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Computer related self-efficacy and anxiety in older adults with and without mild cognitive impairment

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Abstract

Background—This study examines differences in computer related self-efficacy and anxiety in subgroups of older adults, and changes in those measures following exposure to a systematic training program and subsequent computer use.

Methods—Participants were volunteers in the Intelligent Systems for Assessment of Aging Changes Study (ISAAC) carried out by the Oregon Center for Aging and Technology. Participants were administered two questionnaires prior to training and again one year later, related to computer self-efficacy and anxiety. Continuous recording of computer use was also assessed for a subset of participants.

Results—Baseline comparisons by gender, age, education, living arrangement, and computer proficiency, but not cognitive status, yielded significant differences in confidence and anxiety related to specific aspects of computer use. At one-year follow-up, participants reported less anxiety and greater confidence. However, the benefits of training and exposure varied by group and task. Comparisons based on cognitive status showed that the cognitively intact participants benefited more from training and/or experience with computers than did participants with Mild Cognitive Impairment (MCI), who after one year continued to report less confidence and more anxiety regarding certain aspects of computer use.

Conclusion—After one year of consistent computer use, cognitively intact participants in this study reported reduced levels of anxiety and increased self-confidence in their ability to perform specific computer tasks. Participants with MCI at baseline were less likely to demonstrate increased efficacy or confidence than their cognitively intact counterparts.

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1. Introduction

According to the 2003 U.S. Census, 35% of households of individuals 65 years and older had a computer, compared with a rate of 62% in all homes [1]. Internet access in that age group increased to 53% in 2009, from 29% in 2003 [2]. The rapid expansion of computer and Internet access among older Americans coincides with recent research that puts to rest the misconception of older adults as technophobes. In a survey of attendees at a senior center, while only 29% owned a computer, 56% reported having some computer experience [3]. Approximately half of these self-reported computer users had used e-mail and the Internet. Nevertheless, there remains a significant gap between older adults and their younger counterparts in computer familiarity and use.

Factors contributing to the current "digital divide" have been examined and consistently found to relate to negative attitudes about technology in general and anxiety related to computer use in older adults [4, 5]. However, a study examining a group of women in their nineties who were aging-in-place revealed an acceptance and eagerness to use computers and other technologies that could assist them maintain independence and social connections [6]. Other studies have demonstrated a similar acceptance of technology by older adults due to the potential wellness benefits [7, 8].

Our own work suggests that enthusiasm toward computers and technology is tempered by lack of familiarity with potential applications and utility [9]. Similarly, Morrell et al. found that lack of knowledge about the Internet was an important predictor of older adults' computer use, and that the oldest old in their sample had the least interest in using the World Wide Web [10]. In a study of barriers to computer use, Adams and colleagues report that perceptions of computer utility and ease of use among older adults were directly related to more frequent use of the Internet and e-mail [11].

Research has reliably shown that exposure and experience lead to improved attitudes and self-efficacy, decreased anxiety, and better understanding of potential computer applications. Czaja and Sharit demonstrated that even brief exposure to a limited set of computer tasks resulted in more positive attitudes, although the strength of that effect was moderated by task characteristics and users' performance of the task [12]. Following an intervention to learn how to use the computer and the Internet for one year, heavy computer users demonstrated increased participation in social activities and hobbies, and felt more in control of their lives [13]. Jay and Willis found that older adults' attitudes toward computers are modifiable through direct computer experience emphasizing comfort and efficacy [14]. Training programs have been applied to those with prior computer experience [15], as well as those with little or no prior exposure [16] with consistently reported changes in confidence and anxiety regardless of initial level of competence.

These studies have established the potential modifiability of older adults' attitudes and self-perceptions related to computer use through carefully designed training programs. However, for an intervention to be credited with producing meaningful change, long-term benefits should be demonstrated. Most studies to date have not provided information regarding the maintenance of reported gains over time. The present study reports results on attitudes and self-efficacy with regard to computer use from a cohort that has been followed for one year after initial training. Importantly, we examined the role that MCI may play on older adults' sense of anxiety and self-efficacy in using a home computer over time.

