified the predictors of loneliness in this population through quantitative assessments but also qualitatively assessed the challenges of living alone and the role of technology in fulfilling connectedness gaps.

There are many reasons to hypothesize that living alone can pose greater risks for older adults who do not use the Internet. Internet offers opportunities to more frequently and easily connect with others when in-person interactions are not feasible, and such opportunities may be particularly useful when one lives alone. Although the quantitative findings indicated that among solo-dwelling older adults who are Internet non-users, very few suffered from extreme loneliness, on average this sub-population was lonelier than the general population of older adults such as those investigated by Russell (1996) and

Cohen et al. (2006). Moreover, older adults who live alone and use the Internet did not significantly differ from their counterparts who do not use the Internet. This could be indicative of the limitations of the current day technologies in adequately supporting connectedness needs of the older adults who live independently but alone.

Loneliness in older adults who live alone was predicted by social isolation and emotional well-being. Emotional well-being was a stronger predictor than social isolation. A plausible explanation is that in older adults who live alone, feeling negative over extended periods of time could evoke greater needs for emotional support. However, living alone and not using the Internet may also restrict access to desired levels of emotional support resulting in greater dissatisfaction with the social resources and feelings of loneliness. On the contrary, older adults who are generally happy would desire less emotional support and are therefore at a lower risk for loneliness.

The qualitative portion of this dissertation provided clear evidence that living alone was not a homogenous experience across older adults (as was also noted by Eshbaugh, 2008 in her research with older women). When asked about the negative aspects of living alone, loneliness was the most commonly discussed issue. Nonetheless, most of the older adults interviewed also perceived certain benefits of living alone, particularly the freedom to live the way they wish to. Being in good health and having easy access to the desired quantity and quality of social contact increased likeability towards living alone. This is consistent with previous research that shows that older adults living alone are less lonely if they have frequent contacts with family and neighbors, and are satisfied with the amount of contact (Bondevik & Skogstad, 1996). However, some older adults preferred to live with someone *if* the specifics of the person and/or the living arrangement matched with what they had in mind. In general, most participants did not want to compromise on the freedom that living alone bestowed despite the challenges associated with it, such as loneliness and lack of help with everyday tasks.

The present research also advanced the understanding of the associations of person factors (such as demographics and personality) with loneliness in older adults living alone. Previous aging studies have not been conclusive on the effects of aging on loneliness but in general those in very advanced ages are considered to be more susceptible to loneliness risks (Dykstra, 2009; Victor et al., 2000). In the current study, however, age was negligibly correlated with loneliness implying that despite living alone, and the oldest old were not significantly lonelier than the younger older adults. Similarly, other demographic variables of gender, race, and education were not linked with loneliness. Consistent with previous research, personality measures of extraversion and emotional stability were significantly correlated with loneliness (Cacioppo et al., 2006; Heinrich & Gullone, 2006; Martin et al., 1997; Perlman & Peplau, 1981; Russell, 1996); however, they did not predict loneliness in the current study above and beyond social isolation and emotional well-being.

With regard to interpersonal relationships, most older adults in this study had diverse networks comprising both family and friends. The findings were aligned with the socioemotional selectivity theory of aging (Carstensen, 1995) for family networks but provided new insights with regards to friendship ties. Consistent with the socioemotional selectivity theory, the size of family networks was generally small although individual differences existed. Furthermore, older adults' interaction efforts (through various methods) were more focused on the inner intimate circle of family. A quarter of the participants reported zero family members in the outer circle and even those who had family members in the outer circle reported communicating with them to a lesser extent. Moreover, participants reported frequently communicating with their inner family ties; however, they tended to not engage in recreational or interest-based activities with their inner and outer circle of family members.

Older adults' inner circle of friends was also small. However, contrary to the selectivity theory, participants reported large and non-static outer circles. The friends in

the outer circle were not considered emotionally close, but were people one often met (e.g., a neighbor) or participated in an activity together (e.g., church friends, book club friends). Moreover, older adults made attitudinal and behavioral adaptations to engage in group activities at the level that was best aligned with their health, physical energy, and available time. Their adaptations were indicative of selection, optimization, and compensation strategies (SOC model, Baltes & Baltes, 1990).

This dissertation also provides insights into older adults' adoption of social media and the selective preference of one medium over another. In general, older adults perceived Internet-based tools as useful for communication and information sharing. However, because certain technologies such as email (and phone) have existed for a relatively longer period and were adopted first, they are used as the reference to evaluate the value propositions of newer technologies. For a new technology to be adopted by an older adult, its offerings have to distinctly stand out in comparison to the traditional technologies and be perceived personally relevant.

Thus, participants had clear value perceptions of email in that they were aware of its distinct benefits over other forms of interaction (e.g., instant yet non-interruptive mode, useful for record-keeping, time for deliberation and careful selection of words) but were also aware of its limitations (not real-time, less personal than phone or face-to-face interactions, not apt for certain types of messages). Participants, therefore, used it to augment their connectedness experiences. In comparison, video-calling tools and Facebook were not as positively received although users tended to have more positive perceptions than the non-users. Video-calling was considered useful only for communicating with close network ties. Camera-mediated interaction was not considered the ideal form of face-to-face communication but was considered a good alternative when in person meeting was needed but was not feasible.

Facebook users had generally positive or mixed opinions of Facebook and they considered it useful to some extent. Many of the non-users also cited a few positive

aspects of Facebook; however, either the perceived benefits were already being fulfilled through other channels (e.g., email and phone) or the perceived costs of using Facebook were higher than the perceived benefits (e.g., exposure to irrelevant or discomforting content, reduced time to engage in activities one enjoys, privacy and security risks).

In sum, these older adults were willing to use the Internet to stay connected with important others when in person or phone interactions are difficult or infeasible. But the desire was to use it as a compensatory tool rather than as a primary mode of interaction. The older adults strongly valued in-person interactions and also wanted to invest their time selectively on things and activities that are personally meaningful. Thus, they were less likely to adopt a technology whose explicit promise is to increase their network size or the amount of social contact. Instead, they were more open towards technologies that could enrich their experiences of social activities that they are interested in or already engage in.

The current research also provides directions for the improvement of standard technology acceptance models. The UTAUT model of technology adoption (Venkatesh et al., 2003) was used to categorize the qualitative responses for pros and cons of different social media. However, because some of the participants' responses could not be explained by any of the factors in the UTAUT model, the model had to be adapted to represent other new response categories. For instance, many participants talked about using a technology but only in a certain manner or to a certain degree due to their personal preference. Therefore, "selectivity" in usage is a dimension that technology acceptance models do not yet cover. Similarly, privacy and security perceptions, perceived nature of the content, and (lack of) knowledge or skills to use the technology emerged as important barriers that would not be fully captured by the items of the UTAUT model. This indicates that the current models are not exhaustive and require modifications to gain a deeper understanding of the adoption of more complex technologies such as social media, and perhaps especially for older adult users.

This research also revealed limitations of the UCLA loneliness scale – version 3 (Russell, 1996). The questionnaire required older adults to report their frequency of loneliness and connectedness experiences on a four-point scale labeled as: never, rarely, sometimes, and always. A few participants verbally expressed their hesitation to respond "always" to some of the negatively worded items (e.g., How often do you feel that you lack companionship?). They wanted an "often" response option between "sometimes" and "always" to be able to more accurately report their loneliness experiences. Therefore, it is plausible that the scale did not reliably differentiate people who were sometimes lonely from those who were frequently lonely.

Practical Implications

The findings of this dissertation have many applied implications. Whereas study 1 provided an understanding of the predictors of loneliness in older adults who live alone, the second study helped identify ways to best target those predictors to reduce loneliness. First, study 1 showed that social isolation increases the probability of feeling lonely in older adults who live alone. In addition, study 2 showed that many older adults prefer to continue to live alone for greater sense of freedom. Therefore, solutions to decrease social isolation risks should take into account older adults' choice to age in their preferred living arrangement – alone or otherwise. The first or best solution might not be to find someone for them to live with.

One way to reduce social isolation is to provide more opportunities for increasing the size of friend networks. Family networks tend to be small and static for older adults but friendship ties, particularly in the outer circle, are not. Older adults may not actively seek new friends but meeting others with similar interests and co-participating in an activity together kindle new friendships. Thus, I propose designing technologies that can aide older adults to easily and securely participate in activities they enjoy with a group of others that share the same interests. Such technologies should not only help in the

triggering of new ties by introducing people with common interests but also strengthen these ties overtime by providing an environment where sharing and privacy can be simultaneously sustained.

Another way social isolation can be reduced is by increasing the frequency of quality interaction with network members, particularly those who are geographically distant. Video-calling tools such as Skype and Facetime offer the opportunity to have more naturalistic conversations similar to in-person interactions. However, these tools need to be improved to increase perception of control over who can or cannot contact the user via these tools. Many older adults expressed the desire to see others but did not want to be seen on a video camera, particularly when they were not dressed appropriately. Therefore, the video settings should be intuitive but not easy to turn on accidentally. Moreover, users should receive continuous and clear feedback on the status of their camera (on/off). In general, there is a need to improve discoverability and use of privacy settings across all Internet-based social media. Moreover, anytime such technologies undergo a change, how the change will affect privacy/security settings should be clearly communicated to the user.

