2018

EVALUATING THE SOCIAL AND TECHNOLOGICAL BENEFITS OF AN INTERGENERATIONAL PROGRAM FOR OLDER ADULTS

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EVALUATING THE SOCIAL AND TECHNOLOGICAL BENEFITS OF AN INTERGENERATIONAL PROGRAM FOR OLDER ADULTS

BY

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

IN

HUMAN DEVELOPMENT AND FAMILY STUDIES

UNIVERSITY OF RHODE ISLAND

2018

MASTER OF SCIENCE THESIS

OF

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2018

ABSTRACT

Intergenerational programs are on the rise. While studies have shown benefits to participation in these programs, most of the research has been focused on students and less on older adult outcomes (see Andreoletti & Howard, 2016 for a review). Currently, the University of Rhode Island (URI) is host to the Engaging Generations: Cyber-Seniors Program, which connects older adults with undergraduate technology mentors. The aim of this study was to evaluate the outcomes of intergenerational programming participation for older adults related to social isolation, loneliness, social engagement, and digital competency, as measured by the pre/post surveys given to participants. SPSS software was used to conduct descriptive analysis, paired-sample *t* Tests, independent sample t Tests, and one-way ANOVAs. Thematic analysis was used for the open-ended participant response. Results showed significant improvements on items of the digital competence scale, particularly in relation to social media and for those who started with lower levels of digital competence. Qualitative analysis showed that the older adults valued the technological knowledge gained, and the pleasant interactions and pedagogy. Program implications and suggestions are discussed.

ACKNOWLEDGMENTS

I would like to thank several individuals for guiding and supporting me throughout this process. Without them, this would not have been possible.

First, I would like to express my gratitude to my major professor, Dr. Skye Leedahl, for taking me on as her first thesis mentee. She continually motivated me, pushed me forward, and helped me bring my vision to life. I cannot express my gratitude for all the time and effort she put in guiding and teaching me. I would like to thank her for all her patience and contributions, start to finish. Thank you for letting me take part in your baby (CyberSeniors).

I would like to thank my inside committee member, Dr. Phillip Clark, for his continued support. I did not come into URI thinking I would be working with older adult populations, but Phillip Clark has a way of making you excited about aging. Due to his suggestions, I was able to present a completer picture of my results. Thank you for reminding me to never forget the voices of the participants. Thank you for the laughs in times of uncertainty.

I would like to thank my outside committee member, Dr. Molly Greaney, for her unique input and suggestions. She was pivotal in understanding importance insights I would have missed. I am most grateful for all the detailed edits she provided. Thank you for your eagerness to help and commitment to my work.

I would also like to thank my outside chair, Dr. Melanie Brasher, for agreeing to mediate my defense. She committed without knowing me, and I am eternally grateful. You were the final piece in this crazy process and your kindness took the stress right out of it.

I would like to thank the Human Development and Family Studies department for giving me an academic home and allowing me to find my passion. I came in unsure of my direction, and while I still considering opportunities, I now know that there are boundless possibilities for me. Thank you for opening my eyes and being a part of my journey. Lastly, I would also like to thank them for the lasting friendships I've developed with my fellow HDF graduates. Thank you for bringing us together.

I would like to thank the International Center, with a special mention to Tom Hospod, for being my second family. Due to my assistantship with their office, and the educational stipend provided, I was able to take a variety of courses that I would have never been able to take and found new passions to cultivate. They allowed me the opportunity to truly expand my world. Thank you for giving me a safe space to work, to think, to breath, to be, amongst the chaos.

Finally, I would like to thank my family for always believing in me. To my mom, dad, and siblings: I could not have done this without your support. I would also like to thank my partner, Stephen Zukauskas, for encouraging me to apply to this program. Thank you for being my IT guy, my editor, my cheerleader, my rock.

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CHAPTER 1

INTRODUCTION

Statement of the Problem

Under the assumption of an existing and ever increasing generational gap, intergenerational service-learning projects and courses are being implemented to connect students and older adults. While studies have shown benefits to participation (see Andreoletti & Howard, 2016 for a review), most research has focused on student outcomes, and the few assessments of older adult outcomes have found neutral to mildly positive results (Roodin, Brown, & Shedlock, 2013). Through an evaluation of the University of Rhode Island's (URI) Engaging Generations Program: CyberSeniors, a program that connects university students with older adults for student-led technological instruction, the aim of this study is to determine if participating in an intergenerational program reduces social isolation and loneliness, and increases social engagement and digital competency for the older adult participants.

Justification for and Significance of the Study

For decades, intergenerational programs have been used to foster collaboration, promote unity, and nurture cultural and community preservation between generations (Kaplan, 1997; Newman, 1997). However, despite the growth in programs, in-depth evaluations of these programs remain scarce (Kuehne, & Kaplan, 2001) and often focus on student outcomes instead of older adult outcomes (Roodin et al., 2013). A couple of studies that focused on the program impact on older adults noted reduced

depression and negative self-perceptions (Hernandez & Gonzalez, 2008), and more open-mindedness towards younger generations (Young & Janke, 2013). White et al. (2002) reported a trend toward decreased depression and loneliness, but the change was not significant. In a review about intergenerational programs, older adults spoke to having the opportunity to pass down wisdom (Newman & Hatton-Yeo, 2008), share life experiences, and gain cross-generational understanding (Underwood & Dorfman, 2008). Building on the results of previous studies on intergenerational programs, this study is focused on evaluating the URI's Engaging Generations Program: Cyber-Seniors' impact on social and technological outcomes for older adults.

CHAPTER 2

REVIEW OF LITERATURE

Definitions

Service-learning. URI's Engaging Generations Program is implemented through service-learning (Underwood & Dorfman, 2008). Bringle and Hatcher (1996) defined service-learning:

> as a credit-bearing educational experience where students participate in an organized service activity that meets community needs and also provides an opportunity to reflect on the service activity in such a way as to gain further understanding of course content and an enhanced sense of civic responsibility (p. 222).

As implied by its name, service-learning is meant to enhance course material through completion of a related service, with learning for students and benefits for those receiving services being emphasized (Furco, 1996). Young adults participating in service-learning have shown increased ageism sensitivity and more positive attitudes towards older adults, particularly in regards to working with them (Augustin & Freshman, 2016). However, less is known about the outcomes for older adults participating in intergenerational service-learning like URI's Engaging Generations Program.

Reverse mentoring. Due to the program's technological focus, activities are implemented through reverse mentoring. Reverse mentoring is a newer model of

intergenerational programming in which the younger adult provides the support and knowledge to the older adult, instead of the typical gerontocratic model where elders assist younger generations (e.g., Andreoletti & Howard, 2016). This approach provides the opportunity for younger adults to practice leadership skills and for older adults to learn new skills usually associated with youth (Murphy, 2012), such as social media.

Social isolation. Social isolation is defined as the lack of integration into available social networks and supports. In a qualitative study of 30 older adults, half of the participants brought up themes of exclusion (Bell & Menec, 2015), suggesting that worries about social isolation are common among older adults. Research has found social isolation to be a risk factor for poorer physical and mental health (Miyawaki, 2015), including an increased risk of developing Alzheimer's disease (Wilson et al., 2007), higher mortality risk (Holwerda et al., 2012), and reduced cognitive functioning (Cacioppo & Hawkley, 2009). Older adults are at an increased risk of social isolation due to their decreasing social networks through the loss of loved ones and friends associated with aging (Singh & Misra, 2009), and decreased mobility due to the increased chance of disability and disease (Rantakokko, Mänty, & Rantanen, 2013).