2. Methods

2.1 Participants

Volunteers in the present study are part of a longitudinal community cohort study of continuous, unobtrusive in-home monitoring to assess motor and cognitive change. The Intelligent Systems for Assessing Aging Changes (ISAAC) study, in Portland, Oregon, has deployed a home-based assessment platform in over 130 residences. Details of the recruitment and implementation of that study are described elsewhere [17]. Briefly, ISAAC is a NIH-funded study that uses computers and motion sensors installed in homes to monitor activity of healthy, non-demented seniors in their homes. Volunteers are clinically assessed in person with “gold standard” cognitive, behavioral, functional and motor tests. Volunteers also respond to weekly on-line health and activity questionnaires. Broadband Internet connection was installed in each home. Secure web-based software allows remote management of longitudinal data streams, the status of the sensor net and the participants.

The protocol was approved by the OHSU Institutional Review Board (IRB #2353). Enrollment in the ISAAC study began in March 2007 and continued on a rolling basis until September 2009. To be eligible for the ISAAC project, at least one resident volunteer in the household was at least 80 years old at entry, and living independently. While all participants were deemed not demented at time of enrollment, mild cognitive impairment (MCI) was not a criterion for exclusion. MCI was defined based on Petersen criteria as objective cognitive impairment in at least one domain, in the presence of normal general cognitive function, minimal or no functional decline, subjective memory complaint, and absence of dementia diagnosis [18]. Impairment on neuropsychological testing was defined as a score 1.5 standard deviations or more below the model-derived predicted mean values stratified by age, education and sex. Normative data were based upon 3268 cognitively normal individuals enrolled in 32 Alzheimer’s Disease Centers [19].

Participants were free of medical conditions that would cause physical disability or likelihood of death within three years, the duration of the initial ISAAC study. Volunteers were living in retirement communities or single-family dwellings, alone or with a spouse or partner. A subset of the ISAAC cohort chose to participate in the home monitoring portion of that study but declined to take part in the computer use component and are not part of the analyses reported here. Of the 233 individuals who have participated in the ISAAC home monitoring study to date, 219, or 94% volunteered to be “computer users.” All volunteers signed written informed consent to participate in the project.

2.2 Measures

Two brief questionnaires were adapted from existing measures for the purposes of this study [20, 21]. On the Computer Self-Efficacy Survey, volunteers rate their level of confidence on a five-point scale (Very Little Confidence to Very High Confidence) in their ability to complete six specific computer-based tasks, such as moving a cursor, using email, and making selections from an on-screen menu. Computer Self-Efficacy scores were taken as the sum of the six items (among those with no missing values), with a possible range of 6 to 30, with higher scores indicating more confidence. The Computer Anxiety Survey consists of 16 statements describing the respondent’s subjective experience when using a computer. Items such as “I worry about making mistakes on the computer” are rated on a five-point scale from “Strongly Disagree” to “Strongly Agree”. Items were worded so that agreement could indicate either positive or negative experiences with computer use. Additionally, actual computer use data from the monitoring project were available on a subset of participants.

2.3 Computer Training

As part of the in-home monitoring (ISAAC) study, all participants were given a desktop computer unless they preferred to use their own. After enrollment into the study, a research assistant completed a computer proficiency assessment with each participant to determine aptitude in basic elements of computer use, from turning on the computer, typing and saving documents, going to a designated website, and sending email, to turning off the computer. The research assistant directed participants to complete specific computer skills and evaluated if the participant completed the task independently, required some prompting, or was unable to complete the task. Participants were categorized as novice or intermediate/experienced users based on this assessment, and were invited to attend the appropriate computer training program.

