

Improving Seniors' Access to and User Experience of Rideshare Apps

by

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Submitted to OCAD University in partial fulfillment of the requirements for the
Master of Design (MDes) in Inclusive Design
Toronto, Ontario, Canada, 2026

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Abstract

Aging often means the gradual loss of independence due to various constraints. Not being able to drive is one such salient example that can affect the life quality of many seniors, especially those who live in car dependent communities. The advent of rideshare business is a promising solution for this problem. A new challenge arises for those who have the need to use rideshare services but are not accustomed to using digital technology tools because requesting a ride from a rideshare app (App or the App hereafter) requires interaction with an application on a smart device.

To address this challenge, in this study, the researcher intended to investigate how to improve the access to and user experience of rideshare apps for seniors. Two major goals guided this study: 1) To provide training sessions for helping seniors use the App; 2) To develop low-fidelity prototypes to illustrate the improved App design. To achieve these two goals, the researcher conducted this study using the co-design approach from a life course perspective. The design and research activities included two parts: In Part 1, the researcher trained the participants to use the App. In Part 2, the participants and the researcher co-designed the App and its interface.

The results shifted the study's original focus on improving mobile app interface design. The findings revealed broader technology adoption issues deeply rooted in the seniors' contexts, including their prior and current experiences with technology, their life-long lived experience, their living situation, transportation needs, etc. These findings call for a more holistic approach to addressing the digital divide—one that goes beyond interface design to consider the broader factors that shape seniors' ability and willingness to adopt and use digital technologies. This approach should start from breaking the stereotype toward seniors' technology use, respecting seniors' lived experience and helping them navigate the digital world based on their needs, preferences, comfort level, value, and their existing ways to interact with the world. Addressing the digital divide challenge also requires a concerted effort from individuals, families, government entities, corporations, non-profit organizations, and other sectors of society.

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Chapter 1: Introduction

Aging means significant changes to one's life, one common example of which is the gradual loss of independence due to various constraints resulting from aging. Not being able to drive is one such salient example, which can affect the life quality of many seniors, especially those who live in car dependent communities.

The United States is a car-dependent society in most of its territories. People heavily rely on their cars as the major option of transportation in the US. In a recently released survey by Statista, 70% of the respondents said they own a car (Bashir, 2024). Public transportation is either not available, or time consuming, or not an ideal option for many situations, like for people seeking health care services when they are not well.

When seniors living in a car-dependent community lose the ability to drive due to various constraints, they often lose or have restricted connections to many resources that are essential to improve the quality of their lives. A national poll in 2018 found more than one in five Americans older than age 65 not driving (Leavelle, 2018). The report also found that the lack of accessible and reliable transportation alternatives to older adults and people with disabilities "prevents them from doing the things they need and want to do, which leaves them feeling frustrated, isolated, and trapped" (Leavelle, 2018, para. 2).

The advent of ride share business is a promising solution for this problem. With a rideshare app installed in a mobile device, one can request a ride easily to a destination. Between 2015 and 2019, the years when a major rideshare company emerged as an innovative and disruptive social force, many literatures were published, discussing this new business model. Literature on rideshare services focuses on topics, such as the rideshare business model (Jordan, 2017; Smith, 2016), the gig economic (Berger, Chen, Frey, 2018; Fleming, Rhodes, & Yu, 2019), the rideshare app's algorithm (Chen, Mislove, & Wilson, 2015; Cohen, Hahn, Hall, Levitt & Metcalfe, 2016), regulation (Dudley, Banister, & Schwanen, 2017), social impact (Rogers, 2015), and driver welfare (Davidov, 2017; Means & Seiner, 2015).

However, a new challenge arises for those who have the need to use rideshare services but are not accustomed to using digital technology tools because requesting a ride from a rideshare app requires interaction with an application on a smart device. While the problem of access to and user experience of the App for seniors, can be as salient as the lack of transportation problem, very few studies have been conducted to investigate the access to and user experience of the App, especially those who are less or not accustomed to using digital technologies. Therefore, it is difficult to understand the scale of this problem.

To address this problem for seniors, this study is intended to investigate how to remove barriers for seniors to be better connected with essential resources for their lives. ***The overarching research question for this study is: How can a rideshare app be designed to improve seniors' access and user experience?*** The sub-questions are:

- What are the current barriers for seniors to use the App?
- How should technical training be designed for helping seniors use the App?
- How do the identified barriers inform the App design?

Based on the research questions, two major goals guided this study: 1) To provide training sessions for helping seniors use the App; 2) To develop low-fidelity prototypes to illustrate the improved App design. The research objectives are:

- To identify the current barriers for seniors to use the App
- To develop technical training for helping the seniors use the App
- To provide suggestions on how to design technical training for helping the seniors use the App
- To provide suggestions on the App design based on the identified barriers
- To develop low-fidelity prototypes to illustrate the improved design of the App.

Chapter 2: Literature Review

Mobile App Design for Seniors

The design of age-friendly mobile applications for seniors situated in the context of the prevalence and ubiquitous use of the internet and mobile devices. One guiding principle in the studies on designing mobile apps for seniors is that seniors' needs were placed at the center of the design and development process or the research design. Chua, Lim and Teh (2024) interviewed 127 seniors about their experiences of using a rideshare app, through which the researchers aimed at finding the older-adult-friendly usability features that can boost the adoption of mobility apps among seniors. Adopting the Human Centered Design (HCD) framework, Goumopoulos, Papa and Stavrianos (2017) used workshop, interview, and questionnaire to understand seniors' needs in accessibility features and desired services in a mobile app suite for enhancing their social inclusion and well-being. The researchers also invited 22 seniors to evaluate the usability and acceptability of the app suite. By placing user needs at the center of the design or research process, the researchers respected the basic tenets of the inclusive design: Understanding where the exclusion occurs and designing for diverse needs (Treviranus, 2018).

However, studies on mobile app design for seniors could have improved on user involvement. For example, in Chua, Lim and The's study (2024), senior participants could have been given more time or immersive experience to interact with the app before providing opinions. In Goumopoulos, Papa and Stavrianos' study (2017), seniors were not directly involved in the app design and development process while co-design workshops with seniors could have encouraged greater user involvement.

The above studies adopted the Technology Acceptance Model (TAM) or its variations for assessing a mobile app's usability and acceptability. Because TAM emphasizes the user's perspective and prioritizes the ease of use and perceived benefits of a technology, it directs researchers and designers' attention to user needs and adoption, instead of prioritizing designer ambitions. Goumopoulos, Papa and Stavrianos

(2017) also used the Human Centered Design (HCD) approach and conducted their design and research activities around user needs. Although both TAM and HCD are innately consistent with inclusive design practices because of their emphasis on human needs, these frameworks overlook seniors' long life history and how their lived experience influenced their technology use experience.

Research on Rideshare App Interface

Compared to other topics on rideshare apps, the design of the App's interface is a less discussed topic in the literature. Hsu and Chen's usability study on ride-hailing app interfaces (2023) examined user experiences, focusing on ease of navigation, task completion, and satisfaction of three leading rideshare platforms: Uber, Lyft, and Gojek. This study identified key design elements that impact usability in these platforms, such as intuitive menus, clear visuals, and responsive features, aiming to enhance user engagement and efficiency in booking rides seamlessly. Cox (2019) examined Uber's interface as a symbol of automated social interaction, highlighting how its design simplified user experiences while reinforcing the idea of automation in personal transportation and social connection. Silva (2019) explored how voice user interfaces (VUI) in Uber enhanced drivers' perceived agency in human-AI interactions, emphasizing the importance of intuitive design and user feedback to improve driver experience and control. Alpers and his colleagues (2020) explored how digital assistants in autonomous ridesharing vehicles enhance passenger experience, focusing on their role in user interface design to improve comfort, communication, and navigation during rides.

Although these studies provided valuable information on user's experience on the rideshare apps' interface, these studies did not zoom in on improving the experience for those users with special needs or who are not comfortable using technology. Lee et al. (2019) examined the challenges faced by deaf or hard-of-hearing Uber drivers, proposing design improvements for more inclusive interfaces that could enhance communication and accessibility for these drivers during rides. Silva's study (2019) investigated a voice

user interface, which may be beneficial to those with vision impairment. However, both studies focused on the drivers' experience, not passengers'.

With the scarcity of literature on rideshare apps' usability for older people, this study aimed to fill this gap in the literature by investigating seniors' access to and user experience of the rideshare apps.

Technology Adoption: Roger's Diffusion of Technology Theory

Seniors' adoption of rideshare apps is essentially the adoption of an innovation. The five perceived attributes of innovation discussed in Rogers' Diffusion of Innovations theory (Rogers, 2003) can be used to explain seniors' adoption of the App. These five attributes are: Relative advantage, compatibility, complexity, trialability, and observability.

