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OUTCOMES FOR AN INTERGENERATIONAL TECHNOLOGY PROGRAM: A PRE-POST WITH WAITLIST CONTROL STUDY

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BY

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ABSTRACT

The quickly growing population of older adults in the United States, combined with an increasingly digital society post-pandemic, has illuminated the digital divide in recent years. The digital divide contributes to social isolation and, therefore, decreased quality of life in older adults, and intergenerational technology programming has demonstrated the potential to bridge this equity gap and keep older adults involved and productive in their communities and larger society. To expand the current literature on intergenerational programming, this study utilized a waitlist control design to strengthen the results gleaned from the University of Rhode Island (URI) Engaging Generations (eGen) Cyber-Seniors program on measures of quality of life (QOL), social isolation, loneliness, technology use, tablet use, and digital competence. By implementing a waitlist post-survey administered while participants were waiting to take part in the intergenerational technology mentoring program, we were able to see how directly the results were tied to the intervention versus natural life changes over time or other aspects of the program. Results from repeated measures ANOVAs showed that the URI eGen Cyber-Seniors program improved social isolation ($p < .001$), tablet use ($p < .001$), and digital competence ($p < .05$) from pre- to post-survey, but that loneliness ($p < .01$) seemed to improve mainly due to pre-program activities, such as the contact with research assistants to complete preliminary interviews as well as anticipation and excitement for the program. These findings strengthen the previous research on the program by examining the specific aspects of social well-being that the program influences. This methodology was a practical way to utilize the program's waitlist,

demonstrating a way in which to enhance the rigor of evaluation research methods that can be used within public programs.

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I would also like to thank Dr. Melanie Brasher and Dr. Cindy Tsotsoros, my committee members, whose thoughtful insight helped me improve my writing and data analysis skills throughout this project.

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PREFACE

This thesis submitted in partial fulfillment of the degree of Master of Science in Developmental Science employs manuscript formatting as outlined by the graduate school. I would like to mention my involvement with the URI eGen Cyber Seniors Program since 2021. I began as a practicum student performing service-learning hours as a student mentor in Dr. Leedahl's Later Adulthood Growth and Development course at the University. I scheduled weekly one-on-one and classroom meetings with older adults at the Narragansett Senior Center and stayed on as a student mentor for the following two semesters as part of an independent study for which I received college credit. During this time, I became increasingly involved with the research aspects of the program. I eventually began working with the research team to collect data from participants through phone interviews and began a paid undergraduate research assistant position for the program. As a graduate student, I held an assistantship for the URI Cyber-Seniors program performing data collection, cleaning, and analysis. The research team and I collected the data that comprised the dataset used in this thesis.

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Chapter 1

INTRODUCTION

Between 2019 and 2050, the population of older adults is projected to nearly double, rising from 9 to 16%, representing 1.5 billion of the total 9.4 billion global population (United Nations Department of Economic and Social Affairs, 2019). With a rapidly aging population, it is important to understand quality of life (QOL) and its indicators and influencing factors for those in the most rapidly increasing age bracket, that being older adults. Quality of life in older adults can be understood and assessed through four subtopics: physical health, psychological health, social relationships, and environment. Interventions to reduce loneliness and social isolation can improve psychological health and social relationships, resulting in greater QOL (Yang et al., 2023).

Social involvement and feelings of productivity within society are common sources of meaning in older adult populations. Forming social initiatives in which older adults have access to community activities with mutual benefit for both the older adults and the community organizations can contribute to a positive aging process. This concept of activity theory posits that involvement and remaining active throughout the life course allows for greater life satisfaction as individuals age (Johnson & Mutchler, 2013). Specifically, activities that promote lifelong learning have been shown to positively impact older adults' cognitive functioning, health, and life satisfaction among other positive influences on psychological well-being (Sloane-Seale & Kops, 2013). Remaining active in one's community does not need to take the form of paid work or even volunteering, but rather any activity that holds value within the community or

promotes interpersonal relationship-building (Sloane-Seale & Kops, 2013). Menec (2003) notes that older adults encounter more barriers than the rest of the population to participating in learning activities, therefore it is a goal of the URI eGen Cyber-Seniors program to bridge this gap by providing the resources needed to help older adults successfully learn at no cost by bringing student mentors into communities across Rhode Island to reach older adults where they are.

Chapter 2

REVIEW OF THE LITERATURE

The Digital Divide

An equity issue prevalent in recent decades has been described as the digital divide between older adults and the young population. As defined by Delello and colleagues (2016), the digital divide is the equity gap perpetuated by differences in technology use and internet access between older and younger generations, with older adults utilizing technology less than younger generations. The digital divide focuses on the adoption or lack thereof of information communication technologies (ICT) between generations. ICT has the potential to connect older adults to their community through social media, email, and direct messaging, although it is underutilized by older adults due to physical and social barriers (Delello et al., 2016).

For many older persons, the proliferation of personal technology devices (phones, laptops, tablets) occurred after retirement, while those still in the workforce used technology in everyday life to be successful. The necessity of technological literacy is much greater now than it was during the height of previous generations' careers. Older adults encounter barriers to technology use including issues of cost, cultural attitudes, and inaccessible design (Zickuhr & Smith, 2012).

Inaccessible design is an issue for many older adults in terms of both technology knowledge and physical capability. As a natural process of aging, older adults often begin to lose feeling and circulation in their fingers, which can present difficulties when operating technology that is based on touchscreen functionality that relies on accurate button pressing (Baringer et al., 2023). Younger people often do not understand why

older adults struggle to learn technological processes that most people find simple and fail to recognize the fact that the majority of people under the age of 40 grew up with some level of technology (Cisco, 2010). This concept can be viewed similarly to learning a new language at 70 years old versus growing up with it as your first language. In today's world, communities are formed online over social media, email, text, and multiple forms of video conferencing such as FaceTime and Zoom. This phenomenon of social interaction moving online has served to further isolate older adults who may have less technological interest, access, or literacy. Additionally, the COVID-19 pandemic plunged the United States and the world into an almost exclusively digital age, thus deepening the digital divide. Pew Research Center (2017) found that among older adults who use technological devices, social media use stagnates at a rate of 54% compared to that of younger technology users at 81% (Auxier, 2021). For these reasons, interventions such as intergenerational technology programs can serve to both foster connections in the community between people from different generations and to bridge the digital divide through guided technology learning.

Quality of Life

As the United States population ages, it is more important than ever to create and evaluate programs with the aim of improving quality of life (QOL) by addressing the four key aspects: 1) decreasing physical health problems, 2) supporting social involvement, 3) improving psychological health, and 4) encouraging healthy living environments. Some research has been done that supports the positive impact that multidisciplinary programs and online courses can have on the QOL of older adults (Güner et al., 2023). As people begin to live into their late nineties and hundreds, it is important to lengthen the period in

which older adults are mobile, productive, and connected within society. The topic of older adult QOL is integral in a society that is likely to continue seeing a dramatic rise in the population of those 65 years of age and older. Recent research has illuminated the power of technology in providing programming to older adults, with a unique reach that allows home-bound or mobility-impaired people to access programming from home (Czaja & Ceruso, 2022). This unique ability to connect older adults with programs that engage their minds and bodies can contribute to social connectedness, an integral aspect of psychological well-being in older adults (Dinkins, 2019).