The Computer and Internet Literacy Program was developed specifically for implementation with older adults. The program consists of six one-hour instructor led sessions designed to achieve computer proficiency, defined as the ability to launch computer programs from the desktop, send and receive email, and navigate the Internet. Each session, complemented by written materials, provides concise and detailed instructions to achieve a particular goal in that hour. In the novice class, the first session focuses on use of the mouse by means of a version of solitaire. Successive sessions are devoted to the keyboard, email and the address book, and exploring a website. The intermediate class follows the same lesson at a faster pace, which allows time for additional instruction in areas of interest to the class participants, such as web searching and use of Google images and maps. Mid-point and final review and consolidation of skills serve to address individual volunteers' concerns and to increase confidence. The training session leaders were trained in a "Train the Trainers" program that emphasizes facilitating success and personalizing each subject's training to fit their computer use goals.

2.4 Procedures

All volunteers received in-home assessment visits at baseline and at one-year follow-up. In addition to a battery of health, behavioral, and cognitive assessments, volunteers completed the two computer use questionnaires described above. Typically the computer surveys were completed at the time of computer installation; in some cases participants had already received training, while in others the training occurred shortly thereafter. Following completion of the six computer training sessions, volunteers were asked to use their computer a minimum of one hour per week for the duration of the monitoring study. As part of the monitoring study, participants receive a weekly online health questionnaire; failure to respond to two successive questionnaires resulted in a telephone contact to determine the cause for non-response. Additional inducements for computer use included provision of a suite of computer games that were designed for this cohort [22].

2.5 Data Analysis

Changes in Self-Efficacy scores from baseline to year 1 were calculated for each participant. Age was dichotomized as less than 85 years vs. 85 years and older while education was dichotomized as 12 years or less vs. greater than 12 years. Two sample t-tests were used to investigate the differences in baseline scores as well as one-year change in scores, according to gender, age, education, living arrangement (alone vs. not alone), cognitive status (normal vs. MCI) and computer proficiency (novice vs. intermediate). In post-hoc analyses, we examined one-year change in scores according to subject characteristics, adjusted for baseline scores. Principal components analysis with varimax rotation was run on the Computer Anxiety Survey in order to reduce the data by generating factors that represent sets of related independent variables. Based on the factor structures, we created factor scores to represent each individual's placement on the factors identified. Factor scores quantify individual cases on a latent continuum using a z-score scale which ranges from approximately 03.0 to +3.0. Linear regression was used to investigate the associations between participant characteristics and factor scores. Changes in Computer Anxiety factor scores from baseline to Year 1 were calculated for each participant and were compared by groups based participant characteristics.

We examined baseline scores and changes in self-efficacy and anxiety in a subsample of participants for whom computer usage data were available. Actual computer usage was recorded as total time on the computer per day. Mean time on the computer per day was calculated for all days during the one-year period of interest. Coefficient of Variation (COV) of computer use is a measure of the variability or consistency in day-to-day usage. The COV equals the ratio of the standard deviation to its mean multiplied by 100 (a dimensionless number). All analyses were performed using SAS 9.2 (Cary, NC).

3. Results

Figure 1 presents the sample size for each aspect of data collection for the present study. The 14 ISAAC participants who declined to be enrolled in the computer use portion of the longitudinal monitoring study were more likely to be older ($p = 0.02$), male ($p = 0.001$), and part of a couple ($p = 0.054$). The computer decliners did not differ in terms of in cognitive status, education or race from those who opted to have their computer use monitored as part of the ISAAC project. The processes of finalization and IRB approval of the survey measures led to delays their deployment with our participants; as a result 57 ISAAC computer users did not complete the surveys at their baseline visits and were excluded from all analyses.

3.1 Baseline Characteristics

Participant characteristics at baseline are summarized in Table 1. Volunteers were older adults (mean age: 84 years), highly educated (mean: 16 years), mostly white (13% minority representation), and majority female (73%) with half living alone (53%). At baseline, 29 volunteers met our research criteria for mild cognitive impairment. One hundred and sixty-two older adults completed the Computer Self-Efficacy Survey at baseline. Of the 162 survey respondents, 158 (98%) received computer training; almost half (42%) were considered novice computer users. Further analysis of participant characteristics revealed that novice users were more likely to be female (91% vs. 64%, $p < .001$), and more likely to live alone (70% vs. 47%, $p < .01$) than the experienced group. Additionally, female participants were much more likely to live alone than males (66% vs. 26%, $p < .0001$). There were no differences among novice vs. intermediate users according to age, education or cognitive status.