Loneliness. There are various definitions of loneliness in the literature. In different studies, loneliness has been defined as an unpleasant and unwelcome feeling (Hauge & Kirkevold, 2010), and a painful feeling that occurs when one is not as socially or as intimately connected as desired (de Jong Gierveld & van Tilburg, 2006; Perlman & Peplau, 1981). Gerontological studies conducted in Great Britain found that 35 – 46% of older adults ages 65 and older reported feelings of loneliness some of

the time to most or all of the time (Cann & Jopling, 2011). In older adults, loneliness has been shown to be significantly associated with depression and suicidal ideation, particularly for minority groups and females (Wright- St Clair, Neville, Forsyth, White, & Napier, 2017).

Social engagement. Glass et al. (2006) defined social engagement as the "performance of meaningful social roles for either leisure or productive activity" (p. 606). Mendes de Leon and colleagues (2003) found social engagement to positively influence health outcomes for older adults in the areas of healthcare expenditures, disability, and mortality. Glass and colleagues (2006) found longer survival rates and reduced declines in cognitive function for older adults who were more engaged socially. Social engagement is found to have a positive effect on cognitive performance due to the increased presence of activities that exercise cognition (Brown et al., 2016). In addition, social engagement as a protective factor for cognitive functioning was particularly significant for group-based engagement, which strengthened as age increased (Haslam, Cruwys, & Haslam, 2014). Research supports the need for increased social engagement for older adults.

Digital competence and the generational divide. Digital competence was defined by the European Parliament and the European Council in 2006 as:

> the confident and critical use of Information Society Technology (IST) for work, leisure, learning and communication. It is underpinned by basic skills in ICT [Information and Communication Technologies]: the use of computers to retrieve, access, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet (p. 3).

As technology becomes more integrated into everyday life, digital competence is increasingly important for older adults (Czaja et al., 2006). Unfortunately, older adults are unable to learn at the rate technology is developing (Charness, Schumann, & Bortiz, 2002). In addition, computer anxiety is an obstacle to digital literacy (Laguna & Babcock, 1997). However, technology training can mitigate this anxiety (Czaja et al., 2006), improve computer skills, increase usage, and foster social connectedness and social participation (Gardner, 2010). Hampton and colleagues (2011) found increases in social ties, social support, and diversity in social networks with social media use, however, the noted that older adults are less likely to use social media.

Theoretical Framework: Engagement Theory

Kearsley and Shneiderman (1998) believed that engagement theory could be used as a framework for teaching and learning through technology. According to engagement theory, for meaningful learning to occur, learning activities must be social and worthwhile to the student. Summarized by Relate-Create-Donate, learning activities must follow three components: 1) a group context, 2) project-based, and 3) an authentic focus. According to the authors, a group context or Relate, increases learning motivation, exercises social-emotional competencies, and provides opportunities to interact with diverse perspectives. Project-based learning allows for real-world problem solving and the potential for student-controlled learning. Last, an authentic focus, such as tying student learning outcomes to an outside beneficiary, can increase satisfaction and motivation. While not a key component of engagement theory, the authors believed engagement could be facilitated through technology.

For older adults, engagement theory and technological learning seems to relate to modernization theory ideas, as discussed in gerontological literature (Cowgill, 1974). According to Cowgill, older adults face declining status and the loss of political and social influence in rapidly modernizing times. Modernization is:

> the transformation of a total society from a relatively rural way of life based on animate power, limited technology, relatively undifferentiated institutions, parochial and traditional outlook and values, toward a predominantly urban way of life, based on inanimate sources of power, highly developed scientific technology, highly differentiated institutions matched by segmented individual roles, and a cosmopolitan outlook which emphasizes efficiency and progress. (p. 127)

As older adults are slower to learn (Charness, Schumann, & Bortiz, 2002) and less willing to use (Hampton et al., 2011) new technology, older adults may be unable to reconcile their reality with this new societal definition of progress. Marginalized, social and community engagement in older adults may be reduced, while social isolation and loneliness increased (Hooyman, & Kiyak, 2011), suggesting that technology training may alleviate social isolation and loneliness, while increasing social engagement in older adults. This paper will further expand the use of engagement theory with the focus on older adult learning, a novel population.

Program Description

Inception. Following the viewing of the Canadian documentary *Cyber-Seniors* (Rusnack & Cassaday, 2014) and interest in establishing a similar program at URI, a group of faculty from Human Development & Family Studies (HDF),

Pharmacy, and Sociology met during the summer of 2015 to discuss implementation. The trial program began in September and ran through December of 2015. Based on feedback, a program plan was finalized for Spring 2016 and has continued to expand to date.

Funding. In general, this program operates on little funding. The HDF Department provides in-kind support that enables copies to be made and access to office supplies. In addition, the three departments involved have enabled faculty members to spend time working towards the program. The Rhode Island Geriatric Workforce Enhancement Program has provided some financial support to enable the development and refinement of program documents and procedures, and some conference travel for faculty to present research related to the program. Small grants to support the research associated with this program also have been provided through the URI Institute for Integrated Health & Innovation and the URI College of Health Science.

Purpose. The purpose of the program is to meet three objectives: "(1) promote civic engagement and service-learning for college students; (2) help prepare future health and human service professionals for careers; [and] (3) improve social connectedness and interest in technology for older adults" (Leedahl et al., in press, p. 9). Targeted participants are older adults living in the community receiving services from one of the partner organizations.

Program locations. During this study period (Fall 2016-Summer 2017), the program was offered at the following sites: five senior centers in Rhode Island (i.e., North Kingstown, East Greenwich, Pawtucket, South Kingstown, Cranston), the

Program of All-Inclusive Care for the Elderly (PACE) of Providence, the URI Osher Lifelong Learning Institute (OLLI), and two undergraduate gerontology upper-level classes (SOC 438: Aging in Society during Fall 2016 and HDF 440: Environmental Context of Aging during Spring 2017) in which OLLI members were included.

Definitions. A senior center is a community center that provides a variety of services to older adults and connects these older adults to available community services, with the aim of maintaining the independence and social engagement of their participants (National Council on Aging, 2017). PACE is a Medicaid and Medicare program for adults 55 and older to meet their healthcare needs within their community, home, and PACE centers instead of in a nursing home (U.S. Centers for Medicare & Medicaid Services, n.d.). OLLI is an educational program for those 50+ that provides lifelong learning opportunities and is housed at URI (OLLI, 2017).

Program models. During the study period of Fall 2016-Summer 2017 the program was implemented in one of four models: 1) individual appointments, 2) matching program, 3) drop-in sessions, and 4) class sessions. The first model, *individual appointments*, consisted of student mentors holding one-on-one sessions with older adults that lasted 30-60 minutes. Sessions were tailored to the older adults' questions and interests. These sessions were held at senior centers, and older adults received assistance with their own devices. For the second model, *matching program*, students from two URI classes were matched with an OLLI member based on shared interests, technology use, and personal characteristics. Each pair was required to meet six hours during the semester, with the pair determining scheduling and location. For the third model, *drop-in sessions*, student mentors were available for 2-4 hours, 1-2

times a week for OLLI members to receive technology support as needed. Sessions were held at the OLLI office located on the URI campus. The fourth model, *class sessions*, was a student-led class held once a week using iPads provided by the program. Classes were tailored based on interests of those taking the class and were held at PACE. While a student leader ran the course, other students also working on their service-learning hours would assist.

Student involvement. This program was designed to be a learning opportunity for future health and human services professionals and a supplemental program for those with interests in geriatrics and gerontology. Students participate in the program through independent study credits, coursework, or experiential education hours. This flexibility allows for a variety of departments to be involved and for students to receive credit for their participation. Before beginning the sessions, each student-mentor takes part in an hour-long training session encompassing program logistics, tips, and problem-solving.

Current Study

The goal of this study was to advance the literature focused on the older adult outcomes from participation in an intergenerational program implemented using reverse mentoring and connecting generations through technology. The purpose of this study was to understand if and how the program benefits older adult participants. This study examined the following evaluative research questions:

- RQ1: What were the demographic and social characteristics of participants in the Engaging Generations: Cyber-Seniors program during the study period of Fall 2016-Summer 2017?

