Older Adults' Perceptions and Use of Technology: A Novel Approach

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Abstract. This study investigated older adults' perceptions of technology in their everyday lives by using the stages of change model, a behavioral change model, as a guiding framework. Participants answered daily workbook questions about their experiences with technology and also recorded daily interactions and difficulties with technology for a 28-day period. Overall, participants were positive about technology but expressed concerns such as identity theft and loss of human contact. Participants reported using a wide range of technology in their everyday lives and cited efficiency, making life easier, and communication as reasons why they use technology. A recurring theme throughout the study was that their children played a major role in influencing aspects of technology adoption and use. Participants also reported not using technology if the need or value was not apparent. Older adults do adopt and use technologies, but only if the value and personal relevance is clear.

Keywords: Older adults, aging, technology, behavioral change model.

1 Introduction

Many older adults want to stay in their homes as they age [1-2], but this goal can be threatened by age-related declines in cognitive, perceptual, and physical capabilities [3-4]. Age is correlated to increased health problems and lower likelihood of being able to perform activities of daily living requisite for independence [5]. The need to understand and support older adults is imperative as they represent a growing percentage of the U.S. and worldwide population. People age 65 and older represented 11% of the world population in 2009; that percentage is expected to double by 2050 [6]. In the United States, this age group is predicted to represent 19% of the population by 2030 [7].

Technology can bridge the gap between older adults' decreased capabilities (or increased limitations) and their desire to age in place. For example, in-home sensing technologies can monitor individuals within their home and trigger an alarm during emergencies (e.g., a fall incident). Older adults reported increased feelings of safety and security when using ambient intelligence technology in their home [8]. Furthermore, communication technologies such as email and social media have the potential to reduce older adults' feelings of loneliness and isolation, which might be especially important when mobility and/or transportation are limited.

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Assistive technologies as well as information and communication technologies show promise in supporting aging in place, but more research is needed to optimize the person-technology interaction [9].

Understanding older adults' perceptions and use of technology is imperative in designing technology and creating successful user-technology interactions. However, little is known about how older adults view technology in their lives, how they make purchasing decisions of technology, and how they solve technology problems. In general, we know that, although technology is underutilized by older adults [10], they do think it is beneficial in the home. However, they are reluctant to use it themselves [11]. This suggests that there are some barriers that prevent older adults from becoming proficient technology users.

1.1 Stages of Change Model

The stages of change model (Figure 1) offered a unique framework with which to approach this problem-space of understanding older adults' perception of technology and how they consider, purchase, adopt, and/or abandon technology in their everyday lives [12-13]. When introducing new technology to older adults, a behavioral change is required for the adoption of that technology. There is a process of identifiable stages through which people progress when changing their behavior. The stages include precontemplation, contemplation, preparation, action, and maintenance.

During the precontemplation stage, older adults might be aware that a technology exists but see no need to use it in their lives, or they may be in denial that they even need the technology to improve their lives. Then they identify a need and start to consider whether they should purchase the technology. That is, they are contemplating what to do. They then start their preparation by researching the technology, deciding what their requirements are, the barriers they must overcome, and whether the benefits outweigh the risks. Often, this is where the change stops because of insurmountable barriers, such as cost, availability, and desire. When the decision to purchase is made, they move into the action stage. Here they purchase the technology and start to use it; they may encounter problems which cause them to use the technology once and then let it gather dust on the shelf. However, if they are able to overcome all of these barriers, they move into the maintenance stage, where they are using the technology on a regular basis. At any point in time an individual can relapse to an earlier stage. They can also be dealing with several different behavioral changes at the same time with each being in a different stage.

1.2 Study Overview

A daily diary method was used to assess and understand older adults' experiences with technology over a 4-week period. Participants answered daily workbook questions that were developed using the stages of change as a guiding framework to gain insight into older adults' adoption and integration of technology into their lives. During the last four days of the study, participants listed each unique technology they used daily to capture the breadth of technologies used, and a final interview was conducted with each participant.

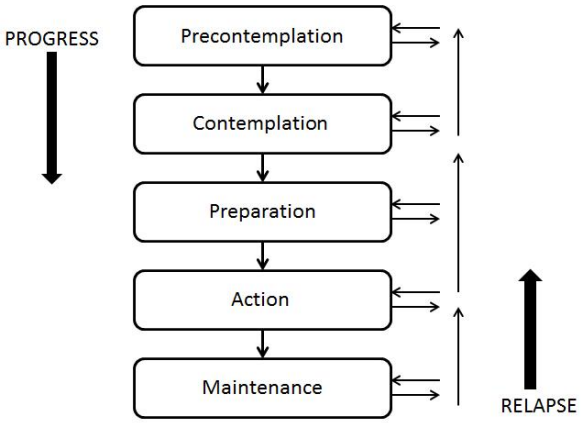

Fig. 1. Stages of change model

2 Methodology

2.1 Participants

Six older adults (3 women, 3 men, M_{age} = 68 years, SD = 11.4 years, range: 55 – 84 years) recruited from the Georgia Tech HomeLab participated in this research study. The Georgia Tech HomeLab is a research program that enrolls adults age 50 and older who are willing to evaluate new home health and wellness products to determine their effectiveness and suitability for seniors. Three participants had BS/BA degrees, one reported some college/associates degree, one reported vocational training, and one was a high school graduate; all were white/Caucasian. Participants were compensated $170 for their participation. The Georgia Institute of Technology Institutional Review Board approved the study.