3.2 Self-Efficacy Survey

Overall the mean self-efficacy total score was 20, with a full range of 6 - 30. Self-efficacy total scores were approximately normally distributed with the Kolmogorov-Smirnov goodness-of-fit test ($p = 0.09$). Group differences in computer self-efficacy were analyzed by gender, age, education, living arrangement, cognitive status (MCI vs. Normal), and computer proficiency (see Table 2). At baseline, statistically significant differences in computer self-efficacy were reported such that men, younger participants (under 85), those not living alone, and those with higher levels of computer proficiency all described more confidence in performing specific computer tasks. Education and cognitive status were not related, at baseline, to self-reported efficacy.

One-year follow up data on the Computer Self-Efficacy Survey has been collected on 130 volunteers. The mean duration between baseline and one-year follow up assessments was 310 days (range: 175-552 days). Four participants withdrew from the study between baseline and Year 1 assessments. Of these, two were unhappy with the in-home sensors, and two felt that the overall demands of the study were “too much.” The 32 participants for whom the Year 1 data are not available did not differ significantly from the rest of the participants by any of the demographic variables in Table 1.

The mean change in computer self-efficacy from baseline to Year 1 was two points, although the range was −13 to +18. Fifty-four (42%) of the scores were unchanged or worse, while 76 (58%) of scores showed improvement in self-reported efficacy. Scores at the two time points were highly correlated ($r = 0.68$, $p < .0001$). When looking at changes in scores after one year, novice users achieved significantly greater gains in self-efficacy, as did those living alone, in comparison with their counterparts (non-novice users and those living with another person). In general, there was a trend such that there were greater improvements in self-efficacy in participant groups that had initially lower scores. Thus, women tended to make greater gains than men, and older volunteers more than younger. The comparison between cognitively intact and MCI participants was the only one in which those with lower baseline self-efficacy scores (MCI) showed smaller gains at follow-up.

It is possible that baseline scores affected change in scores over time. Therefore we also performed a post hoc analysis controlling for baseline scores. There was a statistically significant difference in change scores based on cognitive status; MCI volunteers as a group had a significantly smaller increase in efficacy scores over one year than the cognitively intact participants ($p = .03$). Similarly, novice users had a significantly smaller increase in efficacy scores over one year as compared to intermediate users ($p=0.01$), adjusted for baseline scores. Controlling for baseline scores did not reveal a significant difference in change in scores according to gender, age, education or living arrangement.

Percents of the total group rating themselves as having high or very high confidence for the six individual items of the Computer Self-Efficacy scores at the two time points are presented in Figure 2. Of the six skills described in the Computer Self-Efficacy Survey, four showed statistically significant increases in self-reported confidence in ability to perform the task from Baseline to Year 1. As a whole, the group demonstrated greater feelings of confidence regarding their ability to perform the more basic but ubiquitous operations of computer use, such as using email or the Internet. A minority of participants expressed confidence in their ability to enter information on-line, while about half felt able to use an on-screen menu effectively.

3.3 Computer Anxiety Survey

One-hundred fifty two participants answered all items on the baseline Computer Anxiety Survey. Principal components analysis with varimax rotation was performed on the Computer Anxiety Survey. We investigated the eigenvalues as well as the scree plot and three factors were retained on conceptual grounds, eigenvalues 8.6, 1.3 and 0.9 respectively. Most of the sixteen survey questions loaded strongly on only one factor at a time with minimal cross-loadings. A confirmatory analysis with Year 1 data yielded the same factor loadings. Results of performing factor analysis on the 16 statements of the Computer Anxiety Survey are presented in Table 3. Eight questions loaded strongly on Factor 1 including: I feel anxious whenever I am using computers, I worry about making mistakes on the computer and I feel tense whenever working on a computer. Six questions loaded strongly on Factor 2 including: I feel comfortable with computers, I feel content when I am working on a computer and I feel at ease with computers. While the items in Factors 1 and 2 initially may appear to reflect opposite ends of a continuum, the factor loadings were distinct, reflecting separate constructs. The last two questions loaded to Factor 3: I would like to continue working with computers in the future and I wish that computers were not as important as they are. Based on these results we chose to name Factor 1 ‘Anxiety/Tension’, Factor 2 ‘Confidence/Contentment’ and Factor 3 ‘Computer Use’.

