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Getting Grandma Online: Are Tablets the Answer for Increasing Digital Inclusion for Older Adults in the U.S.?

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Abstract

Using information and communication technologies (ICTs) can improve older adults' quality of life. ICT use is associated with decreased feelings of loneliness and depression, along with increased feelings of independence and personal growth. However, limited access and low technological self-efficacy are key reasons why some groups, especially older adults, are excluded from being fully engaged in the digital world. In this study, we focus on older adults' technological self-efficacy, which is related to their actual use of technology and the second level digital divide. Specifically, we examine: 1) how older adults decide to use a new technology, tablet computers; 2) how they conquer the barrier of technological self-efficacy through using tablets; and 3) the impacts of using this new technology in their lives. Twenty-one in-depth interviews were conducted with older adults residing in independent living communities in a medium-sized city in the Deep South region of the United States. Observational and enactive learning played important roles for older adults in using tablets. Seeing others use tablets, getting recommendations from family members, or having tablets given to them were the primary reasons they started to use tablet computers. The ease of use feature of tablets helped solve the problem of lacking technological self-efficacy. Using tablets helped increase a sense of connectedness. Tablet computers may be one way to increase digital inclusion among older adults.

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Keywords

technology adoption; digital inclusion; digital divide; social cognitive theory; tablets; older adults

OLDER ADULTS AND NEW TECHNOLOGIES

The purpose of this study is to examine older adults' technology adoption in order to narrow the gap of technology use, also known as the digital divide, between older adults and younger generations. The divide is complicated and dynamic (Van Dijk & Hacker, 2003). It generally refers to "the gap between those who do and those who do not have access to new forms of information technology" (Van Dijk, 2006, 221-222). This gap has been found to be highly related to demographic factors, such as population density (rural/urban), education, race, gender, and age (NTIA, 2011, 2013). Education and income are positively related to new technology adoption, while population density and age are negatively related to new technology adoption (Belloc, Nicita, & Alessandra, 2012). Recently, the definition of digital divide has been extended to the gap in digital skills (also known as the second level digital divide) (Van Dijk, 2006). These same relationships are frequently found among those who are digitally proficient, having overcome the second digital divide which focuses on skills and abilities using technologies.

A major factor that affects the quality of life for older adults is the increased isolation that comes from decreasing mobility as well as possible cognitive, vision, or hearing impairments (Bradley & Poppen, 2003; Schulz, Beach, Tabolt-Matthews, Courtney & Dabbs, 2012; Metz, 2000). Increasing numbers of researchers and health care providers are seeing the potential in the benefits of older adults having access to networks of support through the Internet (Baker, 2013; Winstead et al., 2013). This could provide older adults with a variety of resources as wide ranging as forums that provide health information, to networks of friends sharing their favorite jokes, pictures, and humorous stories. Nevertheless, despite the massive potential benefits of having older adults go online, they remain the section of the population that is the least likely to have access to and use the Internet (Baker, 2013). If the digital divide for older adults is ever going to be turned into digital inclusion, the unique needs and limitations of this population in adopting technology should be better understood.

Many studies have been done with regard to the digital divide on technology access. However, simply having access to the technologies does not necessarily lead to the actual technology use and adoption. Therefore, this study focuses on the second-level digital divide, which is related to the actual use and skills in use of technologies, not simply access. Researchers suggest that one way of keeping older adults engaged and maintaining well-being as they age is to decrease this second level digital divide. For example, growing evidence indicates that using information and communication technologies (ICTs) can improve older adults' quality of life in many ways (Berkowsky, 2012; Chaumon, Michel, Bernard, & Croisile, 2013; Chen & Persson, 2002; Nef, Ganea, Muri, & Mosimann, 2013; Winstead et al., 2013; White et al., 2002). ICT use is associated with decreased feelings of depression (Cotten, Ford, Ford & Hale, 2012; 2014), loneliness (Cotten, Anderson, & McCullough, 2013; Sum, Mathews, Hughes, & Campbell, 2008), and stress (Wright, 2000),

along with increased feelings of independence and personal growth (Czaja et al., 2006). Even for older adults in the higher age brackets, such as those over 80, using ICTs can help them with social stimulation and feeling connected with others (Chaumon et al., 2013; Gatto, & Tak, 2008).

Despite these potential affordances, older adults have the lowest computer ownership and Internet use for any age group (Carpenter & Buday, 2006; File, 2013; ILSTV, 2014; Telecentre Europe, 2011). Looking at the distribution of Internet users around the world, there were fewer older adults (age 55 and older) Internet users than any other age group: 12.7% of Internet users were over 55 years old, 26.7% were between 25-34 years old, 26.5% were between 15-24 years old, 20.4% were between 35-44 years old, and 13.7% were 45-54 years old (Statistica, 2014). High financial outlay, as well as low technological self-efficacy are key reasons why some groups, especially older adults, have been excluded from the digital world (Barnard, Bradley, Hodgson, & Lloyd, 2013; Carpenter & Buday, 2007; Lam & Lee, 2006; Morris, Goodman, & Brading, 2007). For example, approximately 39% of older adults with a household income of over \$75,000 had tablet computers, while less than 16% of those with incomes less than \$50,000 and only 8% of those with incomes less than \$30,000 owned tablets (Smith, 2014).

