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Attitudes Towards and Limitations to ICT Use in Assisted and Independent Living Communities: Findings from a Specially-Designed Technological Intervention

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Abstract

While much literature has been devoted to theoretical explanations of the learning processes of older adults and to the methods of teaching best utilized in older populations, less has focused on the education of older adults who reside in assisted and independent living communities (AICs), especially with regards to information and communication technology (ICT) education. The purpose of this study is to determine whether participants' attitudes and views towards computers and the Internet are affected as a result of participating in an eight-week training program designed to enhance computer and Internet use among older adults in such communities. Specifically, we examine if ICT education specially designed for AIC residents results in more positive attitudes towards ICTs and a perceived decrease in factors that may limit or prevent computer and Internet use. We discuss the implications of these results for enhancing the quality of life for older adults in AICs and make recommendations for those seeking to decrease digital inequality among older adults in these communities through their own ICT classes.

Older adults define successful aging as an active process that incorporates events and practices that focus on improving or maintaining physical, functional, psychological, and social health (Phelan, Anderson, LaCroix, & Larson, 2004). Engaging in late life education facilitates successful aging, as the experience of learning in old age may positively affect quality of life and overall well-being (Boulton-Lewis, Buys, & Lovie-Kitchin, 2006). Yet while a great deal of literature has been devoted to theoretically explaining the learning processes of older adults and the methods of teaching best utilized in older populations (see for example Hiemstra, 1998), less has focused on the education of older adults who reside in assisted and independent living communities (AICs). Older adults residing in AICs represent a specific segment of the older adult population with a unique set of characteristics, experiences, and challenges, and thus it is important for educators to develop specialized teaching protocols that are tailored to the needs of these individuals. This is especially true regarding instruction on information and communication technologies (ICTs), as this is a topic older adults have identified as something that they want to learn and something they

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believe they need to learn (Boulton-Lewis et al., 2006). Using ICTs has been shown to have a positive effect on older adults (see for example Cotten, Ford, Ford, & Hale, 2012), but may not be utilized by older adults in AICs due to such factors as a perceived lack of ability to learn and physical/cognitive decline (see for example Timmerman, 1998).

The purpose of this study is to examine the effects of ICT education on attitudes and views towards ICTs among older adults living in AICs. Specifically, using a combination of quantitative and qualitative data, we examine whether the implementation of an ICT training protocol designed specifically for older adults residing in AICs results in more positive attitudes towards computers and a decrease in perceived factors that may limit or prevent computer and Internet use. We discuss the implications of our findings with regards to the possible enhancement of quality of life for AIC residents and in relation to digital inequalities faced by older adults in such communities.

BACKGROUND

Being able to improve or maintain physical, functional, psychological, and social health remain vital aspects of the aging process for older adults (Phelan et al., 2004). For many older adults, continuing education provides a means to promote successful aging, as the process of learning contributes to better outcomes by "keeping the mind active" (Boulton-Lewis et al., 2006, p. 278), by empowering the individual with the development of new skills and abilities (Cusack, 1999), and by reducing social exclusion (Kump & Krašovec, 2007). One particular topic that is growing increasingly popular among older adult learners is learning to use ICTs.

The Benefits of ICTs for Older Adults

The term *ICT* refers to any computer-based or computer-assisted device or application used for communicative or informational purposes. *ICT* is most often used to refer to Internet-connected computers, but can also be used to refer to mobile communication devices and social media applications. Theoretically, ICTs have the potential to positively benefit the quality of life of older adults in a variety of ways, including increased socialization, greater productivity, enhanced physical and mental functioning, and increased self-esteem (Lawhon, Ennis, & Lawhon, 1996). Empirical results indicate a variety of benefits of ICT use for older adults: decreased feelings of loneliness (Sum, Mathews, Hughes, & Campbell, 2008; White et al., 1999; White et al., 2002), decreased levels of depression (Cotten et al., 2012; Ford & Ford, 2009; White et al., 2002), decreased feelings of stress (Wright, 2000), increased feelings of personal growth and purpose in life (Chen & Persson, 2002), and an increased feeling of independence (Stark-Wroblewski, Edelbaum, & Ryan, 2007).

Despite these positive effects, the percentage of older adults who use ICTs in the US is lower compared to other age cohorts. Eighty-two percent of all adults over the age of 18 use the Internet and/or email; however, while 77% of adults aged 50–64 report being online, only 53% of adults aged 65 and over report using the Internet and/or email (Zickuhr & Madden, 2012). This number drops significantly for older adults aged 75 and over, as only 34% of this age cohort report using the Internet and/or email (Zickuhr & Madden, 2012). These statistics suggest that there is a large portion of the older adult population in the US who are not taking advantage of the potential benefits offered by ICT use.