Perhaps surprisingly, older adults did not report engaging in activities with their family members. Co-participating in recreational or interest-based activities could increase closeness with family ties. Internet based technologies can be designed to make it easier for older adults to involve and be involved with their family members in activities of shared interests.

Study 1 showed that emotional well-being is a stronger predictor of loneliness than social isolation. Thus, regular monitoring of health complaints, particularly emotional states over extended days, could help family members, friends, and health care providers be aware of the loneliness risks for the solo-dwelling older individuals. Furthermore, loneliness risks can be addressed by enhancing older adults' emotional well-being. This implies increasing avenues for positive experiences and reducing

sources of negative affect. During the interview, many participants expressed the desire to see positive content in their email and on Facebook and disliked seeing negative or tragic news through such channels. In fact, negative reactions towards Facebook were linked to being inundated with irrelevant or discomforting content. A recent Pew Internet report found that negative affect spreads on Facebook through the "emotion contagion" phenomenon (Hampton, Rainie, Lu, Shin, & Purcell, 2015). Being on Facebook increases people's awareness about sad events in others' lives; the more a person cares about others, the more likely he or she is to feel stressed when Facebook reveals that their friend is in distress.

This finding may be particularly important in the light of the current study. If negative affect increases feelings of loneliness in solo-dwelling older adults, and Facebook is a platform wherein negative content is freely shared, there is a need to offer greater flexibility to users to control the information they receive on their personal pages and on their feed. This will not only enrich experience of older adults in using the features they like, but will also save them time that they can use on other meaningful activities on or off Facebook. The current settings on Facebook tend to be more reactive than proactive. That is, if a user does not like a post shared by someone, she can hide the post and/or can *un-follow* the person to stop viewing any posts from that person. However, a proactive setting should allow the user to select in advance the type of posts they are interested in and should be shown (e.g., positive messages, family pictures). Alternatively or in addition, the users can be allowed to preselect the content they are not interested in and therefore would prefer to be automatically filtered out (e.g., pictures of accidents, sexual content, political debates).

The design recommendations based on the findings of this dissertation are summarized in Table 8.1. Note that this dissertation focused only on independently living older adults. The samples in the two studies did not include older adults who were blind or deaf, or those who were terminally ill or had severe motor or cognitive impairments.

Moreover, the sample in the second study consisted of active Internet users and included early adopters of social networking sites. Therefore, the findings of this dissertation need to be carefully generalized. The social needs of and support available to people aging with disabilities are likely to differ from the samples focused upon in the current dissertation. The perceived benefits of the Internet and Facebook may be less evident to late adopters of technology. Moreover, the perceptions of living alone in older age are culture dependent. Therefore, the insights gained from this research may not be applicable to collectivistic cultures.

Table 8.1. *Limitations of Current Day Social Media and Relevant Design Recommendations*

Problem Statements	***Design Recommendation***
"I don't know how anybody can do it [switch to a new email]. I get emails from people saying, 'oh, I have a new email address.' I think, 'oh good luck with that! How long is that gonna take. Everybody has that email account."	Make it easier to transition from one email account to another. The new email address should automatically replace the older one.
"But I have to go through spam. I get about 150 spams a day. But some of them are not spams. I have got to go through that list – and then that's not spam."	Improve reliability of spam filters in emails. Assess user preferences to determine levels of misses and false alarms for spam filters.
"I hate it when people tell you that someone died, by email, you know, 'sorry to let you know, but…'You know, aw, geez, that's like you just think that should be a phone call or a note or something, not email. Not in an email."	Allow users to select the types of news they do not want to receive via email (e.g., tragic news, political discussions, sexual content). Notify senders when they try to send an email bearing content that the targeted receiver has marked to not receive.
"If they could guarantee that it was only you and the person that you have contacted - are the only ones that could see each other, if there was a way for these technology geniuses to do that, I would think that would be, I would feel more comfortable with it." *"I don't want them to see me half the time [on camera]…We are not always dressed appropriately"*	Make video-settings on video-calling tools intuitive but such that they cannot be turned on accidentally. Provide continuous and clear feedback to the user on the status of their camera (on/off).

Table 8.1 (Continued)

"But so many people once they know that they're on Skype… they got this look in their eyes and no body language whatsoever; they're just stiff, so I don't see the point"	People tend to be more conscious of their body language when they are on camera than when they communicate in person. Moreover, people tend to look at the screen instead of into the camera resulting in poor eye contact during video-calls. There is a need to make video-calling a more naturalistic method of communication with better visibility into each other's physical space and context.
"I have a cousin that lives in North Carolina and she has Skype and I was trying to get my Skype to work, so that I can talk to her and I can't get it done.…My youngest grandson- he uses Skype all the time. It would be better if he can come in and set it up for me."	Provide easy to follow tutorials to learn how to use video-calling tools.
"There are people we see once a week when we do charitable work but I don't know if I would consider them as friends. I would probably refer to them as my friend but it's not a full friendship." *"I think it [Facebook] takes up a lot of time. Everything I do on the Internet is time I don't have to go in my garden, or read a book."*	Design a social-networking site with minimal, easy to use features with clear privacy settings. The goal is to introduce people in the neighborhood with similar interests and goals. The technology will also provide a common platform to plan and engage in activities together.
"I'm just afraid of too much information getting out there that is not necessarily a thing that you would want the public to know about. And they seem to have that access there"	Improve discoverability and use of privacy settings across all social media.
"I like Facebook until Zugumberg or whatever his name is - whenever he starts doing things to it, you go on and something happens and you are thinking is it me? Or is it Facebook? … they change stuff too much too fast too soon. And when they're explaining it they do not explain it properly."	With any changes in the technology, update user about the effects on default privacy settings and how they can be changed.
"Well, every once in a while I'll like to see a funny video and I'll watch that. And I like to see the animals. And some of those are hysterical. And I just don't like, basically the political and this sort of you're not a good person if you don't agree with me. I don't like those implications. If I just want to hear hate, then I can turn on the television anytime."	Offer greater flexibility to users to control the information they receive on their personal pages and on their feed. Allow for proactive settings for inclusion and removal of content based on personal interests.

In sum, this dissertation provided insights into the social connectedness of older adults who live alone. It advanced the understanding of the complexities of living alone in older age and identified directions to best support social connectedness needs in that arrangement. Finally, it addressed the gaps in research on older adults' use of social media and its potential to support connectedness for an aging population. These findings provide guidance for the design of technology to reduce loneliness in older adults, which in turn will improve quality of life and health outcomes.

APPENDIX A

ASSUMPTION CHECKS FOR REGRESSION IN STUDY 1

The following assumption checks for linear regression were conducted in Study 1:

1. **Independent errors (or absence of autocorrelation):** The assumption of independent errors implies that for any two observations of the dependent variable, the residual terms are not correlated. This assumption was checked with the Durbin-Watson test, which tests for the correlation between adjacent residuals. The test statistic can vary between 1 and 4. If the value is close to 2, independent of errors can be assumed. Values below 1 and above 3 are considered problematic. In the current analysis, Durbin-Watson statistic was very close to 2 (= 1.959). Thus, there was no cause of concern for the violation of this assumption.

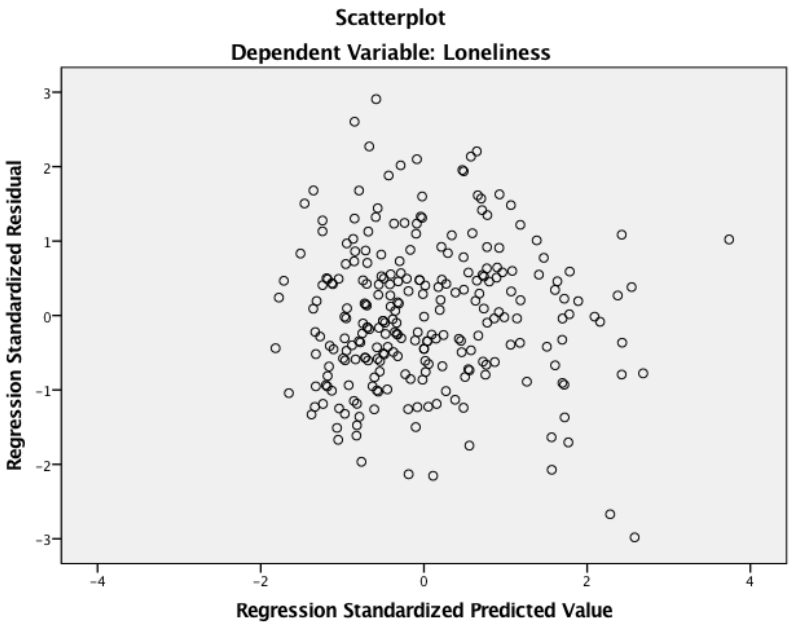


Figure A.1. Plot of standardized residuals versus standardized predicted values.

2. **Homoscedascity:** Homoscedascity assumption implies that the variance in the residual terms is not dependent on the predictors. To check this assumption, the standardized residuals (ZRESID) were plotted against the standardized predicted

values (ZPRED) of the dependent variables (Figure A.1). Linearity and homoscedascity can be assumed if the points are randomly and evenly distributed in the plot, which was generally the case in Figure A.1.