The differences in ICT use between younger and older adults could be a result of differences in their attitudes towards computers (Charness & Boot, 2009; Ellis & Allaire, 1999; Melenhorst, Rogers, & Caylor, 2001; Selwyn, 2004) or their confidence in using technology (Blit-Cohen & Litwin, 2004; Mitzner et al., 2010). To deal with these issues, the availability of help and support is also important to older adults' acceptance and use of a technology (Tsai, Shillair, & Cotten, 2014; Wang, Rau, & Salvendy, 2011; Xie, 2007). In addition to these personal attributes, the usability of a technology—users' satisfaction with the ease of use of the devices—also has an impact on older adults' decision to use a technology (Barnard et al., 2013; Carpenter & Buday, 2007; Nef et al., 2013; Wagner, Hassanein, & Head, 2010). For example, a recent study on tablet computer adoption found that perceived usefulness and enjoyment are positively related to attitudes toward tablet computers, while attitudes and social influence affect the intention to use tablet computers (Hur, Kim, & Kim, 2014). Perceived usefulness and ease of use are also important for older adults when adopting a new technology (Mitzner et al., 2010; Weatherall, 2000). Perceived ease of use had greater influence on attitudes for older adults and females, while perceived usefulness had greater impact on attitudes for younger adults.

Related to these two concepts, expected outcomes are found to be important to older adults' decision-making about using a technology (Lam & Lee, 2006). The perception of whether using an ICT has enough advantages and relevance to older adults is critical to their adoption of a certain technology (Selwyn, Gorard, Furlong, & Madden, 2003; Selwyn, 2004). In line with these, the lack of interest, cost, ergonomic impediments, complexity (Carpenter & Buday, 2007), and the lack of knowledge (Gitlow, 2014) are the main barriers for older adults to use new technologies. Age and gender moderated the relationship between perceived ease of use and attitudes towards using a tablet computer. However, past studies that applied social cognitive theories have found that these demographic factors (e.g., age and gender) are not sole determinants with regard to ICT adoption. Other factors such as

self-efficacy and expected outcomes of using a certain technology can explain technology adoption better than these demographic factors (e.g., LaRose et al., 2012). For example, factors affecting broadband adoption are not simply urban/rural, education, gender, or age, but whether people have the opportunities to learn, and whether they have the confidence to use the new technology that determines their use of the technology (Hernández-Encuentra, Pousada, & Gómez-Zúñiga, 2009; LaRose, et al., 2012).

Technological self-efficacy (Lam & Lee, 2006)—the belief in one's own ability to use new technologies, or the anxiety with the new technology, has been found an important barrier for older adults' technology adoption (Charness & Boot, 2009; Lam & Lee, 2006; Vroman, Arthanat, & Lysack, 2015). Since many older adults did not use a computer in their workplace before retiring, their technical skills are frequently limited (Barnard et al., 2013). On the other hand, younger retirees might have used computers extensively at work and they may not see the potential of using ICTs for enjoyment. As technology is often perceived as difficult to master, and older adults have had little chance to integrate ICTs into their lives, their belief in their ability to learn how to integrate ICTs later in life, or their self-efficacy of ICT use would be low. However, the growing popularity of a relatively new device, the tablet computer (Smith, 2014), may be greatly changing perceptions of ICT usefulness and ease of usage.

In order to understand older adults' technology adoption, we use a model that integrates the diffusion of innovation (DoI) paradigm and social cognitive theory: the social cognitive theory of innovation adoption (LaRose et al., 2012; LaRose, Gregg, Strover, Straubhaar, & Carpenter, 2007). However, our main goal for this study is not to test these theories, but rather to use them to provide a framework for a better understanding of ICT adoption among older adults. In particular, we can also examine whether this theory can be applied to older adults' use of tablet computers to overcome the second level digital divide.

Social Cognitive Theory of Innovation Adoption

Social cognitive theory (SCT) (Bandura, 1986; 1994) has been applied to technology adoption, with prior experiences of using the technology, expected outcomes, self-efficacy, enactive learning, and observational learning as important predictors of the intention to use a technology (Lam & Lee, 2006; LaRose et al., 2007, 2012; LaRose & Eastin, 2004). These concepts were equated with concepts in DoI (Rogers, 2003): prior experiences as compatibility, expected outcomes as the relative advantage, self-efficacy as complexity, enactive learning as trialability, and observational learning as observability (LaRose et al., 2007). However, DoI focuses on the features of the technologies, instead of the users. In contrast, SCT emphasizes the characteristics of users. In this study, we focus on older adults' technology adoption, hence we lean towards the user-centered approach, the SCT approach, instead of solely focusing on the technology-centered approach (DoI).

According to SCT, self-efficacy, the perceived belief in one's ability to perform a specific behavior, will affect one's performance of the behavior and the level of anxiety (Bandura, 1982, 1986, 1988, 1997). Self-efficacy is associated with older adults' technology adoption (Charness & Boot, 2009; Lam & Lee, 2006). A longitudinal study that applied SCT to older adults' (over age 55) technology adoption confirmed the impacts of Internet self-efficacy

and expected outcomes on their intention to use computers (Lam & Lee, 2006). Observational learning, defined as people learning from observing others' experiences, is also a key element in SCT. This is in contrast to enactive learning, where people learn from their own experiences (LaRose et al., 2007). For older adults to consider adopting a new technology, most would not have the common route of exposure that younger populations have, such as in the workplace or through an educational setting. This may be a key factor for low acquisition among older adults. Therefore, we seek to gain insight on the process that older adults go through as they decide to acquire a new technology, tablet computers.

Research Questions

To explore how dimensions of these theories affect older adults' computer adoption, three research questions are addressed.

- 1) How do older adults decide to acquire tablet computers?
- 2) How do older adults conquer the barrier of lacking technological self-efficacy surrounding tablet computers?
- 3) What are the impacts of using tablet computers in older adults' lives?