According to Rogers (2003), these five attributes can predict the rate of adoption for an innovation. **Relative advantage** means the extent to which an innovation is perceived by potential users as better than its existing counterparts. The better the potential users perceive the innovation is, the higher the adoption rate. **Compatibility** means the degree to which an innovation is consistent with potential users' value, needs, and previous experience. Higher consistency level as perceived by the potential users predicts higher adoption rate. **Complexity** is how difficult it is for the potential users to understand and use the innovation. Lower difficulty level predicts a higher adoption rate. **Trialability** is the opportunities for potential users to try out the innovation on a limited basis. The more opportunities in which the potential users may test the innovation, the more likely they will adopt the innovation. **Observability** is how much potential users may observe the innovation being used by other members in the society. The more they observe its use, the more likely they will adopt the innovation.

Roger's Diffusion of Technology Theory can provide suggestions or explanations on how and why an innovation is adopted and how training can be effective to promote the adoption.

Technology Adoption: Goodhue and Thompson's Task-Technology Fit (TTF) Theory

TTF was developed by Deborah Goodhue and Ronald Thompson (1995). The major assumption of the model is to address the “fit” between the capability of a technology tool and requirements of a task. The better the technology fits the task requirements, the likely a potential user will adopt the technology. The model is especially suitable for addressing adoption for information and communication technology (ICT).

The model can effectively explain why a specific technology tool is adopted or not through three major constructs: task characteristics, technology characteristics, and the outcome, i.e., performance impact. This model can be used for explaining seniors' technology adoption because it helps align a design with potential users' needs or identify where the mismatch occurs. In particular, the TTF model addresses data security or quality under the construct of technology characteristics, which is a factor that may influence seniors' adoption of new technology (Chua, Lim, & Teh, 2024).

Beyond accessibility: Seniors' lived experience from a life course perspective

In *An Age-Old Problem: Examining the Discourses of Ageing in HCI and Strategies for Future Research*, Vines and his colleagues (2015) proposed to adopt a life course perspective to understand seniors' diversity derived from their life-long lived experience when designing human-computer interaction (HCI) for older people. Vines et. al. (2015) argued older people were often viewed as a “homogenous” (p. 12) group with two presentations: One was the older people being compared with the younger people; The other was associating aging with “certain capabilities, skills, and attributes in relation to technology” (p. 18). The authors warned us by citing Bytheway and Johnson (1990), “making generalised claims about groups of people based on their age is that it ‘legitimizes the use of chronological age to mark out classes of people who are systematically denied resources and opportunities that others enjoy’” (Vines et. al., 2015, p. 18). When few HCI studies focused on the heterogeneity of the older people, Vines

and his colleagues proposed to adopt the “life-span perspectives on human development” (p. 18). This perspective requires the HCI community to acknowledge the mutual influences between a person and their lived environment, and how a person’s early life history shapes their development and attitudes in later life. Acknowledging such influences also means recognizing the diverse and rich lived experience of the older people.

Vines et. al.’s life course perspective on HCI is a promising framework when applied in this study. Firstly, it is a holistic approach, considering seniors’ lived experience in their whole life and the social context that influences their experience. As Knowles et. al. (2019) argued “What makes older adults uniquely interesting subjects for HCI research is...certain characteristics of their particular life stage, their long histories of learning and using different technologies, and their generational perspective(s) on the social context in which they live” (p. 2).

Secondly, Vines et. al.’s perspective emphasizes seniors as the active participants in the design process and acknowledges that their rich and diverse lived experience shapes the design of HCI. By adopting this perspective, HCI design thus moves beyond the accessibility model of responding to the stereotype of impaired abilities and competencies due to aging. This also liberates the seniors from being denied opportunities or access due to the bias deriving from their age.

Finally, HCI design for seniors can be used to inform the design for the general population if we acknowledge the complex and dynamic social contexts that underline seniors’ lived experience. Other than using aging as the analysis angle, attending to the complexity and dynamics of seniors’ social contexts may help HCI designers reach other populations who are in similar situations. For example, people who are on the disadvantaged side of the digital divide, i.e. people who have limited access to technology resources, may experience similar struggles as seniors do. In this case, it is the social contexts, not aging, that contributes to the barriers of access. HCI design, therefore, may achieve one of the missions in inclusive design that a design product

should reach as many audiences as possible. Therefore, the researcher will adopt Vines et. al.'s life course perspective approach in conducting this study.

Chapter 3: Methodology

In the methodology section, the researcher will describe her positionality and the co-design research method adopted in this study. The researcher will provide details on participants, sampling and recruitment strategies, co-design process, and data collection and analysis.

Researcher Positionality

Prior to the beginning of the study, the researcher used reflexive positionality statements and personal reflection to recognize her position as a researcher, developing awareness of how her social identities and worldview impacted the research questions being asked, the research being conducted and the people she would work with.

The researcher's mother was born in the 1940s and is currently in her 80s. She used to work in a factory, where she utilized no digital communication technology tools for work. The few communication technology tools she used in her life included a landline home phone she did not have until the 1990s. She used the landline phone for 20 some years and got used to it. Within the last ten years, because the phone was not used frequently, the home landline service was canceled. After that, she has been relying on a dumbphone and an Android pad for communication. She merely knows how to make and receive calls from her dumbphone and is nervous when using it. Whenever the phone rings, she has to search around to find the phone. For the tablet, she merely knows how to use a messenger app to view messages, make and receive video or audio calls, and click around randomly to navigate and read contents. She does not know how to send text or voice messages using either the phone or the tablet. As she ages, it is more often that she does not hear the phone or the pad ring at all.

On the surface, the researcher's mother is more connected. The dumbphone replaces the function of a landline, and the Android pad allows her to see her daughter's family via video chat, as the researcher does not live with her mother in the same city.

But in a way, she is also disconnected when she cannot figure out how to make the dumbphone or pad work, or she does not hear them ring.

The exclusion was not intentionally designed or implemented. On retrospection, although a landline phone is becoming increasingly obsolete, some functions of it cannot be fully replaced by a smartphone or a combination of a dumbphone and a tablet. For example, a landline phone is placed on a fixed location, and one will not have to search around for it. This is especially useful for seniors because they are slower to react. It happens often with the researcher's mother that the other party hangs up the call when she finds her phone. The fact that landline phones are becoming increasingly obsolete can lead to unexpected exclusions as experienced by the researcher's mother. Similarly, our society is moving towards cashless services. Those people who do not use a smartphone, like the researcher's mother, sometimes cannot make a purchase when a store does not accept cash. From this sense, the exclusion is systemic. As a society, such exclusionary design may happen everywhere due to the ubiquitous use of smartphones.

The researcher's personal connection with seniors who are not accustomed to using digital technology tools was the starting point of this study. Extending her personal experience, the researcher developed a deep sense of compassion for individuals who are excluded from essential services due to lack of access to technology tools or lack of skills to use them effectively. The compassion towards those seniors and understanding of how seniors' lives being disconnected from essential services were the major driving forces behind the study. As the researcher navigates midlife, confronting the early signs of declining physical fitness and career challenges brought about by the impact of AI, her empathy for older adults resonates more deeply than ever before.

Participants, Sampling and Recruitment

Recruitment Criteria

The researcher used convenient sampling and recruited seven participants for this study. The criteria for recruitment were listed below. Participants in this study should:

- Reside in the metropolitan area where the researcher lives.
- Be Over 65 years old.
- Own and use a smartphone regularly for simple tasks, such as calling, messaging, social media, and watching video.
- Not know how to use rideshare apps.
- Be willing to learn how to use rideshare apps.

The criteria were developed based on a few considerations. Firstly, this study would require two face-to-face meetings. Participants residing in the same metropolitan area would make travel distance realistic for the researcher to complete the self-funded study. Secondly, participants having a smartphone would eliminate the problem of not having the technology tool to conduct the study. Because this project was self-funded, purchasing the tools would be a significant burden on the researcher. Thirdly, participants knowing how to use the smartphone for basic tasks would eliminate the problem of the researcher having to teach the participants how to use a smartphone from scratch, which was not the purpose of this study. Fourthly, participants' willingness to learn how to use the App would ensure participants having sufficient motivation to complete the study. The researcher did not plan to filter language, physical, or cognitive barriers, because the purpose of this study was to observe how these barriers may play a role for seniors to learn using the App.

Sampling & Recruitment

Convenience sampling strategies were employed to recruit participants. The researcher recruited participants through the following channels: 1) The researcher connected with a senior support center in a suburban community in the mid-west United States. She recruited participants by disseminating the recruitment postcard through their monthly newsletter and social media page and hosting two recruitment sessions during lunch hours at the center. 2) The researcher placed the recruitment postcards in public bulletin boards like those in the public libraries. 3) The researcher also used snowball technique to recruit from the researcher's or the participants' social networks.

