Improving Technology Use, Digital Competence, and Access to Community Resources Among Older Participants in the University of Rhode Island Engaging Generations Cyber-Seniors digiAGE Pilot Study

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Abstract

This pilot study aimed to bridge the digital divide between older and younger adults. The goal was for older people in the state to become digitally literate by engaging them in a program that provides digital devices (i.e., Apple iPads), internet connectivity (i.e., through HotSpots), and training from supervised university student mentors. This project, funded as a key policy initiative through the state's unit on aging, specifically promoted social and economic equity by targeting participants from lower-income communities and areas hit hardest by the COVID-19 pandemic. Our university partnered with senior/community centers to recruit and support English- and Spanish-speaking adults 50 years of age and older (age range: 55-100, *M*=72.3, *SD*=8.5). For this paper, we examined changes in technology use and digital competence from the pre- to the post-survey (collected over the phone) from older participants (N=145), and we examined how the program contributed to new ways for participants to connect to community resources. Based on statistical analyses, participants improved in digital competence (pre=2.06, post=2.74), technology use (pre=1.99, post=2.70),

tablet use (pre=1.53, post=4.08), and the number of purposes in which participants used technology (pre=4.09, post=5.55; *p*'s<.01). Themes that arose from the qualitative data included feeling more capable and confident in searching out new information, now knowing where to find activities and resources, and meeting with doctors and booking health appointments. This program addressed a significant community need during the pandemic and had success working with community partners. Policies for state grants that support broadband equity, digital literacy and digital equity initiatives should utilize this research to inform their efforts to address digital inclusion needs for older adults.

Keywords: intergenerational technology program, social and economic equity, technology use, digital competence, digital divide

Mejora del uso de la tecnología, la competencia digital y el acceso a los recursos de la comunidad entre los participantes mayores en el estudio piloto digiAGE de University of Rhode Island

Resumen

Este estudio piloto tuvo como objetivo cerrar la brecha digital entre adultos mayores y jóvenes. El objetivo era que las personas mayores en el estado se alfabetizaran digitalmente involucrándolos en un programa que proporciona dispositivos digitales (es decir, iPads de Apple), conectividad a Internet (es decir, a través de HotSpots) y capacitación de mentores de estudiantes universitarios supervisados. Este proyecto, financiado como una iniciativa de política clave a través de la unidad estatal sobre el envejecimiento, promovió específicamente la equidad social y económica al enfocarse en participantes de comunidades de bajos ingresos y áreas más afectadas por la pandemia de COVID-19. Nuestra universidad se asoció con centros comunitarios/para personas de la tercera edad para reclutar y apoyar a adultos de habla inglesa y española de 50 años o más (rango de edad: 55-100, M=72.3, SD=8.5). Para este documento, examinamos los cambios en el uso de la tecnología y la competencia digital desde la encuesta previa a la posterior (recolectada por teléfono) de los participantes mayores (N=145), y examinamos cómo el programa contribuyó a nuevas formas para

que los participantes se conectaran a los recursos de la comunidad. Con base en análisis estadísticos, los participantes mejoraron en competencia digital (pre=2.06, post=2.74), uso de tecnología (pre=1.99, post=2.70), uso de tabletas (pre=1.53, post=4.08) y el número de propósitos en los que los participantes usaron la tecnología (pre=4.09, post=5.55; p <.01). Los temas que surgieron de los datos cualitativos incluyeron sentirse más capaces y confiados en la búsqueda de nueva información, saber ahora dónde encontrar actividades y recursos, y reunirse con médicos y programar citas médicas. Este programa abordó una importante necesidad de la comunidad durante la pandemia y tuvo éxito al trabajar con socios de la comunidad. Las políticas para las subvenciones estatales que apoyan la equidad de banda ancha, la alfabetización digital y las iniciativas de equidad digital deben utilizar esta investigación para informar sus esfuerzos para abordar las necesidades de inclusión digital de los adultos mayores.

Palabras clave: programa tecnológico intergeneracional, equidad social y económica, uso de tecnología, competencia digital, brecha digital

提高老年参与者的技术使用、数字能力、以及社区资源获取：罗德岛大学的代际参与网络-老年人digiAGE试点研究

摘要

本试点研究旨在填补老年人和年轻人之间的数字鸿沟。研究目标是让罗德岛州的老年人参与一项提高其数字素养的计划，该计划提供数字设备（即Apple iPad）、互联网连接（即通过HotSpots）以及大学生导师培训。该项目作为一项关键政策倡议，由该州老龄化部门资助，专门用于促进社会和经济公平，目标对象为来自低收入社区和受新冠疫情大流行影响最严重地区的参与者。我们的大学与老年人/社区中心合作，招募并支持50岁及以上的、讲英语和西班牙语的成年人（年龄范围：55-100，M=72.3，SD=8.5）。本文中，我们研究了老年参与者(N=145)从调查前到调查后（通过电话收集）在技术使用和数字能力方面的变化，并分析了该计划如何为参与者提供新的方式来连接社区资源。根据统计分析，参与者在数字能力（调查前=2.06，调查后=2.74）、技术使用（调查前=1.99，调查后=2.70）、平板电脑使用（调查前

=1.53，调查后=4.08）以及参与者使用技术的用途数量（调查前=4.09，调查后=5.55；p<.01）方面都有所提高。定性数据提取的主题包括：在搜索新信息方面感觉更有能力和信心，现在知道在哪里可以找到活动和资源，以及与医生会面和完成健康预约。该计划应对了大流行期间的重大社区需求，并与社区合作伙伴取得了成功。支持宽带公平、数字素养和数字公平倡议的州拨款政策应利用本研究，为用于满足老年人数字包容性需求的相关举措提供信息。

关键词：代际技术计划，社会及经济公平，技术使用，数字能力，数字鸿沟

According to the National Digital Inclusion Alliance (NDIA) (2022), the digital divide is defined as the "gap between those who have affordable access, skills, and support to effectively engage online and those who do not" (p. 1), and the digital divide disproportionately impacts people of color, Indigenous individuals, households with lower income, people with disabilities, people in rural areas, and older adults. On the other hand, digital inclusion "refers to activities necessary to ensure that all individuals and communities, including the most disadvantaged, have access to and use of information and communication technologies (ICTs)" (p. 1). Nemer (2015) further described digital inclusion as the process of democratization of access to ICTs. This includes computers and the internet, which ensures that individuals, particularly those from disadvantaged groups, have access to digital literacy training and quality technical support. These trainings and supports ensure that these individuals are able to participate in and benefit from the electronic-mediated and growing knowledge within our information society (Hache & Cullen, 2009; Nemer, 2015). Recognizing digital inclusion as a social determinant of health, Sieck et al. (2021) described digital literacy and internet connectivity as the "super social determinants of health" because they address all other social determinants of health.

When the COVID-19 pandemic shut down communities across the country, older adult advocates in our state quickly recognized that many older adults were experiencing digital exclusion and enhanced levels of social isolation, which was particularly enhanced due to society's increased reliance on technology for information and communication. Following a series of meetings, the state unit on aging, as part of their new digiAGE Initiative, funded our university team to implement a pilot program. This pilot program aimed to ensure digital inclusion among older adults in the state and bridge the digital divide between older adults and younger generations (referred to throughout the report as the iPad pilot program). The goal for this iPad pilot program was for older adults to become digitally literate by engaging them in a formal program that provides digital devices (i.e., Apple iPads), connectivity (i.e., internet connection through HotSpots), and training by supervised university student mentors. This project specifically promoted social and economic equity by targeting participants from lower-income communities and areas hit hardest by the COVID-19 pandemic for recruitment. This paper details findings from a study conducted as part of this pilot project that: 1) examined pre- and post-survey changes related to technology use and digital competence for program participants, and 2) examined how the program contributed to new ways for participants to connect to community resources.

Technology Adoption Among Older Adults

Technology use has become a fundamental aspect of society, with work, education, communication, leisure, healthcare, and health promotion activities all utilizing technology in some way in order for people to fully participate. Although technology is becoming embedded in society, older adults are adapting to technology at a slower rate compared to younger individuals (Anderson & Perrin, 2017). For instance, 90% of all American adults have used the internet; however, only 73% of older adults report having used the internet (Anderson & Perrin, 2017). Though the share of those 65 and older who use technology has grown, there continues to be generational differences related to social media use and broadband access (Faverio, 2022). Lack of technology adoption, known as the digital divide (van Dijk, 2006), can create disparities and disenfranchisement among older adults, especially for those with low incomes. Low levels of digital competence, age-related cognitive and physical decline, and negative attitudes can influence technology adoption among older adults (Czaja et al., 2006; Laguna & Babcock, 1997; Yagil et al., 2013).

Additionally, many older adults are affected by structural inequities that limit access to technology (Dassieu & Sourial, 2021; Nguyen et al., 2021). Utilizing findings from the Pew Research Center (Anderson & Perrin, 2017), an estimated 41% of the state's older adults

are not broadband users and 27% are not internet users. Access to technology can be even harder for racial/ethnic minority groups as there may be language or cultural barriers that inhibit them from finding the technology accessible (Mitchell et al., 2019). For older adults with lower socioeconomic statuses, being able to afford technology (e.g., the device and monthly fees) is a large barrier (Drazich et al., 2022). Technology access can be seen to have a trickle-down effect, meaning that those who can afford it find it accessible in their language or within their culture and thus often learn how to utilize it first (Mitchell et al., 2019). Older adults within racial/ethnic minority groups, particularly those with lower income, may be introduced to technologies later than their White counterparts and thus encounter barriers to utilization of the technology (Mitchell et al., 2019). Disparities in access to technology for Spanish-speaking older adults may be due to language barriers, as differences in the use of communicative technology such as email, phone calls, and texting are less prevalent than utilization of informative based technology such as health resources (Orellano-Colon et al., 2016; Uchechi et al., 2019). This became an increasingly alarming problem when the COVID-19 pandemic came upon our society (Buffel et al., 2021), and testing and vaccine appointments for COVID-19 needed to be made online; current health information was made available online most frequently as well.