- RQ2: Did older adult participants experience improvements in the quantitative measures of social isolation, loneliness, social engagement, and/or digital competence after participating in at least 3 sessions of the program?
    - Hypothesis: Older adult participants will have increased social engagement and digital competence, and decreased in loneliness and social isolation following program participation.
- RQ3: What were the perceived benefits of the program as reported by older adult participants?

CHAPTER 3

METHODOLOGY

This study examined the data collected from older adult program participants during Fall 2016, Spring 2017, and Summer 2017. This study took place at five senior centers, one PACE organization, and one OLLI location. Participant data was collected using pre/post surveys. All collection methods were IRB-approved, and all participants provided informed written consent.

Design

The aims of the study were to examine who participated in the program, determine if there was a statistically significant increase or decrease between pre/post-test scores on selected measures, and to thematically analyze perceived impacts of the program. First, the study examined descriptive statistics. Second, utilizing a pre/post intervention design, this study evaluated pre/post differences on scores from loneliness, social isolation, social engagement, and digital competency measures (outcomes) after exposing older adults to intergenerational reverse mentoring (intervention). Third, this study conducted qualitative analysis using thematic analysis.

Sample

Between Fall 2016 and Summer 2017, 123 older adults participated in at least one of the models of the program, and of these, 82 participants (66%) completed the pre-survey only (non-completers) and 41 older adults (33%) completed both pre- and post-surveys (completers). All older adult participants were given the pretest survey

(T1) at the first meeting between the adult and student. After the completion of three sessions, all participants were asked to take the posttest survey (T2). Importantly, 72 older adults did not participate in three sessions, and for the 51 older adults that did, 10 chose not to complete the posttest survey. The response rate for those that completed the pre- and post-surveys was 80.4 percent.

Data Collecting Tools

The research team conducted a pilot study during the Spring 2016 semester. Then, starting in the Summer of 2017, the research team modified the surveys to include the measures that were a part of the pilot test (i.e., social engagement, social isolation), and they also added measures for loneliness and digital competence. The pre/post surveys used the same items with the exception of additional open-ended questions on the post-survey asking participants to reflect on program effectiveness. The following scales were included on both surveys. See Appendix A for a copy of the survey items used in this study.

Social isolation was measured using the Lubben Social Network Scale (LSNS-6) (Lubben et al., 2006). The LSNS-6 includes six 6-point Likert scale questions about family and friendships, with responses of none, one, two, three-four, five to eight, and nine plus. In this study, separate scale scores for family and friendship were analyzed, as well as the individual items on the scale and an overall sum score. In analyzing this scale, a higher item score, scale score, or summed total score indicated less isolation. For this study, these measures can be considered reliable with Cronbach's alphas ranging from .867 to .912 on the pre/post sub-scales and the overall scale score.

A social engagement scale about the frequency of engagement in social activities (e.g., visiting friends) was used in the study. The measure was derived from Glass and colleagues (2006) and has been used in previous studies (Leedahl, Chapin, & Little, 2015; Leedahl et al., in press). The scale included nine 4-point Likert scale questions, with response choices of never, rarely, sometimes, and often. Individual items, as well as a total sum score, were analyzed in this study. Higher item scores or summed total scores indicated more engagement in social activities. For this study, this measure can be considered reliable with a pretest Cronbach's alpha of .708 and a posttest Cronbach's alpha of .795.

The loneliness scale is a three-item 5-point Likert scale questionnaire with responses ranging from strongly agree to strongly disagree (Campaign to End Loneliness, n.d.). Individual items, as well as a total sum score, were analyzed in this study. Higher item or total summed scores indicated more loneliness. For this study, this measure can be considered reliable with a pretest Cronbach's alpha of .961 and a posttest Cronbach's alpha of .913.

Lastly, digital competence was measured with a scale derived from the suggested indicators from a 2014 report about digital competence (European Commission, 2014). Items selected were chosen from their core competencies when deemed applicable to the Cyber-Seniors' program curriculum. The scale is an eleven-item 4-point Likert scale with responses from strongly disagree to strongly agree. In this study individual items, as well as a total sum score, were analyzed. For this study,

this measure can be considered reliable with a pretest Cronbach's alpha of .873 and a posttest Cronbach's alpha of .909.[1]

Data. The data used in this study was collected through the URI Engaging Generations Program, under the guidance of principal investigator, Dr. Skye Leedahl. Student mentors asked older adults to complete pre- and post-surveys using hard copies of the surveys. Students brought the surveys to Dr. Leedahl's office, and a student researcher recorded survey responses into SurveyMonkey. Once the data was entered into SurveyMonkey, the data was downloaded as SPSS files.

Data Analysis. Quantitative data analysis was performed using SPSS (v. 22). After downloading the SPSS files, the data was merged and cleaned. Prior to conducting this study, all participants had been given an ID number. IDs were matched to the participant survey(s), and then names and any identifying information were retracted from the SPSS database to de-identify the data.

Missing data was identified as not answered (-99) or not included on the survey (-88). To address scale items not answered, mean substitution was used if at least ⅓ of items had data for a respondent (Neuman, 2011). For the pretest data, mean substitution was used for one respondent who missed one question in the friendship sub-scale, two respondents who missed one question in the family sub-scale, 18 respondents who missed 1 or 2 questions in the social engagement scale, and 19 respondents missed 1 to 5 questions on the digital competence scale. For the posttest data, mean substitution was used for one respondent who missed one question on the

[1] A Confirmatory Factor Analysis was conducted for the social engagement & digital competence measures. The results of this analysis showed that separating scale items into more than one-factor would reduce Cronbach's alpha, thus scale scores were analyzed overall.

family sub-scale, seven respondents who missed one question on the social engagement scale, and six respondents that missed 1 or 2 questions on the digital competence scale.

Scale scores that did not meet these criteria were not included in the pre/post analysis. In the pretests, four were excluded from the friendship sub-scale, two from the family sub-scale, nine from the social engagement scale, fifteen from the digital competence scale, and one from the loneliness scale. In the posttests, one was excluded from the friendship sub-scale, one from the family sub-scale, two from the social engagement scale, three from the digital competence scale, and one from the loneliness scale.

A total sum score was created for each of the scales. In addition, the friendship and family sub-scales were combined to create a LSNS-6 (social network) sum score, and the sum scores for each sub-scale was used in the analysis. The sum score was then used to categorize the participant as high or low on the scale for all measures. The sum score was compared to the mean score of that scale. Those scoring above the mean were categorized as high and those below the mean were categorized as low. A change in score for each scale was also calculated. The pretest score was subtracted from the posttest score of each participant. This was calculated for each measure.

Descriptive statistics, frequencies, means, and standard deviations for all variables were identified. To assess pre to posttest changes in individual items and scale scores, paired-sample *t* tests were used. Effect size was also examined using Cohen's *d*. Follow-up independent *t* tests and ANOVAS were conducted to assess the characteristics of the participants with significant changes from pre to post scores.

Qualitative analysis. To assess perceived impacts, open-ended responses for "what was your favorite part of the program, or the most valuable thing you learned?" were analyzed using thematic analysis. Thematic analysis reduces qualitative material to meaningful patterns or themes (Patton, 2002). In conducting qualitative analysis for this study, all responses were first gathered in a single excel document. Responses were initially read to gain an overall sense of responses. Responses were carefully read again and coded, and each response could have multiple codes. Code patterns were identified, and similar codes were collapsed into one theme. A list of five themes was identified, along with key quotes. Once a list of themes was developed, it was reviewed with Dr. Skye Leedahl, the principal investigator, and finalized by collapsing a few of the categories. For example, Advanced Use of Technology was incorporated into the Help with Use of Technology category because it represented one extreme end of the spectrum and not a separate category. An 'Other' category was established for some of the responses that did not fit into any other category.