2.2 Procedure

After participants were recruited into the study, a researcher scheduled a home visit to explain and receive informed consent and to give a brief introduction on how to use the study materials. Participants were instructed to carry the notebook with them at all times so they could record any interactions with technology be it a positive or negative experience, an advertisement they saw, a conversation they had, or a physical interaction with technology. The notebook assignment changed for the last four days of the study. Participants chose two weekdays and two weekend days and listed all of the technologies they used during each day.

The notebook served as a memory aid to answer the daily workbook questions to gain insight into older adults' adoption and integration of technology into their lives. Three questions were asked each day over 28 days for a total of 84 questions. The lead researcher followed-up with each participant periodically to answer any

questions participants had. When participants completed the workbook, a researcher scheduled another visit to their home to conduct an interview. One researcher asked questions about the participant's experience with and perception of the study, and a second researcher reviewed each participant's notebook and workbook; clarification questions were asked for illegible and blank entries.

3 Results

3.1 Breadth

For the last four days of the study, participants chose two weekdays and two weekend days and listed of all the technologies they use during each day. If the technology was used more than once per day, participants were instructed to list it only one time for each day. One participant did not do this portion of the study; the data reported are from five participants. The frequency was computed as the number of participants multiplied by the number of days; the maximum frequency was 20.

Participants reported using a wide range of technologies from alarm clocks to satellite radio to computers. The average number of technologies mentioned by the five participants was 27 (*SD* = 9; range: 15-40). Refer to Figure 2 for a graph of the most frequently mentioned technologies. The most frequently mentioned technologies were grouped into three high-level activities as follows: food preparation (coffee maker, refrigerator, microwave, oven/stove), transportation (car), and communication (cell phone, telephone, TV, computer).

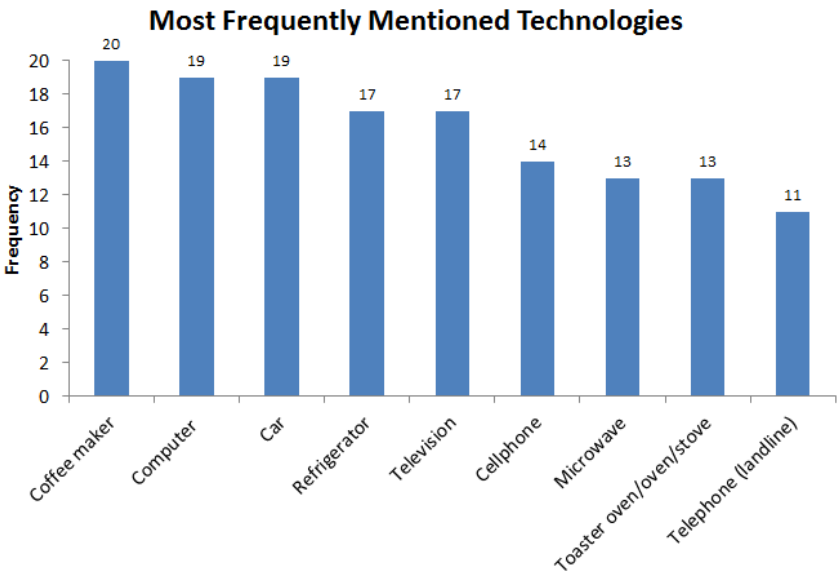

Fig. 2. Most frequently mentioned technologies

3.2 Attitudes toward Technology

Participants reported using technology every day and expressed both positive and negative attitudes toward technology. Positive attitudes included appreciating that technology often increased efficiency and made communication accessible and easier. "Generally, I think technology is a wonderful thing…It makes my life easier. It helps get the mundane things done quicker and more efficiently, more accurately," said one participant. Negative aspects of technology mentioned by participants included the loss of human contact, addiction/dependence on technology, and fear of identity theft. One participant said, "…But I also think that there are some downsides to technology, a big one being identity theft…Another one is [the loss of] our social contacts, face-to-face contacts."