3. **Normally distributed residuals:** The residuals in the model should be random and normally distributed with a mean of zero. To check this assumption, a histogram and a PP plot of the residuals were generated (Figure A.2). Based on a visual inspection of Figure A.2, normality of residuals was assumed in the model.

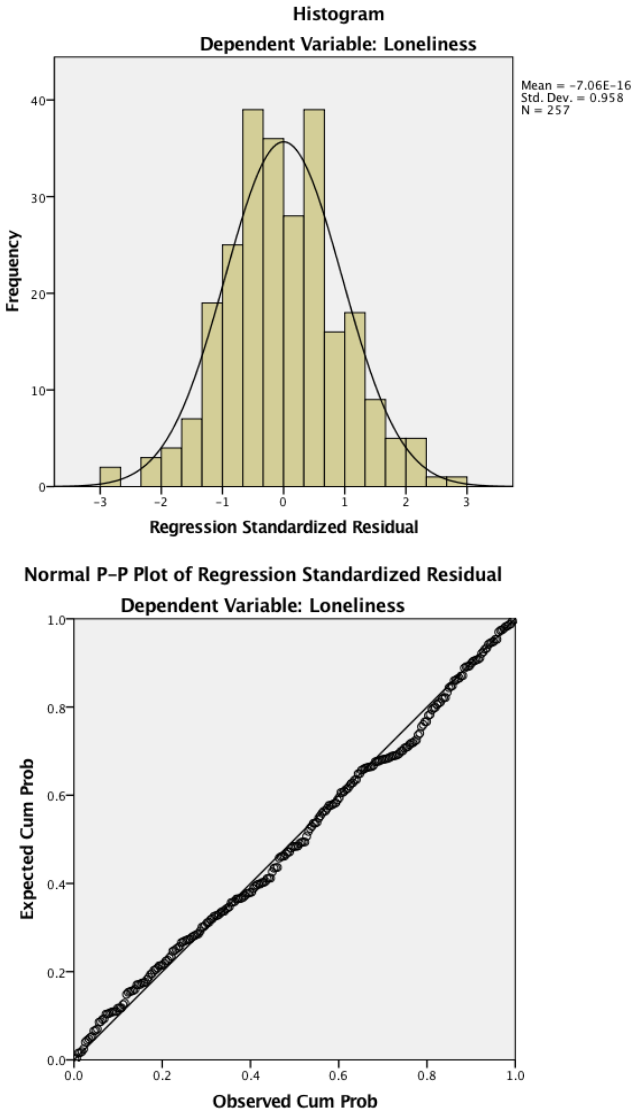


Figure A.2. Histogram and normal P-P plots of residuals.

4. **Non-zero variance in predictors**: That is, the predictors should have some variance to predict variance in the outcome variable. The descriptive statistics presented in Table 3.2 showed that all hypothesized predictors had non-zero variance.
5. **No perfect multicollinearity:** This assumption implies that no two predictors are very highly correlated. Muticollinearity is problematic because it increases the standard errors of the beta coefficients, and it limits the total variance accounted for by the model. A quick check of multicollinearity was conducted by looking at the zero-order correlations between all pairs of predictors. None of the correlations were greater than .80. In addition, collinearity diagnostics of VIF (Variance Inflation Factor) and tolerance were used to check for multicollinearity issues. VIF indicates if each predictor has a strong correlation with other predictors. Tolerance is the reciprocal of VIF (i.e., 1/VIF).

   In the current study, none of the VIF values were greater than 10, which reduced the cause of concern for multicollinearity. However, the average VIF was greater than 1 (=1.81). Moreover, the tolerance values for social isolation (= .15) and social isolation X gender interaction (= .16) were less than 0.2. These two observations indicated that the regression might be biased. However, because VIF was not substantially greater than 1 and none of the tolerance values were lower than 0.1, no multicollinearity was assumed in the model.

Case-wise diagnostics (outlier) analyses were also conducted to check for the residuals that biased the model. Only 4.7% of the cases (12 out of 257) had standardized residuals greater than 2 or less than -2 (Table A.1), which is within the expected limit of 5% for an ordinary sample. Moreover, only 4 cases (1.6%) lied beyond ±2.5. Finally, none of the cases had standardized residual beyond ±3. In addition, the Cook's distance

was less than 1 for all the 12 cases shown in Table A.1. Therefore, based on these analyses, there was no need to exclude any cases from the model.

Table A.1. *Cases with Standardized Residuals Beyond ± 2.*

Casewise Diagnostics[a]

Case Number	Std. Residual	Loneliness	Predicted Value	Residual
9	-2.07	36	50.34	-14.34
11	2.02	51	37.05	13.95
14	-2.13	23	37.75	-14.75
25	2.91	55	34.89	20.11
56	2.21	59	43.74	15.26
68	-2.15	25	39.90	-14.90
69	2.60	51	32.99	18.01
114	-2.98	37	57.62	-20.62
168	-2.67	37	55.48	-18.48
205	2.14	58	43.23	14.77
214	2.10	53	38.47	14.53
260	2.27	50	34.29	15.71

a. Dependent Variable: Loneliness

APPENDIX B

PHONE SCRIPT FOR STUDY 2

This is _____ calling from the Human Factors and Aging Lab at **Georgia Tech**. Your name was on our list of people interested in participating in some of our research projects. We have a new project underway and I want to see if you would be interested in participating. The study is about how people use Internet. Would you be interested in participating?

If no: Okay, may we call you for future studies?
If yes: Great! I just need to ask you a few questions.

- Are you between the ages of 65 and 85?
    - ***If no:*** I'm sorry, but we are looking for individuals in that age range for this particular study. However, may we call you in the future?
    - ***If yes, next question.***
- Do you currently live alone?
    - ***If no:*** I'm sorry, but you are not eligible for this particular study. However, may we call you for future studies?
    - ***If yes, ask the following questions:***
        - Are you currently employed for more than 5 hours/week?
            - ***If yes,*** I'm sorry, but you are not eligible for this particular study. However, may we call you for future studies?
            - ***If not,*** ask next question:
        - Do you currently volunteer for more than 5 hours/week?
            - ***If yes,*** I'm sorry, but you are not eligible for this particular study. However, may we call you for future studies?
            - ***If do not volunteer,*** ask next question:
        - Roughly how many hours a week do you spend at a senior center or a formal organization?
        - ***If more than 10 hours/week,*** I'm sorry, but you are not eligible for this particular study. However, may we call you for future studies?
        - ***If <u>not</u> more than 10 hours/week,*** Now I would like to ask you a few questions about your experience with Internet.

- Do you currently use a computer and/or the Internet?
    - ***If no:*** I'm sorry, but you are not eligible for this particular study. However, may we call you for future studies?
    - ***If yes, next question***
- Have you used a computer and/or the Internet within the last month?
    - ***If no:*** I'm sorry, but you are not eligible for this particular study. However, may we call you for future studies?
    - ***If yes: next question***
- Do you have an email account?

    - ***If no:*** I'm sorry, but you are not eligible for this particular study. However, may we call you for future studies?
    - ***If yes: next question***
- Have you had this email account for longer than 6 months?
    - ***If no:*** I'm sorry, but you are not eligible for this particular study. However, may we call you for future studies?
    - ***If yes:*** Great! Now I would like to ask you a few questions about your experience with Facebook.

(Note: The participants who have said yes to all the questions so far are eligible to participate in this study. The next set of questions will decide whether to consider them a Facebook user or a non-user).

Do you have a personal profile page on **Facebook**?

- ***If no, CONSIDER THEM A NON-USER AND RECORD THIS. Go to next item.***
- ***If yes:*** Have you had this profile for longer than 6 months?
    - ***If no, CONSIDER THEM A NON-USER AND RECORD THIS. Go to next item.***
    - If yes, how frequently do you use Facebook?
        - *Daily*
        - *At least once a week*
        - *At least a couple of times a month*
        - *Once or twice in a year*
        - *Never*

    - ***If frequency of use is NEVER or ONCE OR TWICE A YEAR, CONSIDER THEM A NON-USER AND RECORD THIS. Go to next item.***

    - ***If frequency of use is DAILY, AT LEAST ONCE A WEEK, or AT LEAST A COUPLE OF TIMES A MONTH, CONSIDER THEM A USER AND RECORD THIS. Go to next item.***

Great! You are eligible to participate in this study.
The purpose of this study is to understand older adults social relationships and connectedness.

This an interview study and will take place at the Psychology building of Georgia Tech or at your home depending on your preference and/or transportation availability. The entire session should last 2 hours. You will receive $30 for your participation. Do you think you are interested in participating?

- ***If no:*** May we call you in the future for other research studies?
- ***If yes:*** Great! Do any of these times work for you?

- **[SEE Scheduling Sheet]**.

We will mail you a cover letter, a parking permit and parking directions (*note: mail parking permit and directions only if the participant decides to come to campus*). May I please confirm your mailing address?

We will call you and remind you the day before your scheduled appointment.

Let me give you our telephone number in case you think of any questions later on. My name is _____ and I can be reached at (404) 894-8344. If no one answers, please leave a message and I will call you back. Thank you for you time.

Note: Use the following checklist while going through the phone script to keep track of participant's responses during the eligibility phone call. Use a new checklist for every participant.