CHAPTER 4

FINDINGS

Research Question 1

Between Fall 2016 and Summer 2017, 123 older adults participated in the program (*M* age = 73, *SD* = 7.13). See Table 1 for demographic data for the older adults who participated in the program. Eighty-two of these participants (*M* = 73.57, *SD* = 6.74) did not complete the post-survey (non-completers). Of these 82 participants, 39 adults (48%) participated via senior center appointments, 25 adults (31%) via OLLI drop-in sessions, 14 adults (17%) via the matching program with URI classes, and 4 adults (5%) via the PACE class program.

As shown in Table 1, non-completers were primarily female (56%), White (83%), married (39%), and living with someone (45%). Most participants reported being in very good health (27%) to excellent health (26%), and a small minority were in fair (5%) to poor (1%) health. Seventy-two percent of participants were retired, 10 percent were unemployed or unable to work, and 5 percent were employed full or part-time. Over half (55%) reported an income of $30,001 or more, and 27 percent had reported incomes less than $30,000. Overall, participants were mostly well educated; 29 percent graduated college and 29 percent received a graduate degree, while only 3 percent did not complete high school.

Fifty-one older adults (41%) completed at least three sessions, and of those, 41 adults (80%) completed both the pre- and post-surveys (*M* age = 74, *SD* = 7.85). Of

those who completed both pre- and post-surveys, 12 adults (29%) participated via senior center appointments, 3 adults (7%) via OLLI drop-in sessions, 17 adults (42%) via the matching program with URI classes, and 8 adults (20%) via the PACE class program. This sample did not follow the same program model distribution as the non-completer sample. Given the format of the different program models, it was easier to get participants from certain models to take the surveys. For example, the matching program group was a higher proportion of the sample. Participants were sent an email link and asked to complete the surveys, and prior to signing up for the matching program, they were told they needed to complete at least 6 hours in the program to participate. At other sites, participants could take part in as many or as few sessions as they wanted, for example, at the OLLI drop-in sessions, sessions were designed to be quick and resolve specific questions. Multiple sessions were not necessary or required, thus getting post-survey data was more challenging.

Overall, the completer sample followed the same demographic distribution as the larger non-completer sample; female (56%), white (85%), married (42%), living with someone (49%), and in very good health (17%) to good health (17%). Eighty-two percent of participants were retired, and 59 percent reported an income of $30,001 or more. However, participants had less education; 19 percent less received a graduate degree, and 6 percent more did not complete high school. Therefore, non-completers and completers matched relatively well demographically, with those with less education perhaps participating more often than those with more education, thus explaining the educational differences between samples.

Participants also were asked about the technological devices owned on both surveys. At baseline (n=123), the majority reported owning smartphones (64%), and laptops (57%), however, a larger portion of the matching program participants owned a smartphone (82%) and laptop (74%) as compared to, for example, the class session participants at PACE (42% and 33%, respectively). In the post-survey data (n=41), tablets (58%) and smartphones (58%) were the most owned devices, and once again, the portions were different between program models. For example, 4 percent of the drop-in session participants at OLLI owned a tablet while 48 percent of the matching program participants owned a tablet. Overall, a larger percent of drop-in session and matching program participants owned devices as compared to the individual appointment and class session participants.

Pretest data (n=92) showed that laptop computers and smartphones were used most often at 17 percent each (n=16), followed by desktop computers (n=14) and tablets (n=7). Individual appointment senior center participants and class session PACE participants used smartphones most often, while drop-in session OLLI participants used laptops most often. The question was not included for the matching program participants nor on the post-survey.

Participants also were asked for what purposes the technological devices were used. In both the pre and posttests, email (76% and 80%) and searching the internet for information (60% and 80%, respectively) were the most common reported purposes. Once again, proportions varied by program model. For example, in the pretest, only 39 percent of individual appointment participants searched for information on the internet as compared to 87 percent of the matching program participants.

Research Question 2

Paired-sample *t* tests were conducted to evaluate if any pre/post differences could be detected based on program participation for participants on the following measures: LSNS-6, loneliness, social engagement, and digital competence. See Table 2 for pre/post scale scores and paired *t* test results for the older adults who participated in the program. The results indicated that for social isolation the mean score of the LSNS-6 (social network) scale pre-participation (M = 14.82, SD = 5.57) was not significantly different than the mean post-participation score (M = 14.43, SD = 5.28), $t(36) = .78$, $p = .44$. Results also indicated that mean social engagement was not significantly different pre-participation (M = 16.67, SD = 4.69) to post-participation (M = 16.60, SD = 5.69), $t(37) = .10$, p = .923. Loneliness pre-participation (M =12.58, SD = 2.43) was not significantly greater than loneliness post-participation (M= 11.79, SD = 2.97), $t(18) = 1.62$, $p = .12$, although the p value does approach significance, suggesting that program participants did trend toward becoming less lonely following participation. The standardized effect size index, d, was 0.29 (small to medium effect size[2]). Last, digital competence was not significantly different pre-participation (M = 27.42 SD = 10.49) to post-participation (M = 31.87, SD = 12.42), $t(36) = -1.54$, $p = .13$. However, this measure was also trending toward significance, showing that participants seem to be at least somewhat improving in their digital competence scores after participating in the program, as demonstrated by 43 percent of participants

[2] For interpretation of effect size, Sailowsky's (2009) expansion of Cohen's descriptors of magnitude were used. Very small (.01), Small (.20), Medium (.50), Large (.80), Very Large (1.5), Huge (2.0).

showing improvement. The standardized effect size index, *d*, was 0.39 (small to medium effect size).

Paired-samples *t* tests were then conducted on the individual items of each scale. See Table 3 for pre/post individual item scores and paired *t* test results on the social engagement and digital competence scales for the older adults who participated in the program. While all scale items were analyzed, only these two scales included significant items. Post-participation mean scores for one item of the social engagement scale and five items of the digital competence scale showed significant improvements ($p < 0.05$) in the hypothesized direction towards improvement.

For the social engagement scale, results indicated that the mean score for *Doing Paid Community Work* post-participation ($M = .61$, $SD = 1.00$) was significantly greater than the mean pre-participation score ($M = .20$, $SD = .59$), $t(37) = -3.27$, $p < .01$. The standardized effect size index, *d*, was 0.50 (medium effect). For the digital competence score, results indicated that the mean score for *Using Video Calls, such as Skype* post-participation ($M = 3.22$, $SD = 1.63$) was significantly greater than the mean pre-participation score ($M = 2.25$, $SD = 1.39$), $t(36) = -2.66$, $p < .05$. The standardized effect size index, *d*, was 0.64 (medium effect to large effect size). Results indicated that the mean score for *Participating in Social Networks* post-participation ($M = 3.59$, $SD = 1.55$) was significantly greater than the mean pre-participation score ($M = 2.74$, $SD = 1.43$), $t(36) = -2.48$, $p < .05$. The standardized effect size index, *d*, was 0.57 (medium to large effect size). The mean score for *Posting Messages on Social Networks* post-participation ($M = 3.57$, $SD = 1.54$) was significantly greater than the mean pre-participation score ($M = 2.74$, $SD = 1.41$), $t(36) = -2.59$, $p < .05$. The

standardized effect size index, *d*, was .56 (medium to large effect size). The mean score for *Sharing Talents or Interests on Social Networks* post-participation (M = 3.51, SD = 1.52) was significantly greater than the mean pre-participation score (M = 2.76, SD = 1.46), $t(36) = -2.23$, $p < .05$. The standardized effect size index, *d*, was .50 (medium effect). Last, the mean score for *Using Copy/Paste Tools* post-participation (M = 3.03, SD = 1.61) was significantly greater than the mean pre-participation score (M = 2.28, SD = 1.35), $t(36) = -2.22$, $p < .05$. The standardized effect size index, *d*, was .50 (medium effect). Between 26 to 49 percent of participants showed improvement in these items. All other measure items were not significant.