The primary recruitment tool was a double-sided 5x7-inch postcard. A digital copy of the front and back designs is attached in Appendix K. Each postcard features a QR code that provides direct access to an online screening survey. To accommodate different communication preferences among older adults, the postcard included both a phone number and an email address for the researcher. This ensured that individuals who were less comfortable with QR codes could still inquire about the study or request assistance with the survey. The researcher disseminated the postcards through the abovementioned channels to reach potential participants.

An online screening survey was implemented to verify that potential participants met the inclusion criteria detailed above. This process occurred during the recruitment phase to determine eligibility before obtaining full consent for the in-person study components. Data were collected anonymously in the survey to protect the privacy of all respondents. However, those who wished to proceed with the study were given the option to voluntarily provide their name and contact information.

Recruitment Challenges

Recruiting participants was proved to be difficult due to social media scams and lack of responses. The researcher originally planned to recruit ten to twelve participants. Due to the difficulties, the total number of participants were seven.

Recruiting through social media was challenging due to scams. The researcher disseminated the digital version of the recruitment postcard through multiple social media networks. She initially received overwhelming responses that expressed interest in participating in the study. However, those initial responses turned out to be from scammers who targeted the incentive gift cards.

The responses to the recruitment initiative have been limited. The recruitment spanned for four months. After the initial round of recruitment, the researcher received only one genuine response. Subsequently, five seniors, after expressing initial interests, decided not to participate when the researcher contacted them to schedule the first

research meeting. During the researcher's in-person recruitment sessions, few seniors showed interest in using a rideshare app. Many seniors declined the researchers' invitation and said they did not have a need for using rideshare apps.

Seniors were cautious of activities involving free support or technology use, especially when those activities were connected to financial matters. During recruitment, the free support provided by the researcher was interpreted as marketing promotions from the App's company. Some seniors were cautious when the researcher mentioned the possibility of entering their bank and credit card information into the rideshare app. Some were skeptical and cautious of the incentives, a 25-dollar gift card, provided by the researcher for participating in the study. An originally hesitant senior declined the researcher's invitation immediately and firmly after the researcher mentioned the gift card incentive. Some seniors declined the invitation because they felt they were not good at using smartphones.

Organizations that work with seniors were cautious with research studies targeting seniors. The researcher sent contact emails to several organizations that support seniors but received responses from only one organization. Without credible referrals, it was difficult to create trusted relationships between a researcher and those organizations. However, once the trusted relationship was built, some seniors were willing to place their confidence on a researcher through the organization in which they were a patron.

Participants

Seven participants were recruited for the study. Table 1 provided a summary of the seven participants, including their pseudonym, age group, living situation, highest education level, current and previous job, and the technology tools they owned. All participants lived in the suburban area in the mid-west United States and worked as professionals in their previous jobs.

Table 1***Summary of Participants***

#	Pseudonym	Age Group	Living Situation	Highest education level	Current job	Previous job	Technology Tools Owned
1	Kristen	65-74	Alone in a senior apartment	Two-year college	House and pet sitting	Government office job	One smart phone
2	Kelly	75-84	With husband in a single-family house	Three-year nursing degree	Retired	Intensive Care Unit nurse	Laptop, iPad, iPhone
3	Danny	65-74	In an apartment with his dog	Master's degree, some Ph.D. training	Retired	Middle school teacher, city office employee	Smart phone & iPad
4	Jane	75-84	With husband in a condo	One-year college education	Retired	Postal clerk in a post office	Smart Phone
5	Nora	75-84	With daughter's family in a house	Bachelor's degree in economics and accounting	Retired	State Department of Accounting	Smart Phone & computer
6	James	65-74	A condo apartment	Bachelor's degree	Retired	Fleet manager in an ocean freight company	Smart phone
7	Patricia	65-74	With husband in a house	High School	Retired	Manager in a bank	Two tablets, two smart phones

The Co-Design Process

In this study, the researcher adopted the co-design method. From the life course perspective, the training and design activities in this study were not passive responses to the participants' barriers. Instead of being informants, participants actively guided the direction of the training and design process with their lived experience through their life course.

Two major goals guided this study: 1) To provide training sessions for helping seniors use the App; 2) To develop low-fidelity prototypes to illustrate the improved App design. Based on these two goals, the study consisted of two parts: Activities in Part 1 were meant to deliver the training session and help seniors to use the App; Activities in Part 2 were meant to develop low-fidelity prototypes of senior-friendly rideshare app interfaces through co-design activities. The activities, purpose, and expected duration in each meeting were described in *Table 2. Activity, Purpose, and Expected Duration in Each Meeting with Co-designers*.

Part 1: Training session for seniors to learn how to use the App

In Part 1, the researcher delivered the training session for helping seniors use the App. Detailed activities for the training session were described in *Appendix A: One-on-one Training Session*. The focus of the training was to provide step-by-step guidance on 1. Installing the App on the phone; 2. Registering for an account; 3. Important App features, including simple mode, safety, wallet, help, and inbox. 4. Requesting a ride; and 5. Entering tips for drivers and rating a ride.

During the training, the researcher observed the participants' reactions to the training using an observation checklist (See *Appendix B: Training Observation Checklist*). On the checklist, each major step in the training sequence was broken into smaller steps. The researchers rated the participants' level of competency on each small step using *mastered, progressing, or not mastered*. The researcher also wrote down her observations in the *Notes* section.

After the training, the researcher reflected on the training using an evaluation worksheet with the participants (See *Appendix C: Training Evaluation Worksheet*). The researcher also individually reflected on the training session guided by a list of reflection questions in *Appendix D: Trainer Self-Reflection Guide*.

Then the researcher interviewed the participants on their technology use experience (See *Appendix J: Interview Protocol*). The purposes of the interview were to understand how seniors used technology and how technology training can be designed to meet their needs; to identify seniors' problems and needs in using mobile technologies, and to provide suggestions on the training and mobile app design.

Training and interview activities in Part 1 gave participants ample time to interact with the App and allowed seniors to have the necessary immersive experience before providing their opinions in the co-design sessions in Part 2. The design thus addressed the weakness of insufficient app immersion experience for seniors in Chua, Lim, and Teh's study (2024).

Part 2: Co-design session for creating low-fidelity improved interface for the App

In Part 2, the researcher met with co-designers in small groups to develop low-fidelity prototypes, illustrating the improved design of the App. The activities, purpose, and expected duration in Part 2 were described in Table 2.

The co-design workshop included four major steps: Welcome, problem identification, prototype generation, and prototype evaluation. The Co-design Storyboard (Appendix E) listed the goals, strategies, and detailed activities in each step. In the Welcome section, the researcher focused on creating rapport among the co-designers and connecting the current design opportunities with the previous training session. In the Problem Identification section, the researcher and co-designers discussed and identified the features that a rideshare app must or must not have in order for seniors to use it effectively. In the Prototype Creation section, the co-designers sketched the prototype of a rideshare app on a smartphone wireframe. In the Prototype Evaluation section, the researcher and the co-designers evaluated each design feature

and determined their level of importance using the *Prototype Generation & Evaluation Summary Worksheet* (Appendix I).

After the co-design session, the researcher and the co-designers conducted a group reflection on the mobile app design and research experience. Three major questions guided the reflection: What did we achieve/not achieve in this research study? What are your opinions on the achievement/non-achievement? What are the future actions? Detailed questions were listed in *Appendix J: Interview Protocols*.

The co-design activities in Part 2 provided greater user involvement for seniors in discussing the rideshare app and service features, thus addressing the weakness of the senior participants not being directly involved in the app design process in Goumopoulos, Papa and Stavrianos' study (2017).

Table 2

Activity, Purpose, and Expected Duration in Each Meeting with Co-designers

Project Stage	Meeting	Activity	Purpose	Data Collected	Expected Duration
Part 1	#1	One-on-one training session	• Train participants to use rideshare app • Observe barriers in using the app	• Observation checklist • Evaluation worksheets	60 minutes
		Individual interview	• Understand how seniors used technology and how technology training can be designed to meet their needs • Identify problems/needs based on the training session • Provide suggestion on the training and mobile app design	• Audio recordings of interview conversations	40 minutes
Part 2	#2	Small group co-design session	• Create prototypes for improved interface of a rideshare app	• Audio recordings • Artifacts produced during the session • Co-design logs • Summary worksheet	60 minutes
		Focus group interview	• Reflect on the mobile app design and research experience	• Audio recordings of interview conversations	30 minutes

Data Collection and Analysis

The researcher used qualitative data collection and analysis methods to inform each stage of the research design. Table 3 outlined the methods that afforded collecting thick data and how the data aligned with the research questions. The table presented the major goals in each stage and the corresponding data collection and analysis methods.