Loneliness and social isolation have been found to contribute significantly to QOL in older adults (Yang et al., 2023). During the pandemic, older adults (predominantly women) who lived alone were most affected by stay-at-home orders and other restrictions on social interaction. These regulations impacted loneliness and social isolation measures for older adults as reported by a recent study (Yang et al., 2023). As researched by Levasseur and colleagues (2015), social participation and mobility are key factors in QOL. Levasseur (2015) also emphasized the importance of social support in decreasing social isolation. By reaching older adults in their homes and encouraging those who are capable of participating socially in their communities, technology programs can sustain a higher QOL by mediating the effect of social isolation and loneliness (Hawkley & Cacioppo, 2010; Levasseur, 2015; Yang et al., 2023).

Decreased social isolation and reciprocity are two social factors that can impact QOL in older adults. Feyh and colleagues (2022) demonstrated that social integration of older adults within the community, networking, and social engagement all contributed to improved sense of belonging for older adults. These types of involvement were

associated with increased QOL as well as recognition of the meaningfulness of life for older adults (Feyh et al., 2022). Social participation of any form has been discovered to be meaningful in older age for senior housing residents (Sirén et al., 2023). Social isolation has been shown to have a significant impact on psychological well-being in older adult populations (Dinkins, 2019). A major source of meaning and feelings of productivity within society for older adults is the concept of reciprocity (Schulz & Eden, 2016). Reciprocity, when viewed through an older adulthood lens, refers to the desire an older adult has to be productive and not be solely the recipient of care and support but to provide support of some kind to others. Intergenerational interventions were found to enhance feelings of reciprocity in older adult participants, providing them with a sense of productivity and meaningfulness (Dinkins, 2019). The social connections resulting from the intervention studied by Dinkins (2019) led to reduced ageism and stereotyping on the part of the students involved in the intergenerational activity. This mutually beneficial, or reciprocal relationship increased confidence scores in the older adult participants because they felt as though their experiences and opinions were of value to the younger generations (Dinkins, 2019). Older adults experienced greater self-worth and cognitive functioning after taking part in the intergenerational activity and felt as though they could provide wisdom to their younger counterparts and educate them on various topics while being educated by them. This balanced reciprocity is integral to the concept of intergenerational programming.

This study was informed by activity theory due to its focus on utilizing a social activity to make positive changes in the lives of older adult participants. By providing a technology learning program to increase the social interaction and community

involvement of older adults, bringing them into the senior centers on a regular basis for their mentoring appointments, the program helped keep the older adult participants active cognitively and socially. A primary tenet of activity theory is promoting activities that instill a sense of productivity in older adults, and a sense that they are giving back to their community or providing something in exchange for the benefit they are receiving, otherwise known as reciprocity (Johnson & Mutchler, 2013; Sloane-Seale & Kops, 2013). Similar to social exchange theory, activity theory connects reciprocity with meaning and a sense of purpose for older adults. The URI eGen Cyber-Seniors program provides a unique opportunity for older adults to gain technology skills and social interaction while affording them the time and space to share their own ideas and advice with their student mentors.

Intergenerational technology programs have been shown to have an impact on multiple factors contributing to areas of QOL (Feyh et al., 2022). Most studies regarding QOL in older adults have addressed mostly physical ailments and disabilities as the main contributors to poor QOL, but fail to examine how social involvement, mental health, and one's living environment can influence QOL. Online programs integrating intergenerational interaction and continued learning have been shown to be beneficial for QOL factors such as social relationships and psychological health (Fields et al., 2020). Some research has been done that supports the positive impact that multidisciplinary programs (including social, safety, and medical interventions) and online courses can have on the QOL scores of older adults (Güner et al., 2023). In 2022, a university research team implemented an intergenerational program called Get WISE, that included older adults living in a long-term care facility in contact with young children from a local

childcare center. Before and after the intervention, the older adults were tested for scores on scales regarding health, depression, and personal perceptions of the interactions. This intergenerational program was found to improve the quality of relationships between participants and their surrounding community and also improve cognitive and physical health and QOL measures for participants (Feyh et al., 2022).

Waitlist Control Design

The existing literature involving intergenerational technology programs (e.g., Breck et al., 2018; Delello et al., 2017; Feyh et al., 2022; Fields et al., 2020; Leedahl et al., 2019; Leedahl et al., 2023; Leedahl et al., 2023; Yang et al., 2023) have examined the technological and social impacts of intergenerational technology program participation in older adults. However, none of these programs used a repeated measures design with a waitlist control group, leaving a gap in the literature regarding methodology.

A waitlist control methodology refers to the inclusion of a sample group of individuals who have entered to take part in a program, intervention, or study, but who have not yet been chosen to participate. Other interventions targeting older adults have utilized a waitlist control group to study and compare waitlist control participants to program participants; however, few studies employed repeated measures experimental design. Dunlosky and colleagues (2003) were one of few who utilized repeated measures to examine changes in a waitlist control group against an experimental group. This study utilized a waitlist control design to study the impact of a memory program teaching older adults to train their memories using self-testing measures (Dunlosky et al., 2003). The intervention group was trained in self-testing methods that helped the older adult participants identify which topics (from study materials provided by researchers) they

needed more studying to remember. This group's memory of the given topics were compared with a waitlist control group-- the group that had entered to be a part of the study but had not yet been chosen to participate. The intervention group showed strong improvements from pre- to post. In comparison, the waitlist control group across two time points without the intervention had a small change. Authors therefore concluded that the training intervention had the potential to improve older adult learning strategies, given that the improvement was demonstrated to be a result of the intervention and not natural memory changes across testing points (Dunlosky et al., 2003). Another study also used this waitlist control approach and found that the post-test scores of the intervention group were significantly greater than the waitlist group scroes (Pandya, 2020). This study screened older adults using three neuropsychological tests before and after participation in a 90-day meditation program. Intervention participation was found to have a significant impact on post-test outcomes within the intervention group, while no significant differences were observed across the time points for the waitlist control group (Nadya, 2020). As a final example of waitlist control design, a study completed in 2020 found that technology-based programs have the potential to improve QOL measures for older adults who were socially isolated (Fields et al., 2020). Fields and colleagues (2020) created a community organization called Tech Allies with the mission of providing internet connection, tablets, and one-on-one technology training to socially isolated older adults. In their randomized control trial pilot, Fields and colleagues (2020) recruited volunteers to facilitate eight tablet education sessions over eight weeks, with 44 people participating in the intervention and 39 people randomly assigned to the waitlist group. Participants were surveyed in a pre-post design on self-reported technology use,

technology confidence, social support, and loneliness. Results of the waitlist control group showed no statistically significant changes, while the intervention group demonstrated statistically significant improvements in social support and technological confidence, with the most drastic improvement in technology use. Open-ended qualitative interviews revealed further improvements in social connectivity among intervention participants (Fields et al., 2020), thus providing evidence that these types of programs may influence additional QOL-related concepts

Based on the success of this previous research and to extend the literature, this study employed a repeated measures quasi-experimental design by adding a waitlist post-survey to the traditional pre/post design to serve as a waitlist control group examining the impact of the intervention on potential changes in QOL, social isolation, loneliness, technology use, tablet use, and digital competence. This was done because with the popularity of the program, it was not possible to have a waitlist control group separate from the experimental group that would not have the opportunity to take part in the program, but it was possible to employ repeated measures with the experimental group, implementing the waitlist post-survey to examine individuals prior to participation as a waitlist control population. In this way, we could protect our relationship with our senior center sites and participants while still accomplishing our research objectives.

Intergenerational Technology Programs

The purpose of this study is to examine the impact that an intergenerational technology program had on QOL, social isolation, loneliness, technology use, tablet use, and digital competence. Several studies (Leedahl et al., 2023; Leedahl et al., 2023; Leedahl et al., 2019; Breck et al., 2018) have been published regarding the

implementation of the URI Engaging Generations (eGen) Cyber-Seniors program, and one previous study of the URI eGen program included quasi-experimental design; however, this was before the digiAge iPad Project that started in 2021 (Leedahl et al., 2023). Studies involving intergenerational technology programs ideally should utilize experimental or quasi-experimental design in order to address issues of internal validity and help ensure the intervention led to the intended outcomes.