METHODS AND SAMPLE

Twenty-one semi-structured interviews were conducted with older adults in independent living communities in a medium-sized city in the Southeastern United States. Participants were recruited through a combination of convenience and snowball sampling techniques. They had to own a tablet computer in order to participate in the study. Subjects were given \$20 for participating. The semi-structured interviews were designed to examine how older adults learn to use and the ways in which they use their tablets. Questions crafted to encourage discussion about key constructs allowed elaboration by the participants. Each interview lasted for about 30 minutes. Our main questions for this analysis included how respondents acquired their tablets, their prior computer experiences, what they liked most/least about their tablet computers, what had been the hardest issues in learning to use them, what they used the tablets for, and how they felt about being tablet owners/users. Interviews were recorded and transcribed.

Data Analysis

The transcripts of the interviews were coded based on the structure of the interviews and a code book was developed accordingly. The basic areas of inquiry asked: 1) how they acquired the device, 2) how they learned to use it, 3) what they like about the device, 4) what they did not like about the device, 5) where they used the device, 6) how they used the device, 7) how they connected with the Internet, 8) how friends and family felt about them using the device, and 9) how using the device made them feel. The coding scheme was developed by extracting the common themes for the nine areas mentioned above. Two trained researchers independently coded the transcripts. A sample of the interviews were coded to check the inter-coder agreement. Inter-coder agreement on the test cases was .84 (84%) and the Cohen's Kappa was .68. The remainder of the cases were carefully coded with any further questions about coding being discussed until consensus was reached.

RESULTS

Sample Characteristics

The 21 participants' age ranged from 69 to 91 years old; nine were male and twelve were female. They either owned an iPad (15 of them owned an iPad, 2 owned mini iPads) or a Kindle Fire (4 of them owned Kindle Fires) (see Table 1). Their experience with technology varied widely. A few of them ($n = 4$) had used computers extensively in their work or worked for a technology company before retiring. Most of the participants had only minimal experience with computers, knowing how to check their email and write a text document. A few ($n = 4$) spoke in detail about their frustration with using computers. Pseudonyms are used in reporting results to protect participants' privacy.

How Older Adults Decide to Acquire Tablet Computers

For the first research question in this study, how older adults decide to acquire tablet computers, 38% ($n = 8$) of the older adults received their tablets from their families, others bought their tablets because their families or friends recommended them to buy these tablets (see Table 2). A few ($n = 3$) liked them so much that they bought them as gifts for others. Four people (19%) tried others' tablets and liked them, so they decided to buy tablets for themselves. The same number made the purchase decision as a result of recommendations by others. About half (47%, $n = 10$) saw others using them, and as a result decided to purchase the devices. The influence of family members and observational learning were crucial in the decision to adopt. Combining the three major influences: seeing others using tablets, getting recommendations by others, and trying them out themselves accounted for 76% ($n = 16$) of the decisions. Surprisingly, the weakest of these factors was trying them out themselves (19%, $n = 4$). This might be because they are relatively new products and not as widely used among the participants' friends and family. Another relevant factor for not having the opportunity to personally test the devices is that those who own tablets may not be eager to let others test them. A few of the participants specifically mentioned they did not like others using their tablets since they were concerned that settings would be changed, or "messed up."

Most of the participants were at least somewhat happy to get their new devices. However, two individuals were initially quite resistant to acquiring a tablet computer. Dan, an 81-year-old technical expert who was a pioneer in the computing industry, did not want another computing device, but after using his tablet, felt that it was indispensable. He stated, "if I had to lose everything, take everything I've got, but leave me my iPad." Esther had wanted a smart phone, but got an iPad as a gift from her children. She shared that at first she was disappointed, but over time she realized the wisdom of the purchase. She has arthritis and limited mobility in her hands as well as some visual limitations, so she said the device size and screen size were optimal for her use and now she was very happy with it. For these individuals, it was only through using the devices that they came to see how useful it was for their daily life. To summarize, for this sample of older adults, the combination of either seeing others use the tablet devices or having a meaningful social network member in their life recommend the product were major factors in their decision to acquire the tablet computer.

Overcoming the Barriers of Technological Self-Efficacy

For the second research question, how older adults conquer the technological self-efficacy surrounding tablets, we found that most of the participants (62%, $n=13$) said the design of the iPad or Kindle was so intuitive that it was easy to use. This was true even among those who discussed that they had struggled with self-efficacy in learning how to use computers (19%, $n=4$). Several mentioned their self confidence in using the tablet devices, even if they had only had them a short while. Mary, who is 89 years old, captured this sentiment well when she said, “I feel like I could master this.” Connie mentioned, “Well, I just feel like this shows that I am not an idiot at 77, that I have a brain. It shows other people that I can still communicate the way they do.” Fred, 84-years-old, thought using a tablet made him feel more connected and “not stupid.” Perhaps a major reason for the sense of self-efficacy in approaching the iPad and Kindle devices is the simplicity of the interface and its intuitive interaction. Sarah, 69-years-old, mentioned: “the main thing is to not be afraid.” These results illustrate that learning to use tablets also helps connect these older adults to the larger, technologically based world.