Data Collection Tools

The data collection tools used in this study included:

- **Interviews:** The researcher conducted two interviews on six of the seven participants: One individual and one focus group interview. Due to schedule conflict, one participant completed activities in Part 1, and did not participate in the focus group interview in Part 2. The protocol for the two interviews is included in Appendix J, in which detailed interview questions were listed.

In the first interview, the researcher intended to understand participants' technology use experience. The purposes of the interview were to understand how seniors used technology and how technology training can be designed to meet their needs; to identify seniors' problems and needs in using mobile technologies, and to provide suggestions on the training and mobile app design. When designing the questions, the researcher considered seniors' lived experience from a life course perspective, including questions that would ask participants to share their lived experience regarding technology use in their early lives.

The second interview was conducted after the co-design session. The researcher and the co-designers conducted a group reflection on the mobile app design and research experience. Three major questions guided the reflection: What did we achieve/not achieve in this research study? What are your opinions on the achievement/non-achievement? What are the future actions?

- **Observations:** During the training in Part 1, the researcher observed the participants' reactions to the training and recorded their reactions on an observation checklist (See *Appendix B: Training Observation Checklist*). On the checklist, each major step in the training sequence was broken into smaller steps. The researchers rated the participants' level of competency on each small step using *mastered*, *progressing*, or *not mastered*. The researcher also wrote down her observations in the *Notes* section.
- **Reflections:** After the training, the researcher reflected on the training using an evaluation worksheet with the participants (See *Appendix C: Training Evaluation Worksheet*). The researcher also individually reflected on the training session guided by a list of reflection questions in *Appendix D: Trainer Self-Reflection Guide*.
- **Documents and artifacts:** Documents and artifacts produced during the co-design session were used for analysis. These documents and artifacts included the co-design log (Appendix F) the researcher used to document the co-design process; the rideshare app interface the co-designers sketched in a smartphone wireframe (Appendix G) and the evaluation worksheet the researcher and the co-designers used to evaluate the rideshare app design (Appendix I).

Data Summary

The rich data yielded from the data collection stage and used for analysis in this study included:

- Observation notes and reflection from seven training sessions
- Transcripts from seven individual interviews
- Co-design logs and summary worksheets from three co-design sessions
- Transcripts from three co-design sessions and post session interviews

Due to scheduling conflict, one participant could not participate in the second researcher meeting, the co-design session.

During the co-design sessions, the participants used simple sketches to illustrate their ideas of what a rideshare app interface should look like using a smartphone wireframe. Their sketches were rudimentary. The researcher mainly relied on the transcripts from the co-design sessions for data analysis. Three participant sketches were included in Appendix H.

Data Analysis

Qualitative thematic analysis was used to analyze the thick data and answer the research questions. Table 3 below depicted how each sub research question was answered using specific data sources.

The researcher used thematic analysis to investigate the data from the interviews, observations, reflections, and documents and artifacts with the participants. According to Braun and Clarke (2006), thematic analysis is “a method for identifying, analyzing and reporting patterns (themes) within data. It minimally organizes and describes your data set in (rich) detail” (p. 79). It has six phases: (1) Becoming familiar with the data; (2) generating initial codes; (3) searching for themes; (4) reviewing themes; (5) defining and naming themes; (6) producing the report. The essential step is to identify a theme which “captures something important about the data in relation to the research question and represents some level of partnered response or meaning within the data set” (Braun & Clarke, 2006, p. 82). Following the six phases of thematic analysis, the researcher identified themes to interpret and explain the participants’ narratives of their technology using experience and opinions on rideshare service and app design.

Table 3

Data Analysis Summary Chart

Research Questions	Data Collection Method	Instrument	Data Analysis Methods
What are the current barriers for seniors to use the App?	● Interviews ● Observations ● Reflections	● Training Observation Checklist ● Training Evaluation Worksheet ● Trainer Self-Reflection Guide ● Interview protocol	Qualitative thematic analysis
How should technical training be designed for helping seniors use the App?	● Interviews ● Observations ● Reflections	● Training Observation Checklist ● Training Evaluation Worksheet ● Trainer Self-Reflection Guide ● Interview protocol	Qualitative thematic analysis
How do the identified barriers inform the App design?	● Interviews ● Documents & artifacts	● Co-design log ● Smartphone wireframe ● Prototype Generation & Evaluation Summary Worksheet ● Interview protocol	Qualitative thematic analysis

Ethical Considerations

While the Research Ethics Board did not classify the participants in this study as a vulnerable population, the researcher implemented heightened protective measures to prioritize their well-being and security.

The major risk of participating in this study was that any anxieties and frustrations which participants may have towards using the rideshare app or other digital technology tools may be triggered. Participants may experience mild performance anxiety or frustration when navigating the rideshare app or engaging in codesign activities. These feelings may arise if a participant encounters technical difficulties, struggles with the interface, or feels self-conscious about their digital proficiency during the observed training or group sessions. The researcher was mindful of the participants' possible anxieties and frustration. Whenever she observed the arising of these feelings, she emphasized to the participants that the purpose of the study was to improve seniors' access and user experience to the App, not to assess their ability to use the App or any other digital technology tools. Their participation in this study was not used for any evaluation purposes. These strategies helped shift the participants' focus from "performance" to "design feedback," reducing their anxiety. By maintaining a patient, non-judgmental, and encouraging tone throughout the sessions, the researcher was able to mitigate their frustrations.

Participants were also reminded of their right to skip any task, take breaks, or withdraw from the study at any point without penalty. The researcher clarified that any difficulties encountered were valuable data points regarding design or training flaws, thereby validating the participant's experience and ensuring that their participation in the study would help reduce their anxiety towards technology use. These measures ensured that risks remained minimal and did not exceed those encountered in daily technology use.

The other major concern from the participants was financial data security when prompted by the rideshare app to provide payment information. To mitigate the participants' concerns, the researcher provided a \$25 gift card at the start of the training session. During setup, the researcher helped the participants load the gift card value to their account, without having the participants enter their debit/credit card information. The gift card served as both a token of appreciation and a protective measure to minimize the risk of accidental charges to a participant's personal account because the app applies gift card balances to the next trip by default. This strategy effectively relieved the participants' concerns on financial data security when they knew no debit/credit card information would be required for participating in this study.

The researcher also spent a significant amount of time explaining the payment function in the App and answered the participants' questions on payment. Their improved understanding of how the App functions also help reduce their concerns of financial data security.

Chapter 4: Findings and Discussions

In this study, the researcher intended to investigate how to improve seniors' access to and experience of rideshare apps so that they can be better connected to the resources essential to their lives. ***The overarching research question for this study is: How can the Rideshare app be designed to improve seniors' access and user experience?*** Three sub-questions were derived from the major research question:

- What are the current barriers for seniors to use the App?
- How should technical training be designed for helping seniors use the App?
- How do the identified barriers inform the App design?

In this chapter, the researcher will answer the above research questions by presenting the major findings in the following order: 1) the major characteristics of the participants; 2) participants' motivation in learning how to use rideshare apps; 3) the current barriers for the participants to use the app; 4) technical training to help the participants use technologies; 5) how to design rideshare apps that addressed the identified barriers.

Characteristics of the participants

The participants demonstrated some similar characteristics when they discussed their life history and technology use experience.

They used computers at work before retiring.

Most participants used computers in their previous job(s) before retiring from it, although their comfort level of using a computer varied. For example, Kristen, who worked in a government office, used Windows and Microsoft tools regularly at work. She used computers to manage her clients' information, record client data after she visited them and made notes. Kelly was the only participant who did not use a computer

when she worked as a nurse. She was familiar with using medical devices but used paper and pen to keep records, not computers. She used computers from home for personal purposes. Danny used computers for lesson planning as a middle school teacher and for data input when he worked in a city office. James and Patricia worked at the management level and did not heavily use computers for their responsibilities. But they used computers for work-related tasks from time to time.

Although they used computers at work, they seldom used a computer in their personal life. For those who owned a computer at home, the computer was mainly for their children to use. James and Patricia mentioned video chat with their children or relatives using a computer.

They have been using smartphones in their daily life for a long time.

All the participants began to use a smartphone shortly after smartphones were introduced to the public. Although they did not remember the exact time they began to use a smartphone, they recalled the time was during the first decade of this century. Currently, most of them have more than one technology tools. They have at least one smartphone and/or have a laptop or tablet.