At the beginning of 2020, the COVID-19 pandemic forced many people to isolate and socially distance themselves to manage the rapid spread of the virus. For most people, this meant staying home, wearing a mask, and social distancing as much as possible when needing to go out. For older adults, however, the news of the pandemic came with extra concerns as older adults, especially those with medical conditions or those considered immunocompromised, were encouraged to stay home as much as possible to avoid getting COVID-19 (Brooke & Jackson, 2020; Garcia et al., 2021). Older adults with more intense forms of anxiety or depression were more likely to take isolation seriously and to isolate themselves for longer than necessary. For the younger generations, social media, video conferencing, texting, and calling were used to stay connected and combat anxiety and loneliness (Drazich et al., 2022; Garcia et al., 2021). For older adults, the technological divide was more prevalent than ever before, which motivated many older adults to use technology in ways that were new to them (Drazich et al., 2022; O'Connell et al., 2021).

Even prior to the pandemic, many barriers prevented older adults from fully engaging with technology, such as access issues, lack of interest or motivation, lack of knowledge, cost, and perceived issues due to physical limitations (Wagner et al., 2010). For many older adults, technology may also not be easily accessible. Oftentimes technology can be too expensive, or individuals may not have all the tools necessary to use the technology, such as a strong WiFi connection (Drazich et al., 2022; Garcia et al., 2021; Green-

wald et al., 2018). With the pandemic came increased awareness of these barriers and new motivation among older adults to obtain access to technological devices and adopt technology (Drazich et al., 2022; Greenwald et al., 2018; O'Connell et al., 2021). One concern raised in a research study by Wu and colleagues (2015) is that older adults often find gerontechnologies (i.e., assistive information and communication technologies designed specifically for older adults, such as simplified tablets or assistive robots) to be stigmatizing. These devices are perceived to mostly be for people with major cognitive impairment or who are physically frail. Most older participants would seemingly prefer to learn the latest technology used by the general public rather than these specially designed devices for "older" people. Therefore, based on this research, we specifically developed this pilot project to provide devices and internet connection in order to remove access barriers while also offering commercially available, highly-desirable devices and free internet connection to older adults.

Digital Competence

Digital competence is one's confidence and ability to use technology for communication, information, and problem solving in various aspects of life (Olofsson & Lindberg, 2008). 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 ICTs (Information and Communication Technologies), such as use of computers to retrieve, access, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet.

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 et al., 2002). Older adults' initial technology experiences and how they are taught to use technology can greatly influence ongoing technology adoption (Peek et al., 2016). 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).

Older adults can benefit from technology use through increasing access to health information, promoting social connectedness, improving quality of life, preventing cognitive decline, and maintaining independence (Czaja et al., 2006; Tun & Lachman, 2010). Training older adults on technology to increase digital competence can help them recognize added benefits from using technology and change behavior and attitudes toward technology (Hill et al., 2015). While some older adults may be hesitant to adopt new technology or use technology in different ways,

such as engaging in social media or having telehealth appointments, their hesitation can stem from the anxiety of learning something new and not knowing what they are engaging in rather than simply not wanting to engage (O'Connell et al., 2021). Furthermore, when older adults are using technology, they are more likely to be using it in a functional sense rather than as a way to connect with the world (Greenwald et al., 2018). They may also fear being scammed or having their information stolen off of the internet, limiting their confidence in participating in virtual social connection activities such as social media, online classes, and getting in communication with family and friends (O'Connell et al., 2021). The conditions that the COVID-19 pandemic brought outweighed the technological hesitation for many older adults who may have been previously hesitant to learn. Many started taking telehealth appointments and doing social activities online, essentially learning how to adapt to the pandemic world (O'Connell et al., 2021). For older adults with disadvantages due to income, the pandemic may have contributed to increased motivation to learn, but they needed access to devices and training to make this possible, which this pilot project addressed.

Best Practices for Teaching Older Adults

Technology training is an important component to digital inclusion. For learning technology, research has shown that a positive initial experience combined with interactive teaching modalities can help promote continual use of technology among older adults (Rogers et al., 2000). Further, programs that create a friendly and supportive environment (Gagliardi et al., 2008; Hickman et al., 2007) and that cover topics relevant to older adults tend to work most effectively (Segrist, 2004). Best practices also suggest providing one-on-one training for older adults with step-by-step, direct instructions (Dauz et al., 2004; Leedahl et al., 2018), and that repetition is an important aspect of technology training for older learners (Delollo & McWorter, 2017; Tsai et al., 2017). Providing written materials (Gardner, 2010) and finding a balance of self-directed versus instructor-directed learning is also suggested (Dickinson et al., 2005; Xie & Bugg, 2009). Tsai et al. (2017) found most older adults learn how to use tablet devices through exploratory, self-directed learning using a "trial and error" or "playing around" approach.

A reverse mentoring, service-learning program can create a mutualistic, open relationship where mentors and mentees share knowledge and experiences (Spreitzer, 2006). Reverse mentoring, where younger adults provide support and knowledge to older adults, can be a vehicle to teach older adults about technology and bring generations together (Leedahl et al., 2018; Meister & Willyerd, 2010; Murphy, 2012). 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. Service-learning is an organized community service activity to promote experiential education for students in higher education while they also earn course credit (Underwood & Dorfman, 2006). As implied by its name, service-learning is meant to enhance course material through completion of a related service, with an emphasis on learning for students and benefits for those receiving services (Furco, 1996). Young adults participating in service-learning have shown increased ageism sensitivity and more positive attitudes towards older adults, particularly in regard to working with them (Augustin & Freshman, 2016).

Intergenerational connection through "reverse mentoring" is a way to combat social isolation and increase digital competence in older adults. By pairing young adult mentors with older adults, technological knowledge and skills for older adults can be learned to enhance communication and social involvement (Leedahl et al., 2020). Intergenerational learning programs provide educational benefits and meaningful social interaction. Other benefits for older adults through these connections are enhanced feelings of self-worth, improved self-esteem, and overall satisfaction, with the idea that their life has meaning and importance (Underwood & Dorfman, 2006). These programs can not only change the older adults' perspective but the younger generation as well. Research has shown the intergenerational model used by the University of Rhode Island Engaging Generations Cyber-Seniors Program can help reduce ageist stereotypes and increase interest in working with older adults for the students involved (Leedahl et al., 2020).

Intergenerational programs have shown to be beneficial for all involved. For older adults, intergenerational programs can help to combat loneliness, depression, dementia, and overall cognitive decline (e.g., Juris et al., 2022; Martins et al., 2019). Younger adults often gain a sense of autonomy and agency when participating in intergenerational programs with reverse mentoring models because the typical mentorship roles are reversed (Gamliel, 2017; Juris et al., 2022). For both generations, intergenerational work can help reduce the stigmatization of the other generation (Brown & Strommen, 2018). Brown and Strommen (2018) found that one of the main reasons older adults may not be engaging in technology use is because older adults perceive technology as something that just young people use. Older adults may be skeptical when adopting new technology because they are unsure how relevant it will be in their lives, or they may view the technology as inaccessible because they do not know how to use it (Brown & Strommen, 2018). Intergenerational programs can help to bridge that gap by having the younger generation mentor older adults on how to use technology in a way that is accessible to them (Brown & Strommen, 2018). By

nature of intergenerational programs, connectivity is increased, depression, cognitive decline, and anxiety about aging decrease, and overall participants from both generations gain a sense of belonging when going through the programs (Dorfman et al., 2003; Juris et al., 2022).

Program Background

The University of Rhode Island Engaging Generations Cyber-Seniors (URI eGen Cyber-Seniors) Program is an intergenerational program that serves to teach older adults about technology, increase digital use and digital competence, and increase social connectedness among older adults. The program uses reverse mentoring and a service-learning approach, where university students help older adults learn about technology for experiential education while also developing communication and leadership skills. This program helps older adults learn how to use technology in a person-centered way, as research indicates older adults prefer to learn about technology through personalized one-on-one sessions (Betts et al., 2019). Since its launch in 2016 through the Spring 2022 semester, the program has served over 1,150 older adults in the state with about 450 university students providing 6,280 hours of assistance (URI Human Development & Family Science, 2023).

The URI eGen Cyber-Seniors Program began in 2015 when an interdisciplinary group of faculty members became inspired to connect university students and older adults using the reverse-mentoring model after viewing the Cyber-Seniors® documentary (Leedahl et al., 2018). The documentary highlighted a program in Canada that connected high school students and older adults at a retirement community so that the older adults could learn about using technology. With the URI eGen Cyber-Seniors intergenerational technology program, university students work together with older adults to help them learn about technology, and students gain communication and teaching skills. This program is part of the university's Age-Friendly University (AFU) efforts. AFUs across the world are focused on strengthening intergenerational bonds through innovative programming that involves younger and older adults both engaging and learning (Talmage et al., 2016), and URI sees this program as a key element to their AFU strategy. The program integrates service-learning components into existing courses/curricula within multiple majors and programs, develops University partnerships with community organizations providing services to older adults, and collects quantitative and qualitative information for program evaluation and research. While supporting university student needs, the program is also designed to benefit older adults in the state, specifically by improving social connectedness for older adults and thus influencing outcomes related to health and well-being.