Barriers to Learning ICTs in Late Life

Older adults have an interest in learning new technologies (Boulton-Lewis et al., 2006), yet certain factors limit and/or prevent them from using ICTs. The perception of being too old to learn, embarrassment over a lack of ability, cognitive decline and/or difficulties, and declines in dexterity/visual ability all contribute to an older adult's decision to refrain from

using ICTs (Boulton-Lewis, 1997; Boulton-Lewis et al., 2006; Boulton-Lewis, Buys, Lovie-Kitchin, Barnett, & David, 2007; Broady, Chan, & Caputi, 2010; Gatto & Tak, 2008; Hanson, 2010; Purdie & Boulton-Lewis, 2003; Renaud & Ramsey, 2007; Timmerman, 1998). Broady et al. (2010) argue that when designing training programs that teach older adults to use computers, consideration must be given to the learning issues and barriers that often confront older learners. These include the perceptions that older adults are unable to successfully learn something new as well as barriers arising from physical and cognitive declines that can challenge the older learner. Research has shown that the ability to learn a new set of skills, such as learning to use a computer, is reduced in older adults; thus allowances for longer learning times and more error in the learning process must be part of the program design (Broady et al., 2010). Boulton-Lewis (1997) notes that while older adults have greater trouble learning new information, they are able to access and use information and skills they had previously acquired. Therefore, while older adults may require longer learning times and must expend greater effort in learning, they are still able to acquire new knowledge and skills (Boulton-Lewis et al., 2006).

Prior educational experience may also play a role in the acquisition of new knowledge and skills as well as the ability of the older learner to implement compensatory measures for diminished physical and cognitive abilities (Boulton-Lewis, 1997; Boulton-Lewis et al., 2006). Older learners who have been ongoing participants in learning throughout the life course may be more successful in learning to use a computer because they have learned strategic ways to compensate for diminished “processing speed and working memory to maintain performance” (Boulton-Lewis et al., 2006, p. 273). Physical changes also play a significant role, as declining eyesight, decreased ability to discriminate colors, decline of fine motor skills, and hearing loss can contribute to difficulties in learning to use computers and slower processing of information on a computer screen (Hanson, 2010). Hanson (2010) points out that even something as seemingly innocuous as the need for bifocal lenses can impact the learner because it may require the user to position his/her neck and shoulders in a way that can cause discomfort and impede upon learning ability. Older learners may also require slower, more amplified instruction to compensate for age-related hearing loss (Renaud & Ramsey, 2007).

Attitudes towards computers, as well as perceptions that they are unable to continue the learning process, may inhibit the ability of older adults to learn to use new and emerging technologies (Boulton-Lewis et al., 2007). Older adults may lack confidence in their learning capabilities which can, in turn, affect the learning process (Gatto & Tak, 2008). In order to undertake the often tedious process of learning to use technology, older adults must be persuaded that the outcome is worth the effort involved. For older adults to expend the effort of learning something new like using computers, they must be convinced there is a benefit in “seek(ing) new ways of doing things” (Purdie & Boulton-Lewis 2003, p. 146).

A limitation of previous research on the capabilities and practices of older adults learning to use ICTs, as well as learning to pursue other vocations, is that there is a focus on the general population of the aged. However, little research has been conducted specifically looking at older adults residing in continuing care communities such as AICs; special considerations must be made for these individuals, as they are characteristically different from the general older population. The following section details differences between residents of AICs and the aging population in general.

Older Adults in AICs

Studies have shown that residents in AICs are predominately white, widowed, female, in their early 80’s, and need help with 4 or more activities of daily living (ADLs) (Caffrey, Sengupta, Park-Lee, Moss, Rosenoff, & Harris-Kojetin, 2010; Mitchell & Kemp, 2000;

Newcomer, Breuer, & Zhang, 1994). It is the need for additional assistance with ADLs that often motivates older adults to move into AICs, as AICs often provide 24-hour emergency care and an environment structured to provide needed help. Though there are many reasons that motivate individuals to enter AICs, disability and disease are often the major reasons (Cutchin, Chang, & Owen, 2005). Individuals who live in these types of communities are often more frail but receive better care than their homebound counterparts due to the constant presence of residential and medical staff.