The associations between participant characteristics and their individual factor scores at baseline were investigated. Regression coefficients and significant p-values are presented in Table 4. Less education (years of school) and novice users were significantly associated with higher scores on Factor 1, anxiety/tension. Women, older adults, and novice computer users were less likely to describe confidence and contentment (Factor 2) regarding their computer use. Of the 152 volunteers who completed the Computer Anxiety Survey at baseline, 119 have completed all items of the Computer Anxiety Survey one year later. When changes in factor scores between baseline and Year 1 were examined, only one association yielded a statistically significant result. MCI was associated with a decrease in Factor 2 score (Confidence/Contentment) between baseline and Year 1, while cognitively intact participants showed an increase on that factor (not in Table).

3.4 Computer Use

During the period of this study no participants discontinued use of their computer; indeed, all participants continued to complete weekly online questionnaires as part the ISAAC monitoring study. Computer usage data were continuously gathered and were available for a subset of 88 participants in the computer training and efficacy project at the time of the present analyses. In this group, baseline self-efficacy scores were significantly correlated with subsequent mean time on the computer per day during the one-year period under study (mean = 55 minutes, $r = 0.55$, $p < .0001$). Measured computer usage, however, was not associated with change in efficacy scores over one year. Similarly, baseline anxiety factor scores were associated with mean time on the computer per day such that Factor 1 (Anxious/Tense) was negatively correlated with subsequent computer usage ($r = -0.30$, $p < 0.01$) and Factor 2 (Confident/Content) was positively correlated with time on the computer ($r = 0.33$, $p < 0.01$). Mean time on the computer per day was not associated with any change in factor loadings on the Computer Anxiety Scale. However, day-to-day variability in computer usage during the year was found to be significantly related to change in loading on Factor 2. That is, volunteers with low variability or high day-to-day consistency in time on the computer demonstrated an increase in confidence/contentment in a comparison of baseline and Year 1 survey responses.

4. Discussion

After one year of consistent computer use, participants in this study reported reduced levels of anxiety and increased self-confidence in their ability to perform specific computer tasks. The majority of volunteers reported at baseline that they enjoyed working with computers and had an interest in continuing to work with computers in the future. Nevertheless, even within this generally “early adopter” group, a considerable minority acknowledged feeling tense (22%), anxious (20%), or wishing that they could be calmer (45%) when using a computer. While the percent of participants endorsing those items was significantly reduced at one-year follow-up, it may be useful to examine those items that failed to demonstrate change in attitude, and the traits of those who remain uneasy in their computer use. For example, worry about making mistakes continued to concern about one-quarter of the participants, while nearly a third wished that computers were less important. Future computer training programs for older adults might benefit from focusing on such concerns.

Interestingly, while only 47% of participants reported high or very high confidence in their general ability to use computers at the end of one year, this was not the case when specific computer tasks were rated. For example, 70% were highly confident in their ability to use email, and 72% were highly confident that they could close a computer program. The source of this discrepancy, while not a subject of this investigation, might be explained by those items on which the participants expressed less self-efficacy even after one year. In general, tasks related to interaction with the Internet seemed to elicit fewer ratings of confidence. Or, alternatively, it is possible that despite feelings of competence with particular computer skills, older adults retain a general sense of insecurity regarding their ability to perform yet to be identified new or challenging computer based activities.