The recent study using a quasi-experimental design (conducted prior to the pandemic) completed by Leedahl and colleagues (2023) found that for the experimental and control groups, significant changes were observed between groups. The control group who did not participate in the URI Cyber-Seniors Program showed no improvement in loneliness, social isolation, or other scales, while the experimental group who took part in the program experienced statistically significant increases in technology use, digital competence, loneliness, and social engagement but not in social isolation (Leedahl et al., 2023). The study found, using qualitative methods, that several participants felt more present in their communities and closer to their family members. They also reported increased mental well-being as a result of being able to connect with family and continue normal activities using technology.

The URI eGen Cyber-Seniors program implemented a pilot program in 2021 in which older adults were provided with iPads and mentored by students from the University on how to use the iPad and gain digital competence. This program entailed a pre-post survey design where older adults took part in phone interviews before and after the program to assess changes in QOL-related and technology-related measures. The pilot study (Leedahl et al., 2023) found that the program was successful in achieving its

intended goals of closing the digital divide by increasing digital inclusion for older adults, as well as improving confidence in older adult participants regarding digital competence. The present study constitutes a follow-up to the pilot study and examines the impacts of the same intergenerational technology program on a group of participants who took part in 2023. Intergenerational technology programs show promising results, but also face the unique challenge of demonstrating that changes in measures are due to the impact of the program and are not a result of other aspects of the program or what would have happened to participants naturally.

The Present Study

The purpose of this repeated measures, quasi-experimental research study was to examine the impact of an intergenerational technological intervention on quality of life, social isolation, loneliness, technology use, tablet use, and digital competence. This study utilized data gathered as part of the 2023 URI eGen Cyber-Seniors Program. The dependent variables included QOL, social isolation, loneliness, technology use, tablet use, and digital competence. Technology use is defined as the frequency and variety of technology used by participants. We were specifically interested in tablet use due to the inclusion of iPads in this program. Digital competence is defined by how confident participants feel completing a variety of tasks using technology, from posting on social media to having a telehealth appointment over Zoom. Social isolation is a lack of participation in community events, town meetings, or a lack of contact with family, friends, or neighbors within the community leading to limited social interaction and exclusion from social arenas (Levasseur, 2015). Loneliness can be defined as the number of friends and frequency and quality of contact between friends and family (Hawkley &

Cacioppo, 2010). Quality of life can be defined as the summation of all the positive and negative events in one's life, and the self-assessed well-being a person feels as a result of these events (Hawkley & Cacioppo, 2010).

The current study addressed gaps in the literature by implementing a repeated measures waitlist control methodology as opposed to a pre-post design. A true experimental design in which potential participants are randomly assigned to experimental and control conditions was not possible due to the great demand of this program, the applied nature of this grant-funded project, and the current culture within senior centers of individuals receiving the same/similar services for everyone. The introduction of a waitlist post-survey served to validate the changes seen between the pre-survey and post-survey by examining if the results of the waitlist post-survey are similar to those of the pre-survey evaluating if changes are a result of the intervention, not other changes between time points. The findings serve to assist researchers in conveying the true impacts of the intervention and help older adult health services professionals to know if the program results in actual changes for older adults.

Chapter 3

METHODOLOGY

Sample and Procedure

This study utilized data gathered from the 2023 session of the URI eGen Cyber-Seniors digiAge iPad Project (funded through the Rhode Island Office of Healthy Aging) led by Dr. Skye Leedahl in the Human Development and Family Science Department at URI. This unique implementation of the eGen program entailed older adults in Rhode Island signing up through 14 senior and community centers to take part in an intergenerational technology learning experience. Research assistants called these prospective participants and administered the pre-survey over the phone before iPads are sent out to the sites. After the participants completed the survey, they received an iPad as well as had weekly meetings with a designated student mentor from URI to teach them how to use the iPad and answer any technology questions. To utilize the extensive waiting list for the program, during the spring and summer sessions of the 2023 eGen Cyber-Seniors Program, participants who completed the pre-survey were offered the opportunity to take part in a waitlist post-survey that was administered 4-8 weeks after their pre-survey. Participants were provided an incentive for participation in the waitlist post-survey in the form of a $25 Visa gift card. All participants in the study received an iPad which they were encouraged to keep upon completion of the program. This study proposed to compare the QOL, social isolation, loneliness, technology use, tablet use, and digital competence scores of participants across the three survey points.

This quantitative study utilized a repeated measures design in which data was collected from the entire sample population (n = 76) 8-12 weeks before the intervention

(pre-survey), from a random sample within that population (n = 32) 4-8 weeks following the first survey (waitlist post-survey), and from a larger sample including both individuals who took part in the waitlist post-survey and those who did not after the intervention has been completed (n = 44) (post-survey). See Figure 1 for the flowchart showing the sample across the survey time points survey time points. People who completed all surveys (pre-, waitlist post, and post) (n = 21) were compared on their QOL, social isolation, loneliness, technology use, tablet use, and digital competence scores in order to quantitatively examine the differences in scale scores before and after the intervention. All participants were residents of the state of Rhode Island and were 50 years of age or older. The unit of analysis within this study is at the individual level.

Research questions

The research questions for this study were:

RQ 1: What are the demographic characteristics of the 2023 program participants, and did the waitlist control group differ demographically from those who completed the pre-survey but who were not in the waitlist control?

RQ 2: Are there significant differences in technology and QOL-related measures between the three participant time points (pre-survey, waitlist post-survey, post-survey) among the people who took part in all three surveys?

Hypotheses:

H1: Individuals in the waitlist control group will not differ demographically from the rest of the sample.

H2: Significant improvements will be identified in QOL-related measures between pre-survey and post-survey time points, but not between the pre-survey and waitlist post-survey.

H3: Significant increases will be demonstrated in tablet use and digital competence between the waitlist post-survey and post-surveys, but not the pre-survey and waitlist post-survey.

Measures and Instruments

The basic demographic information gathered from participants included age, living status (alone or with others), total income in the past 12 months, highest level of education completed, gender, race, and overall health. Age in years was calculated by asking participants for their date of birth. Living status (alone = 1, with others = 2), level of education (did not complete high school = 1, completed high school or received GED = 2, associate's degree or some college = 3, graduated college = 4, received graduate degree = 5), income level (above $30,000 = 1, below $30,000 = 2), gender (male = 1, female = 2), race (Minoritized = 1, White = 2), and ethnicity (Hispanic or Latino = 1, Non-Hispanic or Non-Latino = 2) were gathered from participants. Overall self-rated health was assessed on a scale: poor, fair, good, very good, and excellent. The education variable excluded three missing cases who had chosen "other". The race variable was collapsed into two categories since the survey population was mostly White (76%), and each minoritized category (Black, Asian, non-Hispanic other) added together made up only 24% of the population.

The dependent variables for this study included QOL, social isolation, and loneliness. QOL was measured using participants' responses on a Likert Scale to a series

of questions from the OPQOL-brief scale (Bowling et al., 2012). The participants shared their level of agreement with 13 statements. Variables included "I enjoy my life overall" and "I feel safe where I try to stay involved with things" (Bowling et al., 2012). Their response choices were: "strongly" "disagree", "disagree", "neither agree nor disagree", "agree", and "strongly agree".