Life in AICs is more structured than daily living outside the AIC. Individuals are assumed to adhere to the community time schedule (e.g., with regards to meals, social and recreational activities, and receiving/taking medication), especially within assisted living (Eckert, Carder, Morgan, Frankowski, & Roth, 2009; Mitchell & Kemp, 2000). Many of these types of communities are designed for residents to age in place and many provide step-downs for continuing care as the needs of the resident changes (Mitchell & Kemp, 2000). Some research suggests that individuals who reside in AICs are at a higher risk for lower quality of life (Mitchell & Kemp, 2000). Since they have been removed from their homes and are often more frail than other older adults living in the community, AIC residents are often removed from current information in society (Magnusson, Hanson, & Borg, 2004). ICT training may provide a means for these individuals to re-establish or maintain their connections to friends, family, and the community at large (Winstead, Anderson, Yost, Cotten, Warr, & Berkowsky, 2012). In addition, while previous literature has illuminated the fact that older adults may be limited in ICT learning due to physiological effects of aging and a general lack of confidence in ability to learn (see for example Boulton-Lewis et al., 2007; Czaja, Lee, Branham, & Remis, 2012), this is overshadowed by the benefits older adults' exhibit when they have been exposed to specially-geared training (Magnusson et al., 2004).

As mentioned, many studies have focused on examining the implementation and effects of ICT education for older adults; however, these studies have not specifically looked at AIC residents. These residents, based on their particular needs, may require a more specially-tailored program that takes into account physical, cognitive, and social limitations that may not be as pressing for the general older adult population. In addition, many ICT training programs (such as many of those offered by Osher Lifelong Learning Institutes, http://www.usm.maine.edu/olli/national/) are held in public locations such as colleges, universities, and libraries. These locations, while possibly convenient and optimal for the instructors and equipment storage, are difficult for AIC residents to travel to based on transportation limitations. Bringing a specially-designed training program (and the required technology) to the AICs directly is vital for most residents to gain access, maintain use, and reap the potential benefits of ICT use in old age.

The purpose of this investigation is to examine whether ICT education that caters towards the specific needs of AIC populations has a positive effect on overall attitudes towards computers and contributes to a decrease in perceived factors that may limit or prevent computer and/or Internet use. Two hypotheses are presented to guide this investigation:

Hypothesis 1 Older adults living in AICs will report more positive attitudes towards computers after completing a specially-designed ICT education program, compared to attitudes exhibited prior to ICT training.

Hypothesis 2 Older adults living in AICs will report decreases in perceived factors limiting computer/Internet use after completing a specially-designed ICT education program, compared to perceived factors reported prior to ICT training.

As it has been shown that ICT use in old age may contribute to better overall quality of life, results of this investigation may assist those wanting to positively contribute to the well-

being of AIC residents in developing their own ICT education programs and may shed light on the best practices to undertake when educating AIC residents on ICT use.

METHOD

This study uses a combination of quantitative and qualitative data collected as part of an ongoing longitudinal investigation exploring the use of technology and quality of life of older adults residing in a series of AICs in a medium-sized metropolitan area in the Deep South. Participation in the investigation was open to all residents of each participating AIC who achieved a score of at least 18 (out of a possible 24) on an amended version of the Mini-Mental State Examination (Folstein, Folstein, & McHugh, 1975); this was used to screen out residents with cognitive impairments that would have difficulty completing the intervention. The screening instrument also included questions from the 12-Item Short-Form Health Survey (Ware, Kosinski, & Keller, 1996).

As part of the larger study noted previously, five AICs were randomized into an ICT study arm to receive an 8-week ICT training course for interested residents. Information sessions were held at each AIC to describe the study and training course and to recruit potential participants. Notably, while a majority of the overall sample had previous computer experience, most participants indicated that they did not currently use a computer.

Portable computer labs were set up in each AIC for 90-minute training sessions twice per week. Training topics included starting up and getting acquainted with the computer, using email, searching for and evaluating health information, using social networking sites, and visiting online entertainment sites like Hulu and Youtube, among others; these topics were selected as they were deemed to be, by the study personnel, topics that would be of importance to the potential participants. These sessions were led by one graduate-student instructor with at least one additional assistant (also a graduate student) walking around during the class to personally assist those who requested it. Typically, the training sessions had at least 2–3 graduate student assistants on hand to assist the participants. In addition to the formal class sessions, the study team also offered an additional 90-minute session for office hours; these sessions were optional for participants and allowed those who were willing to receive more one-on-one attention from instructors on items covered in class or on topics not covered in the formal training sessions. Combining the formal class and optional office hour sessions, an average of 29 hours was spent with the ICT participants over the course of the 8-week intervention. Desktop computers were set up in public locations at each AIC for participant use during office hour sessions and for use during and after the end of the intervention.