The design, especially of the iPad, which 87% ($n = 18$) of the participants owned, was frequently (62%, $n = 13$) spoken of as easy to use and not intimidating. Participants discussed how instead of having to learn a complex series of steps to accomplish a task, with the tablet devices they only needed a few swipes of the finger. This increased ease of use, or usability, and also increased the participants’ confidence in doing tasks and, in turn, their self-efficacy. This was quite a contrast to many of the subjects’ attitudes towards computers. When Sam, who is 90 years old, was asked about trying something new on his computer, “I would try and try, and finally I would have to just reach up and turn it off I would get so disgusted.” However, when he talked about his iPad, “I don’t know what to do with it...but I love every minute of it.” Anna said, “It was so hard to try new things on the computer. [I would] worry about getting back to where I was before.” She also said, “It’s not like I felt about the computer, which only brought on anxiety.” Another participant, Grace, mentioned: “I will say one thing, I had a much more positive view of it than I ever had of the computer;” she also said, “Never one time [have I] felt that I was scared of it.”

The main reason that these older adults did not lack self-efficacy in regards to tablet computers is related to a specific feature of tablet computers – the ease of use. The very nature of tablet computers make them less constrained and intimidating than traditional computers. Instead of being restricted to a formal desk or tabletop with a large machine whirring on top, a tablet can be held in one’s hand and taken to a comfortable location to learn to use. Most of the older adults talked extensively about how much they appreciated the convenience (62%, $n = 13$), size (47%, $n = 10$), and/or portability (76%, $n = 16$) of tablets. Many also talked about how much they appreciated being able to sit wherever they wanted when using their tablet. Instead of having to sit at a desk, they could sit in their favorite chair to read on their device or send messages. George summarized it as, “I like being able to sit in my chair, pick it up, see who sent me an email or to research something.” As far as portability, a majority (76%, $n = 16$) of the participants specifically mentioned how nice it was to be able to easily take the device from room to room throughout the house. Even though most of the participants used their tablet devices primarily at home, many of

them (67%, $n = 14$) mentioned they had taken the tablets to places such as a relative's house when visiting for an extended stay, or at a doctor's office when waiting for an appointment.

The Impacts of Using Tablet Computers

Participants were asked several questions about the impact of using the iPads and or Kindle devices on their lives. Using tablets made older adults feel connected to the world and to their families, as well as more current and able to keep up with trends.

Feeling connected

For 90% of the older adults ($n = 19$), using tablets made them feel more connected either to the world and/or to their families. Emma, who is 75-years-old, discussed how this new technology allowed her to connect with her family, "My granddaughter called me the other day [on the tablet] to tell me she had pulled a tooth and I could sit here and see my granddaughters and talk to them." About a third (34%, $n=7$) mentioned that they enjoyed the ability to go beyond telephone calls and interact through Facetime or Skype. Most of the subjects also discussed how the tablets allowed them to easily read emails or share pictures with family and close friends. Harold stated:

"I feel more informed; I feel I'm in more contact with my family. I just enjoy it a great deal...for daily news and keeping up with our friends. We've lived in many places all our lives and this is an easy way to keep up."

The ease of connecting with others was mentioned frequently. Dan mentioned how long it took him to wait for his computer to turn on and load up; with the iPad he could quickly look at his latest messages with very little effort.

This sense of connectedness went beyond just family and friends. It also extended to feeling of being connected to the rest of the world and less isolated. Almost all of the participants (80%, $n=17$) used various apps that allowed them to do things such as reading e-books, following news events, checking the weather, or searching for information. Most of our participants expressed positive changes that they had experienced as a result of using tablet computers. As Henry, who is 95 years old and considered his iPad a "foreign object" at the beginning, mentioned, "Oh yes... to the world... It's good when you get old, instead of staying in your own little silly world, because it can get silly.... I get all of these now that I have all the different apps and you get a wealth of information on keeping up with technology, all of those things are just great."

Walter also stated, "It makes me understand a little bit more when people are talking [about] ... for example, downloading books or doing things like this." Connie said, "I feel like I'm connected to the world." Social networks were also frequently mentioned as a way that interviewees connected with others. Grace also said, "I learn so much about my friends and relatives and if I didn't have Facebook, I wouldn't [know]... That's one of the main things I enjoy."

Feeling current

Using tablets also made older adults feel more current (57%, n=12), as George described, “It does ... make me feel like you’re in real time.” Sam said, “When I’m around people, it basically it comes out about my computer or my iPhone or my iPad...I want to get in there and have a little conversation.” Emma said, “I don’t feel like I just stepped off of Noah’s Ark.” Similarly, Irene, 86-years-old, mentioned, “Well, I feel like I’ve come up in the world, because I had always said that I would never learn to use a computer... I didn’t even want to! But I have enjoyed this.” Carol, 80-years-old, said she felt more “modern... I’m up to par with other people.” Mary, who is 89-years-old, mentioned that she felt like she was “coming into the 21st Century.”

Many older adults received positive comments from their family members for using these tablet computers. As Bill described, “they keep saying they’re amazed. Grandpa, you’ve done this, Grandpa, you’ve done that. ‘How did you learn to do that?’ and so forth... They love it.” Similarly, Anna also mentioned, “they are real pleased that I have it, and it’s so nice to be able to talk to my 19-year old-grandson.” Connie also said, “They’re very excited because they didn’t think I’d ever do this. They didn’t think I wanted anything to do with modern technology.” These positive comments made these older adults feel better about themselves and more current in today’s society.

Keeping up with special interests

One of the issues that became apparent through the interviews was the wide range of experiences and interests that the older adults possessed. An additional feature of the tablet devices was the diversity of apps available. Many mentioned that they used apps that were personally beneficial. These included apps for: weather, devotional studies, special interests, sports, and health monitoring.