Prior to implementing this pilot project, the URI team had a strong history of implementing intergenerational technology programming in the

state. Before the pandemic, in a typical semester, we often worked with 5–8 organizations (mostly senior centers) and included approximately ten university students who conducted in-person sessions with older adults. Older adult participants would bring their own devices to one-on-one or small group appointments with university student mentors at senior centers or other community sites. When the lockdown due to the COVID-19 pandemic occurred in March 2020, most senior/community centers closed, and university classes and internships moved to remote experiences. A recent publication details the events and partnerships during this time (Jarrott et al., 2022). The state unit on aging identified the funding mechanisms that could be used to fund a new digiAGE initiative, and this pilot project as one of the signature projects for the initiative.

digiAGE Initiative

The COVID-19 pandemic dramatically impacted the health of older adults in the state as evidenced by the high proportion of deaths and hospitalizations among those age 65 and over (Rhode Island State Department of Health, 2020). The pandemic also highlighted the significant digital divide among older adults, particularly marginalized groups, negatively impacting their quality of life in regards to maintaining social contacts, connecting to family and community resources, accessing healthcare, and delivery of food and other essentials (Buffel et al., 2021). Research showed significant disparities in internet use for older adults living in poorer communities of the state; statewide, one out of four persons aged 60 and over did not use the internet. In several areas, only 55% of older adults had used the internet in the last month (Healthy Aging Data Reports, 2020). These findings led the state unit on aging to begin the digiAGE initiative, a component of Project Hello, a broad initiative aimed at addressing increased social isolation due to the COVID-19 pandemic and its stay-at-home restrictions. The digiAGE initiative was the Office's first effort to specifically address the digital divide for older adults.

Conceptual Framework

Social exchange theory guides the overall URI eGen Cyber-Seniors Program due to its emphasis on how relationships between individuals are often being guided by the pursuit of rewards and benefits and the avoidance of costs and difficulties. This program offers mutual benefits to both generations—older participants learn technology; younger participants gain professional experience and service-learning hours. This ensures reciprocity across generations and ideally helps everyone involved learn from and about those with diverse perspectives from their own (Wan & Antonucci, 2016). Specific to older adult learning and development, this program and this research is also guided by Knowles theory of andragogy (drawing on personal experience and knowledge), sociocultural learning theory (providing social in-

teraction personally tailored to people's interests and capabilities) and contact theory (building trust and confidence across generations) (Fink & Beck, 2015; Martins et al., 2019; Vygotsky & Cole, 1978). These respective theories guided our development of the student training, written materials, and the intergenerational learning approach.

Pilot Program Elements

To implement the iPad pilot program, we worked with five senior/community centers. Since the cost for a device and internet connectivity is a barrier for many older adults, especially those with lower income, we developed the iPad pilot program to provide a new device and a Hotspot, if needed, for internet connection. To offer self-directed and one-on-one support, a binder of resources for participants was provided, and each person was assigned to a university student mentor to work with them individually. Student mentors joined the program to meet internship, service learning, or experiential education requirements. Students were trained and provided resources to help them learn about technology and working with older adults. Future research will detail the student mentor experience and outcomes data.

Partnerships with senior/community centers. The state unit on aging specifically chose the pilot communities to be involved in this pilot program because they had higher COVID-19 rates than other parts of the state when the project began. The five communities also had strong senior/community centers willing to support their participants, and these communities represented a mix of communities geographically. Furthermore, the goal for the project was to promote social and economic equity by targeting the project within communities with higher low-income populations and that represented racially/ethnically diverse communities (both English- and Spanish-speaking).

Intergenerational meetings. Student mentors connected with the older participants in several ways for the pilot project including phone calls, through online meeting platforms such as Zoom, and in-person meetings (when safe and possible). While student mentors were trained to tailor each appointment according to the participant's technology knowledge and goals, each mentor utilized a checklist of learning goals to measure progress for each older participant. The goal was for each participant to have 4–5 meetings with their student mentor during the semester in which they joined the program.

iPads. Based on previous experience in assisting older adults with technology, we chose to purchase Apple iPads for participants in this pilot program due to past experience with older participants finding them more intuitive, reliable, and longer-lasting than other devices; university students tending to have more knowledge of Apple products than other types; and Apple iPads simply making people happy and excited to learn. After receiving the

first order of iPads, we identified the first template of apps and links to load onto the iPads prior to delivery after consulting with the Cyber-Seniors Organization, Assistive Technology Access Partnership/Adaptive Telephone Equipment (ATAP/ATEL) in the state, and older adults who were previous participants in the program. We chose this over attempting to personalize based on community resources or individual needs, as this greatly simplified the tracking systems, iPad preparatory systems, and initial training protocols. Individuals were able to tailor their iPads to meet their personal needs once they received them; however, we wanted to have them all begin from the same interface. We made sure to include links to specific state resources. We did slightly change the interface over time based on participant experiences and site updates. We purchased iPad covers, screen protectors, and styluses for each participant. Additionally, university and the state unit on aging stickers were included on the back of the iPads.

Hotspots. To obtain the Hotspots for study participants, the university entered into a legal agreement with Mobile Beacon. Mobile Beacon is a company that provides high-speed, low-cost mobile internet access to nonprofit organizations, schools, libraries, and healthcare providers (Mobile Beacon, 2023). With the Hotspot (already set-up), we provided an easy-to read instruction sheet for using the Hotspots, which was included in the binder of each participant who received a Hotspot.

Binder. We provided each participant with a binder that included the following:

1) introductory letter from the PI; 2) liability sheet regarding device damage; 3) checklist of learning goals; 4) iPad Information Sheet with details about the iPad and the pre-loaded resources; 5) password management sheet; 6) copy of the Informed Consent Form; 7) internet safety tips from Attorney General; 8) common technology terms & definitions; 9) Cyber-Seniors Participant Handbook; 10) notebook paper for taking notes. We modified some of the documents after the first two semesters when we learned about issues or needs. We created binders in both English and in Spanish, ensuring both types had the same resources.

Optional Weekly Zoom Meetings. We held weekly Zoom meetings throughout the duration of the project for older adult participants and student mentors. Throughout the meetings, approximately 10–20 older individuals attended the Zoom calls, and approximately 3–5 university students attended each week. This was an excellent leadership opportunity for many of the students, as many of them lead parts of the calls. We often chose a technology-related topic, such as avoiding e-mail scams; utilizing Facebook and Facebook Messenger to communicate; and exploring music, TV, or movie apps, or we scheduled a speaker from one of the organizations in the state that offers resources for older adults. We utilized a similar agenda each week so that participants became familiar with the plan. We kept these meetings optional, as many old-

er adults communicated apprehension towards participating in these types of meetings, even after learning how to use Zoom with the help of their student mentor.

Data & Methods

As part of implementing the iPad pilot program, our research questions were as follows: 1) For older participants in the program, were significant improvements detected in technology use and digital competence from the pre- to the post-survey? 2) How did the program contribute to new ways to connect to community resources for participants? We received IRB approval for the study protocol, including community partner involvement, recruitment methods, consent process and verbal consent form, surveys, and training for any study personnel.

Inclusion Criteria

The PI consulted with the state unit on the aging team to determine the inclusion criteria for the pilot project. For the older adults in the pilot program, inclusion criteria were: 1) be age 50 years or older; 2) hold residence in the five selected communities; 3) lack and want a digital device &/or internet access; 4) be willing to receive 2-3 months of technology training through the URI eGen Cyber-Seniors program; and 5) be willing to complete intake forms, pre-or post-surveys, and take part in a phone interview about their experience.

Older Adult Recruitment and Data Collection

Older adults were recruited through the five community partners. Each partner was given a flier that they were able to modify to meet their specific site needs if necessary. If interested in the iPad pilot program, individuals called the centers and filled out an online registration form with staff. Once individuals were recruited, student researchers called each interested person to inform them of the details of participating in the study. Spanish-speaking student researchers completed the pre- and post-surveys with any Spanish-speaking participants. This often involved multiple calls, voice messages, and sometimes a consultation with senior center staff to reach potential participants. If the individual provided their verbal informed consent to participate in the research study and program, the student then asked them questions from the pre-survey over the phone. Students marked down responses to the pre-survey and entered the information into an electronic form. Participants understood they could keep their iPad if they completed all aspects of the study, and that the Hotspot would work for approximately one year.

After completion of the pre-survey, each person was assigned an iPad and a Hotspot (if needed). Toward the beginning of each semester the university team arranged a day/time to bring the iPads and Hotspots to the site or for site staff to pick them. The site identified a process for getting the iPads to each individual. After that, each older participant was assigned to a student mentor,

and the student mentors called them to schedule days/times to meet with them. Student mentors were assigned to a number of older participants based on the number of hours they were able to commit to the program over the course of the semester. For example, if a student mentor had five hours each week to work with participants, they were assigned 8–10 people since they met with each person weekly or bi-weekly for about one hour. Student mentors and older participants mostly met via phone or Zoom for the lessons due to COVID-19 restrictions as well as transportation challenges. Furthermore, Spanish-speaking students were matched with older adults who primarily spoke Spanish to provide mentorship. We also worked to ensure our student mentor population was racially diverse to help with racial concordance with older participants who are people of color (Edwards, Monroe, & Mullins, 2020).