3.3 Need for Technology

A recurring theme throughout the workbook answers and the interview was that participants only used technology when there was a need; it had to be personally relevant and valuable to them. If a technology was too difficult to use, participants reported abandoning the technology and using a different way to accomplish a task. Participants reported not using technology if the need or value was not apparent. One participant responded to the question, "Why don't you use technology?" with the following, "When I don't need it, when it is too difficult to understand, and when I just don't want to." Another participant responded, "There are times the old fashion way makes more sense. Easier to do it [the] old way versus learn new [way]." When discussing what prevents them from obtaining new technology, themes of high cost and lack of value resurfaced. For example, "Two things prevent me from obtaining new technology: 1) if it has no value to me to make my life or work better; 2) if it costs more than it is worth to me to use." Similarly, participants indicated that they decide to purchase technology when they realize the need for it in their lives. Said one participant, "It is usually based on a need rather than a want and almost always to help me accomplish a task quicker."

3.4 Reasons for Using Technology

The technology that participants used improved their lives in several ways. Communication, making life easier, and gaining knowledge were most frequently mentioned when participants explained why they use technology and what they liked about technology. For example, one participant said, "And of course, I use it [technology] for communication. And I use it to gain more knowledge. I Google a lot. And to keep in touch with friends and family." Another said, "Technology makes many jobs easier and faster. Technology makes the whole world much smaller. Communication through technology keeps us informed instantly of what is happening around the world."

3.5 The Role of Children

Participants frequently mentioned that their children played a major role in influencing several aspects of technology adoption and use. When asked who they ask for help if they have a problem with technology, four out of six participants mentioned their children. "Usually I ask my daughter. She and her husband understand technology better than I do. My son and daughter-in-law are very good also." Children were also cited as a resource to determine whether a technology is needed and as support for making decisions about technology. "This is something my friends and I discuss a lot. How much do we want versus how much we actually need. My husband is one I turn to, to discuss this matter with as well as my two daughters." Another participant said, "I have talked to my step-son…about new technologies. The latest is using the 'cloud' for storage." One participant explained, "I ask my daughter or son what they think about certain brands or benefits of new technology."

4 Discussion

Understanding older adults' perceptions and use of technology is imperative in designing technology and facilitating successful user-technology interactions. The purpose of this 28-day diary study was to use the stages of change model [12-13] to understand older adults' perception of technology and how they consider, purchase, adopt, and/or abandon technology in their everyday lives.

Several themes emerged from participants' responses to workbook questions and interviews that included the following:

1. Older adults do use a wide range of technology, primarily for cooking, communicating, and daily routine activities (alarm clock, curling iron, tooth brush).
2. Older adults expressed both positive (e.g., makes life easier) and negative (e.g., loss of human contact) attitudes toward technology.
3. The need for technology must outweigh the cost (monetary or time to learn the technology).
4. Communication, efficiency, and knowledge were frequently mentioned throughout the workbook and interview.
5. Children played a major role in influencing several aspects of technology adoption use.

Three themes (range of technologies used, attitudes toward technology, and reasons for using and liking technology) were consistent with the results of a focus group study in which 113 older adults discussed their technology use and attitudes [14]. The average number of technologies used by the older adults in the current study was greater than the number of technologies mentioned in the focus group study. This slight discrepancy might indicate the current study participants are high-technology users or, more likely, that the daily diary method allowed a more detailed level of analysis of actual range of technology use. Mitzner and colleagues [14] also found that older adults more frequently expressed positive attitudes about technology than negative, consistent with the participants' general thoughts about technology.

Participants frequently mentioned efficiency, making life easier, and communication as reasons why they used technology and what they liked about it. One participant said, "Technology makes every day work easier and faster, such as online checking, writing letters, keeping in touch with family and friends, etc." These responses were also consistent with results from Mitzner et al. [14] who found the most frequently mentioned reasons for liking technology by older adults included convenience, support for activities, and features of the technology.

The role of need and benefit of technology expressed by participants in this study was consistent with previous models of technology acceptance [e.g, 15]. Participants in the current study were aware of many technologies such as, self-parallel parking cars, iPods, and GPS, but they saw no need for such technology in their lives. Older adults do not adopt technology if the benefit (efficiency or making their lives easier) is not clear to them [16].

A new theme that emerged from this study was that of older adults' children playing a major role in influencing aspects of technology adoption and use. One participant even discussed getting cell phone upgrades for his mother and mother-in-law who were in their mid to late 80s. This finding might suggest that technology brings families together in discussing new technologies or assessing need for technology. An interesting follow-up to this finding would be to understand how the children felt with such a role; are they comfortable being the technical "experts?"

5 Conclusion and Future Work

This pilot study used a novel approach to investigate older adults' perceptions and use of technology by using the stages of change model as a guiding framework. Older adults used a wide range of technologies and do adopt new technologies when the value and personal relevance is clear to them. Themes consistent with the literature did emerge, as well as a new theme of the role of children influencing aspects of technology adoption and use. The next step will be to use these data to create and deploy a technology survey to the 300 (and growing) HomeLab participants to better understand their technology interactions with the goal to support technology development that meets older adults' needs.

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