Social isolation was measured by using participant responses to the Social Isolation Scale devised by Nicholson (2019). This scale consisted of two parts. The first part required participants to respond with a numerical answer to three questions regarding how many family, friends, or neighbors they see in person at least monthly, how many of those people they communicate with electronically, and how many of those people they feel close to on a personal level (Nicholson et al., 2019). Response options included "none", "1", "2-3", "4-5", or "6 or more" (Nicholson et al., 2019). The second part of the Social Isolation Scale asked participants how much they agreed or disagreed with three questions related to the fulfilling nature of their relationship, their sense of belonging, and their involvement in social activities. Response choices included "strongly disagree", "disagree", "neither agree nor disagree", "agree", and "strongly agree" (Nicholson et al., 2019).

Older adult loneliness was measured by survey questions from a Loneliness Scale (Gierveld & Tilburg, 2006). This scale asked participants six questions about their personal relationships and their feelings surrounding social relationships, all with the response options "yes", "more or less", or "no". Participants were prompted to choose the answer that best pertained to their own perspective. Some prompts included: "There are

plenty of people I can rely on when I have problems" and "I often feel rejected" (Gierveld & Tilburg, 2006).

We also examined technology use, tablet use, and digital competence using a series of survey questions asking older adult participants how often they use a variety of technological devices and how confident they feel completing technology-related tasks. Within the technology use measure, we asked how often individuals used landlines, smartphones, flip phones, desktop computers, laptop computers, tablets, and televisions. Response options included "never", "monthly", "weekly", "daily", and "multiple times a day". The technology use measure was calculated by summing responses to the eight questions. Within the digital competence measure, we asked participants how much they agreed with a list of statements, all following the same format: "How much do you agree with the statement: I feel competent (digital skill here)?". The digital skills we asked of participants included "searching and finding information about goods and services", "sending/receiving emails", and "participating in social networks", among others. Response options were the same for each question in the digital competence measure and included "not at all", "a little", "somewhat", and "very much" (European Commission, 2014). These responses were summed to create a composite score.

Ethical Considerations

To serve as a research assistant for this program and collect the data, I completed CITI training. The URI eGen Cyber-Seniors program has IRB approval through the University of Rhode Island, and IRB approval was requested and provided for this additional data collection in the program and to complete my thesis using this data. All participants were provided with information about the study, a detailed description of the

data collection process, an explanation of any risk or benefit that may result from participation in the study, as well as a description of the intervention to be completed. This waitlist post-survey was completely optional, and about half (n = 32) of the 76 total Cyber-Seniors intergenerational activity participants chose to take part in the waitlist post-survey. After receiving all this information, participants provided their verbal informed consent to be a part of the study and to have their data confidentially stored within locked and secured environments with their records labeled with unique number codes, not participant names. All study procedures and written materials were approved by the Institutional Review Board at the University of Rhode Island.

Data Analysis

For research question 1, descriptive statistics were run for all demographic variables to examine the means and standard deviations as well as the percentages for each demographic variable at each survey time point. Chi-Square comparisons were run between income, race, gender, and living status to compare waitlist control membership to the rest of the sample. Independent samples t-tests were run for age, education level, and overall self-rated health across the three time points. The comparison of descriptive statistics, chi-square analyses, and independent samples t-tests allowed me to describe the demographic makeup of the 2023 program participants and to assess any differences between the waitlist group and the overall sample (Ho, 2023).

For research question 2, six Repeated Measures Analyses of Variance (ANOVA) were examined. First, a Repeated Measures ANOVA was conducted to compare Quality of Life Scale scores between the three time points: pre-survey, waitlist post-survey, and post-survey. Five additional Repeated Measures ANOVAs were also run to compare

social isolation, loneliness, technology use, tablet use, and digital competence across the time points. The use of the Repeated Measures ANOVA was appropriate because the dependent variables of this study were continuous: technology use, tablet use, digital competence, loneliness, social isolation, and QOL, and the independent variable was categorical (pre-survey, waitlist post-survey, and post) (Heck et al., 2022). These multivariate tests identified the mean differences across the three survey groups.

Chapter 4

FINDINGS

Research Question 1: Demographics

Demographic frequencies were run for every demographic variable (age, race, gender, education, living status, and overall self-rated health) at each of the three survey time points, yielding the results shown in Table 1. As shown, all groups had similar ages with mean scores being about 75 with a range of ages across groups ranging from age 56-96. Race was also similar, with the waitlist control group having the most minoritized individuals (28%). The majority of all groups lived alone, with the largest percentage existing in the group that completed all three surveys (76%). The study population was also mostly female, with the waitlist control group having the greatest percentage of female participants (75%) and both the pre-survey group and the group that completed all three surveys having identical male-to-female ratios (71%/29%). Most individuals across the three groups fell into the low-income category, with the waitlist control group having the highest percentage of low-income participants (63%).

I also examined descriptive statistics across the dependent variables. See Table 2 for descriptive statistics and frequencies of QOL, social isolation, loneliness, technology use, tablet use, and digital competence. Following these comparisons, I ran a series of chi-square analyses on the nominal variables and independent samples t-tests on the continuous variables, and none of the results showed significant differences between the waitlist group and others, as described below.

The chi-square test of association was used to examine the association between race and waitlist control group membership. Preliminary inspection of the 2 x 2

contingency table indicated no violation of the assumption of sample size. The results of the chi-square test showed no significant association between race and waitlist control group membership ($\chi 2_{(df=1)} = .60$; $p = .31$). The results of the contingency table showed that the number of waitlist group members who were White ($n = 23$) was not significantly lower (Standardized Residual = -.3) than expected ($n = 24.4$), and the number of individuals not in the waitlist population who were white ($n = 35$) was not significantly higher (Standardized Residual = .2) than expected ($n = 33.6$).

Furthermore, the number of waitlist group members who were Minoritized individuals (including Black, Asian, API) ($n = 9$) was not significantly higher (Standardized Residual = .5) than expected ($n = 7.6$). On the other hand, the frequency of non-waitlist group minority individuals ($n = 9$) was not significantly lower (Standardized Residual = -.4) than expected ($n = 10.4$). The results of the Cramer's V showed no statistically significant association between race and waitlist control group membership (Cramer's V = .089, $p = .44$), indicating that people of color were no more or less likely to be part of the waitlist control group than their white counterparts. Race accounted for less than .8% (Cramer's $V^2 = .0079$) of the variance in survey group membership, thus indicating a weak relationship between the variables.

The chi-square test of association was used to examine the association between income and waitlist control group membership among a sample of 76 people. Preliminary inspection of the 2 x 2 contingency table indicated no violation of the assumption of sample size. The results of the chi-square test showed no significant association between income and waitlist group membership ($\chi 2_{(df=1)} = .79$; $p = .26$). The results of the contingency table showed that the number of waitlist control group

members who made more than $30,000 a year ($n$ = 12) was not significantly lower (Standardized Residual = -.5) than expected (n = 13.9), while the number of non-waitlist group members who made more than $30,000 a year ($n$ = 21) was not significantly higher (Standardized Residual = .4) than expected (n = 19.1).

Furthermore, the number of waitlist control group members who made less than $30,000 a year ($n$ = 20) was not significantly higher (Standardized Residual =.4) than expected (n = 18.1). The frequency of non-waitlist control members who made less than $30,000 a year ($n$ = 23) was not significantly lower (Standardized Residual = -.4) than expected (n = 24.9). The results of the Cramer's V showed no statistically significant negative association between income and waitlist control group membership (Cramer's V = .102, p = .37), indicating that individuals with low income were no more likely to be part of the waitlist control group than their higher-income counterparts. Income accounted for less than 1.1% (Cramer's V^2 = .0104) of the variance in waitlist group membership, thus indicating a weak relationship between the variables.