Laura, a 72-year-old woman, proclaimed, “I just like it. I feel [it] really gives me something to look forward to, and I don’t feel frustrated the way I did years ago when I started on the computer.” They also discussed how refreshing it was to be able to easily search for information and keep up with personal interests. As Grace said, “I just enjoyed mine, you know...to look up things that I want to know more about, like art things...maybe some art site that I want to see, or look up a better museum or that kind of thing.” Henry summed it up with, “I think it makes me more content. When I get bored, I can always think of the iPad and see what’s going on.”

DISCUSSION

Summarizing the findings for each research question: 1) older adults in this study usually decided to acquire tablets after seeing others use them, or as a result of recommendation by family members or close friends; 2) lack of self-efficacy in using technology was not seen as a barrier by the subjects; many of them had some prior experience with computers and felt tablet devices were much easier to use. They had no serious problems in learning how to perform basic functions of the devices; 3) the impacts in their lives were profound in helping them feel connected, current, and more content. All of the participants reported being happy

with their tablet devices, and many had recommended them for others. This was despite almost a third of the interviewees having reported that they had a difficult time learning how to use computers (33%, $N = 7$). Those who said they felt confident in using computers sometimes did not initially see the need for another computing device. However, once they tried the iPads or Kindles, they were some of the strongest supporters. As Sarah, a 69-year-old woman, mentioned, “I think the older community should have it...everyone should have a tablet as opposed to a laptop or computer.”

One of the key elements to older adults gaining technological proficiency by using these devices is the ease of use with tablet computers. Ease of use is associated with the self-efficacy concept in SCT. However, it is not specifically emphasized in SCT. Other theories, like the technology acceptance model (TAM; Davis, Bagozzi, & Warshaw, 1989) and the unified theory of the adoption and utilization of technology (UTAUT, Venkatesh, Morris, Davis, & Davis, 2003; Venkatesh et al., 2012) specify similar concepts as important predictors to technology use. According to TAM, a person’s intention to adopt a technology is determined by one’s attitudes toward using the technology. These attitudes toward usage are influenced by personal beliefs about a technology, which in turn are influenced by the perceived usefulness and ease of use (Venkatesh & Davis, 2000) of a technology. In UTAUT, the term for ease of use is effort expectancy. In our study, the participants viewed the tablets as not intimidating and something they felt they could master. Therefore, for older adults who own tablet computers in this sample, a lack of self-efficacy was not a strong barrier for them to use this new technology. This is in line with TAM, UTAUT, and SCT. When a new technology is easy to use (such as a tablet computer), and people have higher perceived self-efficacy in using the new technology, they will have higher intention to use the new technology (Lam & Lee, 2006; Mitzner et al., 2010).

Past studies have found that the expected outcomes of using a technology are important for technology adoption (e.g., Lam & Lee, 2006). However, few studies have examined how to improve the perception of expected outcomes for older adults. In this study, what was seen as particularly salient was SCT’s concept of observational learning in the decision to adopt, and how it related to positive expected outcomes. Through their own observations, they saw that the tablets looked easy to use, and had great potential for personal benefit. By observing others using tablet computers (observational learning), older adults gained positive expected outcomes (had higher perceived usefulness) about using tablet computers.

The older adults themselves were the most ardent promoters of their devices. Several mentioned they “love” or “like” their tablets. Others felt that wider adoption would help their peers. As Martha said, “I think that older people should get one of these...because it puts you in touch with today... it is just available to you all the time ...” Many had transferred almost all of their computing activities to their iPads. Many had similar sentiments to Dan, our computer expert, who said, “I think I’m almost certain to do away with my computer. What do I need it for?”

Tablet devices have the potential to become indispensable in connecting older adults to health information, communication, and feeling connected to the outside world. As Dan had declared, “if I had to lose everything, take everything I’ve got, but leave me my iPad.”

Limitations and Future Research

In this study, twenty-one interviews were conducted to examine older adults' gains in technological proficiency through tablet computer adoption. Overall, even though this research was conducted with a small sample, the findings indicate the potential for using tablets to make a substantial difference in the lives of older adults. Given the tremendous gains of comfort in using technology and the increased experiences of the affordances of technology by this older adult sample, tablet computers could be one way to increase digital inclusion. Future research should investigate the potential of wider adoption, especially with populations that do not have experience with technology and those in different types of living environments. Furthermore, the devices show special promise to those who suffer from limited mobility, arthritis, or visual problems as reported by many of these participants.

While this study yielded important findings regarding how older adults in this sample learn to use tablet computers and the perceived impacts of this use in their lives, there are some limitations of this study. The sample was recruited from independent living communities. Individuals typically move into these communities due to some type of limitation in activities of daily living. Thus, these older adults may be different from older adults in the larger community. In addition, being able to afford the fees to reside in assisted living communities suggests that the participants in this study might have slightly higher socioeconomic status than older adults in other types of settings and limits the generalizability of the findings in the present study. However, generalizability is not our major concern in this study. By using a qualitative interviews approach, our main purpose is to gain a deeper understanding of older adults' use of tablet computers and how the findings can help inform future study and theoretical framework development. It would be helpful for future researchers to use a combination of methods, such as observations and surveys, to explore the generalizability of the findings of this study.

In addition, the participants in this study had to have a tablet computer in order to participate. Therefore, the focus of this study is not about how they "adopt a completely new technology for the first time." Perhaps not all older adults will have the ability or desire to adopt the latest technology and perhaps that is a self-efficacy issue, but self-efficacy might be less of a problem for adopting new, more accessible technologies when they have already adopted another kind. This study sheds light on our understanding of their actual use and perceptions of a new technology. Future studies should explore older adults' use of other new technologies from their first receipt of the technology through an extended period of time to have a more comprehensive understanding of their use of new technologies in general.