Eligibility Checklist

Name of Participant: _____
Age of Participant: _____

Questions from script	**Yes**	**No**
Do you currently live alone?		
Are you currently employed for more than 5 hours/week?		
Do you currently volunteer for more than 5 hours/week?		
How many hours a week do you spend at a senior center or a formal organization?	Less than 10 hrs/wk	More than 10 hrs/wk
Do you currently use a computer and/or the internet?		
Have you used a computer and/or the Internet within the last month?		
Do you have an email account?		
Have you had this email account for longer than 6 months?		

Note: If all answers are in the highlighted part, person is eligible for the study.

Facebook User or Non-user?

****Remember:**

If frequency of use is **NEVER** or **ONCE OR TWICE A YEAR,** consider them a **NON-USER**

If frequency of use is **DAILY, AT LEAST ONCE A WEEK,** or **AT LEAST A COUPLE OF TIMES A MONTH,** consider them a **USER**

User	Non-user

APPENDIX C

INTERNET ACCEPTANCE QUESTIONNAIRE

Please check response box that best represents your general opinion about using the Internet.

Please think about the Internet broadly, including web pages, search engines/tools, email, social media, video-conferencing tools.

1. I have the resources necessary to use the Internet.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

2. My interaction with the Internet is clear and understandable.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

3. I have the knowledge necessary to use the Internet.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

4. I hesitate to use the Internet for fear of making mistakes I cannot correct.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

5. People who are important to me think that I should use the Internet.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

6. The Internet is somewhat intimidating to me.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

7. Someone is available for assistance with the Internet difficulties.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

8. Using the Internet is fun.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

9. Using the Internet enables me to share information.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

10. The Internet makes life more interesting.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

11. Learning to operate the Internet is easy for me.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

12. I could use the Internet successfully if I could call someone for help if I got stuck.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

13. I find the Internet easy to use.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

14. The Internet is compatible with other technologies I use.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

15. Using the Internet enables me to connect with people.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

16. It scares me to think that I could lose a lot of information using the Internet.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

17. I find the Internet useful in my life.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

18. My friends who use the Internet encourage me to use the Internet.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

19. I feel apprehensive about using the Internet.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

20. People who affect my behavior think that I should use the Internet.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

21. I like using the Internet.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

22. I could use the Internet successfully if there was no one around to tell me what to do as I go.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

23. Using the Internet is a good idea.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

24. My family members who use the Internet encourage me to use the Internet.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

25. It is easy for me to become skillful at using the Internet.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

26. I could use the Internet successfully if I had a lot of time to spend on it.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

27. Using the Internet has improved the quality of my life.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

28. I could use the Internet successfully if it had a built-in help facility for assistance.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

29. I intend to keep using the Internet in the future.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

30. I intend to recommend other people of my age to use the Internet.

☐1	☐2	☐3	☐4	☐5	☐6	☐7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

APPENDIX D

COMMUNICATION VIA INTERNET CHECKLIST

Through this checklist, we want to keep track of whom you communicate with via Internet.

In the left column is a list of people you may be communicating with via Internet. Please put a checkmark (✓) to indicate which Internet tool (i.e., email, video-conferencing, Facebook) you use to communicate with these people.

For each group of people described, you can check **zero, one, or all** three boxes depending on how you communicate with them via Internet.

People you communicate with	via **Email**	via **Video-conferencing**	via **Facebook**
Family members of your own generation (sisters, brothers, cousins, etc.)			
Family members of a generation older than yours (parents, aunts, uncles, etc.)			
Family members from one generation younger than yours (children, nephews, nieces, etc.)			
Family members from two or more generations younger than yours (grandchildren, great grand-children, etc.)			
Current friends			
Friends from the past, such as high school or college classmates			
Work colleagues			
Neighbors			
Acquaintances			
People whom you have never met in person			
Others (Please specify)_____			

APPENDIX E

SOCIAL MEDIA USE QUESTIONNAIRE

The goal of this questionnaire is to understand your use of email, video conferencing, and social networking websites. There are no right or wrong answers.

*** 1. Participant ID:**

*** 2. Social networking websites include any website that enables users to create public profiles within that website and form relationships with other users. Listed in the table below are some specific examples of social networking websites. Please place a check mark to indicate how often you use each website.**

	Daily	At least once a week	At least a couple of times a month	Once or twice in a year	Never	Never heard of this site
Facebook	◯	◯	◯	◯	◯	◯
Instagram	◯	◯	◯	◯	◯	◯
LinkedIn	◯	◯	◯	◯	◯	◯
MySpace	◯	◯	◯	◯	◯	◯
Online dating	◯	◯	◯	◯	◯	◯
Online discussion forums	◯	◯	◯	◯	◯	◯
Online health discussion forums/support groups	◯	◯	◯	◯	◯	◯
Pinterest	◯	◯	◯	◯	◯	◯
Twitter	◯	◯	◯	◯	◯	◯

Do you use any other social networking website? If yes, please mention its name and how often you use it.

*** 3. Do you currently use social networking websites or have used them in the past? If yes, please answer questions 4-6.**

◯ Yes

◯ No

4. How long have you been using social networking websites?

- ◯ Less than 6 months
- ◯ Between 6 months and 1 year
- ◯ More than 1 year, but less than 5 years
- ◯ 5 years or more

5. When did you last use a social networking website?

- ◯ This past week
- ◯ More than 1 week ago, but within the last month
- ◯ More than 1 month ago, but within the last year
- ◯ More than 1 year ago

6. On average, how many hours a week do you spend on social networking sites?

- ◯ Less than one hour a week
- ◯ Between 1 hour and 5 hours a week
- ◯ More than 5 hours, but less than 10 hours a week
- ◯ 10 hours a week or more

*** 7. Do you currently use Email or have used it in the past? If yes, please answer questions 8-10.**

- ◯ Yes
- ◯ No

8. How long have you been using Email?

- ◯ Less than 6 months
- ◯ Between 6 months and 1 year
- ◯ More than 1 year, but less than 5 years
- ◯ 5 years or more

9. When did you last use Email?

- ◯ This past week
- ◯ More than 1 week ago, but within the last month
- ◯ More than 1 month ago, but within the last year
- ◯ More than 1 year ago

10. On average, how many hours a week do you spend on Email?

- ◯ Less than one hour a week
- ◯ Between 1 hour and 5 hours a week
- ◯ More than 5 hours, but less than 10 hours a week
- ◯ 10 hours a week or more

* **11. Do you currently use video conferencing tools (Skype, Facetime, Google Hangout etc.) or have used it in the past? If yes, please answer questions 12-14.**

- ◯ Yes
- ◯ No

12. How long have you been using video conferencing tools?

- ◯ Less than 6 months
- ◯ Between 6 months and 1 year
- ◯ More than 1 year, but less than 5 years
- ◯ 5 years or more

13. When did you last use a video conferencing tool?

- ◯ This past week
- ◯ More than 1 week ago, but within the last month
- ◯ More than 1 month ago, but within the last year
- ◯ More than 1 year ago

14. On average, how many hours a week do you interact via a video conferencing tool?

- ◯ Less than one hour a week
- ◯ Between 1 hour and 5 hours a week
- ◯ More than 5 hours, but less than 10 hours a week
- ◯ 10 hours a week or more

* 15. Listed in the table below are examples of reasons for why people USE Internet. Please place a check mark in the box next to each topic to indicate if you have used email, video-conferencing, and/or social networking websites for each reason.

Which tool do you USE for the following reasons?
(For each reason you can select more than one answer)

	Email	Video-conference	Social Networking sites	None of the three
Connect/communicate with family members	☐	☐	☐	☐
Connect/communicate with friends	☐	☐	☐	☐
Document/update others on your daily life	☐	☐	☐	☐
Express opinions on political issues	☐	☐	☐	☐
Find a new hobby/support an existing hobby	☐	☐	☐	☐
Find a romantic partner	☐	☐	☐	☐
Get age-related information or advice	☐	☐	☐	☐
Get health-related information or advice	☐	☐	☐	☐
Join an online community of like-minded individuals	☐	☐	☐	☐
Meet new people	☐	☐	☐	☐
Network with professionals/occupational reasons	☐	☐	☐	☐
Stay up to date on news/current affairs	☐	☐	☐	☐

Is there any other reason why you use Internet? If yes, please mention the reason and which Internet tool(s) you use for this reason.

* 16. Listed in the table below are examples of reasons that PREVENT people from using Internet. Please place a check mark in the box next to each reason if it has prevented you from using email, video-conferencing, and/or social networking sites.

Which tool have you AVOIDED USING for the following reasons?
(For each reason you can select more than one answer)

	Email	Video-conference	Social Networking sites	None of the three
I am concerned about privacy	☐	☐	☐	☐
I am concerned about security	☐	☐	☐	☐
I do not like that method of communicating because it is not face-to-face	☐	☐	☐	☐
I have a disability, which makes it difficult for me to use it	☐	☐	☐	☐
I have friends and family members who go online for me	☐	☐	☐	☐
I never learned how to use it	☐	☐	☐	☐
Information shared is often not reliable	☐	☐	☐	☐
It is too complicated	☐	☐	☐	☐
It is too expensive	☐	☐	☐	☐
It is too slow	☐	☐	☐	☐
It reduces face-to-face communication	☐	☐	☐	☐
Most of my family members do not use it	☐	☐	☐	☐
Most of my friends do not use it	☐	☐	☐	☐

Is there any other reason that prevents you from using Internet? If yes, please mention the reason and which Internet tool(s) you avoid using for this reason.