The chi-square test of association was used to examine the association between gender and waitlist control group membership among a sample of 76 people. Preliminary inspection of the 2 x 2 contingency table indicated no violation of the assumption of sample size. The results of the chi-square test showed no significant association between gender and waitlist control membership ($\chi 2_{(df=1)}$ = .419; p = .35). The results of the contingency table showed that the number of male waitlist control members (n = 8) was not significantly lower (Standardized Residual = -.4) than

expected (n = 9.3), while the number of non-waitlist control males (n = 14) was not significantly higher (Standardized Residual = .4) than expected (n = 12.7).

Furthermore, the number of female waitlist control individuals (n = 24) was not significantly higher (Standardized Residual = .3) than expected (n = 22.7). On the other hand, the frequency of non-waitlist control females (n = 30) was not significantly lower (Standardized Residual = -.2) than expected (n = 31.3). The results of the Cramer's V showed no statistically significant association between gender and waitlist control group membership (Cramer's V =.074, p = .52), indicating that women were not more or less likely to participate in the waitlist control group. The overall sample of 76 individuals in the 2023 URI eGen Cyber-Seniors Program was highly female (M = 71%), but the Chi-Square test showed no statistically significant association between being female and participating in the waitlist control group. Gender accounted for less than .6% (Cramer's V^2= .0055) of the variance in waitlist control group membership, thus indicating a weak association between the two

The chi-square test of association was used to examine the association between living status and waitlist control group membership. Preliminary inspection of the 2 x 2 contingency table indicated no violation of the assumption of sample size. The results of the chi-square test showed no significant association between living status and waitlist group membership ($\chi 2_{(df=1)}$ = .74; p = .27). The results of the contingency table showed that the number of waitlist control group members who lived alone (n = 22) was not significantly higher (Standardized Residual = .4) than expected (n = 20.2), while the number of non-waitlist group individuals who lived alone (n = 26) was not significantly lower (Standardized Residual = -.3) than expected (n = 27.8).

Furthermore, the number of waitlist control group members who lived with others (n = 10) was not significantly lower (Standardized Residual = -.5) than expected (n = 11.8). On the other hand, the frequency of non-waitlist control individuals who lived with others (n = 18) was not significantly higher (Standardized Residual = .4) than expected (n = 16.2). The results of the Cramer's V showed no statistically significant association between living status and waitlist control group membership (Cramer's V = .099, p = .39), indicating that people who live alone were no more or less likely to be a part of the waitlist control than were their counterparts who lived with others. Living status accounted for less than .99% (Cramer's V^2= .098) of the variance in waitlist control group membership, thus indicating a weak association between the two variables.

The independent t-test was utilized to examine if there was a statistically significant difference in age between the waitlist group and the rest of the pre-survey group. Before conducting the analysis, data were evaluated to ensure that the test's assumptions including normality and homogeneity of variances were met. The Levene's test of equality of variances shows that the assumption of homogeneity of variances was met (F = .173; p =.68). The results of the independent samples t-test showed no significant differences between the waitlist and overall pre-survey populations regarding their age ($t_{(df=74)}$ = -.137; p = .45).

The independent t-test was utilized to examine if there was a statistically significant difference in education between the waitlist group and the rest of the pre-survey group. The Levene's test of equality of variances shows that the assumption of homogeneity of variances was met (F = .880; p =.35). The results of the independent

samples t-test showed no significant differences between the waitlist and overall pre-survey populations regarding their education ($t_{(df=72)} = 1.11$; $p = .14$).

The independent t-test was utilized to examine if there was a statistically significant difference in self-reported health between the waitlist group and the rest of the pre-survey group. The Levene's test of equality of variances shows that the assumption of homogeneity of variances was met ($F = .205$; $p = .65$). The results of the independent samples t-test showed no significant differences between the waitlist and overall pre-survey populations regarding their health ($t_{(df=74)} = -.769$; $p = .22$).

Research Question 2: Time Comparisons

Quality of Life

For QOL, the result of the repeated-measures ANOVA indicated that the within-subjects variable of survey time is not significant, $F(2,40) = 5.0$, $p = .10$. That is, the QOL scores of the participants did not differ significantly as a function of the three survey time points. In the Test of Within-Subjects Contrasts, the first contrast was between Level 1 (pre-survey) and Level 2 (waitlist post-survey), which was not statistically significant, $F(1,20) = 2.93$, $p = .10$ This means that the mean QOL scores measured in the pre-survey were not significantly lower than the mean scores measured in the waitlist post-survey. The second contrast was between level 2 (waitlist post-survey) and level 3 (post-survey), which was also not statistically significant, $F(1,20) = 8.95$, $p = .007$. This means that the difference in the mean score measured in the waitlist post-survey and post-survey was due to chance variation.

Social Isolation

For social isolation, the results of the Repeated Measures ANOVA indicated that the within-subjects variable of survey time (pre, waitlist post, and post) was statistically significant $F(2,40) = 26.00$, $p < .001$. That is, the social isolation scores of the participants did differ significantly as a function of the survey time points.

Since the within-subjects variable, survey timepoint, is statistically significant, results from the Tests of Within-Subjects Contrasts can be interpreted to determine which variables contributed to the overall difference. The first contrast was between Level 1 (pre-survey) and Level 2 (waitlist post-survey), which was not statistically significant, $F(1,20) = .048$, $p = .83$. The second contrast was between Level 2 (waitlist post-survey) and Level 3 (post-survey), which was highly statistically significant, $F(1,20) = 35.04$, $p < .001$. This means that there was a significant decrease in social isolation before and after participation in the program, with mean scores from the post-survey showing a significant decrease from social isolation scores on the waitlist post-survey and pre-survey. This supports the hypothesis that the program would impact social isolation for participants.

The Pairwise Comparisons table presents all pairwise comparisons (with Bonferroni adjustment) between the three levels. The results indicated that the scores generated in the pre-survey ($M = 24.29$) were significantly higher than the scores generated in the post-survey ($M = 17.19$). Additionally, the social isolation scores of older adult participants were significantly decreased between the waitlist post-survey ($M = 24.48$) time point and the post-survey ($M = 17.19$). There was no significant difference in the scale scores generated between the pre-survey (24.29) and the waitlist post-survey ($M = 24.48$). The Multivariate tests table (Pillai's trace, Wilk's lambda, Hotelling's trace,

Roy's Largest Root) indicated that the overall difference in the scale scores generated across the three surveys was statistically significant. See Table 3 for the results of the Repeated Measures ANOVA.

Loneliness

For loneliness, the results of the Repeated Measures ANOVA indicated that the within-subjects variable of survey time (pre, waitlist post-survey, and post) was statistically significant $F(2,38) = 5.28$, $p < .05$. That is, the loneliness scores of the participants did differ significantly as a function of the survey time points.

Since the within-subjects variable, survey timepoint, is statistically significant, results from the Tests of Within-Subjects Contrasts can be interpreted to determine which variables contributed to the overall difference (Wagner, 2020). The first contrast was between Level 1 (pre-survey) and Level 2 (waitlist post-survey), which was statistically significant, $F(1,19) = 5.59$, $p < .05$. The second contrast was between Level 2 (waitlist post-survey) and Level 3 (post-survey), which was not statistically significant, $F(1,19) = .00$, $p = 1.0$. This means that there was no significant decrease in loneliness as a result of participation in the program, however, participants in the program did experience decreased loneliness perhaps as a result of being included in the program and/or taking part in the pre-program survey interview.