As the emphasis of this investigation is to examine the effects of a specially-designed ICT intervention, the following section details how the training sessions were designed to accommodate the specific needs of the AIC participants.

Tailoring ICT Training for AIC Residents

At each AIC, training was conducted in a centralized location on site, such as an activity room or dining hall that was easily accessible to all residents. This allowed for individuals with mobility issues to attend class without much hassle and encouraged continued participation. While the set-up for each AIC was slightly different due to space limitations, the classroom was arranged such that a large screen was placed at the head of the class (on which the instructor's computer screen would be projected) and the portable computer lab was arranged around the front screen. Computers from the portable lab were set up on tables as close to the front of the class as possible so that participants did not have to strain their eyes in order to see what the instructor was doing on the main screen and so that participants

could easily hear what the instructor was teaching. When possible, the tables used were slightly more elevated compared to traditional tables in order to accommodate those attending the class in motorized wheelchairs.

The laptop computers used for the mobile lab were set-up with higher resolution and increased overall font size to accommodate those with poor eyesight. In addition, specially designed equipment (such as enlarged keyboards and enlarged track-ball mice) were plugged into the computers for those who requested them. The larger keyboards helped accommodate those with failing eyesight and those with no prior typing experience; the larger track-ball mice accommodated those with poor hand dexterity and those who had trouble controlling their hand movements. The participants were also given the option to use the traditional keyboard built into the laptops as well as a regular-sized mouse or the built-in track-pad mouse. These were especially popular with those who had previous computer experience and those who wished to emulate the computer experience of close friends/family.

During the class, material was presented loudly (to accommodate those with impaired hearing) and slowly (to accommodate those with impaired hearing or decreased mental processing speeds). Material was also repeated often and built on prior material to assist those with memory issues. The class culminated in a final in-class project where participants had to use the skills obtained during the training course to complete the project. This reinforced the individual activities and using them in combination.

While the sessions were structured like traditional classes (with an instructor lecturing and giving instructions to students on what to do), active participation between the students and instructor was highly encouraged so as to motivate the participants and make the experience more enjoyable. Examples of this included asking participants to suggest topics to search for on Google or Youtube. Interaction was also encouraged between students and between the students and other training personnel before and after class; keeping the experience more social helped contribute to a sense of community wherein students were not afraid to ask questions or request assistance, and this in turn promoted self-confidence and facilitated a technical support network among residents. As the 8-week intervention progressed, the instructor and training personnel would identify a “resident expert,” an individual from the class who demonstrated a strong grasp of the material presented and who would be willing to assist other residents with their computer issues once the training was complete. This, again, was done to promote a more confident feeling towards computer use and to make the participants less reliant on the training personnel with regards to computer troubleshooting.

The instruction during the 8-week intervention was supplemented with a specially-designed training manual written by the training personnel and distributed at the beginning of the intervention. This manual included the lesson plans for each session in the 8-week course and also included additional material that the participants could read to obtain more detailed information. The manual was written with the brand and operating system of the mobile lab in mind so that the lessons presented in the book would reflect the activities done during the classes. This made the learning experience more consistent (although it also meant that the manual might not be as useful if the participants opted to use a different brand of computer or different operating system at the conclusion of the intervention). The material was presented in such a way as to allow older adults to follow more easily (e.g., larger font, large pictures, avoidance of computer jargon, etc.).

Quantitative Data

Quantitative data were collected through the use of a survey individually administered to each participant in-person by a trained survey administrator. Surveys were administered

prior to the start of the ICT intervention and immediately following the completion of the ICT classes (i.e., approximately 8 weeks after the initial survey). Paired-sample *t*-tests were done on measures between the pre- and post-intervention surveys to determine if there was any change in the respondents' attitudes and feelings towards computers and to determine if there was any change in the respondents' views towards what limits or prevents them from using a computer or the Internet. Tables 1 and 2 contain information on the measures compared between the pre- and post-intervention surveys.

Qualitative Data

In addition to the survey data, qualitative data were collected throughout the course of the interventions. This data consisted of instructor updates (compiled by lead instructors at the end of each ICT class), field notes (collected by study team members who remained removed from the class and observed the class environment and participants), focus group data (which focused on having the participants evaluate the classes and were collected at the completion of each 8-week intervention), and observation files (which consisted of miscellaneous observations made by study team members that did not fit under the purview of the other notes files). Analysis followed an inductive approach using a grounded theory method with common themes and concepts arising from the qualitative data. The field notes were chronologically ordered and reviewed for common themes. As patterns emerged, the qualitative notes were reviewed again by a different researcher for accuracy and consistency. While a number of themes emerged from the data, this investigation focuses specifically on those related towards participants' opinions of the specially-designed class, the successes/failures of the participants with regards to knowledge acquisition, changes in attitudes towards computers, and changes towards perceived limitations towards computer use.