Once participants completed the learning goals on the checklist, student mentors let research staff know they had finished their meetings and that the person was ready for a post-survey. In cases where a person did not finish the checklists during the time the students had to meet with them, we re-assigned the older participant to the next semester. We would then complete a post-survey with them once they finished. To complete the post-surveys, one of the student researchers would call the older adult and ask them questions over the phone. Most of the questions were the same as the pre-survey. We did include a few program evaluation questions at the beginning of the post-survey. At the end of the post-survey, we introduced the interview portion to the participants. The interview portion included open-ended questions about the program and how it influenced people's lives. Student researchers offered to reschedule the interview at a different time or complete it right after the other questions. Nearly everyone chose to complete it that day.

To assess for digital competence on the pre- and post-survey, we asked participants how much they felt competent or able to: 1) search & find information about goods & services; 2) read or download a file; 3) obtain information from public authorities or public services; 4) seek health information; 5) send/receive emails; 6) use video calls, such as Skype; 7) participate in social networks; 8) post messages on social networks; 9) share talents or interests on social networks; 10) share interests and ideas with those they know; 11) use copy/paste tools; 12) have a telehealth appointment. These questions were derived from a report about digital competence available when we first began our program (European Commission, 2014). For each of these survey items, response choices included: 1) not at all; 2) a little; 3) somewhat; 4) very much. Using these questions/responses, we created two measures: a composite scale that averaged the responses across the 12 questions (range 1-4) and a count of the number of digital competencies in which respondents reported "very much" (range 0-12). The alpha for the pre-survey was 0.91.

To examine technology use, we asked respondents how frequently they use the following technological devices: 1) desktop computer; 2) laptop computer; 3) tablet (e.g., iPad, Kindle); 4) smartphone (e.g., iPhone, Android); 5) flip phone; 6) landline; 7) television; 8) Other. For each of these survey items, response choices were: 1) never; 2) monthly; 3) weekly; 4) daily; 5) multiple times a day. We examined "technology usage," which was an average across the eight questions for technology use (range 1-5). We also examined an index of how many different technological devices (computers, tablets, phones) they reported using at least weekly (range 0-5).

To examine purposes for using technology, we asked respondents if they use technological devices for: 1) e-mail; 2) social media (Facebook, Twitter); 3) watch videos (YouTube); 4) video conferencing (Skype, FaceTime, Google Meet, Zoom, WebEx); 5) Search the internet; 6) online banking or paying bills; 7) health appointments or health information; 8) shopping. Response choices were yes or no. Using these responses, we created an index, "purposes for technology," which counts the total number of purposes they use technology for (range 0-8). The alpha for the pre-survey measure was 0.77.

For the post-survey interviews, the student researchers informed the participants that we would be recording the interview, that their name would not be stated in any of our reports, and that the recording would be deleted once we no longer need it for analysis purposes. The audio recordings were uploaded to a secure file folder and shared with the PI, and the recordings were professionally transcribed. For any interviews conducted in Spanish, the recordings were transcribed in Spanish, and then translated into English using a translation service and verified by student researchers who spoke both English and Spanish. All transcripts were uploaded into NVivo qualitative software for analysis. Open-ended interview questions included the following: What was your favorite part of the program? What has it meant for you to be involved in the program? Has your iPad helped you connect with family and friends in different ways? What social groups or activities have you joined (or been able to do) since getting your iPad?

Analysis

To answer Research Question 1, we analyzed items and scales from the pre- and post-surveys. For each variable, we compared whether there was a change in the score from pre- to post-survey and if that change was statistically significant using Wilcoxon signed rank tests. This is the nonparametric equivalent of a paired samples t-test, which was suitable for our data which was not normally distributed. For each variable, we are testing the hypothesis that scores changed from the pre-survey (time 1) to the post-survey (time 2). All analyses were carried out using SPSS.

To answer Research Question 2, we analyzed responses from participants who answered questions from the post-survey interview using a nar-

rative approach. This approach enables participants to tell their stories, and as researchers, we then sought to learn the meaning of the experiences of participants, including their environment and their lived experience (Josselson, 2011). A grant from the university to the PI allowed for the hiring of two students to help in completing this project. To analyze the interviews, the study team consisted of a graduate student researcher, an undergraduate student researcher, and the PI. To begin, we all reviewed the interview guide and three transcripts. Everyone was asked to write down key themes they identified from this initial review. We then held a meeting with the three of us in which we compared key themes and came up with a preliminary list of primary codes and subcodes. The student researchers went back to the transcripts to ensure this list could be used for coding. We met one more time where we made some modifications to the coding list. Once we agreed on the list of codes and subcodes, each student researcher coded five of the same transcripts and then compared the codes. In instances where there was disagreement, they met to discuss the differences and identify an agreed path forward for coding. Once agreements were made, they coded another five transcripts and reviewed agreement percentages until achieving at least 80% agreement, and after which, they continued with the remaining transcripts by dividing them up.

Results

Participation Data and Participant Demographics

Between January and December 2021, a total of 272 people from the five community partners showed interest in participating in the iPad pilot program. Of those, 184 completed the pre-survey (67.7% response rate) over the phone with URI student researchers and were assigned an iPad and if needed, a Hotspot. All 184 participants received their iPads, and of the 184 people, 89 received a Hotspot for internet connection (48.4%). Of the 184 people who received an iPad, 145 people completed a post-survey by May 2022, thus finalizing their program completion (78.8% completion rate). Ninety-eight people completed the post-survey interview (67.6% response rate). Only 14 iPads were returned by participants (15.2% return rate). See Table 1 for details on program information by community site.

Demographics

See Table 2 below for a listing of the demographic characteristics of participants in the pilot program. This includes everyone who completed a pre-survey, and the table also includes those who completed the post-survey interview. For the total sample, the participants ranged in age from 55–100 with a mean age of 72.4. The sample was predominantly female identifying and rather diverse regarding racial/ethnic group identification. Most primarily spoke English, but about one-fifth of the participants primarily spoke

Table 1. *Program Information by Community Site*

Started Program Between January 2021-December 2021	Site 1	Site 2	Site 3	Site 4	Site 5	Total	%
Registered by Partners	30	58	56	78	50	272	
Completed Pre-Survey (became research participants)	28	41	48	40	27	184	67.7% Response Rate
iPads Delivered	28	41	48	40	27	184	100% Served Rate
Hotspots Delivered	10	24	18	15	22	89	48.4% Hotspot Rate
Completed Post-Survey	14	37	42	27	25	145	78.8% Completion Rate
iPads Returned	3	3	3	4	2	14	15.2% Return Rate

Spanish. Relationship status also varied with many participants identifying as single and/or divorced; participants were allowed to choose more than one response. For current employment status, most were retired, though over 20% did identify as unemployed. Most lived alone. A majority of participants were lower income (meaning had less than $30,000 a year in income). About half of the participants had a high school education or below, and about an equal number of participants had some college or were college graduates. Self-reported health status was rather mixed. Finally, about half reported having internet access. The post-survey interview sample did not differ significantly from the pre-survey sample on any of the demographic variables.

Quantitative Results (Research Question 1)

Based on statistical analyses, the program participants showed statistically significant improvements in digital competence (average score) going from 2.06 (low competence) to 2.74 (moderate competence) (range 1-4, $p<.001$). The number of digital competencies in which respondents reported feeling "very much" able to do increased from 2.01 to 4.01 (range 0-12, $p<.001$).

Table 2. *Demographics of Participants (N=184)*

Characteristics	Total Sample Mean/% N=184	Interview Sample Mean/% N=98
Age (Range = 55 -100)	72.4	71.7
Female	77.7%	75.5%
Race/Ethnic Group		
White	56.5%	57.1%
Hispanic	21.7%	19.4%
Black	13.6%	17.3%
Native American / Alaska Native	4.9%	4.1%
Asian	1.1%	1.0%
–missing	2.2%	1.0%
Primary language		
English	77.7%	80.6%
Spanish	20.7%	17.3%
Other	1.6%	2.0%
Relationship status (allowed to choose more than 1)		
Single	34.8%	28.6%
Divorced	30.4%	32.7%
Widowed	22.3%	21.4%
Married/Partnered	17.4%	20.4%
Current employment status		
Retired	66.3%	64.3%
Unemployed	22.8%	23.5%
Employed	5.4%	5.1%
Disabled	2.2%	3.1%
Other	2.7%	4.1%
–missing	0.5%	0%
Lives alone	70.7%	69.4%
Income		
Less than $30,000 a year	81.0%	79.6%
Greater than $30,000 a year	17.4%	19.4%
–missing	1.6%	1.0%
Education		
HS or less	48.9%	44.9%

Some college	25.0%	27.6%
College or more	26.1%	27.6%
Self-reported health status		
Poor	9.2%	7.1%
Fair	20.7%	19.4%
Good	40.2%	40.8%
Very Good	20.7%	21.4%
Excellent	9.2%	11.2%
Internet access		
Yes	49.5%	48.0%
No	35.9	30.6%
–unsure/missing	14.7%	2.0%

In addition, participants' average technology use from pre- to post-survey increased from 1.99 (monthly) to 2.7 (close to weekly), and tablet use frequency went from 1.53 (less than monthly) to 4.08 (daily); both were statistically significant (p<.001). Furthermore, the number of technology devices used regularly went from 1.47 (pre) to 2.62 (post), and the number of purposes in which participants used technology went from 4.09 to 5.55; both were statistically significant (p<.001). See Table 3 for these details.