The Pairwise Comparisons table presents all pairwise comparisons (with Bonferroni adjustment) between the three levels. The results indicated that the scores generated in the pre-survey ($M = 2.35$) were significantly higher than the scores generated in the post-survey ($M = 1.35$). Additionally, significant decreases in loneliness were demonstrated between the pre-survey ($M = 2.35$) and waitlist post-survey ($M =$

1.35) time points. There was no significant difference in the scale scores generated between the waitlist post-survey ($M = 1.35$) and post-survey ($M = 1.35$). The Multivariate tests table (Pillai's trace, Wilk's lambda, Hotelling's trace, Roy's Largest Root) indicated that the overall difference in the scale scores generated across the three surveys was statistically significant. See Table 3 for the results of the Repeated Measures ANOVA.

Technology Use

For overall technology use, the results of the Repeated Measures ANOVA indicated that the within-subjects variable of survey time (pre, waitlist post-survey, and post) was statistically significant, $F(2,42) = 8.5$, $p < .001$. That is, the technology use scores of the participants did differ significantly as a function of the survey time points.

Since the within-subjects variable, survey timepoint, is statistically significant, results from the repeated tests of within-subjects contrast can be interpreted to determine which variables contributed to the overall difference. The first contrast was between Level 1 (pre-survey) and Level 2 (waitlist post-survey), which was statistically significant, $F(1,21) = 6.87$, $p < .05$. This means that the mean technology use scores measured in the pre-survey were significantly lower than the mean scores measured in the waitlist post-survey. The second contrast was between level 2 (waitlist post-survey) and level 3 (post-survey), which was not statistically significant, $F(1,21) = 2.76$, $p = .12$. This means that there was significant increase in overall technology use before and after participation in the program.

The Pairwise Comparisons table presents all pairwise comparisons (with Bonferroni adjustment) between the three levels. The results indicated that the scores generated in the pre-survey ($M = 18.32$) were significantly smaller than the scores

generated in the post-survey ($M = 21.64$). Additionally, the technology use scores of older adult participants were significantly increased between the pre-survey ($M = 18.32$) and waitlist post-survey ($M = 20.41$). However, there was no significant difference in the scale scores generated between the waitlist post-survey ($M = 20.41$) and the post-survey ($M = 21.64$). The Multivariate tests table (Pillai's trace, Wilk's lambda, Hotelling's trace, Roy's Largest Root) indicated that the overall difference in the scale scores generated across the three surveys was statistically significant. See Table 6 for the results of the Repeated Measures ANOVA.

Tablet Use

For tablet use specifically, the results of the Repeated Measures ANOVA indicated that the within-subjects variable of survey time (pre, waitlist post-survey, and post) was statistically significant, $F(2,42) = 113.77$, $p < .001$. That is, the tablet use scores of the participants differed significantly as a function of the survey time points.

Since the within-subjects variable, survey timepoint, was statistically significant, results from the repeated tests of within-subjects contrast could be interpreted to determine which variables contributed to the overall difference. The first contrast was between Level 1 (pre-survey) and Level 2 (waitlist post-survey), which was not statistically significant, $F(1,21) = 1.4$, $p = .25$. This means that the mean tablet use scores measured in the pre-survey were not significantly different from the mean scores measured in the waitlist post-survey. The second contrast was between level 2 (waitlist post-survey) and level 3 (post-survey), which was highly statistically significant, $F(1,21) = 360.94$, $p < .001$. This means that there was a significant increase in tablet use before

and after participation in the program, with mean scores from the post-survey showing a vast increase from tablet use scores on the waitlist post-survey.

The Pairwise Comparisons table presents all pairwise comparisons (with Bonferroni adjustment) between the three levels. The results indicated that the tablet use scores of older adult participants were significantly increased between the pre-survey (M = 1.50) and post-survey (M = 4.36). There was no significant difference in the scale scores generated between the pre-survey (M = 1.50) and the waitlist post-survey (M = 1.23). There was a significant difference between the waitlist post-survey (M = 1.23) and post-survey (M = 4.36). This result indicated support for H3. The Multivariate tests table (Pillai's trace, Wilk's lambda, Hotelling's trace, Roy's Largest Root) indicated that the overall difference in the scale scores generated across the three surveys is statistically significant. See Table 3 for the results of the Repeated Measures ANOVA.

Digital Competence

For digital competence, the results of the Repeated Measures ANOVA indicated that the within-subjects variable of survey time (pre, waitlist post-survey, and post) is significant, $F(2,42) = 5.60$, $p < .05$. That is, the digital competence scores of the participants differed significantly as a function of the three survey time points.

As the within-subjects variable, survey timepoint, is statistically significant, results from the repeated tests of within-subjects contrast can be interpreted to determine which variables contributed to the overall difference. The first contrast was between Level 1 (pre-survey) and Level 2 (waitlist post-survey), which did not showed statistical significance, $F(1,21) = .85$, $p = .37$. This means that the mean scores measured in the pre-survey were not significantly lower than the mean scores measured in the waitlist post-

survey. The second contrast was between level 2 (waitlist post-survey) and level 3 (post-survey), which was statistically significant, $F(1,21) = 4.57$, $p < .05$. This means that the difference measured in the mean scores from the waitlist post-survey and post-survey was due to participation in the program; this supports the hypothesis.

The Pairwise Comparisons table presents all pairwise comparisons (with Bonferroni adjustment) between the three levels. The results indicated that the scores generated in the pre-survey ($M = 27.55$) were significantly less than the scores generated in the post-survey ($M = 33.59$). Similarly, the digital competence scores of older adult participants were significantly increased between the waitlist post-survey ($M = 28.73$) and post-survey ($M = 33.59$). There was no significant difference in the scale scores generated between the pre-survey ($M = 27.55$) and the waitlist post-survey ($M = 28.73$). This result indicated support for H3. The Multivariate tests table (Pillai's trace, Wilk's lambda, Hotelling's trace, Roy's Largest Root) indicated that the overall difference in the scale scores generated across the three surveys is statistically significant. See Table 3 for the results of the Repeated Measures ANOVA.

Chapter 5

CONCLUSION

Results indicated very little demographic differences between the survey groups, supporting the generalizability of the findings and providing support that the waitlist group did not differ from the rest of the study population. The lack of demographic differences between groups suggests that the waitlist control group was a representative sample of the entire study population. Supporting study hypotheses, results showed that social isolation, tablet use, and digital competence improved significantly between the pre- and post-surveys and had no statistically significant change between the pre-survey and waitlist post-survey time points. This provides evidence that the program elements influenced participants when it comes to using the tablet use, learning about and feeling confident with technology, and being more socially connected. The results for technology use and loneliness were similar in that changes were observed between the first and second time points, both prior to study participation, but not between the waitlist post-survey (before participating) and the post-survey (after participating). these results showed the program does not influence QOL in the same ways as other aspects of social well-being.

Research question 1 was answered through descriptive statistics, chi-square analyses, and independent samples t-tests. Overall, the 2023 program participants were mostly White, low-income, female, educated individuals, and people who lived alone. Participants in the waitlist control group did not significantly differ from the overall pre-survey population.

Related to the social isolation, these findings showed that the time and outside influences that occurred between the pre-survey and waitlist post-survey did not impact individuals' levels of social isolation, but rather it was participation in the program that positively impacted the lives of the participants. The one-on-one technology mentoring aspect of the program mitigates a common barrier for older adults participating in learning-based social activities by creating an engaging opportunity for older adult participants to maintain social interaction with their mentors and other individuals at the senior centers. By nature, this program allowed for the cultivation and maintenance of new social relationships with family and friends and facilitated ideally weekly social interaction for older adults, increasing their activity level as a result of their decreased social isolation. In line with activity theory, decreased social isolation leads to improved life satisfaction, and therefore is a contributor to overall QOL (Sloane-Seal, 2013).