In the present study, comparisons based on cognitive status showed that the cognitively intact participants benefited more from training and/or experience with computers than did the MCI participants, who after one year continued to report less confidence and more anxiety regarding certain aspects of computer use. Other studies have reported that people with MCI fall between cognitively healthy and mild dementia groups in terms of perceived difficulty and ability to use everyday technology [23, 24]. While it has been demonstrated that older adults with MCI are capable of participating in and may benefit from computer-based cognitive training programs [25, 26], these interventions tend to be intensive and tightly structured experiences. What has been less evident is whether people with the earliest signs of cognitive decline are capable of independent computer use and resultant feelings of mastery and success. The current study suggests that those with MCI will continue to use a computer at home, but have concerns about their confidence in its use. The current longitudinal results also support the possible ability of detecting cognitive decline based on simple computer use over time since presumably the self perceived anxiety and lack of confidence with computer based tasks reported by the MCI volunteers, reflects actual performance lapses that could be measured on-line over time.

Other group differences merit further examination. While women showed a trend toward increased self-efficacy over one year compared with men, they did not demonstrate similar gains in the Confidence/Contentment factor of the Computer Anxiety Survey. Czaja and Sharit found relatively few gender differences in attitudes toward computers following training in particular tasks [12]. While they reported generally more positive attitudes with experience for all participants, the mean age of this sample (48.4 years) was significantly younger than in the present study. In a study of older adults, White et al. found that after training a group of novice computer users, men were more likely than women to use the World Wide Web, while women were more likely than men to use email. In the same study they found that those who live alone were less likely to use the Internet [27]. Among the ISAAC research participants, women are more likely to live alone than men, and were more likely to be novice users. It is possible that differences in computer use based on living situation may be driven by underlying gender differences.

While it may seem self-evident that those who have higher levels of self-efficacy and confidence, and lower anxiety, will be likely to spend more time on the computer, greater mean time on the computer did not lead to increases in self-efficacy or reduced anxiety over the subsequent year. Although the nature of the association between frequency of use and level of comfort remains unanswered, our finding regarding consistency of computer use as a variable related to reduced anxiety suggests that regular computer use may be as much a factor in improving confidence and contentment as actual time on the computer.

Improvement in one's level of comfort related to computer use is of more than theoretical interest. Campbell has shown that women with low computer-related anxiety and high levels of self-efficacy were more likely than men to use the Internet to locate medical information [15]. Shapira et al. broadened the scope of potential benefits in a study describing changes in quality of life following a 15-week intervention aimed at teaching basic computer skills.

They found less depression and loneliness, and greater life satisfaction in older adults who received the training, while a comparison group reported decline in the same time period [28]. Others have reported similar benefits from computer and Internet use among older adults [27].

Limitations and Future Directions

Unlike earlier studies [29], computer ownership was not a prerequisite for enrollment in the present study, allowing us to include those with no previous exposure or experience, as well as those who already had access to computers. Nevertheless, this was a convenience sample of older adults recruited in the Portland metropolitan area who were willing to participate in a longitudinal study of in-home monitoring. Thus volunteers in the ISAAC protocol can be assumed to have more positive, or at least neutral, initial attitudes toward technology than the general population. While the findings of this study are not entirely generalizeable to the older adult population, we feel they can extend beyond those who have evident interest in using computers.

The constraints and complications of deploying a large-scale community-based in-home monitoring program created methodological challenges. Limited manpower combined with volunteers' multiple competing schedules resulted in some timing differences in the initiation of training sessions for participants. Thus some people received computer training prior to receiving their computers, while others were trained shortly after their computer had been installed. Additionally, administration of the survey questionnaires varied somewhat in timing vis-à-vis completion of computer training. Given the year-long follow-up interval and exposure to using the computer after baseline, it is not likely that these administration differences at entry had a major effect on the longitudinal outcomes.