Although not all of them used a desktop or laptop currently, all participants have been using their smartphones extensively daily for many different tasks or purposes. Below is a list of apps or functions they use on their smartphones:

- Communication (phone, text messages, email)
- Internet search
- Directions and maps
- Banking
- Shopping or comparing price, like gas prices
- Checking weather
- Utility apps that help manage their lives, such as clock, calendar, notes, and tools like a calculator

- Taking and viewing photos
- Social media
- Hobbies/gaming
- Apps for those places they frequent, such as a gym or a non-profit organization
- Access to medical and health insurance information
- Religious purposes like prayers

Some heavily rely on their smartphones. Kirsten does “everything” on her phone, “I live in a small apartment, so I couldn't have a desk anymore...so no more desk, no more computer. My phone has everything that I need, and it's right there. I can do it at my table.” To Kristen, a smartphone “was so much easier... it's all in one place and I take it with me, and I don't have to carry the big bulky thing...So laptop just gradually fade out of your life.”

Patricia mentioned one biggest benefit of using her Android phone was to connect the phone to their car. She can use voice commands to control the phone and the larger screen on their car is easier for her to navigate the map because she has lower vision.

They also maintain their hobbies using mobile apps. Kelly uses an app to learn information about plants and how to care for them. Danny uses an app to identify birds based on their sounds. Nora used her phone to take pictures and use those pictures to make cards in Microsoft Word on her computer.

They have generally positive attitudes, but mixed feelings towards technology tools.

Participants in this study generally have a positive attitude towards using technology tools. Some have favorable feelings. Kristen said “I love [my phone]. I know, I take it wherever I go. It's so small, it fits right here in my purse.” Kristen said she’s a very organized person and good at “find[ing] ways to do things more quickly and faster”. She just liked “computers naturally when [they] first appeared in our world”. Then she was

eager to learn how to use computers. She “liked it” and “thrived on it”. Seniors like Kristen “naturally” like information technologies are the early and eager adopter of technologies.

Some participants had mixed feelings of technology tools. They understand why they need to use technology tools, see the benefits of using them, and push themselves to use technology tools despite difficulties. During the training, Kelly and Jane did not know or remember their phones’ password to install an app. Therefore, the researcher could not help them install the App on their phone. As an alternative, the researcher chose to demonstrate how to request a ride on her own phone during the training. Kelly, who used to work as a nurse in an intensive care unit, did not use computers regularly in her work. To her, technology is “overwhelming”. She was not comfortable using technology tools and felt nervous about using them. Although she has been using a smartphone regularly, she admitted not seeing the purposes of using a smartphone at the beginning, “it was, to me, it was silly to take a phone with you to the grocery store. I mean, why would you talk on a phone in a grocery store?”

Jane was the other participant who forgot her phone password. She felt she must use technology tools although she thought she was not good at them. She said, “I have an Apple, so it's a Mac Pro. And I use it...I'm not good at it. I stumble through things. And you know, it's, I've been forced to do more and more because everything's on the computer. And I do a lot on my phone. I had an iPad for years, but it died, so I don't have it anymore. But I did a lot of things on my iPad.”

Danny is a cautious technology adopter. He saw the benefits of using technology in general but felt technology is “invasive”, using algorithms to feed users information. Therefore, he does not use any social media and revokes permissions to his iPhone to maintain his own privacy. He said, “I value my privacy and I don't want [the social media company] to know where I'm at all the time or anything like that. So no, I'm not on any of that.”

They are curious and eager to learn.

Curiosity and eagerness to learn are another two salient characteristics of this group of seniors. Kristen said she was “eager to learn them all” after she was introduced to computers. She “liked it” and “thrived on it”. James said he was not interested in learning new technology tools because he felt the technology tools he currently knew were sufficient for his life. However, if some apps may help him, he would learn it. He likes to exercise his brain to remain as sharp as possible for as long as he can. During the researcher’s interactions with the participants, the seniors asked many questions and tried to understand how the App functions, especially Danny. He said he asked those questions “out of curiosity”, and that was how he understood things: “I’m just a curious person anyway. I like to know how things work.”

They are busy and active.

Contrary to a common misunderstanding of seniors’ life, many of the participants have an active and busy schedule. Scheduling the two research meetings with the participants turned out to be challenging, especially the co-design sessions.

Many of the participants have a lot of responsibilities. Kristen works as a house/pet sitter. She maintains a busy schedule during summertime when many of her clients go out of town for vacations. She is the only participant who is currently working after retiring from their previous jobs.

For the other participants, some have heavy family care responsibilities. Most of the time, they are the sole care giver for their spouse. Kelly is the main care giver for her husband who is 91 years old, had a stroke and cannot drive. She said,

I hardly sit down. I'm always busy. You know, women tend to clean the floor, dust this, dust that, see this, should I organize it? You know, I rarely sit down before 8 o'clock at night. But then your mind is moving, so I didn't solitude. I always feel like I have to use my time fruitfully. You know, I'll make a list in the morning or beginning of the week,

and then I mark things off. If I do something that's not on the list, I'll write it down and mark. Girl, to see how productive I was that day, because you can't just sit, not do anything. You can't just, you know, that's why I go to exercise.

Jane's husband was hospitalized on the night before the first research meeting was originally scheduled to take place. She juggled between taking care of her husband, and other routine life chores. The first research meeting was rescheduled in an ad hoc manner because she had unpredictable schedules due to her husband's sickness.

Traveling is another constant theme among the participants. Four of the seven participants had travel plans during the research period. Due to their travel schedule conflict, James could not participate the research activities in Part 2. The researcher had to meet with Patricia individually, instead of in a focus group, to conduct the co-design session.

Summary

Some of these characteristics may have explained why the seniors chose to participate in the study: They are curious and have the motivation to learn new things; when they hoped to remain independent as much as they can, learning how to use the App gave this group of seniors opportunities to maintain their independence through connecting to essential resources.

This group of seniors are relatively comfortable with technology tools and have developed a certain degree of familiarity with using smartphones for their daily lives. These characteristics suggest this group is a biased sample from the seniors population and does not represent the full spectrum of seniors' experiences with digital technology. However, even within this group, individuals' experiences with and feelings towards technology varied considerably. Therefore, using chronological age to classify seniors' technology use experience may lead to stereotypes which could potentially,

“systematically [deny them] resources and opportunities that others enjoy” (Bytheway & Johnson, 1990).

From Vines and his colleagues’ life course perspective (2015), the adoption of and relative comfort with computers in most of the participants’ early lives may have translated into their willingness to use smartphones in their senior lives. They had immersive experiences with information and communication technologies (ICT) and understood the benefits of using them. According to Roger’s Diffusion of Innovation theory (2003), the participants’ knowledge and positive attitudes from using computers in their early lives helped inform their decisions to adopt smartphone use. In contrast, Kelly had limited experience using computers earlier in life and now finds navigating technology “overwhelming.” The researcher’s mother had no exposure to ICT in her early life and remained digital illiterate in her later life. The lack of exposure helped contribute to Kelly’s anxiety in using her smartphone and the researcher’s mother’s digital illiteracy. Therefore, senior’s current technology use experiences are consistent with their early life experience.

Participants’ motivation in learning how to use rideshare apps

“Learn to use it before you need it”

Seniors’ need for transportation highlighted their motivation to participate in this study and learn about the rideshare app. Nora was interested in learning how to use the App because she travels a lot and hopes to use the App to request rides to and from the airport. She has been relying on friends and family to provide her with those airport rides.

Kelly was highly motivated to learn the App. She went to a few classes that provided information about rideshare apps but had not downloaded or set up an account with the App. From those courses, one statement that never left her was, “learn to use it

before you need it.” The concern of not being able to drive has been like a mounting pressure for her. Kelly said, her husband

had a stroke and lost a sighted part of his right eye. And he's 91. And he can't drive. He thinks he can, but he cannot. And I don't let him. So now I'm back doing all the driving. I'm a little bit afraid of traffic. I'm 82. Highways, interstates, places I don't know. I don't have a good sense of direction. I get lost a lot. And so, I'm just and then getting older and forgetting where to turn. I'm trying to drive less and less places. And I know that within a year or two, I want to know how I'll be able to drive. So, this is something that I need to learn before I need to use it for myself and for my husband and for all the relatives and people around me. You know, you can't, it's hard. You know, it's eating on the nerves.

Jane's husband was recently hospitalized. She drove her husband to the hospital at night and drove back home in the dark the same night. After a sleep-deprived and unsettling night, she had to drive to the hospital the next morning in the rain. The driving under such situations made her very nervous although she was not usually nervous about driving. She said she would have used the rideshare app had she known how to use it.

Need for maintaining social connection and independence

Maintaining social connection and independence is a very important goal in the participants' lives. This topic was raised by multiple participants and was mentioned repeatedly by some participants. Kelly exercised three times a week to stay as healthy as she could so that she could take care of her husband. She also plays games on her phone to keep her mind sharp. She explained her philosophy of staying active:

When you have to go someplace and you have no car, you can't drive, and you don't want to ask somebody, then you become isolated. Then you start missing appointments. You stop socializing. You stop going out to dinner and to movies and

lunch with friends. [That] begins a downfall, I think...That's my philosophy. So that's why we go to the gym three times a week.