Follow-up analyses were then conducted using the high/low variable categorizations. Independent samples *t* tests were conducted to test whether having a high or low initial pretest score would be significantly associated with the amount of change in the scale occurring pre to posttest. The tests were significant for the digital competence scale, overall and for all individual items except *Using Video Calls* (see Table 4). The average change for participants starting with higher digital competence (M = -5.51, SD = 8.37) was significantly less than those that started with low digital competence (M = 14.96, SD = 18.74), and in fact went in the opposite direction. Those starting with higher digital competence reported less digital competence in the posttest. This was the same trend for all significant individual items.

Independent samples *t* tests were conducted to test whether any dichotomous demographics were associated with the amount of change in the scale occurring pre to posttest. Significant relationships were found with *Using Video Calls* (see Table 5 and 6). Participants with a reported income of less than $30,000 ($M$ = 8.36, SD = 21.50)

had more significant positive change than participants with a reported income of $30,001 or more (*M* = 2.70, *SD* = 14.62). In addition, female participants (*M* = 1.69, *SD* = 2.28) had more significant positive change than male participants (*M* = .12, *SD* = 1.87).

One-way analyses of variance (ANOVAs) were conducted to test if non-dichotomous demographics would be significantly associated with the amount of change in the scale occurring pre to posttest. The test approached significant at the .05 level between *Using Video Calls* and the grouping variable Program Model, $F(3, 32) = 2.78$, $p = .057$. A follow-up least square difference test was conducted to evaluate pairwise differences among the means. There was a significant difference in the means between the matching program participants and participants of the class sessions and the individual appointments. Both class session and individual appointment participants increased scores on *Using Video Calls,* while matching participants decreased. The means, standard deviations, and 95% confidence intervals for the pairwise differences of the four models are reported in Table 7. However, initial digital competence was not the same per group. OLLI members in both the drop-in sessions (*M* = 27.7, *SD* = 3.1) and matching program (*M* =30.3, *SD* = 11.3) had a higher initial score than the average of the sample (*M* = 27.4, *SD* = 10.1), as compared to the individual appointments (*M* = 26.5, *SD* = 8.7) and class sessions (*M* = 22.1, *SD* =10.6). Thus, OLLI members are participating with a higher initial digital competence score.

Research Question 3

Of the 51 participants who completed the post-survey, 48 (94%) replied to the open-end question: What was your favorite part of the program, or the most valuable thing you learned? Three participants did not respond. From the responses, five major themes were identified: help with use of technology, appreciation of the student teaching approach, enjoyment with the intergenerational interaction, assistance with overcoming anxiety or fear, and other (Table 8).

Help with use of technology. Fifty-four percent of the 48 participants who answered the question directly mentioned the positive influence of the program on their ability to use technology. Some participants spoke in general about learning to use their devices, while others mentioned learning about specific functions or applications on their device such as photo transferring, email, and social media.

> *"They answered all my questions regarding my iPhone and clearly demonstrated how to set up apps."* —OLLI participant

Four of the participants were satisfied with the help received with specific issues or questions related to their devices, including streamlining usage. Some of the participants went beyond basic uses of technology and used their sessions to collaborate on these projects with their student.

> *"Having a college student as a conversation partner for a podcast project I am planning."* —Matching program participant

Two additional participants were helped to set up websites. Last, two participants mentioned that there was a need to try to keep up with current technology.

"Realizing how much there is to learn about the new technology but understanding you have to keep at it to keep up. One session a week won't help if you don't utilize what has been taught or shown to you." —Matching program participant

Appreciation of the student teaching approach. Thirty-three percent of the 48 participants touched upon an appreciation for the student's teaching approach in two categories: program characteristics and student characteristics. Regarding the program characteristics, participants valued a variety of lesson styles; a conversation partner, lecture, discussion; and valued the benefit and "ease" of 1-on-1 learning. Some participants viewed the learning as reciprocal and one participant "enjoyed the opportunity to contribute to someone's education." There was, however, a single critic of the program in response to this question. While their student was very determined to help, the participant from the matching program remarked that the matching was not done necessarily with the older adult participant's needs in mind.

Eight of the participants mentioned student characteristics that they found to be valuable as part of their experience. The participants characterized their student as "knowledgeable," "polite," "non-judgmental," and "open-minded." Instruction was given with "energy" and "total dedication." One participant was grateful for the respect their student showed for herself and others. Some of the participants were grateful for the patience their student demonstrated while working with them.

"He was easy to be with and patient while teaching me how to streamline my use of the computer. We had good communication..." —Matching program participant

Enjoyment of the intergenerational interaction. Twenty-seven percent of the 48 participants suggested that the intergenerational interaction was the most valued part of the program. As participants wrote, learning from these students was a "pleasure" and "wonderful." Many of these participants spoke of the enjoyment of getting to know and connect with their student.

> *"My favorite part of the program was meeting and interacting with my student contact. I enjoyed our conversations and as time passed... our growing friendship. Our sessions lasted 1 1/2 hours and time flew! I looked forward to our Friday morning meetings at a local coffee shop...a lovely way to begin a weekend."* —Matching program participant

Some participants mentioned interactions that went beyond the intended learning of technology. These participants enjoyed learning about their student's future plans and goals.

> *"Learning about my partner's plans for life, her accomplishments and our getting along and having fun as well as learning about each other."* — Matching program participant

Other participants concluded that it is important to know the interests and pursuits of current youth. Last, one participant's experience in the program resulted in the transference of positive feelings towards his/her student mentor to youth in general.

> *"Just sitting with a young woman and getting to know her re-confirm[ed] that most young people are a good generation!"* —Matching program participant

Assistance with overcoming anxiety or fear. Thirteen percent of the 48 participants directly stated or implied overcoming an anxiety or fear regarding

learning technology. One participant valued being in a non-judgmental environment while another appreciated not being scolded.

> *"It was wonderful to have such a knowledgeable and non-judgmental student to help me learn how to use my computer."* —Matching program participant

These responses imply that previous learning experiences had not been positive or, without these previous learning experiences, the fear that their learning would elicit negative responses. One participant was able to get past her feelings of discomfort.

> *"Not feeling uncomfortable using technology around the younger generation like [I] once did."* —Senior center appointment participant

Lastly, one participant desired to "try to keep it up with today's technology," implying a fear of losing touch with a technologically advancing society.

Other. Three of the participants did not specify any specific portion of the program and instead mentioned that they enjoyed the program as a whole. For example, their responses were: "Everything!", "The wonder of it all!", and "I enjoyed all aspects of the program." Finally, one participant wrote about learning to be more empathetic towards other older adults who may have less abilities than him/her.

CHAPTER 4

DISCUSSION

From Fall 2016 to Summer 2017, the Engaging Generations: Cyber-Seniors program connected older adults with URI undergraduates technology mentors. Over sessions, these undergraduate students gave hands-on technological instruction. A larger proportion of participants were White, married, educated, and retired. Many owned a smartphone, laptop, or tablet, however, those in the matching program and drop-in sessions, both OLLI members, tended to own devices more often. Assessing the pre/post survey responses from the older adults who completed at least three sessions revealed that most measures did not show significant improvement. Significant improvements were shown on five items of the digital competence scale; *Using Video Calls, Participating in Social Networks, Posting Messages on Social Networks, Sharing Talents or Interests on Social Networks,* and *Using Copy/Paste Tools.* When grouping participants as low or high initial digital competence based on pre-survey scores, all items except for *Using Video Calls* showed significant improvement. Interestingly, significant relationships were found with the survey item *Using Video Calls* and demographic data. Significant positive change in use of videos calls was most likely for female participants, participants with a reported income of less than $30,000, and those participating in the class sessions or individual appointments, as opposed to the matching program.