In the burgeoning field of gerontechnology, much of the initial research has of necessity been qualitative. Although more recent efforts have utilized questionnaires and surveys, their psychometric properties have not been well established. The measurement instruments that were used in this study were adapted from existing measures, to address the priorities of the ISAAC project, that is, to begin to describe older adults' attitudes toward computers and technology. Thus the rationale was a practical one, to examine how older adults feel about computers and their own ability to perform specific computer-related tasks. The intent of this project was not to create and establish a new standardized measure for future use; nevertheless further development of appropriate outcome measures is warranted.

The results of this research are convergent with previous studies demonstrating that attitudes toward computer use vary by gender [4, 5], age [4], cognitive status [24], and level of activity [11], but are modifiable with training and exposure [12, 14, 16]. However, this is one of a few studies to our knowledge where participants were followed longitudinally, demonstrating that the benefits of computer training and experience accrue and are sustained over time especially if one remains cognitively healthy. Continued follow-up of this cohort will reveal whether additional computer use will strengthen these feelings of increased efficacy and confidence. Additionally, continuous monitoring of actual computer use that is part of the ISAAC study will provide a standard against which to compare self-reported use and attitude data. Finally, sources of continued anxiety or insecurity despite acquisition of specific skills will be investigated.

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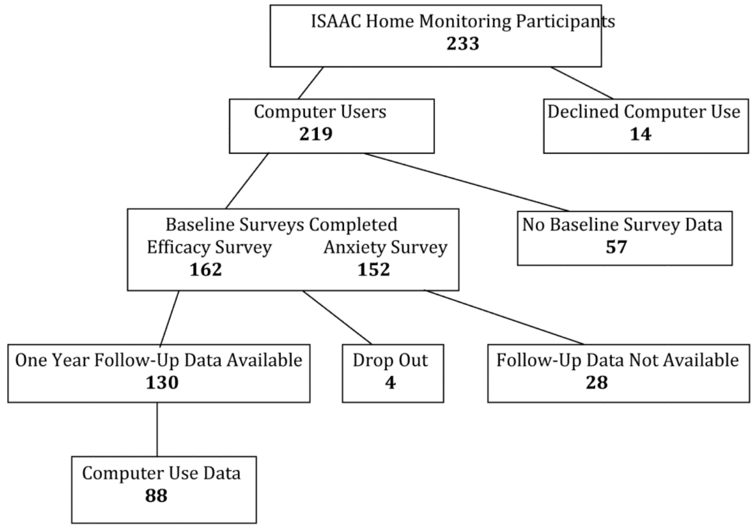

Figure 1.

Flow Chart of Participation in the Study

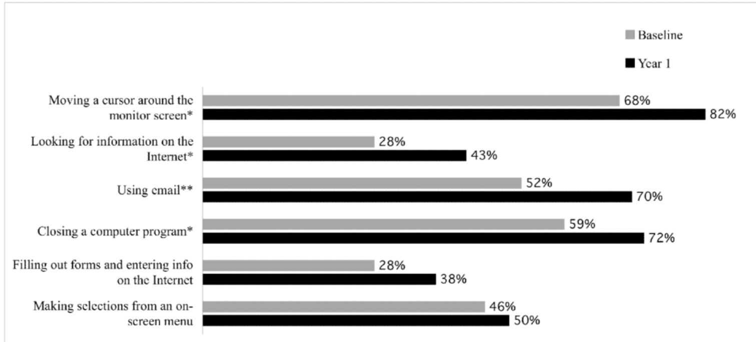

Figure 2.

Self-reported High Confidence in Performing Computer Tasks Over Time

*:p<0.05, **: p<0.01, ***: p<0.008 based on the Bonferroni multiple comparison adjustment

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Table 1

Participant Characteristics

		TOTAL N=162
Age (years)		
	Mean ± SD	83.9 ± 5.0
	Range	67 – 96
Gender		
	Male	44 (27%)
	Female	118 (73%)
Education (years)		
	Mean ± SD	15.6 ± 2.4
	Range	10 – 20
Race		
	White	140 (86%)
	Black	15 (9%)
	Asian	7 (4%)
Living Alone		
	No	76 (47%)
	Yes	86 (53%)
MMSE	Mean ± SD	28.5 ± 1.5
	Range	21 - 30
Cognitive Status		
	Normal	132 (82%)
	MCI 29	(18%)
Computer Experience		
	Novice	68 (42%)
	Intermediate	94 (58%)