Table 3. *Pre/Post Results for Technology Measures*

	Pre-Survey Mean	**Post-Survey Mean**	**N**	**p-value**
Digital Competence (average, range 1–4)	2.06	2.74	145	p<.001
Number of digital competencies (range 0–12)	2.01	4.01	145	p<.001
Technology usage (average frequency, range 1–5)	1.99	2.7	145	p<.001
Tablet use frequency	1.53	4.08	145	p<.001
Number of different types of devices used regularly (range 0–5)	1.47	2.62	145	p<.001
Purposes for using technology (range 0–8)	4.09	5.55	145	p<.001

Note: Wilcoxon signed rank tests were used to compare pre and post measures.

When examining tablet use specifically (see Table 4 below), on the pre-survey a majority of respondents (76.6%) reported never using a tablet. On the post-survey, most respondents reported daily or higher tablet usage (76.6%). Only 2.8% of respondents in the post-survey reported monthly usage. No one reported "never" on the post-survey.

In examining the digital competence questions specifically, Table 5 below shows the pre/post differences across all the questions. As shown, all questions were statistically significant from pre- to post-survey. The questions that show the greatest increase from pre- to post-survey were using video calls, obtaining information from public authorities or public services, seeking health information, and being able to have a telehealth appointment.

We also ran our analysis separately for English (n=108) and Spanish (n=34) speakers. We found that both groups showed statistically significant improvement on all measures of digital competence, technology usage, and tablet use frequency between pre- and post-test (using Wilcoxon signed rank tests). However, the change in mean scores was larger for the Spanish-speaking group for all measures. Therefore, we also compared Spanish and English speakers on the pre-survey measures to see if groups were starting out at different levels of competence and experience (using Mann-Whitney U tests for non-parametric data). We found significant differences in pre-survey values between the two groups for number of digital competencies, technology usage, number of devices, and number of purposes for using technology. For all of these, English speakers were starting at a higher level. We did not find differences in mean digital competence or in tablet frequency usage.

Qualitative Results (Research Question 2)

Analyzing responses from the post-survey interview, we aimed to understand how the program has helped participants get new connections to community members and to community resources. Within this theme, we identified the following sub-themes: 1) feel more capable and confident; 2) now know where to find resources; 3) now join social groups/activities; 4) participate in faith-related groups; 5) meet with doctors and book health appointments; 6) provide long-lasting life changes. Table 6 below shows the number of comments identified that fit into that particular sub-theme. These numbers are provided to indicate how often each sub-theme was mentioned, but we do not suggest over-interpreting these numbers.

Offered New Connections to Community

A main issue for older adults as it pertains to technology is simply not knowing how to use the device. After participating in the program, many individuals reported that they felt **more capable and confident** performing tasks on their devices. By feeling more confident, individuals were able to ac-

Table 4. *Tablet Use Pre/Post Outcomes*

Frequency of Tablet Use (e.g., iPad)				
How often used?	**Pre-Survey**		**Post-Survey**	
	Frequency	Percent	Frequency	Percent
Never	111	76.6%	0	0%
Monthly	9	6.2%	4	2.8%
Weekly	9	6.2%	30	20.7%
Daily	14	9.7%	61	42.1%
Multiple times a day	2	1.4%	50	34.5%
Total	145	100%	145	100

Table 5. *Digital Competency Pre/Post Outcomes*

Digital Competency (1=not at all, 2=a little, 3=somewhat, 4=very much)	**Average (mean)**			
Participants feel confident or able to:	**Pre**	**Post**	**N**	**p value**
Search and find information about goods and services	2.60	3.21	145	p<.001
Read or download files	1.86	2.63	145	p<.001
Obtain information from public authorities or public services	2.10	2.94	144	p<.001
Seek health information	2.31	3.12	144	p<.001
Send/receive e-mails	2.58	3.26	144	p<.001
Use video calls, such as Skype	1.87	3.01	143	p<.001
Participate in social networks	2.14	2.54	143	p<.01
Post messages on social networks	1.86	2.32	145	p<.001
Share talents or interests on social networks.	1.74	2.16	144	p<.01
Share my interests and ideas with those I know	1.98	2.46	142	p<.01
Able to use copy / paste tools	1.70	2.41	144	p<.001
Able to have telehealth appointment	2.01	2.81	144	p<.001

Note: Wilcoxon signed rank tests were used to compare pre and post measures.

Table 6. *Themes Related to New Connections to the Community*

How Did the Program Offer New Connections to the Community?	
Themes	# of comments from participants
More capable and confident with their devices	63
Now know where to find resources	64
Now join social groups/activities	62
Participate in faith-related groups	6
Meet with doctors and book health appointments	8
Provide long-lasting life changes	32

cess new opportunities to connect with the community. For example, they now feel comfortable navigating through the process of searching for information using search engines, such as google, or joining a Zoom call.

> *It has made me a more capable and more determined person, that if the young people of today can, I can too. I feel more determined. I feel more confident to say, "I can or will try." If I see that I can't, I say, "I have to be able," and I try, and until I get it, I don't know, it's a very good satisfaction for me.* –Age 66, female, Hispanic, Spanish-speaking

> *At least now I know what I'm doing when I want to interact with my friends far away.* –Age 63, female, White, English-speaking

> *I feel more confident. Well, I still get a little fearful with pushing buttons on the computer because, I'm thinking that I won't be able to undo it. Mostly, I'm getting beyond that. It's okay to explore, and to really find things out.* – Age 71, female, White, English-speaking

Now that they are more confident in using technology, they communicated that they **now know where and how to find resources** that are available to them. Prior to joining the program, many participants were unaware of all the information and resources that were available online.

> *There's a lot of resources on it. There's a lot of activities on it. I just enjoyed realizing that there was so much there to do.* –Age 70, female, White, English-speaking

> *I think the thing that was most valuable was finding out all the resources that are available and ... also the sense of community for meeting regularly with other seniors.* –Age 66, female, White, English-speaking

> *Well, what I'm saying is when I start exploring online with the iPad, all the activities are available. Obviously, it's going to open*

> *up a lot of doors. That's something I'm looking forward to.* –Age 75, male, White, English-speaking

By learning how to find the resources that are available to them, participants discussed that they had **now joined social groups or activities** that are of interest to them. This is important for individuals to stay active in the community and in the things they enjoy doing. This also opened up the possibilities of developing new hobbies, participating in civic engagement, and exploring new interests, particularly when they were not able to participate in their usual in-person activities.

> *Oh my God, I've been able to join podcasts, I've been able to join meditation classes, I'm a biggie for that. I also joined a group of live pastors. I've also joined the book club. I joined my walking club. Oh boy, what else? It seems I've joined so many things.* –Age 64, female, Hispanic, English-speaking

> *I've learned a lot to knit. As there are programs there, to knit, to do many crafts, many things.* –Age 78, female, Hispanic, Spanish-speaking

> *I've gone to some of the [Community] Library activities, that they opened up to the general public and I've been to some of the activities in the city of [Community] at [the] Park. My friends and I check out things like the farmer's markets and that.* –Age 70, female, White, English-speaking

> *I haven't joined too many social groups, but I did join an online book club* –Age 65, female, Black, English-speaking

> *I go on activities for creating and selling things and looking up styles and things that I can do in the community on a weekly basis.* –Age 76, female, White, English-speaking

By learning new technology, participants were able to continue to **participate in faith-related groups.** Many of these group meetings were moved online due to the pandemic and have remained that way in some capacity since. This allowed for leaders of the groups to hold classes online or stream services for those unable to come in-person.

> *I have joined the activity only of the church, which as I see sometimes is the Mass, because sometimes many people go to church and I do not like to go because of COVID, that has helped me. I see the activities they have.* –Age 75, female, Hispanic, Spanish-speaking

> *Well, I'm a minister, so I use it for Bible study. I use it for our services on Sunday morning so it helps me to be able to see some of the people in my church that I can't see right now so it's really great. Really great.* –Age 71, female, Black, English-speaking

Older adults were also now able to **meet with their doctors, correspond with medical staff, and book their health appointments online**. This is important for those individuals who experience transportation issues, and as many people have learned, can be an excellent option for meeting with doctors for follow-up appointments, second opinions, or other appointments that do not require a physical examination. Most doctors' offices now have online portals to communicate with patients and share information, so participants were able to utilize these resources as well.

> *I make my doctors' appointments. I will also call him and communicate with the doctors.* –Age 75, female, Hispanic, Spanish-speaking

> *The fact that I'm able to do this technology. It's not as difficult as I had thought. It's just made it so much easier, especially with my doctors' appointments.* –Age 63, male, White, English-speaking

Overall, the majority of the participants repeatedly mentioned how the program contributed to **long lasting life changes** for them. Many felt more connected to the community and with their loved ones. Many appreciated being able to continue their normal life through technology, and they were eternally grateful for the opportunity to partake in the program.