Qualitatively, the older adults valued the technological knowledge gained, and the pleasant interactions and pedagogy. Of the five themes identified (i.e., help with use of technology, appreciation of the student teaching approach, enjoyment with the intergenerational interaction, assistance with overcoming anxiety or fear, and other), *help with use of technology* was valued by over half of the participants. This help ranged from the basics of understanding how to use their device, to more advanced lessons such as creating a website. In addition, a third of participants appreciated the student teaching approach, and a quarter of participants enjoyed the intergenerational interaction.

Over half of participants most valued the technological knowledge gained, suggesting the program's success at technological instruction. Following the Engagement Theory principle of problem-based learning, older adults were able to have meaningful learning because it was 1) technology they wanted to learn (create) and 2) knowledge that could be transferable to their daily lives (donate). Some of the older adults enjoyed the reciprocity of learning and understood that this program was a part of the student's education, and thusly the students could be considered the "outside" beneficiary for the older adult participants, further demonstrating the component "donate". One-on-one instruction was emphasized as a positive feature of the program by the older adult participants, which is contrary to the principle of group learning (relate). Kearsley and Shneiderman (1998) suggest that the importance of group learning lies in motivating continual participation through peer participation. The participation of these older adults was completely voluntary, thus motivating participation was not a large concern. Attrition would remain a concern, however,

group learning could have prevented learning and increased attrition. Some participants mentioned overcoming fear or anxiety in respects to technology use. The one-on-one approach may have been a key factor in helping with alleviating their fear and anxiety. Participation may have been hindered in a group setting because of the potential to feel inferior to their peers or feeling forced to learn the material at a faster pace than they are ready for. In this respect, engagement theory could be expanded to be more inclusive of all types of populations.

Items showing significant improvement on the digital competence scale were most related to social media. Improvements were found in the participation in social media, including through video platforms such as Skype, and the skills of posting to and sharing on social media. Using aspects of social media is more possible on a daily basis, in comparison to the other techniques of digital competence asked about in the measure. For example, participants were asked about searching for information about goods or seeking health information. Social media use could be a daily activity while the need for the latter searches may not come up often. The opportunity to use these newly learned skills may not have occurred in the time between pre and posttest. Yet, even if they had, it is likely they occurred at a lower frequency. Improvements in the basics of copy and paste would facilitate improvements in sharing and posting on social media, thus the adjacent improvements are complimentary.

However, the increase in social media knowledge and usage, surprisingly, did not transfer to an increase in social networks, as a whole or within the family and friendship sub-scales. One possible explanation is that social media may help with staying in touch with people, but may not necessarily expand a person's social

networks or facilitate feelings of closeness, core concepts in the LSNS-6 scale. Social media may not influence these aspects, but instead changed the ways and frequency of communication (Raghavendra, Newman, Grace, & Wood, 2015), neither of which are addressed.

The program was unable to seemingly influence social isolation (as measured by changes in social networks), social engagement, and loneliness. While significance requirements were not met, the effect sizes point to some change in the loneliness (d = .29) and digital competence (d = .39) scales in the direction hypothesized. Effect sizes were even larger, ranging from .50 to .64, for significant individual items in the social engagement and digital competence measures. All other measure means went in the opposite direction hypothesized; with some participants testing lower in the posttest. One possible explanation is a regression to the mean (Barnett, van der Pols, & Dobson, 2004). Participants may have overestimated their capabilities in the pretest and readjusted their responses once they had a better understanding of the concept.

There are two possible explanations for the lack of significant improvement in the overall measures. First, the program was not enough of an intervention to address these issues. The program itself is not centered on expanding social networks or creating pathways to these networks. This lack of focus is evidenced by the participants in the open-ended responses, none of which mentioned an expanded network or increase in outside interactions using knowledge gained. However, it was hoped that this social expansion would occur indirectly by directly teaching the basic skills necessary to navigate online networks. Yet given the individualized curriculum, learned skills were not the same across participants. Some participants may have

learned more in depth how to use functions of social media that would facilitate their usage or ability to communicate to a larger group whereas others may not have been interested in social media at all. As social media and the growth of social networks were not the explicit focus of the mentoring sessions, social media usage needed to be expressed as an interest by the older adult. It cannot be assumed that all older adults would know what to ask for, and thus gain the same wealth of knowledge. This could possibly explain why more females perceived more improvements in making video calls. Females may have been more likely to ask for such assistance, as compared to the male participants.

Second, the program may be causing changes in the older adult participants, but the scales may be inappropriate measures. Cook and Campbell (1979) state that "inadequate preoperational explication of constructs" (p. 65) could hinder construct validity. Definitions of the research construct inform program activities or manipulation, and measures. The connection between the constructs, the activities, and the measures is questionable. For example, while these older adults were more knowledgeable of videos calls, the frequency of how often these videos calls were made was never addressed. More comfort with this skill does not necessarily mean more usage of the skill outside of the learning environment. The timeframe from pre to post-surveys may not have been sufficient for learned skills to be used in a measurable way. Changes in social isolation may be a longer-term outcome than the timeframe of the program, and the current short-term measure may not predict this long-term outcome well (Schanzenbach, 2012). In a review of social isolation interventions in older adults, the duration of successful interventions was between 8 weeks to 5 years,

with most programs lasting less than a year (Cattan, White, Bond, & Learmouth, 2005).

Suggestions for the Program

For the future, a targeted intervention may be worth considering. Within the digital competence scale, those that started with less knowledge made more significant changes as compared to those that started with more knowledge. In fact, those with more knowledge seemed to regress. This may have been an issue with the measures; while those with more knowledge were learning, they may have been learning things beyond what was asked on the measure. This program may be better suited for those initiating the program with less knowledge. In addition, significant positive change in use of videos calls was most likely for female, low-income, and class sessions or individual appointments. It would be interesting for future studies with a larger sample to test if this trend remains and appears on other items of the digital competence measure. Lastly, further analysis into why certain changes are occurring with some program models but not others would help inform if all program models are necessary.

Despite more than half of participants directly mentioning the positive influence of the program on their ability to use technology, it seems that the connection between technology and social networking was lost. It cannot be assumed that older adults would understand their device well enough to optimize networking or even ask the correct questions to reach optimization. One suggestion for future program implementation is a more deliberate connection between technology and social networking on the part of the student mentors. For example, for the older adults who were taught how to use email, did the students show them how to find address

books, emails on web pages, etc.? For Facebook, were the older adults taught how to search for friends, different hobby and social groups, how to join games, how to use chat? If a deliberate goal of the program is to expand older adults' social networks and reduce social isolation and loneliness, more deliberate attempts to influence participants' social networks would need to occur for every participant, and not just for those who know to ask for assistance with social network related technology.

In addition, the current measures may be inappropriate measures. If the researchers desire to continue measuring the indirect effects of the program on social isolation, social engagement, and loneliness, new outcome measures may be needed. The researchers themselves may have to create their own measures that focus on the changes technological learning may have on social isolation, social engagement, and loneliness. Instead of focusing on the number of people, social networks questions should focus on the type, frequency, and quality of relationship changes.

For the social engagement and loneliness measures, the length of the program must be considered. Three sessions may not be a long enough timeframe to show measurable change. Longer term follow-ups may be a solution. Alternatively, the program could embrace what it does well in the short-term, such as improving digital competence and bringing generations together, and focus its measures on these aspects of the program. If the intervention is going well as is, the program staff may need to re-evaluate its objectives and make decisions about future measures based on this re-evaluation.

For future studies, a qualitative inquiry as to how the participants are and are not using the lessons learned outside of the program setting may be of interest. This

could shed light on not only why it seems that changes are not occurring in the measures but also what other measures could be included. The use of a control or comparison group would help with the ability to interpret causality and the true effectiveness of the program when comparing participants and non-participants. Finally, as this was not a focus of this study, the student outcomes need to be examined. As the extensive intervention was more focused on the students, there may be more significant outcomes for this group than for the older adults.