RESULTS

Table 3 contains the descriptive statistics taken in the pre-intervention survey for each AIC as well as for the whole sample. Overall, the sample was predominately female, white, and widowed. The mean age was 83.5 years, and a majority of respondents indicated that they had at least some college education and were financially stable. Regarding use of the computer, while a majority of participants indicated that they had used a computer previously, only 43.6% of participants indicated that they currently used a computer.

Quantitative Findings

Figure 1 shows the significant results of the paired-sample *t*-tests comparing the responses to the attitudes towards computers questions between the pre- and post-intervention surveys. As detailed in Table 1, responses to these questions were recoded such that *lower* scores indicate more positive attitudes towards computers (scores ranged from 0–4) except in the case of the question that asks how much the respondent agreed/disagreed with the statement, "I can make the computer do what I want it to." For this question, *higher* scores indicate a more positive attitude towards computers. Thus, for all variables except "I can make the computer do what I want it to," a *negative* change in score between the pre- and post-test indicates an increase in positive attitudes. For the "I can make the computer do what I want it to" variable, a *positive* change between pre- and post-test indicates an increase in positive attitudes.

Of the individual attitude variables, significant changes between the pre- and post-intervention surveys were found in 6 of the 11 measures ($p<.10$), with each of these measures trending towards more positive attitudes towards computers at the completion of the ICT class. Significant changes were seen in the following measures: *Computers make me uncomfortable*, indicating that participants grew more comfortable with the technology

upon completing the intervention ($p<.05$); *I feel intimidated by computers,* indicating that participants were less intimidated by the technology at the end of the ICT class ($p<.10$); *Computers are difficult to understand,* with respondents reporting less difficulty understanding computers between the pre-and post-intervention surveys ($p<.01$); *I can make the computer do what I want it to,* suggesting that the intervention successfully increased computer knowledge as well as confidence in computer ability; *I usually need help to use a computer,* indicating the participants required less assistance with completing computer tasks as a result of the training ($p<.10$); and *Computers are hard to use,* suggesting that the respondents disagreed with this statement moreso at the conclusion of the intervention ($p<.01$).

In addition to the individual attitudes measures, an overall attitudes scale was created by summing the measures detailed in Table 1 (prior to summation, the responses to "I can make the computer do what I want it to" were reverse coded). The possible score range for the new scale was 0–44, with *lower* scores indicating more positive attitudes towards computers. A paired-sample *t*-test of this summed scale revealed that the mean score for this scale decreased from 19.26 to 17.42 between the surveys, and this change was significant at the $p<.01$ level. This result suggests that the participants had an overall increase in positive attitudes towards computers upon completing the intervention.

Figure 2 shows the significant results of the paired-sample *t*-tests comparing the responses to the views on what limits/prevents computer use questions between the pre- and post-intervention surveys. The analytic sample for each comparison is slightly different, as noted in Figure 2; we found that many respondents opted to skip certain questions in this particular matrix, and restricting the entire analytic sample just to those respondents who answered *all* questions would have greatly reduced our sample. Thus, rather than restricting the sample using listwise deletion of missing cases, the analysis was run separately for each measure. Overall, of the questions posed, seven were found to significantly change between the pre- and post-survey (at least at the $p<.10$ level), and in each case it was seen that there was an overall decrease in the number of respondents who viewed these particular things as factors that limit or prevent computer/Internet use. Figure 2 shows the percentage of respondents in the pre- and post-surveys who responded "yes" to the statement posed, indicating that they found the factor to limit or prevent their own use.

Statistically significant changes between pre- and post-tests were seen with the following measures: *I don't have access to a computer*, with fewer participants indicating that access was an issue at the end of the computer training ($p<.001$); *Computers are too complicated or hard to use*, with a smaller percentage of participants indicating that they still had difficulties using the technology after the intervention ($p<.05$); *The Internet is too complicated or hard to use*, with more respondents disagreeing with this statement in the post-survey ($p<.05$); *I have trouble using the keyboard or mouse*, with fewer participants indicating that this remained an issue after the computer training and with only 3% of the participants in the post-survey indicating that they still had difficulty using the equipment associated with computer and Internet use ($p<.01$); *I do not know what computers can be used for*, with a lower percentage of respondents agreeing with this statement, indicating that participants were becoming more knowledgeable as a result of the intervention ($p<.01$); *I do not know what can be done with the Internet*, with, like in the previous question, a smaller percentage of respondents agreeing with this statement in the post-test ($p<.001$); and *The computer is too far away or too difficult to get to*, with fewer respondents indicating that the computer they have best access to is in a location that is difficult to get to ($p<.05$).