> *It just makes me feel more energetic and more interested in my life because I feel like I have the support of somebody, and I enjoy having meetings, looking forward to seeing and hearing your smile and nice voice. It gives me a chance to see more of life.* –Age 83, female, White, English-speaking

Discussion

The goal of the pilot was to increase digital literacy and social and economic equity for older adults through structured programming. Participants engaged in intergenerational meetings with students in utilizing digital devices, resources, and optional weekly zoom meetings. Overall, the intergenerational program met its goal of enhancing digital inclusion for Rhode Island participants, mostly lower income older adults, and contributing to new ways for participants to connect to community resources. Our analysis shows that participants increased their technology use and digital competence from pre- to post-survey, thus showing the participants in the program now use their devices, especially their new iPads, a lot more and feel more confident and competent with their technology knowledge. Spanish-speaking older adults had similar pre/post results; however, their growth from pre- to post-survey was greater than it was for English-speaking older adults. The qualitative results showcased how the program contributed to long lasting life changes for the majority of participants who were grateful for the opportunity to engage in an intergenerational program. Participants revealed an increased sense

of confidence in using their devices to access connection opportunities, find resources, and join social, faith-based, or healthcare-related activities. Because the qualitative results support the quantitative findings, we believe this strengthens the confidence of the findings from the pilot study.

Peek et al. (2016) conducted a study of older adults and identified a need for research that provides technology and training for older adults in such a way that large-scale rollouts are possible. To fill that gap, this study piloted a program that could be used in any country/state or community to provide iPads (a product available to the general public; Wu et al., 2015) and mentoring by college/university students that exposed them to working with the aging population and enhanced professional skills (e.g., problem-solving, time management, leadership). Future research is needed to examine if a larger scale roll-out beyond this pilot can produce similar outcomes and to identify best practices for implementing programs of this nature. This study also advances the literature by offering a much-needed pilot program targeted to older adults from disadvantaged communities, many of which have higher numbers of older adults from racial/ethnic minority groups, that assessed the frequency of technology use as well as technology proficiency (Drazich et al., 2019; Mitchell et al., 2019). As described by Drazich et al. (2023) in discussing the considerations for avoiding some of the potential negative impacts of older adult utilizing technology, "it is important to ensure that older adults do not feel further stress from being forced into using technology, and that they are provided the resources and education they need to feel prepared to use technology" (p. 161). This study advanced the literature by following these suggestions and identifying positive impacts from doing so.

One of the biggest take-aways from implementing this program is the need to consistently work to balance all four stakeholder groups' needs. This program offers mutual benefits for all stakeholders involved including community partners, older adults, faculty/staff, and students, and this has been critical for sustainability of the program. Community partners are seeing the need for technology support for older adults but often do not have the capacity themselves to meet the need. Older adults appreciate the program because it helps them gain technological knowledge and skills while getting to know the younger population, and they can participate in the program at their local senior center or over the phone and through virtual ways. The program benefits faculty/staff who want to offer unique, meaningful student experiential education opportunities for students and conduct research studies to advance scholarship related to intergenerational technology programs, service learning, ageism, and social connectedness. Students, eager for internship and service-learning opportunities, also benefit from this program because they can complete their hours and gain professional skills. Because there are mutual benefits for all involved, this program continues to flourish and (mostly) meet the needs of all engaged parties.

However, trying to keep everyone happy and balancing the needs of the four groups of stakeholders is most challenging. For example, it can be challenging to ensure students are getting all the hours they need, it can be difficult to ensure older adults are starting the program at the same time students are trained and ready to meet with them, and it can be time-consuming to make sure equipment is ready and delivered when it is needed. While we have consistently found ways to make it work, we are working to identify sustainable staffing with the addition of increased graduate students to aid with implementing the program state-wide and continue to balance all the stakeholder needs. At this time, meeting the interest and demand across the state within ideal timeframes is certainly posing a challenge because we have wait lists. However, while this is a programmatic challenge, we are working to add a delayed treatment group to our design, which will enhance the rigor of the research.

Senior/community center partnerships work well for recruiting and supporting older adults, and the program seems to be meeting the needs of the older adults it serves. From a recruitment standpoint, having community partners recruit participants through their regular channels (e.g., newsletters, emails, flyers) has proved quite effective, and we suggest other programs and studies consider a similar partnership. Furthermore, because many older adults have had success and appreciate the program offerings, word-of-mouth has become one of the biggest recruitment tools. This, however, does not mean that every person who has experienced the program fully understands how the program works. We intentionally created a program that can be individualized to meet the diverse needs and learning styles of the older adults included, but inevitably there are older adults who have higher expectations than we can meet, have greater challenges than what we can handle, or do not read the materials provided to them explaining the program. For others that develop similar programs, we recommend acknowledging these issues as potentially difficult and continuing to make modifications and communicate with partners to address these types of challenges.

Policy Implications

The COVID-19 pandemic amplified and heightened the need to address the digital divide for older adults. Programs to address the increased isolation facing older adults through virtual means were offered in many states by local senior centers. Research also documented that increased internet use contributed to positive outcomes in quality of life and mental health for older adults (Wallinhemo & Evans, 2021). Webinars to promote learning about best practices to engage older adults in digital competency were offered by engAGED, a national association funded by the federal Administration on Aging and administered by USAging (2023). The state unit on aging digiAGE initiative's goal was to bridge the digital divide for older adults and family caregivers through public/private partnerships and investments in

smart devices, training to increase digital literacy, expanding connectivity for older adults and family caregivers, and promoting compelling online content. Initially small grants from corporate sponsors helped fund several small pilots, and Federal COVID Relief funds from the Administration for Community Living (ACL) awarded to the state unit on aging provided it the opportunity to move forward with digiAGE. In allocating these funds, the ACL specifically provided funds to be used for prevention and mitigation activities related to COVID–19. Funds needed to focus on addressing extended social isolation among older individuals, including activities for investments in technological equipment and solutions or other strategies aimed at alleviating negative health effects of social isolation due to long-term stay-at-home recommendations for older individuals for the duration of the COVID–19 public health emergency (ACL, 2021).

Because the URI eGen Cyber-Seniors Program had demonstrated previous experience in assisting older adults with digital technology through its past intergenerational technology programs, this URI team was well positioned to apply that experience to implement this targeted pilot. The state unit on aging worked with URI to modify their program to meet COVID-19 restrictions, engage local senior programs in recruiting older participants from more underserved communities, and include an evaluation component using surveys to collect basic demographic information and measure impact. These design features are attributed to the success of the pilot and have important implications for public policy.

The fact that over 80% of participants were lower income and almost half lacked internet access highlights the need to provide affordable broadband. This need was recognized by Congress when it passed the 2021 Consolidated Appropriations Act, which established the $3.2 billion Emergency Broadband Connectivity Fund to implement the Emergency Broadband Benefit program (EBB) to provide low-income households with a discount off the cost of broadband service and certain connected devices during the COVID-related public health emergency. The EBB program started in May of 2021 and ended at the end of December 2021 when it was replaced with the Affordable Connectivity Program (ACP), which was designed to be a permanent program. Data from the Federal Communications Commission (FCC) shows 24,623 people in our state subscribed to EBB during that time, and nationally, about 14 percent of the nine million EBB subscribers were age 65 and over (Universal Service Administrative Co., 2022). The ACP benefit changed from the $50/month provided under EBB to $30/month (households on tribal lands received and continue to receive $75/month). Persons enrolled in EBB were automatically enrolled in ACP and would continue to receive the $50 a month for 60 days during the transition. As of February 2023, there were just under 16 million ACP subscribers and 17 percent were age 65 and over (Universal Service Administrative Co.) Although this was an increase from the

percent of older EBB participants, U.S. Census income data for older households shows a need to continue to promote awareness of the ACP to older adults to address the affordability issue (18% have income below 150% federal poverty level) (Universal Service Administrative Co., 2022). The iPad pilot demonstrated value in helping persons learn how to find information about benefits, programs, and services online. This is especially important for persons in underserved communities who often lack such knowledge and demonstrates that providing devices and connectivity is not sufficient and needs to be accompanied by technology training uniquely tailored for older adult learners as the iPad pilot program has done.

The lessons learned in the pilot program can serve as a model for and inform other state government-university collaborations working to promote digital equity for older adults and to stimulate government and foundation funders to support grant funding in this area. This is especially important as states develop plans and programs in response to the "Internet for All" federal initiative (National Telecommunication & Information Administration, 2023). Through this initiative states receive funds from the administration's (NTIA) Broadband Equity, Access & Deployment (BEAD) program and the Digital Equity Act (DEA) that provides Digital Equity Planning and Capacity Grants to plan for and implement digital equity and inclusion initiatives. In response to this new federal funding, the state Commerce Department launched a Broadband Initiative to close the state's digital divide. They estimated 164 households, and 410,000 individuals are eligible for the $30-per-month discounts from the ACP. However, as of February 1st, 2023, only 56,226 households had made ACP claims. With Census data showing 27 percent of the state's older households with income of $25,000 or less it is important for the State Unit on Aging and its community partners to continue outreach to make older adults aware of the ACP discounts so they can fully participate in the digital world. Many of the state's older adults reside in large, subsidized apartment complexes restricted to persons aged 62 and over and those with disabilities. To promote digital inclusion for these adults, BEAD funding can be used to install building-wide connectivity in these complexes to assist in meeting resident connectivity needs thus addressing cost as a barrier.

Providing devices and connectivity is not sufficient and must be accompanied by technology training uniquely tailored for older adult learners as demonstrated in the pilot program. To meet this need, advocates should push for continued funding through the Administration for Community Living for state grants that support digital literacy training programs for older adults. Additionally, as states work on Strategic Planning for using the significant federal funding available under the Digital Equity Act, older adults and entities that serve them must be involved in the planning to ensure the unique needs of older adults including those needing devices with accessibility features, those for whom English is not their primary language, and those living in rural areas

are considered in the planning and implementation process. As our research found, targeting digital inclusion initiatives to non-English speaking populations, such as Spanish-speaking older adults as our research did, is suggested since these populations may start with lower digital competence but also have greater capacity for improvement.