Limitations

As this is not a true experiment, but instead a one group pretest/posttest quasi-experimental design, causal inference cannot be determined, and extraneous variables cannot be fully controlled. For example, the number of sessions attended, who participated, and what was learned was not controlled. A control group was also not included, but future research could do so. In addition, the number of sessions had different expectations per model. The matching participants were encouraged to sign up for six sessions, while the structure of the OLLI drop-ins only required one session. Thus, while it can be stated that program participation and changes in the measured variables are associated, it cannot be claimed that program participation was the cause of this change over other variables.

In addition, older adults are not required to complete the surveys as part of their participation in the program. This affected the post-surveys in particular. Some programs, for example the matching program, were more apt at getting both pre and post-survey data. The final pre/post sample was small, and therefore, this situation limits the generalizability of the findings and the items that did trend toward

significance in the hypothesized direction may have been significant had the sample been larger. Results from this analysis should be taken as preliminary findings to be further investigated once a greater sample size is available. Finally, OLLI members, in both the drop-in sessions and matching program, were fundamentally different from participants in the class sessions and individual appointments. OLLI members reported higher initial digital competence. This could explain the differences in success between models, as opposed to the actual structure of the model itself. Further analysis is recommended.

Conclusion

Qualitatively, the older adult participants are responding favorably to the program. As many did mention advancing in technological abilities and their enjoyment of the interaction, the underlying features of the program, intergenerational interaction and technological instruction, are working. However, researchers need to better match the actual goals related to social isolation and social engagement of the program to program activities and/or measures. The influence this program has on the older adults may be better measured once the more ideal quantitative measures are created and/or implemented.

Table 1. *Frequencies of Categorical Demographics for Pre/Post Survey Non-completers and Completer Samples*

	Non-completers (N = 82)		Completers (n = 41)	
Variable	Frequency	%	Frequency	%
Program Model				
Senior center appointment	39	47.6	12	29.3
OLLI drop-in session	25	30.5	3	7.3
Matching program	14	17.1	17	41.5
PACE class program	4	4.9	8	19.5
Gender				
Female	46	56.1	23	56.1
Male	26	31.7	18	43.9
Relationship Status				
Married/in a domestic partnership or civil union	32	39.0	17	41.5
Widowed	13	15.9	12	29.3
Divorces/separated	17	20.7	6	14.6
Single	10	12.2	6	14.6
Employment Status				
Employed, full-time or part-time	4	4.9	3	7.3
Not employed, looking for work	2	2.4	1	2.4
Not employed, NOT looking for work	1	1.2	1	2.4
Retired	59	72.0	34	82.9
Disabled, not able to work	7	8.5	2	4.9
Living Status				
Live alone	30	36.6	21	51.2
Live with others	37	45.1	20	48.8
Total Income Before Taxes During the Past 12 Months				
$30,000 or less	18	22.0	15	36.6
$30,001 or more	45	54.9	24	58.5
Highest Level of Education Completed				

Did not complete high school	1	1.2	3	7.3
Completed high school or received GED	8	9.8	2	4.9
Attended some college	16	19.5	16	39.0
Graduated college	24	29.3	15	36.6
Received graduate degree	24	29.3	4	9.8
Race/Ethnicity				
Hispanic	1	1.2	1	2.4
Asian	1	1.2	1	2.4
Black or African American	1	1.2	3	7.3
White	68	82.9	35	85.4
Primary Language				
English	71	86.6	37	90.2
Other	2	2.4	2	4.9
Perceived Health				
Poor	1	1.2	0	0
Fair	4	4.9	5	12.2
Good	11	13.4	7	17.1
Very good	22	26.8	7	17.1
Excellent	21	25.6	1	2.4
Condition Which Limits Activity				
No	47	57.3	14	34.1
Yes	9	11.0	5	12.2

Table 2. *Paired Samples t Tests for Older Adult Pre/post Survey Completers*

Measures[a]	Pre Mean (SD)	Post Mean (SD)	*t* value	Cohen's *d*	% Showing improvement
Friendship Scale[b] (*n* = 37)	8.24 (3.50)	8.45 (3.19)	-0.374	.062	43.2
Family Scale[c] (*n* = 39)	6.66 (3.09)	6.30 (3.33)	1.064	.112	28.2
Social Network Scale[d] (*n* = 37)	15.09 (5.73)	14.75 (5.61)	.775	.060	40.5
Social Engagement Scale[e] (*n* = 38)	16.93 (4.72)	16.79 (5.74)	.097	.027	47.3
Digital Competence Scale[f] (*n* = 37)	27.35 (10.10)	31.87 (12.25)	-1.541	.403	43.2
Loneliness Scale[g] (*n* = 19)	5.42 (2.43)	6.21 (2.97)	-1.621	.291	21.1

Notes:

[a]Sample sizes vary across the different measures due to the listwise deletion of missing data

[b]Scores range from 0-15, with higher scores indicating more closer friends

[c]Scores range from 0-15, with higher scores indicating more closer family members

[d]Scores range from 0–30, with higher scores indicating more close friends and family members

[e]Scores range from 0–27, with higher scores meaning more social engagement

[f]Scores range from 11-55, with higher scores indicating more competency in tasks involving technology

[g]Scores range from 3-12, with higher scores meaning more loneliness

* $p < .05$

** $p < .01$

*** $p < .001$

Table 3. *Paired Samples t Tests for Older Adult Pre/Post Survey Completers: Individual Items Scores for Social Engagement and Digital Competence Scales (n = 41)*

Measures	Pre Mean (SD)	Post Mean (SD)	*t* value	Cohen's *d*	% Showing improvement
Social Engagement Scale (n = 38)					
Doing paid community service/volunteer work	1.58 (1.20)	1.66 (1.12)	-.502	.069	18.4
Doing paid community work	.197 (.59)	.605(1.00)	-3.27**	.497	26.3
Taking courses or participating in discussion…	2.00 (1.09)	1.61 (1.10)	1.69	.356	18.4
Going to a movie, restaurant, or sporting event	2.05 (.87)	1.95 (1.01)	.75	.106	15.8
Participating in social or community groups	1.95 (.98)	2.24 (.97)	-1.86	.297	36.8
Talking on the phone	2.83 (.57)	2.69 (.69)	1.69	.221	5.3
Visiting friends	2.24 (.85)	2.14 (.93)	.66	.112	18.4
Digital Competence Scale (n = 37)					
Searching and finding information about goods…	2.43 (1.24)	2.27 (1.52)	.51	.115	27.0
Reading or downloading files	2.49 (1.33)	2.76 (1.59)	-.79	.184	29.7
Obtaining information from public authorities...	2.41 (1.12)	2.84 (1.42)	-1.32	.336	29.7
Seeking health information	2.65 (1.14)	2.63 (1.59)	.06	.014	35.1
Sending/receiving emails	2.11 (1.41)	2.05 (1.41)	.15	.043	24.3
Using video calls	2.25 (1.39)	3.22(1.63)	-2.66*	.640	43.2
Participating in social networks	2.74 (1.43)	3.59(1.55)	-2.48*	.570	45.9
Posting messages on social network	2.74 (1.41)	3.57(1.54)	-2.59*	.562	48.6
Sharing talents or interests on social networks	2.76 (1.46)	3.51(1.52)	-2.23*	.503	37.8
Sharing interests and ideas with those you know	2.58(1.26)	2.40(1.36)	.57	.137	18.9
Using copy/paste tools	2.28 (1.35)	3.03(1.61)	-2.22*	.505	37.8