Qualitative Findings

In the qualitative data, there were numerous instances during the intervention and during the focus groups held after the intervention that suggested that the AIC residents enjoyed the classes, successfully improved their computer skills, and had a more positive outlook towards computers. Below is a representative sample of these results. When asked if participants had enjoyed the classes during a focus group session, one participant responded:

> Ms. B: "Very much. I've had two other courses in computers and it didn't hold a candle to what we had in here."

This quote suggests that Ms. B not only enjoyed the classes, but also found them to be more helpful and useful compared to other classes that were taken. It also suggests an appreciation for tailoring the class towards the needs of this specific population. Others made statements similar to this, such as this participant:

> Ms. G: "You have cracked a door that we want to push open. Wish I were younger and could have learned this."

Another resident, during a conversation about what she had learned over the course of the study, had this to say:

> Ms. M: "I'm 88 years old, I have 11 grandchildren, they talked about things I didn't know what it was…now I can understand what they are talking about. It made me feel good."

This quote suggests that Ms. M, as a result of taking the class, was able to successfully increase her knowledge of a computer and the Internet, supporting what was found in the quantitative analysis. She was now able to carry on technological conversations with her family members and, as a result, felt better about herself and her abilities. This sentiment was shared by a number of other participants who indicated that, after the training, they were better able to use the technology and were less afraid to approach it.

Other participants indicated that they had a more positive outlook towards computers and the Internet as a result of the training. One participant stated:

> Ms. S: I have a great-grandson in Texas and I get to see pictures of him all the time. I love it…I feel more connected."

Many other participants made similar statements, telling stories of how they used computers (in *and* out of the classroom) to connect with friends and family; this increase in ability, in turn, seemed to contribute to more positive attitudes towards the technology.

CONCLUSION

While a great deal of gerontological literature has been devoted to the process of learning in late life and how older adults may benefit from continued education (see for example Boulton-Lewis et al., 2006; Cusack, 1999; Kump & Krašovec, 2007), less has focused specifically on AIC populations, particularly with regard to ICT education. The purpose of this investigation was to determine if a specially-designed ICT training protocol conducted in AICs resulted in more positive attitudes towards computers and the Internet and a decrease in perceived factors that limit or prevent computer/Internet use. Results from the quantitative and qualitative analysis suggest that an ICT intervention specifically designed for AIC populations may contribute to more positive views of using computers and the Internet. Many participants in the study, while interested in learning to use a computer, had fears and difficulties associated with learning new technologies; however, with an intervention that catered to their specific needs, the participants were able to confidently engage themselves in a new learning experience, which in turn led to changed attitudes

towards technology. While there were a number of items in the quantitative analysis wherein no significant change was recorded between the pre- and post-test, a review of the results not shown indicate that, in most cases, this was due to the fact that the participants already exhibited a more positive attitude towards the technology with regards to the question being asked; thus no significant change was seen because the intervention simply reinforced the attitude rather than enhance it.

While previous evidence has illustrated positive benefits to using ICTs in late life (Cotten et al., 2012; Chen & Persson, 2002; Ford & Ford, 2009; Stark-Wroblewski et al., 2007; Sum et al., 2008; White et al., 1999; White et al., 2002; Wright, 2000), there are numerous barriers older adults face that may hinder or prohibit computer use or learning how to use a computer. These barriers can be particularly troublesome for AIC residents, who may lack the necessary physical, psychological, or social means to overcome these limitations. However, the results of this investigation suggest that overcoming these barriers is not impossible, as participants were able to successfully learn to use a computer and the Internet over the course of the intervention, and participation resulted in more positive outlooks towards the technology. It can thus be argued that more specialized instruction can go a long way in decreasing digital inequality with regards to older adults.

Limitations of this study include the small sample size and the geographic location in the Deep South. We do not know if the patterns found in these communities are reflective of those for older adults who do not reside in AICs and/or those in AICs in different regions of the U.S. Future research is needed to determine whether older adults can maintain the skills acquired in various ICT training activities, particularly as they age and experience more advanced physical and cognitive health declines. While providing access and training can help older adults to cross the digital divide, further research is needed to better understand *how* older adults use the ICT skills they acquire and whether this particular use enhances their quality of life in any way.