Limitations and Future Research

We, of course, need to be cautious in interpreting the findings because we did not have a control group, and the pandemic itself (meaning people gradually increased or resumed their normal activities) may have contributed to the improvements in the measures analyzed in the study. However, we attempted to address this concern as well as social desirability bias by identifying objective technology-related measures. While the study has strengths with the sample size, geographic dispersion, and mixed methods design, we plan to address the methodological shortcomings in future research. For example, we are adding additional communities during more "normal" times related to the pandemic, which we will compare to the pilot sample, and we are also adding a waitlist control group. We also plan to examine how variation in the number of sessions held with student mentors influenced potential outcomes and examine the data using more advanced statistical analyses. Future research will further assess outcome differences across racial/ethnic groups as well as intersectional groups (e.g., older adults who are Black and low income compared to others).

We began rolling out the program state-wide in January of 2022, and we are continuing to gain momentum. Starting in January 2022, we began enrolling participants from additional sites, and by October 2022, we now have a total of 14 communities taking part and enrolling participants in the program and research project. We will be spending the next couple of semesters establishing processes that work with each partner and ensuring we find enough student mentors for each site. Future publications will detail these efforts and compare results to the findings from this article and others regarding pilot project outcomes. Future research will also examine implementation of similar programs within higher education institutions across the United States and Canada. This pilot study showed promising results for addressing digital inclusion among a sample of racially/ethnically diverse, mostly lower income older adults across one state. Community or state policy initiatives could benefit from offering similar programs, particularly to help increase digital inclusion among older adults and/or ensure access to community resources that increasingly involve digital means to learn about or access them.

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References

Administration for Community Living (ACL). (2021). Fiscal FAQ, COVID-19 emergency. Older Americans Act funding and American rescue plan Act. Retrieved from https://acl.gov/sites/default/files/2021-05/ARP%20Fiscal%20FAQ_4_30_2021.pdf

Anderson, M., & Perrin, A. (2017). Tech adoption climbs among older adults. *Pew Research Center.* Retrieved from https://www.pewresearch.org/internet/2017/05/17/tech-adoption-climbs-among-older-adults/

Andreoletti, C., & Howard, J. L. (2018). Bridging the generation gap: Intergenerational service-learning benefits young and old. *Gerontology & Geriatrics Education, 39*(1), 46–60. https://doi.org/10.1080/02701960.2016.1152266

Augustin, F., & Freshman, B. (2016). The effects of service-learning on college students' attitudes toward older adults. *Gerontology & Geriatrics Education, 37*(2), 123–144. https://doi.org/10.1080/02701960.2015.1079705

Bell, S., & Menec, V. (2015). "You don't want to ask for the help" the imperative of independence is it related to social exclusion? *Journal of Applied Gerontology, 34*(3), NP1-NP21. https://doi.org/10.1177/0733464812469292

Betts, L., Hill, R., & Gardner, S. E. (2019). "There's not enough knowledge out there": Examining older adults' perceptions of digital technology use and digital inclusion classes. *Journal of Applied Gerontology, 38*(8), 1147–1166. https://doi.org/10.1177/0733464817737621

Brooke, J., & Jackson, D. (2020). Older people and COVID-19: Isolation, risk and ageism. *Journal of Clinical Nursing, 29*(13-14), 2044–2046. https://doi.org/10.1111/jocn.15274

Brown, L., & Strowmmen, J. (2018). Training younger volunteers to promote technology use among older adults. *Family & Consumer Sciences*, 46(3), 297–

313.https://doi.org/10.1111/fcsr.12254

Buffel, T., Yarker, S., Phillipson, C., Lang, L., Lewis, C., Doran, P., & Goff, M. (2021). Locked down by inequality: Older people and the COVID-19 pandemic. *Urban Studies (Edinburgh, Scotland)*, 4209802110410. https://doi.org/10.1177/00420980211041018

Charness, N., Schumann, C. E., & Boritz, G. M. (1992). Training older adults in word processing: Effects of age, training technique, and computer anxiety. *International Journal of Technology & Aging, 5*(1), 79–106.

Czaja, S., Charness, N., Fisk, A. D., Hertzog, C., Nair, S. N., Rogers, W. A., & Sharit, J. (2006). Factors predicting the use of technology. *Psychology and Aging, 21*(2), 333–352. https://doi.org/10.1037/0882-7974.21.2.333

Dassieu, L., & Sourial, N. (2021). Tailoring interventions for social isolation among older persons during the COVID-19 pandemic: Challenges and pathways to healthcare equity. *International Journal for Equity in Health, 20*(1), 26–26. https://doi.org/10.1186/s12939-020-01360-8

Dauz, E., Moore, J., Smith, C. E., Puno, F., & Schaag, H. (2004). Installing computers in older adults' homes and teaching them to access a patient education web site: A systematic approach. *Computers, Informatics, Nursing, 22*(5), 266–272. https://doi.org/10.1097/00024665-200409000-00005

Delello, J., & McWhorter, R. R. (2017). Reducing the digital divide. *Journal of Applied Gerontology, 36*(1), 3–28. https://doi.org/10.1177/0733464815589985

Dickinson, A., Eisma, R., Gregor, P., Syme, A., & Milne, S. (2005). Strategies for teaching older people to use the world wide web. *Universal Access in the Information Society*, *4*(1), 3–15. https://doi.org/10.1007/s10209-003-0082-6

Dorfman, L., Murty, S., Ingram, J. G., & Evans, R. J. (2003). Incorporating intergenerational service-learning into an introductory gerontology course. *Journal of Gerontological Social Work, 39*(1-2), 219–240. https://doi.org/10.1300/J083v39n01_18

Drazich, B. F., Li, Q., Perrin, N. A., Szanton, S. L., Lee, J. W., Huang, C., Carlson, M. C., Samuel, L. J., Regier, N. G., Rebok, G. W., & Taylor, J. L. (2023). The relationship between older adults' technology use, in-person engagement, and pandemic-related mental health. *Aging & Mental Health, 27*(1), 156–165. https://10.1080/13607863.2022.2046695

Edwards, H.A., Monroe, D.Y., & Mullins, C.D. (2020). Six ways to foster community-engaged research during times of societal crises. *Journal of Comparative Effectiveness Research, 9*(16), 1101-1104. https://doi.org/10.2217/cer-2020-0206

European Commission. (2014). Measuring digital skills across the EU: EU wide indicators of digital competence (1st ed.) Retrieved on December 5, 2017, from https://ec.europa.eu/digital-single-market/en/news/measuring-digitalskills-Across-eu-eu-wide-indicators-digital-competence

Faverio, M. (2022, January 13). Share of those 65 and older who are tech users has grown in the past decade. *Pew Research Center.* Retrieved July 20, 2022, from https://www.pewresearch.org/fact-tank/2022/01/13/share-of-those-65-and-older-who-are-tech-users-has-grown-in-the-past-decade/

Fink, A., & Beck, J. C. (2015). Developing and evaluating a website to guide older adults in their health information searches. *Journal of Applied Gerontology, 34*(5), 633–651. https://doi.org/10.1177/0733464813486961

Furco, A. (1996). Service-learning: A balanced approach to experiential education. Expanding boundaries: Service and learning (pp. 2–6). *Washington, D.C.: Corporation for National Service.*https://digitalcommons.unomaha.edu/cgi/viewcontent.cgi?article=1104&context=slceslgen

Gagliardi, C., Mazzarini, G., Papa, R., Giuli, C., & Marcellini, F. (2007). Designing a learning program to link old and disabled people to computers. *Educational Gerontology, 34*(1), 15–29. https://doi.org/10.1080/03601270701763902

Gamliel, T. (2017) Education in civic participation: Children, seniors and the challenges of an intergenerational information and communications technology program. *New Media & Society, 19*(9), 1388–1405. https://doi-org.uri.idm.oclc.org/10.1177/1461444816639971

Garcia, K. R., Rodrigues, L., Pereira, L., Busse, G., Irbe, M., Almada, M., Christensen, C., Midão, L., Dias, I., Heery, D., Hardy, R., Quarta, B., Poulain, M. M., Bertram, M., Karnikowski, M., & Costa, E. (2021). Improving the digital skills of older adults in a COVID-19 pandemic environment. *Educational Gerontology, 47*(5), 196–206. https://10.1080/03601277.2021.1905216

Gardner, P. (2010). Older adults and OATS computer training programs: A social impact analysis findings report. *New York.: New York Academy of Medicine*. https://oats.org/older-adults-and-oats-computer-training-programs-a-social-impact-analysis-findings-report/

Greenwald, P., Stern, M.E., Clark, S., & Sharma, R. (2018). Older adults and technology: In telehealth, they may not be who you think they are. *International Journal of Emergency Medicine*, *11*(1), 1–4. https://doi.org/10.1186/s12245-017-0162-7

Hachè, A., & Cullen, J. (2010). ICT and youth at risk: How ICT-driven initiatives can contribute to their socio-economic inclusion and how to measure it

(No. JRC58427). *Joint Research Center (Seville site).*

Healthy Aging Data Reports. (2020). Rhode Island Health Aging Data Report. Retrieved from https://ri-department-of-health-covid-19-data-rihealth.hub.arcgis.com/

Hickman, J.M., Rogers, W. A., & Fisk, A. D. (2007). Training older adults to use new technology. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences, 62*(1,1), 77–84. https://doi.org/10.1093/geronb/62.special_issue_1.77