James lives close to her daughter's house. However, he said he would do everything as much as he could on his own because he knew her daughter and her family maintain a very busy schedule.

Danny lives by himself with his dog in an apartment. He uses an app to check in everyday before 9 am so that his emergency contacts know he is well. This is the way in which he maintains his independence with support from technology.

Summary

The TTF Theory's (Goodhue & Thompson, 1995) emphasis on the "fit" between the requirements of a task and the capability of a technology tool can be used to explain the participants' motivation to learn about the App. Both of their needs for transportation to essential resources and maintaining independence can be addressed by the App's services: The App provides rides to connect seniors with the resources that are essential to their lives and can help seniors maintain the sense of independence. From this perspective, the App's functions provide the right "fit" for meeting seniors' needs.

Current barriers for seniors to use the App or technology tools

In this section, the researcher highlighted the barriers from the observation of the seniors' interactions with their phones and from the interviews.

Difficulty in Seeking help

Seeking help is one of the biggest challenges for seniors to use technology tools. Most participants identified one to three individuals whom they could turn to for assistance when they needed help using technology.

- Many participants would first try to resolve technical problems on their own. They developed their own way of fixing technology “hiccups”. Kristen said, “Well, let's say when there's a hiccup and...I just close it and then I wait and then I open it back up and sometimes it works right.” When Jane could not fix a technical problem, she would stop trying to solve it on the spot. She would then wait for a while, research the problem from the internet, and “patiently” try again till she resolved the problem on her own.
- They seek help from professionals like their phone companies. A few participants, Kristen, Kelly, Nora and Patricia, mentioned they would go to their mobile phone service providers to seek support. Kristen prefers to ask professionals because her family does not live close to her and she is almost the most digital literate senior among her friends. However, the providers may fix the problems on their phones but not necessarily teach them how to resolve the problem on their own or use an app on their phone. Although they may also seek technical help from a non-profit organization, the volunteers there are busy and getting an appointment with them is difficult.
- When things do not work, they mainly rely on their friends or family to help them.
 - For those participants who live close to their family, they would seek help from the younger generations, such as their children or grandchildren. The younger generation fixed things for them without patiently teaching them how and why things work. They “just do it”. After seeking help from their family, the participants often remained baffled as to how the technology tools work or how the technical problems they experienced were fixed. Some participants hesitate to ask for technical support from their family even if they live close by. Because their children and grandchildren are

busy with their own lives, the participants try to remain as independent as possible and avoid causing them additional “troubles”.

- For those participants who do not live close to their family, neighbors or friends are their sources of technical support. However, these sources are not always present to provide the needed support. For example, Kelly had to wait for her neighbor, also her cousin, to come back from out of town to help her fix a subscription problem on her phone.

Low confidence

Lack of confidence is another barrier for the participants to use technology tools. Kristen, Danny, and James were the participants who were more confident in using their smartphones, while Kelly, Jane, Nora and Patricia demonstrated a varied degree of lower confidence.

Kelly said, “I’ll tell you another thing about elderly people: We’re smart. I mean, we’re smart. We got through life. I worked in intensive care in a hospital, so it’s not like I’m stupid. But every time I can’t do a simple thing on a computer, or the grandkids just say, ‘There, there now,’ [which] makes you feel stupid.”

Jane was relatively proficient in using technology. She was able to follow the researcher when she showed her how to request a ride on the App. Using the steps she wrote down during the training, she was able to install the App on her own and set up an account. But during the interviews, she repeatedly said that she was not good at using technology, which showed her lack of confidence in navigating technology tools.

Insufficient understanding of how the App works

During the training, the participants asked the researcher many questions regarding the app use, like how do I pay, how do I know which car is the one I requested, how do I know where I am, will the driver send me to a wrong place, can I ask the driver

to wait for me and drive me to another place, where do I wait for my ride at an airport, does the driver have to stay at the airport and wait for you, etc. etc.

The participants asked those questions to understand how the App functions, in addition to learning how to navigate the interface. For example, for Danny who was a science teacher in a middle school, navigating the App was not an issue for him as he could go through the process on his own without much help from the researcher. When the researcher introduced a feature, Danny would ask questions about the feature. For example, after telling him that he could add a trusted contact in the App and share his ride information with the trusted contact, Danny asked how the person receives the information of the ride and whether it is through text messages. After walking him through how to request a ride, he asked a few what if questions, like what to do if your ride arrives and you find the car filthily dirty.

Cost for using rideshare services

The cost of using rideshare services was deemed high by most participants. When the researcher showed the participants the interface where the estimated cost of a ride was displayed, many of them were surprised by the cost. Danny said the cost of a ride using the App was “a shocker for most people that it costs that much.” During the first co-design session, cost was mentioned as one of the barriers for seniors to use it.

Safety concerns

- General safety concerns on rideshare services

Danny had a lot of concerns regarding the safety of taking a ride. He asked many questions related to safety, such as how the rideshare company performs background checks on their drivers, how rigorous those checks are when compared to traditional taxi companies, how the rideshare company knows how many tickets a driver has, and how the company obtains the driver's driving records.

- Financial and Data Security

Financial and data security was a reoccurring topic the participants mentioned. The fraud they had experienced made them nervous and cautious about using their credit card to sign up for services. Kelly had been charging \$50 each month for a subscription service that she did not recognize. When she contacted the bank, the bank instructed her to contact the company providing the service. Because she did not recognize either the service or the company, she had to wait for her cousin, who was out of town, to help her resolve the issue. Although she felt the pressure to use rideshare apps, she was also concerned about the security of her financial information.

The insecurity was also partially from insufficient understanding of how the App worked. For example, although the App provides many payment options, the participants were either not aware of the various payment options or had a lot of concerns on those options. Patricia did not have a debit or credit card of her own. She used her daughter's card. She was concerned that the card information would be compromised if she added the card to the App. When she was told that she could use cash, she had the concern that how she knew the amount of cash for the ride, whether she would have enough cash on her, and whether the driver would have changed. When told she could use the gift card, she was concerned that what if the gift card balance was running low and was not sufficient to pay for the ride.

James used rideshare apps when he was visiting his home country, where he was able to navigate those rideshare apps in his native language very well. However, language was not the main barrier for him to use the App in the States. He has not used the App or has an App account of his own because he does not have a debit or credit card. He was not aware that the App would allow him to pay using gift cards or cash.

As Chua, Lim, and Teh (2024) suggested, seniors' adoption of new technology may be influenced by security concerns. Building in sufficient measures to ensure authorization and security and enhance data quality in a mobile app may alleviate seniors' concerns and therefore boost adoption of the App, as suggested by the TTF Theory (Goodhue & Thompson, 1995).

General technology use and interface issue

The biggest technology use barrier during the training sessions was that Kelly and Jane did not remember their password so that the researcher could not install the App on their phone. The researcher then used her phone to walk through the App and the steps to use the App with Kelly and Jane. In the co-design session, both Kelly and Jane returned with the App installed on their phone. Kelly was able to install the App with help from her cousin. Jane was able to install the App from the steps she wrote down during the training session. This barrier can be removed by using alternatives, such as password manager, Passkeys, Magic links and one-time passcodes.

Many interface use barriers can be addressed by turning on the accessibility features. Some participants used common accessibility features, such as adjusting the font size and using magnifiers. But they did not use other less common accessibility features. Below are two examples the researcher observed from the training sessions:

- ***Double click.*** Kelly had difficulty double clicking the side button on an iPhone to install an app. She usually needed to repeat the action a few times before she was able to successfully double click. The accessibility alternative to bypass the action of double click is using the AssistiveTouch, which would allow users to touch a floating button on their screen instead of a double click.
- ***Touch to open a link.*** Patricia had trouble clicking open a link because her click sometimes was too slow for the phone to recognize the click. An accessibility alternative for addressing the slow-motion issue is to enable the Touch & hold delay feature under Interaction and dexterity.

These obstacles can be removed by switching on some less commonly used accessibility features. More support or training on using specific accessibility features that address their individual specific needs can be helpful.

Information overload

Generally, the amount of information provided by a technology tool is overwhelming and beyond their needs. Kelly said that technology is “overwhelming to me. It's overwhelming to me. I think things are harder to understand. Too much information, way more information than any person needs.” Kristen, Kelly and Danny reiterated this point in the co-design session. The participants noted that the high volume of advertisements can make mobile apps more difficult to use. The amount of information was “overwhelming”, and it is hard for them to understand how a promotion works.

Clark and Kimmons (2023) introduced Sweller's Cognitive Load Theory. According to Sweller (1988), the capacity of a human's working memory is limited. To maximize learning effectiveness, minimizing extraneous cognitive load is important. When a smartphone app or service pushes heavy amount of information to its users, the cognitive overloading may contribute to seniors' unwillingness to use the app or the service.