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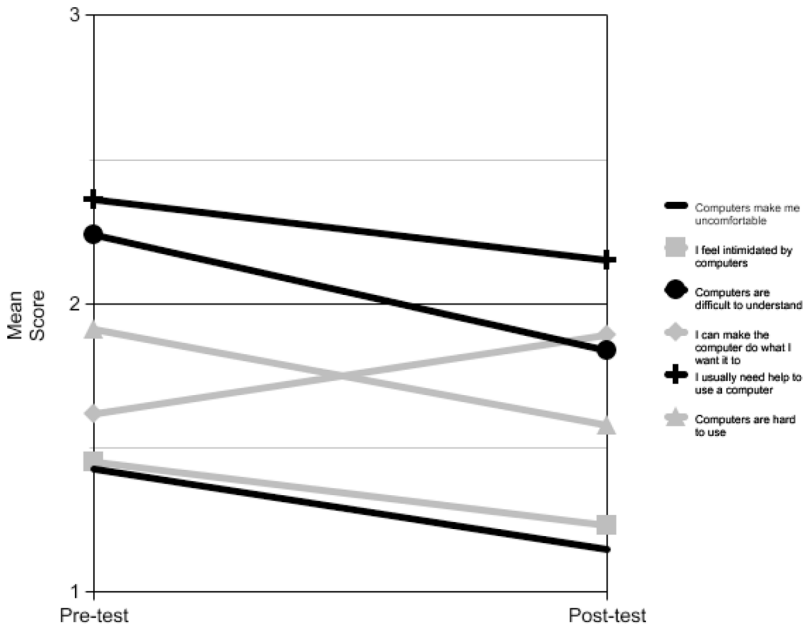

Figure 1.
Changes in attitudes towards computers between pre- and post-intervention ($N = 74$).

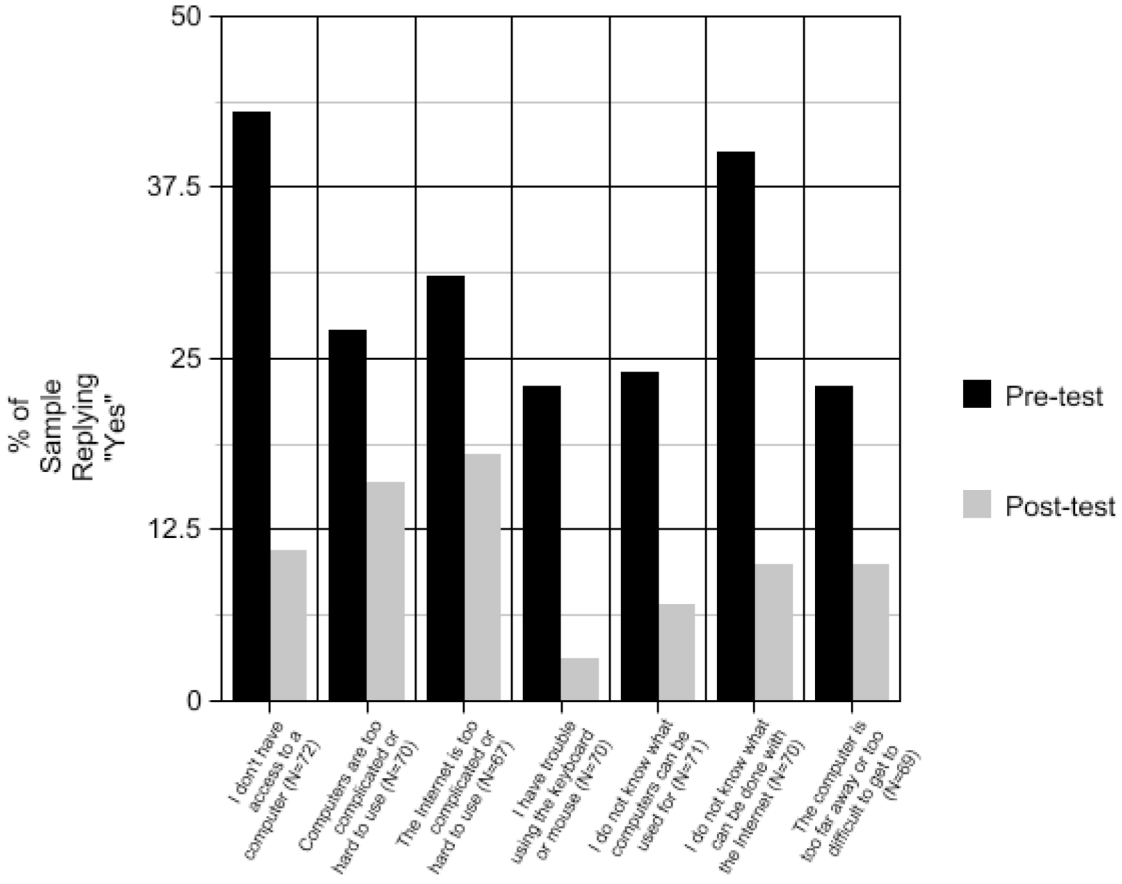

Figure 2.
Changes in views towards what limits/prevents computer and/or internet use