APPENDIX F

STUDY 2 INTERVIEW SCRIPT

Hello and welcome to this study.

Informed Consent

Hand the participant the informed consent.

This is the informed consent. This form tells you about this study and your rights as a participant. Please read through it and let me know if you have any questions.

If you agree with everything that's on this form, please sign at the end. You will receive a copy of the form for your records.

Sign both copies of the Informed consent. Give one to participant and keep the other. Make sure it has participant's signature.

Thank you.

Demographics Form

Open demographics form on the computer. Enter participant ID on form.

I'll now request you to complete this demographics questionnaire. This questionnaire asks general questions about your background and health. If there is any question on it that you do not wish to answer, please select "do not wish to answer" and move on to the next question.

Thank you.

Interview – Part 1 (*Offline Relationships and Connectedness Experience)*

I am now going to ask you a few questions about your social relationships and connectedness. This is an Interview study and we'll be audio-recording the session. Please let me know when you are ready and then I'll turn on the recorder.

We'll take a 10 minute break after an hour or so but if you need to take a short break at any other point, please feel free to do so.

<<TURN ON RECORDER>>

As I mentioned before, in this interview we are interested in learning about your social relationships and connectedness.

Please remember that you are free to not answer any of these questions.

I am going to ask you a few questions about your social network. By social network, I mean people whom you consider emotionally close to you, including family members, relatives, and friends. We will talk about family and friends separately.
<<Hand over the circle diagram for family & relatives>>:

Please take a look at this diagram. These two circles represent different levels of closeness to the person at the center, that is, you. The inner circle describes those family members & relatives to whom you feel so close that it is hard to imagine life without them. <<point to the circle>>

1. Are there any family members or relatives who match this description? *If no, <<write 0 inside the inner circle>>. If yes*, how many family members & relatives would you place on this circle? You can list them all and I'll count. *<<note response on the diagram>>*
    a. *Probe: For all questions related to network size, if participants are unsure about how precise they should be, tell them that we just want a rough estimate.*
2. How do you keep in touch and stay connected with these inner circle family members & relatives? *<<point to the circle>>*
    Anything else?

The outer circle describes those family members & relatives to whom you may not feel quite that close but who are still important to you. <<point to the circle>>

3. Are there any family members or relatives who match this description? *If no, <<write 0 inside the second circle>>. If yes*, how many family members & relatives would you place on this second circle? *<<note response on the diagram>>*
4. How do you keep in touch and stay connected with these outer circle family members & relatives? *<<point to the circle>>*
    Anything else?

<<Hand over the second circle diagram for friends>>

Now let's talk about your friends. Please take a look at this diagram. The inner circle describes those friends to whom you feel so close that it is hard to imagine life without them. <<point to the circle>>

5. Are there any friends who match this description? *If no, <<write 0 inside the inner circle>>. If yes*, how many friends would you place on this circle? *<<note response on the diagram>>*
6. How do you keep in touch and stay connected with these inner circle friends? *<<point to the circle>>*
    Anything else?

The outer circle describes those friends to whom you may not feel quite that close but who are still important to you. <<point to the circle>>

7. Are there any friends who match this description? *If no, <<write 0 inside the second circle>>. If yes*, how many friends would you place on this second circle? *<<note response on the diagram>>*
8. How do you keep in touch and stay connected with these outer circle friends? *<<point to the circle>>*

9. Have you reconnected with someone in the last year or so? If yes, how did you reconnect with him/her?
    a. Any other examples?
10. Have you made any new friends in the last year or so?
    b. *If yes*, how did you become friends with this person?
11. Let's now talk about participation in any community or social activities.
    a. Do you currently engage in any neighborhood socializing?
        i. If yes, could you speak about your involvement in it?
        ii. How do you communicate with other members of this group?
    b. Let's now talk about religious service attendance. Do you currently attend any religious services?
        iii. If yes, could you speak about your involvement in it?
        iv. How do you communicate with other members of this group?
    c. Do you currently participate in any other organized groups?
        v. If yes, which other organized group do you participate in? How involved are you in this group?
        vi. How do you communicate with other members of this group?

End of Part 1 of Interview. Turn off Recorder and say:
I am now going to turn the recorder off and request you to complete a couple of questionnaires.

Technology Experience Questionnaire
Open this on the computer.
This questionnaire will ask you about your use of various technologies in the last 12 months.

Attitudes toward Internet Questionnaire
Open this on the computer.
Here's another questionnaire which asks your opinions about the **Internet.** Please think about the Internet broadly, including web pages, search engines/tools, email, social media, video-conferencing tools.

Interview - Part 2 (Social Connectedness via Internet)
We'll now resume the Interview. And I'll turn the recorder on again.

<<TURN ON RECORDER>>

Perceptions and Use of Internet

In this section we are interested in learning about your perceptions and use of Internet for social interactions and connectedness. I will not ask you to reveal any specific personal information, just your opinions about different Internet tools and how you use them.

A. Let's start with **Email.**

***If participant ever mentions spam, ask what type of spam?*

1. What is your general perception of Email?
    a. Probe: *If they say, they like or dislike it, ask them to elaborate or explain why.*
2. Do you currently use Email?
    a. *If no,* why do you not use Email?
    b. *If yes,*
        i. What do you generally use Email for?
        ii. Are you more likely to send emails, receive emails, or do both happen almost equally?
            1. If unequal, ask why?

3. Is there anything that prevents you from using Email more actively than you currently do?
4. I want to learn about your opinions about the pros and cons of using Email.
    a. Let's first talk about what you like about Email.
        i. Anything else?
    b. Is there anything that you dislike about Email?
        i. Anything else?
5. Let's now talk about your likes and dislikes for the content of the Email. By content, I mean any information, messages, or attachments that are sent via Email.
    a. What types of content do you like to receive in your Email? Why?
    b. What types of content do you <u>not</u> like to receive in your Email? Why?
        a. If they mention SPAM, ask what type of SPAM?
    c. What types of content do you like to send via Email? Why?
    d. What types of content do you <u>not</u> like to send via Email? Why?

6. Do you have any suggestions about Email to make your experience better?

B. Let's now discuss **video-conferencing tools such as Skype, Face-time, or Google hangout.**

7. What is your general perception of video-conferencing tools?
    a. Probe: *If they say, they like or dislike it, ask them to elaborate or explain why.*
8. Do you currently use any video-conferencing tool?
    a. *If no,* why do you not use any video-conferencing tool?
    b. *If yes,*

i. Which tool do you use?
ii. What do you generally use it for?
iii. Are you more likely to start a video-call, get a video-call, or do both happen almost equally?
1. If unequal, ask why?

9. Is there anything that prevents you from using video-conferencing more actively than you currently do?

10. I want to learn about your opinions about the pros and cons of using video-conferencing?
    a. Let's first talk about what you like about video-conferencing.
        ii. Anything else?
    b. Is there anything that you dislike about video-conferencing?
        ii. Anything else?
11. Do you have any suggestions about video-conferencing to make your experience better?

C. Let's now discuss **social networking websites such as Facebook.**

12. What is your general perception of Facebook?
    a. Probe: *If they say, they like or dislike it, ask them to elaborate or explain why.*
13. Do you currently use Facebook?
    a. *If no,* why do you not use Facebook?
    b. *If yes,*
        i. What do you generally use it for?
        ii. Do you post things yourself, read other people's posts, or do both almost equally?
            1. If unequal, ask why?

14. People use Facebook in different ways and to varying extent. Here are the descriptions of 7 people who use or do not use Facebook. *Provide vignettes of 5 types of users (sporadic, lurker, socializer, debator, & active), and 2 non-users (i.e., lapsed & not-tried). Match gender of personas in all vignettes to the user. See attached laminated cards.*
    NOTE THEIR SELECTION!
    a. Which of these is most similar to you?
        i. Could you explain why you are most similar to ____?
        ii. Probe (only if needed): Why do you use Facebook like this person?

15. Is there anything that prevents you from using Facebook more actively than you currently do?

16. In your opinion, what are the pros and cons of using Facebook?

a. Let's first talk about what you like about Facebook.
   - Anything else?
b. Is there anything that you dislike about Facebook?
   - Anything else?

17. Let's now talk about your likes and dislikes for the **content** posted on Facebook. By content, I mean any information, messages, news, updates, photos, or videos shared on Facebook.
    a. What types of content do you like to see on Facebook?
    b. What types of content do you not like to see on Facebook?
    c. What types of content do you like to share or post on Facebook?
        a. Where do you share or post this on Facebook?
    d. What types of content do you not like to share or post on Facebook?

18. Do you have any suggestions about Facebook to make your experience better?

Once again, I am going to turn off the recorder, and ask you to complete two questionnaires.

Turn off recorder.

Communication via Internet Checklist

Through this checklist, we want to keep track of whom you communicate with via Internet.
In the left column is a list of people you may be communicating with via Internet. Please put a checkmark (✓) to indicate which Internet tool (i.e., email, video-conferencing, Facebook) you use to communicate with these people. For each group of people described, you can check **zero, one, or all** three boxes depending on if and how you communicate with them via Internet.

Social Networking Sites, Email, and Video-conferencing Use Questionnaire

Open this on the computer.
Through this questionnaire, we want to learn about your use of various Internet tools, the reasons why you use them and what prevents you from using them.