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Appendix A

Name (Pseudonym)	Gender	Age	Type of device	Method of acquisition
Fred	M	84	Mini iPad (had a Kindle before)	Bought
Harold	M	n/a	iPad (had a Kindle before)	Bought
Carol	F	70s	iPad (and a Kindle for reading)	Bought
Henry	M	95	iPad (and a Kindle for reading)	Gift
Martha	F	n/a	iPad	Gift
Irene	F	86	Mini iPad	Gift
Connie	F	77	Kindle Fire	Bought
George	M	n/a	iPad	Bought
Walt	M	n/a	Kindle Fire	Bought
Elsa	F	n/a	iPad	Bought
Bernie	M	n/a	iPad	Bought
Laura	F	72	Kindle Fire	Bought (bought additional ones as gifts for others)
Sam	M	90	iPad	Bought (bought additional ones as gifts for others)
Esther	F	82	iPad	Gift
Mary	F	89	iPad	Bought
Dan	M	81	iPad	Gift
Sarah	F	69	iPad	Bought (bought additional ones as gifts for others)
Bill	M	90	iPad	Gift
Emma	F	75	iPad	Gift
Anna	F	n/a	iPad	Bought
Grace	F	n/a	iPad	Gift

REFERENCES

- Ajzen, I. From intentions to actions: A theory of planned behavior. In: Kuhl, J.; Beckmann, J., editors. *Action-control: From cognition to behavior*. Springer; Heidelberg: 1985. p. 11-39.
- Ajzen I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*. 1991; 50:179–211.
- Baker C. A connection for all ages: Enabling the benefits of high-speed Internet access for older adults. AARP Public Policy Institute. 2013; (79):18.
- Bandura A. Self-efficacy mechanism in human agency. *American psychologist*. 1982; 37(2):121–147.
- Bandura, A. *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall; Englewood Cliffs, NJ: 1986.
- Bandura A. Self-efficacy conception of anxiety. *Anxiety research*. 1988; 1(2):77–98.

- Bandura, A. Social cognitive theory of mass communication. In: Bryant, J.; Zillman, D., editors. *Media effects: Advances in theory and research*. Lawrence Erlbaum; Hillsdale, NJ: 1994. p. 61-89.
- Bandura, A. *Self-efficacy: The exercise of control*. Freeman; New York: 1997.
- Barnard Y, Bradley MD, Hodgson F, Lloyd AD. Learning to use new technologies by older adults: Perceived difficulties, experimentation behaviour and usability. *Computers in Human Behavior*. 2013; 29(4):1715–1724. doi: 10.1016/j.chb.2013.02.006.
- Belloc F, Nicita A, Alessandra Rossi M. Whither policy design for broadband penetration? Evidence from 30 OECD countries. *Telecommunications Policy*. 2012; 36(5):382–398. doi: 10.1016/j.telpol.2011.11.023.
- Berkowsky, RW. *Internet use, social integration, and psychological well-being in older adults*. University of Alabama at Birmingham; Birmingham, AL: 2012. Unpublished masters thesis
- Bernard M, Phillips J. The challenge of ageing in tomorrow's Britain. *Ageing and Society*. 2000; 20(1):33–54. doi: 10.1016/j.chb.2013.02.006.
- Blit-Cohen E, Litwin H. Elder participation in cyberspace: A qualitative analysis of Israeli retirees. *Journal of Aging Studies*. 2004; 18(4):385–398. doi:10.1016/j.jaging.2004.06.007.
- Bradley N, Poppen W. Assistive technology, computers and internet may decrease sense of isolation for homebound elderly and disabled persons. *Technology and Disability*. 2003; 15(1):19–25.
- Carpenter BD, Buday S. Computer use among older adults in a naturally occurring retirement community. *Computers in Human Behavior*. 2007; 23(6):3012–3024.
- Charness N, Boot WR. Aging and information technology use potential and barriers. *Current Directions in Psychological Science*. 2009; 18(5):253–258. doi: 10.1111/j.1467-8721.2009.01647.x.
- Chaumon MEB, Michel C, Bernard FT, Croisile B. Can ICT improve the quality of life of elderly adults living in residential home care units? From actual impacts to hidden artefacts. *Behaviour & Information Technology*. 2013:1–17. ahead-of-print. doi: 10.1080/0144929X.2013.832382.
- Chen Y, Persson A. Internet use among young and older adults: Relation to psychological well-being. *Educational Gerontology*. 2002; 28:731–744. doi: 10.1080/03601270290099921.
- Chou C-C, Chang C-P, Lee T-T, Chou H-F, Mills ME. Technology acceptance and quality of life of the elderly in a telecare program. *Computers, Informatics, Nursing: CIN*. 2013; 31(7):335–42. doi: 10.1097/NXN.0b013e318295e5ce.
- Cotten SR, Ford G, Ford S, Hale TM. Internet use and depression among older adults. *Computers in Human Behavior*. 2012; 28(2):496–499. doi:10.1016/j.chb.2011.10.021.
- Cotten SR, Ford G, Ford S, Hale TM. Internet Use and Depression Among Retired Older Adults in the United States: A Longitudinal Analysis. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*. 2014 doi:10.1093/geronb/gbu018.
- Cotten SR, Anderson WA, McCullough BM. Impact of internet use on loneliness and contact with others among older adults: Cross-sectional analysis. *Journal of Medical Internet Research*. 2013; 15(2)
- Czaja SJ, Charness N, Fisk AD, Hertzog C, Rogers WA, Sharit J. Factors predicting the use of technology: Findings from the center for research and education on aging and technology enhancement (CREATE). *Psychology and Aging*. 2006; 21(2):333–352. [PubMed: 16768579]
- Davis FD, Bagozzi RP, Warshaw PR. User acceptance of computer-technology: A comparison of two theoretical models. *Management Science*. 1989; 35:982–1003. doi:10.1287/mnsc.35.8.982.
- Ellis RD, Allaire J. Modeling computer interest in older adults: The role of age, education, computer knowledge, and computer anxiety. *Human Factors*. 1999; 41:345–355. [PubMed: 10665203]
- File, T. Computer and Internet use in the United States. 2013. Retrieved from <http://www.census.gov/prod/2013pubs/p20-569.pdf>
- Gatto SL, Tak SH. Computer, Internet, and e-mail use among older adults: Benefits and barriers. *Educational Gerontology*. 2008; 34(9):800–811. doi: 10.1080/03601270802243697.
- Gitlow L. Technology use by older adults and barriers to using technology. *Physical & Occupational Therapy in Geriatrics*. 2014; 32(3):271–280. doi: 10.3109/02703181.2014.946640.
- Hernández-Encuentra E, Pousada M, Gómez-Zúñiga B. ICT and older people: Beyond usability. *Educational Gerontology*. 2009; 35(3):226–245. doi: 10.1080/03601270802466934.