Table 1

Survey Questions Measuring Attitudes Towards Computers

"Computers make me uncomfortable"
"I feel intimidated by computers"
"Computers are difficult to understand"
"Computers are frustrating to work with"
"I can make the computer do what I want it to"
"I don't understand how some people can spend so much time on computers"
"I usually need help to use a computer"
"I'm just not interested in using a computer"
"Computers are hard to use"
"I don't have any use or need for computers"
"I have better ways to spend my time than with a computer"

Note: Respondents were asked to rate their level of agreement or disagreement with the above statements (4 = strongly agree, 0 = strongly disagree). Lower scores indicate more positive attitudes towards computers (except for "I can make the computer do what I want it to," wherein a higher score indicates a more positive attitude – this item was later reverse coded for the creation of a summed overall scale). Summed scale $\alpha = .847$.

Table 2

Survey Questions Measuring Views on What Limits Computer and/or Internet Use

"I don't have access to a computer"
"Computers are too complicated or hard to use"
"The Internet is too complicated or hard to use"
"I have trouble using the keyboard or mouse"
"I have trouble seeing or reading what is on the screen"
"I know how to use a computer, but don't have the time"
"I know how to use the Internet, but don't have the time"
"I do not know what computers can be used for"
"I do not know what can be done with the Internet"
"I know what is on the Internet but have no need or use for it"
"It might be useful, but I do not wish to use the Internet"
"Someone else is always using the computer"
"The computer is too far away or too difficult to get to"
"Someone else is always using the computer"
"The computer I have access to is broken and needs repair"
"My Internet access does not work reliably or is too slow"
"I worry about things like identity theft or online scams"
"Computers are too expensive or are too costly to maintain"
"Internet access is too expensive/I can't afford it"

Note: Respondents were read the above statements regarding reasons that might limit or prevent computer and/or Internet use. Respondents were asked to indicate if the above statements applied to them. Scores were recoded such that 0 = no and 1 = yes.

Table 3

Sample Characteristics by AIC

Measure	AIC 1	AIC 2	AIC 3	AIC 4	AIC 5	Total
N	15	13	31	21	21	101
Female	93.3%	84.6%	87.1%	76.2%	76.2%	83.2%
Age	82.13 (9.33)	80.15 (7.83)	85.63 (5.00)	82.67 (9.96)	84.48 (8.17)	83.53 (8.00)
White	93.3%	92.3%	96.8%	85.7%	100%	94.1%
Economic resources *						
More than enough money to get by	26.7%	23.1%	38.7%	23.8%	42.9%	32.7%
Just enough money to get by	53.3%	46.2%	58.1%	66.7%	47.6%	55.4%
Not enough money to get by	0.0%	30.8%	3.2%	4.8%	4.8%	6.9%
Marital status						
Married	0.0%	30.8%	16.1%	0.0%	33.3%	15.8%
Widowed	66.7%	53.8%	71.0%	71.4%	61.9%	66.3%
Divorced	20.0%	7.7%	6.5%	9.5%	0.0%	7.9%
Separated	6.7%	0.0%	0.0%	0.0%	0.0%	1.0%
Never married	6.7%	7.7%	6.5%	19.0%	4.8%	8.9%
Education						
Less than high school	13.3%	0.0%	3.2%	4.8%	0.0%	4.0%
High school graduate	20.0%	30.8%	16.1%	19.0%	9.5%	17.8%
Some college	33.3%	38.5%	16.1%	42.9%	9.5%	25.7%
College graduate	13.3%	15.4%	32.3%	23.8%	38.1%	26.7%
Postgraduate	20.0%	15.4%	32.3%	9.5%	42.9%	25.7%
Previous computer use/experience	46.7%	76.9%	80.6%	76.2%	85.7%	75.2%
Currently uses a computer	26.7%	30.8%	38.7%	42.9%	71.4%	43.6%

Note: Descriptives for continuous measures are expressed as means with standard deviations. Descriptives for nominal measures are expressed as percentages and indicate what proportion of the group has that particular attribute.

* Due to some participants' refusal to answer questions regarding socioeconomic status, the percentages for this variable do not add up to 100%.