Break (Let's take a 10 minute break now).

Interview- Part 3 (Perceptions of living alone).

TURN ON RECORDER

1. You indicated in the questionnaire that you filled out earlier that you live alone. For how long have you been living alone?
2. How do you feel about living alone? *Probe:* Could you tell me more about that?
    a. Is there anything that you dislike about living alone?
        i. Anything else?

    b. Is there anything that you like about living alone?
        i. Anything else?
3. If you had the option, would you prefer to continue to live alone or live with someone?

With that we come to the end of this Interview. Do you have any other comments on things that we discussed today? *Turn off recorder.*

All PRISM questionnaires

I'll now request you to complete this final set of questionnaires.

1. Lubben Social Network
2. UCLA Loneliness Scale
3. Functional Health
4. Life-Space Questionnaire
5. Life Engagement Test
6. Interpersonal Support Evaluation List
7. Ten-item Personality Inventory

Debriefing

That concludes this session. I have a debriefing form for you. This will tell you about the goals of this research and a summary of what all we did today.

Compensation

Write participant's name on check and the receipt form. Get the person's signature on the form.

Here is a small token of thank you for your participation. Thank you!

APPENDIX G

CODING SCHEME FOR INTERVIEW ANALYSIS

Goal 1 (Living alone): To understand the experience of living alone in older age

Q1. Duration lived alone
Select the format that applies:

1. Number of years specified (e.g., 20 years),
2. Since the year specified (e.g., since 2005)
3. Qualitative labels (e.g., a very long time, since my spouse passed away)
4. Don't remember

Q2. Overall Perception of living alone
Select **one** from the following options:

1. Generally Positive
2. Generally Negative
3. Mixed or Neutral
4. Unclear (when you don't understand what the person meant)

Q3. Positive Aspects of living alone
Select all that apply:

1. Perceived in**dependence** (e.g., being able to do things without help, the feeling that one is not dependent on anyone else)
2. Perceived freedom of **choice** (i.e., less adjustment or compromise to pursue what one enjoys, such as favorite food, TV programs, preferred cleanliness levels, sleeping time, etc.)
3. Reduced responsibilities (e.g., don't have to cook for anyone or take care of anyone)
4. Less interpersonal conflict
5. Peace and quiet
6. Other (If you select "other", specify in parentheses what other reason was mentioned)

Q4. Negative Aspects of living alone
Select all that apply:

1. Lack of help/support with **non-health related** instrumental tasks (e.g., with chores, cleaning, getting to places, etc.)
2. **Health concerns** (e.g., when I am sick, I have no one to take care of me)
3. Loneliness (e.g., feeling lonely, alone, or left out, perceived lack of companionship, having no one to talk to)
4. Boredom (e.g., feeling bored, not having much to do)
5. Safety concerns (e.g., fear of a break-in, fear of falling)
6. Other (If you select "other", specify in parentheses what other reason was mentioned)

Q5. Conditional responses about living arrangement (living alone or with someone)
Select all that apply:

1. Fine now but concerned about future (e.g., if my health gets worse I might be able to live alone; I'll live alone till I can drive myself; I am getting older and my health may get worse)
2. Particular about who to live with (e.g., spouse, someone with shared interests) or not live with (e.g., children, relatives)
3. Particular about the living arrangement (e.g., can live with someone as long as I have my own quiet space)
4. Other (If you select "other", specify in parentheses what other reason was mentioned)

Q6. Preference to live Alone or With Someone?
Select **one** from the following options:

1. Alone
2. With Someone
3. Preference not clear

Goal 2 (Social life): To understand how older adults who live alone maintain their connectedness at the interpersonal and collective levels.

Q1. Family inner circle size
Write the number participant mentions. If he or she changed it at a later point, remember to update it here.

Q2. Connectedness tools/methods (specified for family inner circle)
Select all that apply:

1. In person visits (e.g., I visit them every now and then, they drop by every week)
2. Lunch/dinner meetings (e.g., at a restaurant)
3. Phone calls
4. Letters/cards (sent through mail)
5. Emails
6. Texting
7. Facebook (or other social networking sites)
8. Skype/Facetime/Google hangout
9. Through others (e.g., I stay connected with my daughter through my granddaughter)
10. Through an activity (e.g., we play cards together, I see her at the book club, we pray together)
11. Organized reunions/get-togethers (i.e., large-scale events rather than one on one meetings)
12. Other

Q3. Family outer circle size
Write the number participant mentions. If he or she changed it at a later point, remember to update it here.

Q4. Connectedness tools/methods (specified for family outer circle)
Select all that apply:

1. In person visits (e.g., I visit them every now and then, they drop by every week)
2. Lunch/dinner meetings (e.g., at a restaurant)
3. Phone calls
4. Letters/cards (sent through mail)
5. Emails
6. Texting
7. Facebook (or other social networking sites)
8. Skype/Facetime/Google hangout
9. Through others (e.g., I stay connected with my daughter through my granddaughter)
10. Through an activity (e.g., we play cards together, I see her at the book club, we pray together)
11. Organized reunions/get-togethers (i.e., large-scale events rather than one on one meetings)
12. Other

Q5. Friends inner circle size
Write the number participant mentions. If he or she changed it at a later point, remember to update it here.

Q6. Connectedness tools/methods (specified for friends inner circle)
Select all that apply:

1. In person visits (e.g., I visit them every now and then, they drop by every week)
2. Lunch/dinner meetings (e.g., at a restaurant)
3. Phone calls
4. Letters/cards (sent through mail)
5. Emails
6. Texting
7. Facebook (or other social networking sites)
8. Skype/Facetime/Google hangout
9. Through others (e.g., I stay connected with my daughter through my granddaughter)
10. Through an activity (e.g., we play cards together, I see her at the book club, we pray together)
11. Organized reunions/get-togethers (i.e., large-scale events rather than one on one meetings)
12. Other

Q7. Friends outer circle size
Write the number participant mentions. If he or she changed it at a later point, remember to update it here.

Q8. Connectedness tools/methods (specified for friends outer circle)
Select all that apply:

1. In person visits (e.g., I visit them every now and then, they drop by every week)
2. Lunch/dinner meetings (e.g., at a restaurant)
3. Phone calls
4. Letters/cards (sent through mail)
5. Emails
6. Texting
7. Facebook (or other social networking sites)
8. Skype/Facetime/Google hangout
9. Through others (e.g., I stay connected with my daughter through my granddaughter)
10. Through an activity (e.g., we play cards together, I see her at the book club, we pray together)
11. Organized reunions/get-togethers (i.e., large-scale events rather than one on one meetings)
12. Other

Q9. Reconnected with anyone in the last year or so?
Select: Yes/No

Q10. If reconnected, who was it?
Select all that apply:

1. Friend
2. Family
3. Relative
4. Ex-Colleague
5. Ex-Classmate
6. Acquaintance
7. Other (Please specify)

Q11. Reconnection tool/method
Select one:

1. Met accidentally
2. Through a letter/card
3. Through phone call/text
4. Through Email
5. Through Facebook
6. Through other Internet tools (besides Email and Facebook. Specify which tool).
7. Other (If other, specify the tool/method in parentheses)

Q12. Made any new friends?
Select: Yes/No

Q13. If yes, which age group the new friends belong to?
1. Someone younger
2. Someone older
3. Someone of similar age
4. Age unspecified

Q14. New friendship tool/method
Select all that apply:
1. Through a shared interest/activity (e.g., book club, member of the volunteering group I joined)
2. Through someone else (e.g., A introduced me to B)
3. Lives in the same neighborhood/community (note: select this response only when they specifically mention that the person lives in the same **area, building, or neighborhood**).
4. Through Email
5. Through Facebook
6. Through other Internet tools (besides Email and Facebook. Specify which tool).
7. Other (If other, specify the tool/method in parentheses)

Q15. **Any comments about strength of friendship?**
Note any comments about the strength of new friendship (e.g., they are not really friends, acquaintances or people I see often).

Q16. **Participation in neighborhood socializing?**
Select one.
1. No
2. Yes-somewhat active
3. Yes-very active

Q17. **Participation in religious activities?**
Select one.
1. No
2. Yes-somewhat active
3. Yes-very active

Q18. **Participation in any other organized groups?**
Select one.
1. No
2. Yes-somewhat active
3. Yes-very active

Q19. If response is yes for the previous question, write the type of organized group.

Q20. **Participation in any other social activities?**
Select one.

1. No
2. Yes-somewhat active
3. Yes-very active

Q21. If response is yes for the previous question, write the type of social activity.