Loneliness showed changes between the pre-survey and waitlist post-survey time points. Significant changes were found between the pre-survey and waitlist post-survey, and between pre-survey and post-survey, but loneliness scores between the waitlist post-survey and post-survey were very similar. Therefore, while social isolation decreased significantly due to program participation, individuals did not report a decrease in loneliness as a result of the program itself. Contributing factors to the significant decrease in loneliness for individuals waiting to take part in the program could include the two phone interviews taken by participants as well as the anticipation of being on the waitlist to take part in a program that they know will provide weekly interaction with a mentor. While administering the phone interviews for the pre- and waitlist post-survey, a common sentiment that participants would share is that they could not wait to begin, and

the most commonly asked questions when prompted for any questions or concerns were normally "When am I going to meet my student mentor?", "Will I be seeing you at the senior center?" and "When will I be hearing from you next?". Most individuals on the waitlist shared great excitement for beginning the program and speaking with myself and the other research assistants again. This feeling of continued contact with program staff at the site and research assistants before the program began could have led to the decrease in loneliness seen between the pre-survey and the waitlist post-survey.

The increases shown in technology use were between the first and second time point (pre-survey and waitlist post-survey), as well as between the first and third time point (pre-survey and post-survey). Similar to loneliness findings no significant improvement was shown between the second and third time points (waitlist post-survey and post-survey). Technology use seemed to change in a pattern similar to that of loneliness, with the majority of the improvement taking place while individuals were waiting to take part in the program. Researcher observations during survey administration support this finding, with many participants sharing their excitement to start learning how to use technology and their motivation to start "brushing up" and practicing with the technology they already had. Since many older adults felt insecure about their lack of technology knowledge, most participants felt the need to do their own research and start experimenting with their phones as well as desktop computers at senior centers and local libraries prior to starting the program so that they would no feel behind when they began the iPad program. This anticipation and personal motivation may explain the increase in technology use overall for individuals in the program.

For tablet use, the repeated measures ANOVA analyses found that tablet use more than tripled between the pre- and post-surveys but showed no statistically significant increase between the first two time points. This strong finding shows that the program clearly had an impact on participants' tablet use, showing evidence that the combination of providing an iPad plus offering technology mentorship can be an effective way to increase device use.

Results indicated a significant increase in digital competence between the second and third time points (waitlist post-survey and post-survey), as well as between the first and third time points (pre-survey and post-survey). Additionally, no significant change was found between the first and second time points (pre-survey and waitlist post-survey). These findings support the impact of the URI eGen Cyber-Seniors program as the main source of change in participants' increased digital competence. Over the course of the program, student mentors follow a learning checklist to teach older adult participants a variety of skills including but not limited to email, video conferencing, copying and pasting, and social media use. Participants also receive lessons in online safety skills such as password protection, how to spot a scam, and avoid interacting with unsafe entities online, an issue commonly faced by older adults. In addition to these skills, older adults are shown how to use cognitive enrichment apps such as Lumosity as well as a variety of Rhode Island-specific apps to connect them with their community and their state. Participants are encouraged to explore their new devices on their own between meetings to learn through trial and error, and in the process many older adults find apps such as painting apps, word games, and other entertainment which they then bring back to their mentor, allowing both participant and mentor to learn together. The improvement in

competence scores on these and other digital skills before and after the program demonstrates the effectiveness of this intergenerational technology intervention.

A Framework for Intergenerational Technology Programming

Based on these findings, a framework was devised as shown in Figure 2. Using study findings, the framework was developed to illustrate the functioning of the URI eGen Cyber-Seniors Program from pre-survey to participation to post-survey. At program entry, the older adult participants register through their local senior centers using a Google form. Next, research assistants from the University of Rhode Island call individuals on the registration (waiting) list and administer the pre-survey to enroll them in the program. Older adults begin anticipating the start of the program and are given an idea of when they will be able to begin. While older adults wait to take part in the program, a decrease in loneliness and an increase in technology use is observed. Next, program participation begins when older adults receive their iPads and supplementary learning materials including a binder with information and resources about iPad use and the Cyber-Seniors program. Older adults begin scheduling meetings with their student mentors and have regular meetings, normally consisting of one-hour meetings once a week for 2-3 months, with some variation depending on the individual. The program impacts include increased tablet use, increased digital competence, and decreased social isolation, as measured in the post-survey administered over the phone after the program has been completed. Activity theory posits that older adults who remain active in their communities and social circles experience greater life satisfaction, and are therefore encouraged to continue participating in social and community activities (Johnson & Mutchler, 2013). Older adult participants, in taking part in this technology-based learning

activity, experienced positive changes in various social and technological areas, improving their confidence and ability to participate socially in their senior centers and larger communities.

Study Limitations

This study experienced limitations in diversity, with all participants in this study sample speaking English and being mostly White. As a strength of the sample, the population in the study was representative of the population of Rhode Island, with a 61% White population as surveyed in the 2020 U.S. Census and a 76% White sample in the study, both majority percentages (U.S. Census Bureau, 2020). Another limitation of this study was that while the waitlist survey sample was a representative sample of the total population, it was smaller than the overall pre-survey population and would have benefitted from a larger sample in order to complete more sophisticated quantitative analyses. A waitlist control study with a larger waitlist group could be beneficial in supporting the results found by this study. Furthermore, utilizing a waitlist control design with ANOVA testing at a similar interval to the program participants rather than a repeated measures design on individuals who will take part in the program may also shed additional light on the differential impacts of the various program elements on technology-related and QOL-related measures. Finally, the biggest challenge for this study was getting post-surveys from study participants. This may have been due to a lack of participation in the program or people not feeling compelled to complete the post-survey. Future research could build in additional incentives related to the iPad and its use to ensure program participants take part in post-program research components.

Conclusion

The results of this study have shown that the waitlist control design is a valuable method of evaluating the effectiveness of intergenerational technology programs beyond that of a pre-post design. The waitlist control group comparisons provided support for the improvements in dependent variables being a direct result of the program and not life changes between survey time points. Waitlist control designs such as this can be utilized to evaluate the implementation of interventions for a variety of social issues.

With a rapidly aging population, it is important to understand QOL and its indicators and influencing factors for those in the most rapidly increasing age bracket, older adults. This study aimed to examine the effects of an intergenerational technology learning program (URI eGen Cyber-Seniors Program) on the QOL, social isolation, loneliness, technology use, tablet use, and digital competence on older adult participants as assessed at three different time points: before the intervention, while on the waitlist for the intervention, and after completing the intervention. Each of these scores indicated the relevance of the given variable in determining overall QOL, and to show a significant improvement in scale scores would demonstrate that this program has the potential to positively impact the QOL of the largest growing population in the United States. Overall, this study contributes to the academic literature by examining QOL-related measures (QOL, social isolation, loneliness) and technology-related measures (technology use, tablet use, digital competence) in a waitlist control design, validating and further explaining the outcomes of an intergenerational technology program.