Summary

In this section, the researcher highlighted the obstacles that influenced the seniors' adoption of rideshare apps. These obstacles, including low confidence or self-efficacy in handling new devices, financial constraints, lack of knowledgeable support, low confidence and technology anxiety, Security, privacy, and fraud concerns, and cost are consistent with findings from other studies (e.g., Chua, Lim & The, 2025; Khan et al., 2026; Vaportzis et al., 2017).

Technical training to help seniors use technologies

The participants overwhelmingly welcomed the one-on-one guided training. In this section, the researcher highlighted the features that were deemed most effective by the participants.

Training is a starting point

The training provided a starting point by involving the participants to install and interact with the App and gave them confidence to use it. The training helped participants realize that understanding and navigating a mobile app was easier than they had initially thought. Kelly said, "It's easy for me to understand what we went over today. I just have to gain enough confidence to realize that I can understand it through the whole thing. So, this is a really good start because I've not been even this far in other training that I've had or in other lectures."

Kelly mentioned she had taken a few classes about rideshare apps. In those classes, she was given high-level introduction to rideshare apps, without being worked through detailed steps. Those classes provided resources for participants to call to set up their rideshare app. Kelly did not take any action after taking those classes. She said, "After you get all that information and you're just trying to think about [it], well, do I need this or I don't need this? Should I do this? I don't like this. I don't want to give up my car. The likelihood that you're going to then think about it and then call somebody to get that set up...go the next step is minimal to me. So [that's] why I've been to three or four different times learning about it but never went any further than that class." It was the "immediate actions" in this training session, such as downloading the App, setting up an account, and walking through step-by-step the process to request a ride, that helped her go further in learning how to use the App.

The slow-paced, logically sequenced hands-on experience

The training provided participants with hands-on experiences and allowed them to operate the App on their phone by themselves. Kelly noted that this approach differed from how her family members had previously shown her how to use her phone or helped her resolve problems on it. They “do it” for her, instead of slowly showing the process, let her practice and give feedback during her practice.

The training was delivered in a logical sequence, which made it easier to follow. Kristen said: “[S]tep by step is always good because you know where it begins and you know where it ends.” Danny said that the trainer started “at the beginning and just kind of like baby steps. You got to kind of work your way through it. And the important thing is...explaining like the monetary part...yeah, it's very logically sequenced and explained well, you did a good job.”

The clear explanation

The participants liked the hands-on experience, coupled with the trainer's detailed explanation of each step as she went through it. Kelly said, “[G]oing from understanding nothing was good. Now I understand at least 50%. Great. You know, hands-on is always better, but you explained it very well.” “I understood what you said, and anything I didn't understand, you retold it in a way that I [could understand].” “Yeah, and for the first time, I feel like I'm going to be able to do this.”

Participants valued the trainer's ability to answer their questions while demonstrating how the app worked. Danny said his questions came from his interaction with the app and conversations with the trainer. Those questions were necessary for him to understand how the App functions. The immediate responses to their questions helped deepen their understanding of the app. In contrast, when they watching a video, the participants could not receive immediate answers to their questions, thus making them more likely to forget the questions and miss opportunities to develop a deeper understanding of the technology.

The trainer's explanation also helps clarify their misunderstanding of how the App functions. Kelly was afraid that she would get lost and no one would pick her up. The researcher explained to her that she could track the route on a map in the App during the ride so that she would know where she was. Both Kelly and Nora were confused how the rideshare services were different from traditional taxis. After the researchers explained, they understood after a ride completes, they would have to request an additional ride from the app for a return ride or to go to another place and they usually would not have the same driver for that ride. This is very different from the traditional taxi service which would allow the same driver to return and give the guest a ride back or to another place.

The in-depth and respectful interactions with the trainer

Participants highly valued the in-depth interactions with the trainer. Kristen said that the most useful part of training is “you”, the trainer. “So is...that having a person that can stand by your side and then point it out to you with things you need to notice. And where things could possibly go wrong, that part.”

The one-on-one setting was deemed ideal for the participants to have in-depth interactions and conversations with the trainer. This setting allowed the trainer to provide detailed explanations, have slow-paced hands-on training, and answer questions and clarify the participants' misunderstandings. The participants said a small group setting involving three to five participants may also work. But large classes on technology use for seniors were deemed possibly less effective.

The trainer's respectful manner was praised by the participants. Kelly mentioned a few times that when a helper says something was easy when teaching her how to do something on a phone would make her feel “stupid”. Seniors are “proud” individuals and do not like the feeling. She mentioned a helpful volunteer from the non-profit organization she went to for technical support. She said, “We need more volunteers to answer people's questions...we could probably use three of him (referring to the

volunteer) because he's older and he knows how to talk, relate to older people. Because teaching an older person is way different than teaching a teenager, or a 30-year-old, you know, and we're very proud.”

Knowing why is as important as knowing how

The participants said the training helped them learn not just how to use the App, but also truly understand how the App functions. Kelly said her daughter and grandsons would help her fix things on her phone. But they usually just did it for her without explaining what was not working and demonstrating to her how to fix the problem or how things work on her phone step-by-step. Danny appreciated that the researchers answered his questions patiently and that was how he learned new things by asking questions.

Summary

This section summarized the features from the training session that were deemed effective by the participants. These training features are consistent with the recommendations from previous literature. For example, after reviewing 46 empirical studies, Xu et al. (2025) identified several effective approaches, including carefully paced lessons, step-by-step instructions, personalized tutoring, peer learning, intergenerational learning, and dialogic learning. Ahmad et al. (2022) examine instructional strategies used to help older adults learn digital technologies. The review supports learner-centered instruction, appropriate scaffolding, clear guidance, practice, and training adapted to older learners' needs. This study adopted some of the approaches or strategies suggested in the two papers, such as carefully paced lessons, step-by-step instructions, personalized tutoring, appropriate scaffolding, clear guidance, practice and training adapted to older learners' needs. The respect the researcher had on the participants placed the learners at the center of the training and catered for their specific needs. These methods were proved to be effective by the researcher in this study.

Designing rideshare apps that addressed the identified barriers

In this session, the researcher summarized the observations and discussions on the design of rideshare apps that may address the above identified barriers.

Praising the app for ease of use

The participants praised the App for ease of use. Using the App was less of a daunting task than they originally expected. For Kelly, who was least comfortable with her smartphone among the participants, she felt more confident in using the App after the training session. She said, “Yeah, and for the first time, I feel like I'm going to be able to do this.”

- *Simple Mode* is beneficial.

During the training session, the researcher helped the participants' switch on the *Simple Mode* feature under their app settings. The *Simple Mode* features a few essential services on the App's home page. After comparing the interface before and after the mode was enabled, participants generally appreciated the clean design of the home page, as well as its ease of comprehension and navigation.

Maeda, in this 2006 book, *The Laws of Simplicity*, proposed three core principles to achieve simplicity: Reduce, Organize, and Time. The App's *Simple Mode* reduces the amount of information on the App's homepage. By organizing the four most essential services provided by the App, the homepage is easy for the participants to navigate, thus contributing to a better understanding of how the App functions.

- Smooth flow and the prompts/feedback to guide the flow are beneficial.

The participants generally felt the App did “a pretty good job to guide the users step by step, how to get to the next one” and the process to request a ride was “pretty self-explanatory”. The prompts and the feedback the App provided to guide the users directed the flow of requesting a ride. The participants did not have to search or

navigate away from their current page to complete the process. Kristen said “the app asks you what you want, which is nice and it just goes along, flows along, you know, and so that's nice that it asks you, you don't have to wonder what's going on next. It asks you.”

By simplifying the information and organizing the information into manageable steps, the App reduces unnecessary mental efforts for senior users. Such design is consistent with the suggestions by Sweller’s Cognitive Load Theory (1988).

- Safety features address some of their concerns.

Safety was one of the major concerns from the participants. After being introduced to the App’s safety features, including Emergency Contacts, Women Driver for Women, Pin Verification, and various payment options, the participants had a much better understanding of the safety features built in the App. Although they still have concerns like driver background check, their anxiety level towards using the App was lower.

Simplify Information

From the co-design sessions, the participants emphasized the importance of simplifying the information that is being pushed to them. They hope to receive less commercials, marketing emails or promotions. For the information that is pushed to them, they hoped the messages were simple and clear. The overwhelming information can make a mobile app very difficult to use. Danny emphasized the importance of keeping his phone simple. He did not install a lot of apps but only those essential apps he uses regularly.