Goal 3 (Role of technology): To understand the current role and potential of Internet-based social technologies in maintaining social connectedness

Q1. Use Email?
Select one:

1. Yes, use right now
2. No, but have used in the past
3. No, never used it

Q2. If currently use or have used in the past, what do/did you use Email for?
Select all that apply

1. Communication (e.g., keeping in touch with others)
2. Information (e.g., sharing or seeking information, facts, world news)
3. Entertainment (e.g., reading jokes, watching funny or entertaining videos)

Q3. Overall perception of Email
Select one:

1. Generally Positive
2. Generally Negative
3. Mixed/Neutral
4. Unclear (when you don't understand what the person meant)

Q4. Reasons for positive perceptions of Email
Select all that apply (for definition of each term, refer to the table at the end of the coding scheme):

1. Performance Expectancy
2. Effort Expectancy
3. Social Influence and Subjective Norm
4. Facilitating Conditions
5. Self-Efficacy
6. Anxiety
7. Trust - Privacy
8. Trust - Security
9. Affect

10. Personal Preference (to use the website a certain way, for a certain purpose, and/or for a certain amount of time)
11. Perceived Nature of Content or Information (too much, uninteresting, irrelevant, etc.)
12. Prior Experiences (with the same or similar technologies)
13. Current Knowledge or Skills
14. Other (please specify)

Q5. Reasons for negative perceptions

1. Performance Expectancy
2. Effort Expectancy
3. Social Influence and Subjective Norm
4. Impeding Conditions
5. Self-Efficacy
6. Anxiety
7. Trust - Privacy
8. Trust - Security
9. Affect
10. Personal Preference (to use the website a certain way, for a certain purpose, and/or for a certain amount of time)
11. Perceived Nature of Content or Information (too much, uninteresting, irrelevant, etc.)
12. Prior Experiences (with the same or similar technologies)
13. Current Knowledge or Skills
14. Other (please specify)

Q6. Type of content Email is suited for?

Q7. Type of content Email is not suited for?

Q8. Suggestions for improvement of Email.

Q9. Use Video conferencing?
Select one.

1. Yes, use right now
2. No, but have used in the past
3. No, never used it

Q10. If don't use it right now, reason for non-use?

1. Performance Expectancy
2. Effort Expectancy
3. Social Influence and Subjective Norm
4. Impeding Conditions
5. Self-Efficacy
6. Anxiety
7. Trust - Privacy

8. Trust - Security
9. Affect
10. Personal Preference (to use the website a certain way, for a certain purpose, and/or for a certain amount of time)
11. Perceived Nature of Content or Information (too much, uninteresting, irrelevant, etc.)
12. Prior Experiences (with the same or similar technologies)
13. Current Knowledge or Skills
14. Other (please specify)

Q11. If currently use or have used in the past, which video-conferencing tool do/did you use?

Q12. If currently use or have used in the past, what do/did you use Video-conferencing for?
Select all that apply

1. Communication (e.g., keeping in touch with others)
2. Information (e.g., sharing or seeking information, facts, world news)
3. Entertainment (e.g., reading jokes, watching funny or entertaining videos)

Q13. Overall perception of Video-conferencing
Select one:

1. Generally Positive
2. Generally Negative
3. Mixed/Neutral
4. Unclear (when you don't understand what the person meant)

Q14. Reasons for positive perceptions of video-conferencing
Select all that apply (for definition of each term, refer to the table at the end of the coding scheme):

1. Performance Expectancy
2. Effort Expectancy
3. Social Influence and Subjective Norm
4. Facilitating Conditions
5. Self-Efficacy
6. Anxiety
7. Trust - Privacy
8. Trust - Security
9. Affect
10. Personal Preference (to use the website a certain way, for a certain purpose, and/or for a certain amount of time)
11. Perceived Nature of Content or Information (too much, uninteresting, irrelevant, etc.)
12. Prior Experiences (with the same or similar technologies)
13. Current Knowledge or Skills
14. Other (please specify)

Q15. Reasons for negative perceptions of video-conferencing
Select all that apply

1. Performance Expectancy
2. Effort Expectancy
3. Social Influence and Subjective Norm
4. Impeding Conditions
5. Self-Efficacy
6. Anxiety
7. Trust - Privacy
8. Trust - Security
9. Affect
10. Personal Preference (to use the website a certain way, for a certain purpose, and/or for a certain amount of time)
11. Perceived Nature of Content or Information (too much, uninteresting, irrelevant, etc.)
12. Prior Experiences (with the same or similar technologies)
13. Current Knowledge or Skills
14. Other (please specify)

Q16. Suggestions for improvement of video-conferencing.

Q17. Use Facebook?
Select one.

1. Yes, use right now
2. No, but have used in the past
3. No, never used it

Q18. User/Non-User Persona
Select one: A, B, C, D, E, F or G?

Q19. If don't use it right now, reason for non-use?

1. Performance Expectancy
2. Effort Expectancy
3. Social Influence and Subjective Norm
4. Impeding Conditions
5. Self-Efficacy
6. Anxiety
7. Trust - Privacy
8. Trust - Security
9. Affect
10. Personal Preference (to use the website a certain way, for a certain purpose, and/or for a certain amount of time)
11. Perceived Nature of Content or Information (too much, uninteresting, irrelevant, etc.)
12. Prior Experiences (with the same or similar technologies)

13. Current Knowledge or Skills
14. Other (please specify)

Q20. If currently use or have used in the past, what do/did you use Facebook for? Select all that apply:

1. Communication (e.g., keeping in touch with others)
2. Information (e.g., sharing or seeking information, facts, world news)
3. Entertainment (e.g., reading jokes, watching funny or entertaining videos)

Q21. Overall perception of Facebook:

Select one:

1. Generally Positive
2. Generally Negative
3. Mixed/Neutral
4. Unclear (when you don't understand what the person meant)

Q22. Reasons for positive perceptions of Facebook?

Select all that apply (for definition of each term, refer to the table at the end of the coding scheme):

1. Performance Expectancy
2. Effort Expectancy
3. Social Influence and Subjective Norm
4. Facilitating Conditions
5. Self-Efficacy
6. Anxiety
7. Trust - Privacy
8. Trust - Security
9. Affect
10. Personal Preference (to use the website a certain way, for a certain purpose, and/or for a certain amount of time)
11. Perceived Nature of Content or Information (too much, uninteresting, irrelevant, etc.)
12. Prior Experiences (with the same or similar technologies)
13. Current Knowledge or Skills
14. Other (please specify)

Q23. Reasons for negative perceptions of Facebook?
Select all that apply

1. Performance Expectancy
2. Effort Expectancy
3. Social Influence and Subjective Norm
4. Impeding Conditions
5. Self-Efficacy
6. Anxiety
7. Trust - Privacy
8. Trust - Security

9. Affect
10. Personal Preference (to use the website a certain way, for a certain purpose, and/or for a certain amount of time)
11. Perceived Nature of Content or Information (too much, uninteresting, irrelevant, etc.)
12. Prior Experiences (with the same or similar technologies)
13. Current Knowledge or Skills
14. Other (please specify)

Q24. Type of content Facebook is suited for?

Q25. Type of content Facebook is not suited for?

Q26. Suggestions for improvement of Facebook.

Q27. Any other comments/remarks about the participant.

APPENDIX H

COMPARISON OF STUDY 1 AND 2 PARTICIPANTS

Across demographics variables, Study 2 sample had significantly more males and was significantly more educated than Study 1 participants (Table H.1). However, the two samples were similar in age and had similar proportions of non-white and white participants.

Table H.1. *Comparison of Study 1 and 2 Participants Across Categorical Variables*

		Study 1 (N = 300)		Study 2 (N = 48)		Chi-Square Test	
		Frequency	*%Proportion*	*Frequency*	*%Proportion*	χ^2	*p*
Gender	Male	66	22.0	17	35.4	4.10	.04
	Female	234	78.0	31	64.6		
Race	Non-white	119	39.7	19	39.6	<0.01	.99
	White	181	60.3	29	60.4		

Although Study 1 sample's loneliness mean was higher than that of Study 2 sample, the difference was not statistically significant (Table H.2). The two samples were also not significantly different in their levels of social isolation. However, Study 1 participants were significantly more *physically* isolated in that they moved around to less distances (measured by Life Space Questionnaire) than Study 2 participants. Study 1 sample also reported significantly worse health status across the dimensions of general health and physical functioning. The two samples did not appear to be different across personality measures. The breadth of technology experience of the two samples could not be compared because Study 2 participants were given a revised version of the technology experience questionnaire on which the number and types of technologies listed did not completely match with the version used in Study 1.

Table H.2. *Comparison of Study 1 and 2 Participants Across Continuous Variables*

	Study 1 (Non-Users of Internet)			**Study 2** (Users of Internet)			**T-tests**	
	N	***Mean***	***SD***	***N***	***Mean***	***SD***	***t***	***p***
Loneliness	293	39.40	9.97	48	37.73	7.74	1.11	.27
Isolation								
Social Isolation~	291	24.08	6.25	48	24.69	6.15	-0.63	.53
Physical Isolation~	290	5.75	1.39	48	6.31	1.09	-2.67	<.01
Health								
General Health#	298	1.87	0.88	48	1.52	0.92	2.54	.01
Physical Funct.	298	61.28	26.63	48	70.10	25.48	-2.14	.03
Emotional WB	298	79.27	17.17	48	83.25	11.83	-1.55	.12
Demographics								
Age	300	76.15	7.37	48	75.19	6.14	0.86	.39
Education	300	4.38	1.57	48	5.58	1.04	-5.12	<.01
Personality								
Extraversion	296	8.90	2.81	48	9.54	2.73	-1.47	.14
Agreeableness	296	12.10	2.02	48	11.73	1.95	1.18	.24
Conscientiousness	295	12.10	2.22	48	11.81	2.33	0.83	.40
Emotional Stab.	295	10.92	2.84	48	11.62	2.28	-1.62	.10
Openness to Exp.	295	11.13	2.45	43	10.98	2.27	0.38	.70
Tech Experience Breadth	287	12.78	4.84	48	21.12	6.69	--	--

~*Lower scores imply greater social and physical isolation*.