Hill, R., Betts, L. R., & Gardner, S. E. (2015). Older adults' experiences and perceptions of digital technology: (Dis)empowerment, wellbeing, and inclusion. *Computers in Human Behavior, 48*, 415–423. https://doi.org/10.1016/j.chb.2015.01.062

Josselson, R. (2011). Narrative research: Constructing, deconstructing, and reconstructing story. In F. J. Wertz, K. Charmaz, L. M. McMullen, R. Josselson, R. Anderson, & E. McSpadden (Eds.), *Five ways of doing qualitative analysis* (pp. 224–242). *New York, NY: The Guilford Press.*

Juris, J., Bouldin, E. D., Uva, K., Cardwell, C. D., Schulhoff, A., & Hiegl, N. (2022). Virtual intergenerational reverse-mentoring program reduces loneliness among older adults: Results from a pilot evaluation. *International Journal of Environmental Research and Public Health, 19*(12), 7121. https://doi.org/10.3390/ijerph19127121

Laguna, K., & Babcock, R. L. (1997). Computer anxiety in young and older adults: Implications for human-computer interactions in older populations. *Computers in Human Behavior, 13*(3), 317–326. https://doi.org/10.1016/S0747-5632(97)00012-5

Leedahl, S. N., Brasher, M. S., Estus, E., Breck, B. M., Dennis, C. B., & Clark, S. C. (2018). Implementing an interdisciplinary intergenerational program using the Cyber Seniors® reverse mentoring model within higher education. *Gerontology & Geriatrics Education, 40*(1), 71–89. https://doi.org/10.1080/02701960.2018.1428574

Leedahl, S.N., Brasher, M.S., LoBuono, D.L., Wood, B.M., & Estus, E.L. (2020). Reducing ageism: Changes in students' attitudes after participation in an intergenerational reverse mentoring program. *Sustainability, 12*(17), 6870. https://doi.org/10.3390/su12176870

Martins, T., Midão, L., Martínez Veiga, S., Dequech, L., Busse, G., Bertram, M., McDonald, A., Gilliland, G., Orte, C., Vives, M., & Costa, E. (2019). Intergenerational programs review: Study design and characteristics of inter-

vention, outcomes, and effectiveness. *Journal of Intergenerational Relationships, 17*(1), 93–109. https://doi.org/10.1080/15350770.2018.1500333

Meister, J. C., & Willyerd, K. (2010). Mentoring millennials. *Harvard Business Review, 88*(5), 68–72. PMID:20429252

Mitchell, U. A., Chebli, P. G., Ruggiero, L., & Muramatsu, N. (2019). The digital divide in health-related technology use: The significance of race/ethnicity. *The Gerontologist*, *59*(1), 6–14. https://10.1093/geront/gny138

Mobile Beacon. (2023). Get to know Mobile Beacon. Retrieved from https://www.mobilebeacon.org/get-to-know-mobile-beacon/

Murakami, J., Lund, D. A., Wright, S. D., & Stephenson, M. (2003). Service learning in gerontology. *Gerontology & Geriatrics Education, 23*(2), 1–24. https://doi.org/10.1300/J021v23n02_01

Murphy, W. M. (2012). Reverse mentoring at work. *Human Resource Management*, *51*(4), 549–573. https://doi.org/10.1002/hrm.21489

National Digital Inclusion Alliance (NDIA). (2022). The words behind our work: The source for definitions of digital inclusion terms. Retrieved from https://www.digitalinclusion.org/definitions/

National Telecommunication & Information Administration. (2023). High-speed internet for all. Retrieved from https://www.internet4all.gov/

Nemer, D. (2015). From digital divide to digital inclusion and beyond. *The Journal of Community Informatics, 11*(1). https://doi.org/10.15353/joci.v11i1.2857

Nguyen, M. H., Hargittai, E., & Marler, W. (2021). Digital inequality in communication during a time of physical distancing: The case of COVID-19. *Computers in Human Behavior*, *120*, 106717–106717. https://doi.org/10.1016/j.chb.2021.106717

O'Connell, M. E., Haase, K. R., Grewal, K. S., Panyavin, I., Kortzman, A., Flath, M. E., Cammer, A., Cosco, T. D., & Peacock, S. (2022). Overcoming barriers for older adults to maintain virtual community and social connections during the COVID-19 pandemic. *Clinical Gerontologist*, *45*(1), 159–171. https://doi.org/10.1080/07317115.2021.1943589

Olofsson, A. D., & Lindberg, O. J. (2008). An ethical perspective on ICT in the context of the other. In T. Hansson (Ed). *Handbook of Research on Digital Information Technologies: Innovations, Methods, and Ethical Issues* (pp. 506–521). Hershey, PA: IGI Global.

Orellano-Colón, E. M., Jutai, J., Santiago, A., Torres, V., Benítez, K., & Torres, M. (2016). Assistive technology needs and measurement of the psychoso-

cial impact of assistive technologies for independent living of older Hispanics: Lessons learned. *Technologies, 4(*3), 21. https://10.3390/technologies4030021

Peek, S.T.M., Wouters, E. J., Luijkx, K., & Vrijhoef, H. J. (2016). What it takes to successfully implement technology for aging in place: Focus groups with stakeholders. *Journal of Medical Internet Research, 18*(5), e98–e98. https://doi.org/10.2196/jmir.5253

Rhode Island Department of Health. (2020). Rhode Island COVID-19 response data. Retrieved from https://ri-department-of-health-covid-19-data-rihealth.hub.arcgis.com/

Rogers, W. A., Campbell, R. H., & Pak, R. (2001). A systems approach for training older adults to use technology. In N. Charness, D. Park, & B. Sabel (Eds), *Communication, technology, and aging: Opportunities and challenges for the future* (pp. 187–208). New York, NY: Springer Publishing Company.

Segrist, K. A. (2004). A computer training program for older adults. *Activities, Adaptation, & Aging, 28*(4), 13–26. https://doi.org/10.1300/J016v28n04_02

Sieck, C.J., Sheon, A., Ancker, J.S. Castek, J., Callhan, B., & Siefer, A. (2021). Digital inclusion as a social determinant of health. *NPJ Digital Med., 4*(1), 52. https://doi.org/10.1038/s41746-021-00413-8

Spreitzer, G. M., (2006). Leading to grow and growing to lead: Leadership development lessons from positive organizational studies. *Organizational Dynamics, 35*(4), 305.

Talmage, C. A., Mark, R., & Slowey, M. (2016). Age friendly universities and engagement with older adults. *International Journal of Lifelong Education*, *35*(5), 537–554. https://doi.org/10.1080/02601370.2016.1224040

Tsai, H. S., Shillair, R., & Cotten, S. R. (2017). Social support and "playing around." *Journal of Applied Gerontology, 36*(1), 29–55. https://doi.org/10.1177/0733464815609440

Tun, P. A., & Lachman, M. E. (2010). The association between computer use and cognition across adulthood: Use it so you won't lose it? *Psychology and Aging, 25*(3), 560–568. https://doi.org/10.1037/a0019543

Underwood, H. L., & Dorfman, L. T. (2006). A view from the other side: elders' reactions to intergenerational service-learning. *Journal of Intergenerational Relationships, 4*(2), 43–60. https://doi.org/10.1300/J194v04n02UL04

Universal Service Administrative Co. (2022). Additional EBB program data. Retrieved on October 3, 2022 from https://www.usac.org/about/emergen

cy-broadband-benefit-program/emergency-broadband-benefit-program-enrollments-and-claims-tracker/additional-ebb-program-data/

University of Rhode Island Human Development & Family Science. (2023). Engaging Generations: Cyber-Seniors. Retrieved from https://web.uri.edu/human-development/outreach-and-research/cyber-seniors/

USAging. (2023). About us. Retrieved from https://www.usaging.org/about

Van Dijk, & Jan A.G.M. (2006). Digital divide research, achievements and shortcomings. *Poetics (Amsterdam)*, *34*(4), 221–235. https://doi.org/10.1016/j.poetic.2006.05.004

Vygotsky, L. S., & Cole, M. (1978). Mind in society: Development of higher psychological processes. *Harvard University Press*.

Wagner, N., Hassanein, K., & Head, M. (2010). Computer use by older adults: A multi-disciplinary review. *Computers in Human Behavior, 26*(5), 870–882. https://doi.org/https://doi.org/10.1016/j.chb.2010.03.029

Wallinheimo, AS., & Evans, S. L. (2021). More frequent internet use during the COVID-19 pandemic associates with enhanced quality of life and lower depression scores in middle-aged and older adults. *Healthcare, 9*(4), 393. https://doi.org/10.3390/healthcare9040393

Wan, W. H., & Antonucci, T. C. (2016). Social exchange theory and aging. *Encyclopedia of Geropsychology*, *1*(1), 1–9.

Wu, Y. H., Damnée, S., Kerhervé, H., Ware, C., & Rigaud, A. S. (2015). Bridging the digital divide in older adults: A study from an initiative to inform older adults about new technologies. *Clinical Interventions in Aging, 10*, 193–200. https://doi.org/10.2147/CIA.S72399

Xie, B., & Bugg, J. M. (2009). Public library computer training for older adults to access high-quality. Internet health information. *Library & Information Science Research, 31*(3), 155–162. https://doi.org/10.1016/j.lisr.2009.03.004

Yagil, D., Cohen, M., & Beer, J. D. (2016). Older adults' coping with the stress involved in the use of everyday technologies. *Journal of Applied Gerontology, 35*(2), 131–149. https://doi.org/10.1177/0733464813515089