- Hur WM, Kim H, Kim WM. The moderating roles of gender and age in tablet computer adoption. *Cyberpsychology, Behavior, and Social Networking*. 2014; 17(1):33–39. doi:10.1089/cyber.2012.0435.
- ILSTV. Canada's Internet user penetration higher than that of the US. 2014. Available at http://www.ilstv.com/canadas-internet-user-penetration-higher-us/#.VSc_Ylw-B-U
- Lagacé M, Tanguay A, Lavallée M-L, Laplante J, Robichaud S. The silent impact of ageist communication in long term care facilities: Elders' perspectives on quality of life and coping strategies. *Journal of Aging Studies*. 2012; 26(3):335–342. doi:10.1016/j.jaging.2012.03.002.
- Lam JC, Lee MK. Digital inclusiveness—Longitudinal study of Internet adoption by older adults. *Journal of Management Information Systems*. 2006; 22(4):177–206. doi: 10.2753/MIS0742-1222220407.
- LaRose R, Eastin M. A social cognitive explanation of Internet uses and gratifications: Toward a new theory of media attendance. *Journal of Broadcasting and Electronic Media*. 2004; 48(3):358–378. doi: 10.1207/s15506878jobem4803_2.
- LaRose R, Demaagd K, Chew HE, Tsai HS, Steinfield C, Wildman SS, Bauer JM. Measuring sustainable broadband adoption: An innovative approach to understanding broadband adoption and use. *International Journal of Communication*. 2012; 6:2576–2600.
- LaRose R, Gregg J, Strover S, Straubhaar J, Carpenter S. Closing the rural broadband gap: Promoting adoption of the Internet in rural America. *Telecommunications Policy*. 2007; 31:359–373. doi: 10.1016/j.telpol.2007.04.004.
- Melenhorst, AS.; Rogers, WA.; Caylor, EC. The use of communication technologies by older adults: exploring the benefits from the user's perspective; Proceedings of the Human Factors and Ergonomics Society Annual Meeting; SAGE Publications. 2001, October; p. 221-225.
- Metz D. Mobility of older people and their quality of life. *Transport Policy*. 2000; 7(2):149–152. doi: 10.1016/S0967-070X(00)00004-4.
- Mitzner TL, Boron JB, Fausset CB, Adams AE, Charness N, Czaja SJ, Sharit J. Older adults talk technology: Technology usage and attitudes. *Computers in Human Behavior*. 2010; 26(6):1710–1721. doi:10.1016/j.chb.2010.06.020. [PubMed: 20967133]
- Morris A, Goodman J, Brading H. Internet use and non-use: views of older users. *Universal Access in the Information Society*. 2007; 6(1):43–57. doi: 10.1007/s10209-006-0057-5.
- Nef T, Ganea RL, Müri RM, Mosimann UP. Social networking sites and older users—a systematic review. *International Psychogeriatrics*. 2013; 25(07):1041–1053. doi: doi:10.1017/S1041610213000355. [PubMed: 23552297]
- NTIA. Digital Nation. Expanding Internet Usage. National Telecommunication and Information Administration; Washington, DC: 2011. Retrieved from http://www.ntia.doc.gov/files/ntia/publications/ntia_internet_use_report_february_2011.pdf
- NTIA. Exploring the Digital Nation: America's Emerging Online Experience. National Telecommunication and Information Administration; Washington, DC: 2013. Retrieved from http://www.ntia.doc.gov/files/ntia/publications/exploring_the_digital_nation_-_americas_emerging_online_experience.pdf
- Pew Research. Internet user demographics. Pew Research Internet Project. 2014. Retrieved from <http://www.pewinternet.org/data-trend/internet-use/latest-stats/>
- Rogers, EM. *Diffusion of Innovations*. 5th ed.. Free Press; New York, NY: 2003.
- Schulz R, Beach SR, Matthews JT, Courtney KL, De Vito Dabbs AJ. Designing and Evaluating Quality of Life Technologies: An Interdisciplinary Approach. *Proceedings of the IEEE*. 2012; 100(8):2397–2409. doi:10.1109/JPROC.2012.2200558.
- Selwyn N. The information aged: A qualitative study of older adults' use of information and communications technology. *Journal of Aging Studies*. 2004; 18(4):369–384. doi:10.1016/j.jaging.2004.06.008.
- Selwyn N, Gorard S, Furlong J, Madden L. Older adults' use of information and communications technology in everyday life. *Ageing and Society*. 2003; 23(5):561–582. doi: 10.1017/S0144686X03001302.
- Smith, A. Older adults and technology use: Usage and adoption; Pew Research: Internet Project. 2014. p. 1-7. Retrieved from <http://www.pewinternet.org/2014/04/03/usage-and-adoption/>