#*Lower scores imply better general health*.

APPENDIX I

FREQUENCY DISTRIBUTIONS OF NETWORK SIZES

Frequency distributions for family and friend network sizes are presented below for inner and outer circles.

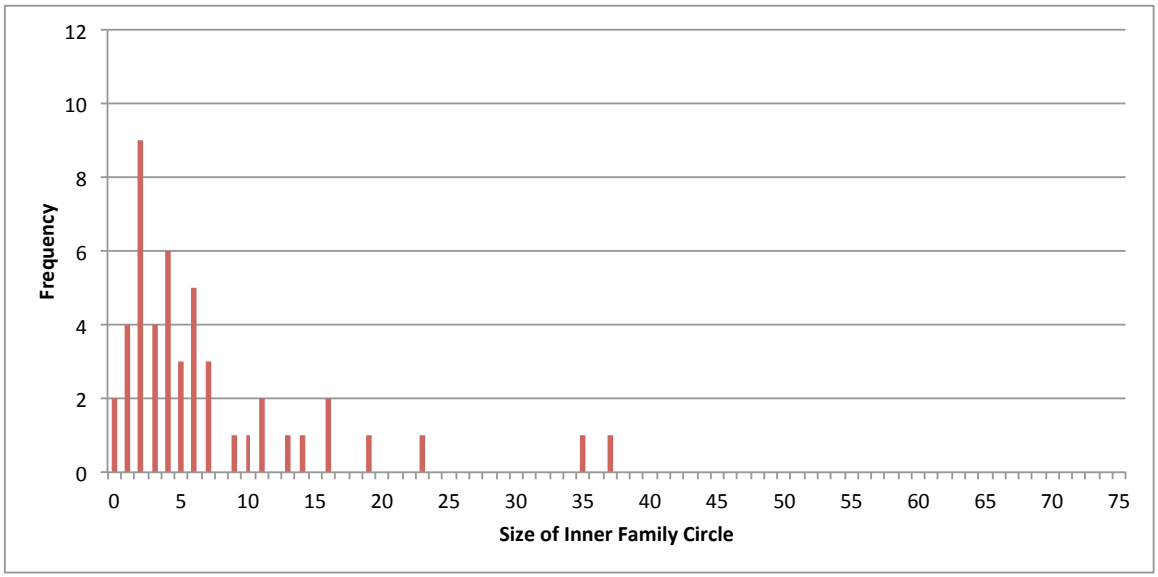


Figure I.1. Frequency distribution of inner family network size.

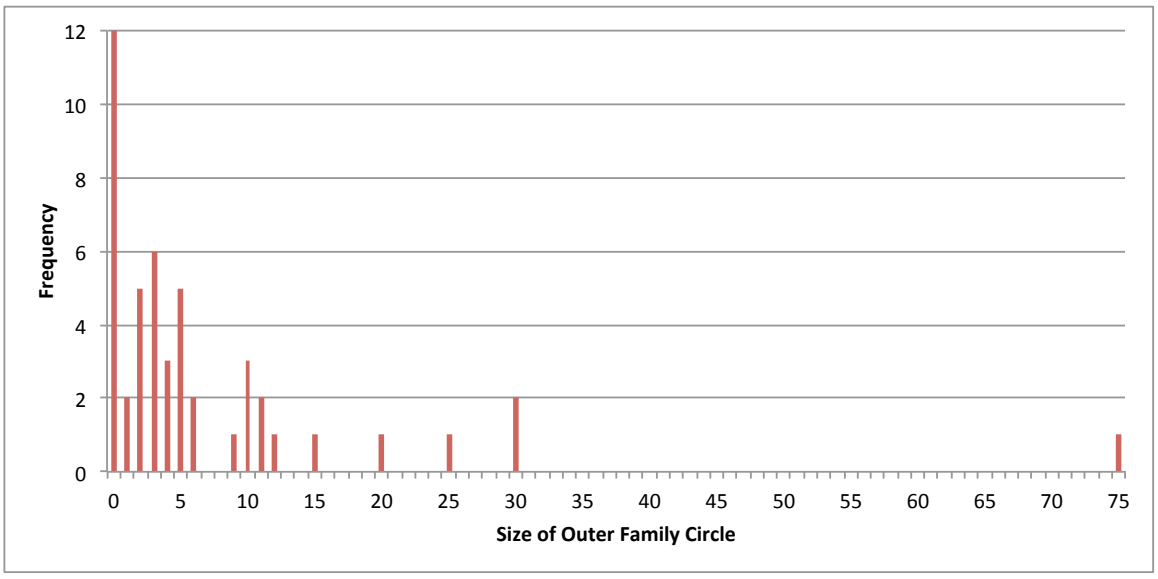


Figure I.2. Frequency distribution of outer family network size.

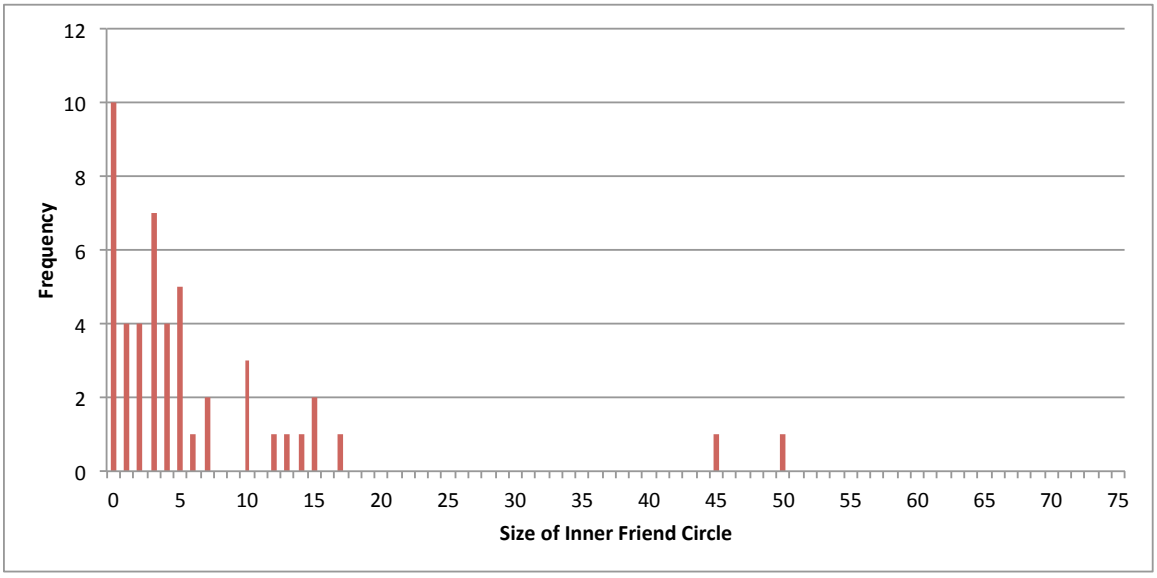


Figure I.3. Frequency distribution of inner friend network size.

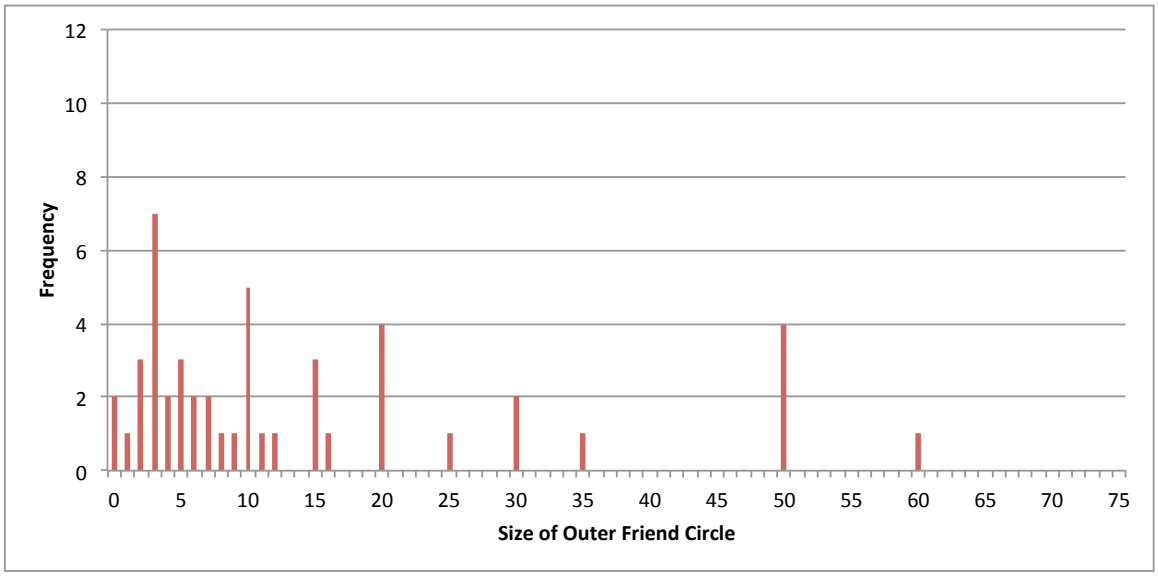


Figure I.4. Frequency distribution of outer friend network size.

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