* $p < .05$
** $p < .01$
*** $p < .001$

Table 4. *Independent Samples t Tests between High/Low Pretest Digital Competence and Change in Digital Competence (scale and items) for Pre/Post Survey Completers*

	Low Digital Competence (n = 18)	High Digital Competence (n = 19)	
	M (SD)	M (SD)	*t*-value
Digital Competence Scale	14.96(18.74)	5.51(8.37)	4.33***
Searching and finding information about goods and services	0.72(1.93)	1.00(1.60)	2.96**
Reading or downloading files	1.33(2.17)	0.74(1.45)	3.43**
Obtaining information from public authorities or public services	1.39(2.30)	0.47(1.07)	3.18**
Seeking health information	1.22(2.29)	1.20(1.49)	3.83***
Sending/receiving emails	1.00(2.20)	1.05(1.75)	3.16**
Using video calls	1.39(2.52)	0.57(1.87	1.12
Participating in social networks	2.00(1.78)	0.23(1.81)	3.77**
Posting messages on social network	1.86(1.74)	0.14(1.65)	3.57**
Sharing talents or interests on social networks	1.71(2.07)	0.16(1.61)	3.08**
Sharing interests and ideas with those you know	0.722(1.90)	1.02(1.32)	3.26**
Using copy/paste tools	1.61(1.82)	0.07(1.95)	2.71*

* $p < .05$
** $p < .01$
*** $p < .001$

Table 5. *Independent Samples t Tests between Gender and Change in Digital Competence (scale and items) for Pre/Post Survey Completers*

	Female (n = 20)	Male (n = 17)	
	M (SD)	M (SD)	*t*-value
Digital Competence Scale	7.38(20.14)	.99(13.74)	1.11
Searching and finding information about goods and services	-.35(2.08)	.06(1.82)	-.63
Reading or downloading files	.55(2.54)	-.06(1.39)	.88
Obtaining information from public authorities or public services	1.00(2.20)	-.24(1.52)	1.95
Seeking health information	.31(2.81)	-.41(1.32)	.97
Sending/receiving emails	-.45(2.72)	.41(1.33)	-1.19
Using video calls	1.69(2.28)	.12(1.87)	2.28*
Participating in social networks	1.33(2.31)	.29(1.72)	1.53
Posting messages on social network	1.24(2.32)	.35(1.32)	1.39
Sharing talents or interests on social networks	1.04(2.29)	.41(1.73)	.93
Sharing interests and ideas with those you know	-.32(1.97)	-.01(1.70)	-.51
Using copy/paste tools	1.33(2.35)	.059(1.39)	1.96

* $p < .05$
** $p < .01$
*** $p < .001$

Table 6. *Independent Samples t Tests between Income and Change in Digital Competence (scale and items) for Pre/Post Survey Completers*

	Income less than $30,000 (n = 15)	Income more than $30,001 (n = 20)	
	M (SD)	M (SD)	*t*-value
Digital Competence Scale	8.36(21.50)	2.70(14.62)	0.93
Searching and finding information about goods and services	-0.13(1.92)	-0.05(2.01)	0.12
Reading or downloading files	0.60(2.52)	0.00(1.84)	0.81
Obtaining information from public authorities or public services	1.27(2.12)	-0.10(1.74)	2.09
Seeking health information	0.21(2.76)	0.05(1.82)	0.21
Sending/receiving emails	-0.27(2.91)	0.30(1.53)	-0.75
Using video calls	1.95(2.24)	0.40(2.06)	2.12
Participating in social networks	1.67(2.55)	0.35(1.63)	1.86
Posting messages on social network	1.27(2.66)	0.55(1.32)	1.06
Sharing talents or interests on social networks	1.05(2.59)	0.60(1.70)	0.630
Sharing interests and ideas with those you know	-0.47(2.07)	0.15(1.70)	-0.96
Using copy/paste tools	1.20(2.48)	0.45(1.76)	1.05

* $p < .05$
** $p < .01$
*** $p < .001$

Table 7. *95% Confidence Intervals of Pairwise Differences in Mean Changes in Digital Competence Scale Item, Using Video Calls, for Pre/Post Survey Completers (N = 41)*

Program Model	M(SD)	Individual appointments	Drop-in sessions	Matching program
Individual appointments	1.99(1.96)			
Drop-in sessions	1.67(1.53)	[-2.52, 3.16]		
Matching program	-0.13(1.93)	[0.34, 3.89]*	[-0.89, 4.47]	
Class sessions	1.88(2.64)	[-1.96, 2.18]	[-3.09, 2.67]	[-3.84, -0.16]*

Note: An asterisk indicates that the 95% confidence interval does not contain zero, and therefore the difference in means is significant at the .05 level using LSD

Table 8. *Thematic Analysis*

Theme	Frequency
Help with use of technology	26
Appreciation of the student teaching approach	16
Enjoyment with the intergenerational approach	15
Assistance with overcoming anxiety or fear	6
Other	4
Did not respond	3

APPENDIX

Social Isolation Measure (LSNS-6)

FRIENDSHIPS: *When answering the items below, consider all friends including those who live in your neighborhood.*

	None	One	Two	3-4	5-8	9+
How many of your friends do you see or hear from at least once a month?	☐	☐	☐	☐	☐	☐
How many friends do you feel at ease with that you can talk about private matters?	☐	☐	☐	☐	☐	☐
How many friends do you feel close to such that you could call on them for help?	☐	☐	☐	☐	☐	☐

FAMILY: *When answering the items below, consider all the people to whom you are related by birth, marriage, adoption, etc. (include spouse/partner)*

	None	One	Two	3-4	5-8	9+
How many relatives do you see or hear from at least once a month?	☐	☐	☐	☐	☐	☐
How many relatives do you feel at ease with that you can talk about private matters?	☐	☐	☐	☐	☐	☐
How many relatives do you feel close to such that you could call on them for help?	☐	☐	☐	☐	☐	☐

Social Engagement Measure

ACTIVITIES: *For the activities listed below, please select the answer that best reflects how often you take part in that activity:*

	Never	Rarely (less than once a month)	Sometimes (at least once a month)	Often (at least once a week)
Doing Unpaid Community Service or Volunteer Work	☐	☐	☐	☐
Doing Paid Community Work	☐	☐	☐	☐
Taking Courses or Participating in Discussion Groups	☐	☐	☐	☐
Going to a Movie, Restaurant, or Sporting Event	☐	☐	☐	☐
Participating in Social and Community Groups	☐	☐	☐	☐
Talking on the Phone	☐	☐	☐	☐
Visiting Friends	☐	☐	☐	☐
Attending Group Exercise Activities	☐	☐	☐	☐
Corresponding with friends & family on the internet (such as Facebook, FaceTime, Skype)	☐	☐	☐	☐

Loneliness Measure

RELATIONSHIPS: Please respond to the following questions below.

How much do you agree or disagree with the following?

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I am content with my friendships and relationships.	☐	☐	☐	☐	☐
I have enough people I feel comfortable asking for help at any time.	☐	☐	☐	☐	☐
My relationships are as satisfying as I would want them to be.	☐	☐	☐	☐	☐

Digital Competence Measure:

How much do you agree with the statements, I feel competent:

	Strongly disagree	Slightly disagree	Slightly agree	Strongly agree
Searching and finding information about goods and services.	☐	☐	☐	☐
Reading or downloading files.	☐	☐	☐	☐
Obtaining information from public authorities or public services.	☐	☐	☐	☐
Seeking health information.	☐	☐	☐	☐
Sending/receiving emails.	☐	☐	☐	☐
Using videocalls, such as Skype	☐	☐	☐	☐
Participating in social networks	☐	☐	☐	☐
Posting messages on social networks	☐	☐	☐	☐
Sharing talents or interests on social networks.	☐	☐	☐	☐
Sharing my interests and ideas with those you know.	☐	☐	☐	☐
Using copy/paste tools.	☐	☐	☐	☐

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