- Statista. Distribution of internet users worldwide as of November 2014, by age group. 2014. Retrieved from: <http://www.statista.com/statistics/272365/age-distribution-of-internet-users-worldwide/>
- Sum S, Mathews RM, Hughes I, Campbell A. Internet use and loneliness in older adults. *CyberPsychology & Behavior*. 2008; 11(2):208–211. doi: 10.1089/cpb.2007.0010. [PubMed: 18422415]
- Telecentre Europe. Latest EU survey: one quarter of Europeans have never gone online. 2011. Available at <http://www.telecentre-europe.org/latest-eu-survey-one-quarter-of-europeans-have-never-gone-online/>
- Tsai, HS.; Shillair, R.; Cotten, S. Social Support and ‘Playing Around’: An Examination of How Older Adults Acquire Digital Literacy with Tablet Computers; Paper presented in Sept., 2014, at the 2014 TPRC conference. D.C; Sept. 2014; Available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2418100
- Van Dijk JA. Digital divide research, achievements and shortcomings. *Poetics*. 2006; 34(4):221–235. doi:10.1016/j.poetic.2006.05.004.
- Van Dijk J, Hacker K. The digital divide as a complex and dynamic phenomenon. *The Information Society*. 2003; 19(4):315–326. doi: 10.1080/01972240390227895.
- Venkatesh V, Davis FD. A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management Science*. 2000; 45:186–204. doi: 10.1287/mnsc.46.2.186.11926.
- Venkatesh V, Morris MG, Davis GB, Davis FD. User acceptance of information technology: Toward a unified view. *MIS Quarterly*. 2003; 27:425–478. doi:10.1234/12345678.
- Venkatesh V, Thong JYL, Xu X. Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly*. 2012; 36(1):157–178.
- Vroman KG, Arthanat S, Lysack C. “Who over 65 is online?” Older adults’ dispositions toward information communication technology. *Computers in Human Behavior*. 2015; 43:156–166. doi: 10.1016/j.chb.2014.10.018.
- Wagner N, Hassanein K, Head M. Computer use by older adults: A multi-disciplinary review. *Computers in Human Behavior*. 2010; 26(5):870–882. doi:10.1016/j.chb.2010.03.029.
- Wang L, Rau PLP, Salvendy G. Older adults’ acceptance of information technology. *Educational Gerontology*. 2011; 37(12):1081–1099. doi: 10.1080/03601277.2010.500588.
- Weatherall JWA. A grounded theory analysis of older adults and information technology. *Educational Gerontology*. 2000; 26(4):371–386. doi: 10.1080/036012700407857.
- White H, McConnell E, Clipp E, Branch LG, Sloan R, Pieper C, et al. Randomized controlled trial of the psychosocial impact of providing Internet training and access to older adults. *Aging and Mental Health*. 2002; 6:213–221. doi:10.1080/13607860220142422. [PubMed: 12217089]
- Winstead V, Anderson W, Yost E, Cotten SR, Warr a, Berkowsky RW. You can teach an old dog new tricks: A qualitative analysis of how residents of senior living communities may use the web to overcome spatial and social barriers. *Journal of Applied Gerontology*. 2013; 32(5):540–560. doi: 10.1177/0733464811431824. [PubMed: 25474761]
- Wright K. Computer-mediated social support, older adults, and coping. *Journal of Communication*. 2000; 50(3):100–118. doi: 10.1111/j.1460-2466.2000.tb02855.x.
- Xie B. Information technology education for older adults as a continuing peer-learning process: A Chinese case study. *Educational Gerontology*. 2007; 33(5):429–450. doi: 10.1080/03601270701252872.

Table 1

Descriptive Characteristics of the Sample

		<i>N</i>	Percentage
Gender	Female	12	57%
	Male	9	43%
Device	iPad	15	71%
	iPad mini	2	10%
	Kindle Fire	4	19%
Age	Range: 69-95	<i>M</i> = 79.5	
	No data	7	

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Table 2

Key concepts

<u>Influences on decision to use the technology</u>	Percentage
Saw others using them	47% (n=10)
Tried the tablets of others first	19% (n=4)
Read or heard about it	10% (n=2)
Didn't want or need at first	10% (n=2)
Bought for self	62% (n=13)
Got as gifts from families	38% (n=8)
Got extras as gifts for others	14% (n=3)
<u>Overcoming barrier of self-efficacy</u>	
Struggled with traditional computers	19% (n=4)
Found design of tablet "intuitive"/easy to use	62% (n=13)
Convenient to use (fast, simple)	62% (n=13)
Good size to hold	47% (n=10)
Portability (move to comfortable location)	76% (n=16)
<u>Impacts of using this technology</u>	
Feel more connected to the world	90% (n=19)
Ability to go beyond phone calls	34% (n=7)
Using apps	80% (n=17)
Feeling current	57% (n=12)
Support from family	67% (n=8)

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