Tables

Table 1

Descriptive Statistics for Demographics

	Individuals Who Completed Pre-Survey (N=76) %/Mean (SD)	Waitlist Control (completed pre & post) (N=32) %/Mean (SD)	Individuals Who Completed Pre- and Post-Survey, but no Waitlist Post Survey (n=44) %/Mean (SD)	Individuals Who Completed Pre-, waitlist post-survey, and Post-Surveys (N=21) %/Mean (SD)
Age (years)	74.86(9.34)	74.44(9.99)	75.06(8.50)	75.10(8.81)
Income				
Less than $30,000 annually	57%	63%	49%	57%
More than $30,000 annually	43%	37%	51%	43%
Living Status				
Lives alone	63%	69%	60%	76%
Lives with others	37%	31%	40%	24%
Education level				
Did not complete high school	7%	7%	7%	10%
Completed high school or GED	31%	37%	19%	19%
Associate degree or some college	30%	26%	38%	38%
Graduated college	19%	27%	21%	28%
Received graduate degree	13%	3%	15%	5%

Gender				
Male	29%	25%	34%	29%
Female	71%	75%	66%	71%
Race				
White	76%	72%	81%	81%
Minoritized	24%	28%	19%	19%
Self-rated health				
Fair	4%	0%	4%	0%
Good	25%	34%	28%	38%
Very Good	49%	50%	45%	45%
Excellent	22%	16%	23%	23%

Note. No significant differences were found in demographic characteristics across the three survey time points nor the group that completed all three surveys.

Table 2

Descriptive Statistics for Dependent Variables

	Total Sample Who Completed Pre-Survey (N=76) %/Mean (SD)	Total Sample Who Completed Pre & Waitlist Post-Survey (N=32) %/Mean (SD)	Individuals Who Completed Pre- and Post-Survey, but no Waitlist Post Survey (n=44) %/Mean (SD)	Total Sample Who Completed Pre-, Waitlist Post-Survey, and Post-Survey (N=21) %/Mean (SD)
Quality of Life	56.16(5.48)	57.88(5.42)	55.33(5.3)	55.44(5.29)
Social Isolation	23.57(4.34)	24.58(3.44)	17.18(3.06)	17.04(3.16)
Loneliness	1.77(1.64)	1.27(1.46)	1.22(1.31)	1.24(1.30)
Technology Use	17.97(3.28)	19.82(3.50)	20.60(3.63)	20.69(3.65)
Tablet Use	1.58(1.09)	1.27(.84)	4.15(.83)	4.15(.83)
Digital Competence	25.24(8.67)	27.45(9.42)	31.64(10.01)	31.88(10.03)

Table 3

One-Way Repeated Measures ANOVA (Within-Subject Effects) on the Individuals who Participated in all Surveys (n=21) for QOL- and Technology-Related Dependent Variables

Source of Variation	SS	Pre	Waitlist	Post	df	MS	F	P-value
Quality of Life	219.46	56.48	58.81	54.24	2	109.73	5.01	.10
Residual	875.87				40	21.90		
Social Isolation	724.22	24.29[a]	24.48[b]	17.19[ab]	2	362.11	26.00	<.001
Residual	557.11				40	13.93		
Loneliness	13.33	2.35[cd]	1.35[d]	1.35[c]	2	6.67	5.28	.009
Residual	48.00				38	1.26		
Technology Use	123.85	18.32[ef]	20.41[e]	21.64[f]	2	61.92	8.48	<.001
Residual	306.82				42	7.31		
Tablet Use	132.82	1.5[g]	1.23[h]	4.36[gh]	2	66.41	113.77	<.001
Residual	24.52				42	.58		
Digital Competence	451.73	27.55[i]	28.73[j]	33.59[ij]	2	225.86	5.60	.007
Residual	1695.61				42	40.37		

Note. Corresponding letters indicate a statistically significant relationship.

Figures

Figure 1.

Flowchart of Survey Process

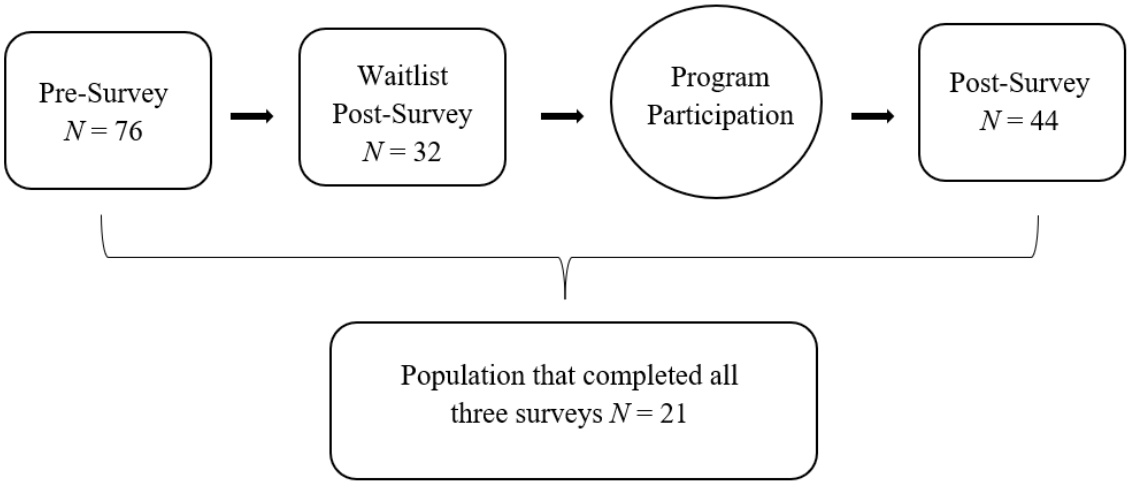
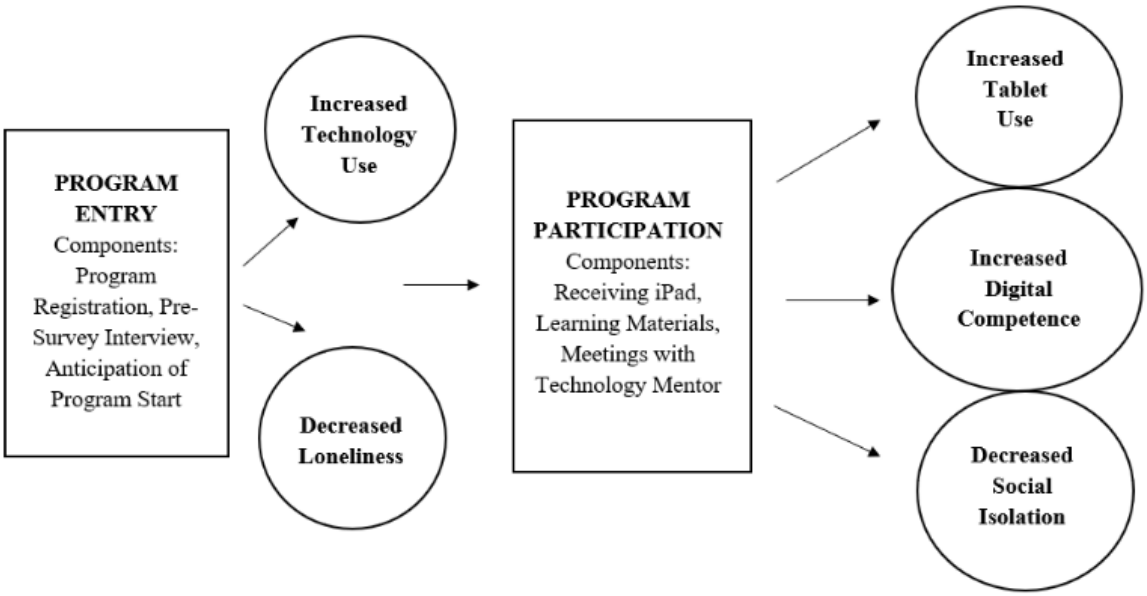


Figure 2.

Framework for How the eGen Cyber-Seniors iPad Program Functions



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