Table 2

Differences in Baseline Computer Self-Efficacy Scores and Change in Scores Over One Year

		Baseline Score (N=162)	p-value	Change in Score (N=130)	p-value
Total	Mean ± SD Range	19.8 ± 6.4 6 – 30		1.9 ± 4.9 −13 – 18	
Gender					
Male		22.2 ± 5.7	<0.01	0.8 ± 4.7	NS
Female		18.9 ± 6.5		2.3 ± 4.9	
Age					
Less than 85 years		21.2 ± 6.5	<0.01	1.8 ± 5.1	NS
85 years or older		18.2 ± 6.5		2.1 ± 4.6	
Education					
Less than 13 years		19.3 ± 6.8	NS	2.3 ± 5.1	NS
13 years or more		20.0 ± 6.4		1.9 ± 4.9	
Living Alone					
No		21.6 ± 6.4	<0.001	1.0 ± 4.4	<0.05
Yes		18.3 ± 6.0		2.7 ± 5.1	
Cognitive Status					
Normal		20.2 ± 6.5	NS	2.2 ± 4.5	NS
MCI		18.1 ± 6.0		1.1 ± 6.2	
Computer Proficiency					
Novice		15.2 ± 5.3	<0.0001	3.1 ± 5.2	0.03
Intermediate		23.2 ± 4.9		1.2 ± 4.6	

Table 3

Factor Analysis of Baseline Computer Anxiety Survey (N=152)

Survey Questions	**Factor 1 Anxiety/ Tension**	**Factor 2 Confidence/ Contentment**	**Factor 3 Computer Use**
I try to avoid using computers whenever possible.	***0.60***	−0.38	0.20
I wish that I could be as calm as others appear to be when they are using computers.	***0.62***	−0.34	0.13
I feel tense whenever working on a computer.	***0.70***	−0.56	0.10
I feel anxious whenever I am using computers.	***0.70***	−0.22	0.38
I experience anxiety whenever I sit in front of a computer terminal.	***0.72***	-0.46	0.05
I am frightened by computers.	***0.73***	−0.22	0.25
I feel overwhelmed whenever I am working on a computer.	***0.74***	−0.21	0.27
I worry about making mistakes on the computer.	***0.75***	−0.26	−0.23
I am confident in my ability to use computers.	−0.49	***0.63***	−0.01
I enjoy working with computers.	−0.14	***0.64***	−0.38
I feel relaxed when I am working on a computer.	−0.44	***0.74***	−0.17
I feel at ease with computers.	−0.42	***0.75***	−0.27
I feel content when I am working on a computer.	−0.29	***0.76***	−0.25
I feel comfortable with computers.	−0.36	***0.80***	−0.22
I would like to continue working with computers in the future.	−0.01	−0.27	***−0.70***
I wish that computers were not as important as they are.	0.25	−0.16	***0.74***

Table 4

Participant Characteristics Associated with Computer Anxiety Survey Factors at Baseline (N=152)*

Participant characteristics	Factor 1 Anxiety/Tension	Factor 2 Confidence/ Contentment	Factor 3 Computer Use
Female (vs. Male)	0.17 (NS)	**−0.40 (0.03)**	0.12 (NS)
Age	0.02 (NS)	**−0.03 (0.03)**	0.02 (NS)
Education	**−0.08 (0.02)**	−0.01 (NS)	0.03 (NS)
Living Alone (vs. Not Alone)	0.06 (NS)	−0.09 (NS)	0.17 (NS)
MCI Cognitive Status (vs. Normal Cognition)	−0.08 (NS)	−0.03 (NS)	−0.03 (NS)
Novice Computer User (vs. Intermediate)	**0.94 (<0.0001)**	**−0.76 (<0.0001)**	0.19 (NS)

*Regression coefficients and (p-values) presented.