Summary

The rideshare app used in this study set a good example on simplifying the interface design and streamlining the user flow to enhance user experience. The App

also provides safety features that address some user concerns. As the participants' discussions heavily focus on what did not work for them, they yielded few suggestions on how the App's interface shall be designed for them. This is understandable as the participants are not designers and their discussions naturally centered their own user experiences. Understanding their barriers, however, is the first step for researchers and designers to improve access and user experience for seniors.

Chapter 5: Conclusions, Limitations & Future Studies

In this study, the researcher intended to investigate how to improve seniors' access to and experience of rideshare apps so that they can be better connected to the resources essential to their lives. ***The overarching research question for this study is: How can the Rideshare app be designed to improve seniors' access and user experience?*** In this chapter, the researcher will summarize the findings, present the conclusions, and discuss the limitations of this study and suggestions for future studies.

Summary of Findings

In this section, the researcher will summarize the findings according to the three sub-questions that were derived from the major research question:

- What are the current barriers for seniors to use the App?
- How should technical training be designed for helping seniors use the App?
- How do the identified barriers inform the App design?

What are the current barriers for seniors to use the App?

Participants generally thought using the App was easier or much easier than they originally expected, especially after they interacted with the app's *Simple Mode*. The barriers for them to use the App were not the interface issues, which they knew how to circumvent using some accessibility features. The barriers for them were more on the help seeking, low confidence, insufficient understanding of the App, cost, safety and financial related matters, and information overload.

How should technical training be designed for helping the seniors use the App?

Training for seniors to use technology tools should go beyond high-level introduction. The following training elements were deemed by the seniors as effective for them to grasp the technical skills:

- a. Slow-paced, logically sequenced hands-on activities
- b. Patient, detailed, and clear explanations
- c. Explaining the “hows” and “whys” related to the process
- d. One-on-one or small group setting allowing more interactions with a trainer

By suggesting the above training features, this study answered the call for more studies on designing better training programs to address the digital divide for seniors by Chua, Lim and Teh (2025). In addition, support on a regular basis, such as training and help sessions, from an organization that serves seniors, can be an effective way to encourage seniors' technology use. The credible, consistent, and extended support can help address technology use difficulties and give the necessary push for seniors to start or continue using some helpful services on their phone.

How do the identified barriers inform the App design?

Although the study could not yield the prototype of the improved App interface design, based on the identified barriers and the co-design sessions, the researcher generated a set of suggestions on how rideshare apps and services may be designed to improve access for seniors.

Cost has been identified as one significant barrier preventing seniors from using the app. To help connect seniors with essential resources in their daily lives, our society should consider ways to reduce the cost of rideshare services for seniors or provide financial assistance to help them access these services.

The findings also call for changes in corporate practices, in order to create a smoother user experience for seniors to use the rideshare services. Rideshare companies may:

- a. Simplify the services, use and the amount of information provided to the seniors.

The **Simple Mode** interface provided by the App in this study sets a good example on how rideshare apps may design to provide smoother user experience.

However, the company behind the App may also consider pushing fewer or simplifying marketing information to those users who opt for using the simple mode.

- b. Increase transparency on corporation practices, especially when the practices are closely related to clients' benefits. In this study, the participants voiced their concerns regarding personal and data safety. Although some concerns were derived from their lack of understanding, open communication and being transparent can help address clients' concerns on the services.

Conclusions

This study breaks the stereotype of seniors, especially regarding their technology use experience. This study presented a group of seniors who are busy and active, curious and eager to learn, and intelligent in their own terms. Although they did not grow up with technology or lived their professional life in a world where technology tools, especially mobile technology tools, were prevalent, they have been making diligent efforts to understand today's world in which digital technology is ubiquitous.

This study began with a focus on improving mobile app interface design, with the goal of developing a more accessible rideshare app interface for seniors. However, the findings shifted the study's focus toward broader issues deeply rooted in the participants' contexts, including their prior and current experiences with technology, their lived experience, their living situation, transportation needs, etc. These findings call

for a more holistic approach to addressing the digital divide—one that goes beyond interface design to consider the broader factors that shape seniors' ability and willingness to adopt and use digital technologies. This approach should start from breaking the stereotype toward seniors' technology use, respecting seniors' lived experiences and helping them navigate the digital world based on their needs, preferences, comfort level, value, and their existing ways to interact with the world. Finally, addressing the challenges of digital divide in seniors requires a concerted effort, started from individuals and families, funded by government entities, and supported by corporations, non-profit organizations, and other social sectors.

Limitations and Directions for Future Research

In this section the researcher will discuss some limitations of this study and how future research may address these limitations.

1. Because of difficulty in recruitment, the researcher recruited seven participants.

Although the researcher was able to observe common themes and this study may have reached a certain level of code saturation (Guest, Bunce & Johnson, 2006), the sample size was relatively small and the number of interviews may not be sufficient to reach meaning saturation, as suggested by Hennink et al. (2019). Future study can utilize a bigger sample to fully understand the depth and rich context of seniors' technology use experience.

Future research on senior technology use should also consider how to alleviate senior's concerns and anxiety on using technology from the recruitment stage. Recruiting participants through organizations which support seniors is an efficient way for researchers to reach out to the target research audience. Having credible referrals can help researchers to establish trusted connections with those organizations. For researchers who are new to conducting research with older adults, building trusting relationships with nonprofit organizations that serve older adults can be a valuable way to get started.

2. The participants were self-selected to participate in this research study. They were from a typical middle-class community, motivated to learn, curious, worked as professionals before retirements and had a certain comfort level of using technology tools. This was a biased sample and represented a small spectrum of the overall senior population. If a fuller range of older adults had been recruited in this study, the observed digital divide may have been even more pronounced. As Hawash (2025) suggested that older adults, particularly women, individuals with lower levels of education or income, those who are unemployed, and rural residents, experience significant barriers to adopting digital technologies. Future studies may consider recruiting participants that can represent a fuller spectrum of seniors, such as seniors from socially and/or economically disadvantaged groups, seniors living in rural areas, and seniors feeling more revered or unwilling to use technology tools.
3. Mobile technology tools were identified as convenient by the participants in this study despite the barriers they encountered. More research can be conducted to help seniors use mobile technologies more efficiently and effectively, thus conquering the digital divide that is faced by seniors.
4. More training and support can be provided for seniors on mobile technology accessibility features. For seniors to use their mobile technology tools smoother, observing their specific needs for accessibility alternatives and creating customized accessibility plans based on individual needs are important.
5. More research is needed on how corporations may rethink their marketing strategies for their older clients. While pushing the commercials and having promotions are common marketing strategies, such information can be confusing, instead of beneficial, especially to older adults. Simplifying their app interface and services may be a better option to retain and attract senior clients.
6. The importance of seniors' immersive experience with an app in mobile app design studies for seniors was reiterated by Jane's experience in this study. Jane forgot her password. The researcher cannot help her install the app in the training session but

just showed her the steps. In the co-design session, she emphasized that she could not answer the researcher's questions because she had not used the App herself. Future studies should consider providing ample and various opportunities for seniors to interact with the technology tools before soliciting their opinions.

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Appendices

Appendix A: One-on-one Training Session

In this document, the researcher will describe the activities in the one-on-one training session, in which the researcher will train the participant using a rideshare app to request a ride. The training observation checklist and evaluation worksheets are attached at the end of this document.

1. Step-by-step walk-through (20 minutes)

After the participants watch the video tutorials, the researcher will walk through the five steps to complete a trip using a rideshare app with the participants. The major steps to complete a trip include: 1. Install the app on the phone; 2. Register for an account; 3. Request a ride; 4. Enter tips for driver; 5. Rate your ride.

At each stage, the researcher will demonstrate the required skills step by step using a mobile device, while the participant follows along on a separate device. After the initial demonstration, the participant will be invited to complete the steps independently, with the researcher offering reminders or guidance only when needed. The training will conclude once the participant is able to perform all steps on their own. Throughout the session, the researcher will use a training observation checklist to record notes and observations.

2. Training evaluation (5 minutes)

3. At the end of the training, the participants will complete an evaluation worksheet. The researcher will review the questions in the evaluation worksheet along with the participants.

4. Break (5 minutes).

5. One -on-one interview.

Appendix B: Training observation checklist

Activity	Skill(s) expected to master	Level of competency after training	Notes
1. Install the app on the phone	Locate the app store	Mastered Progressing Not mastered	
	Search for the app in the app store	Mastered Progressing Not mastered	
	Install the app	Mastered Progressing Not mastered	
2. Register for an account	Locate the app in the phone and open the app	Mastered Progressing Not mastered	
	Enter phone number	Mastered Progressing Not mastered	

Activity	Skill(s) expected to master	Level of competency after training	Notes
	Receive, locate and enter verification code	Mastered Progressing Not mastered	
	Enter email address	Mastered Progressing Not mastered	
	Receive, locate and enter verification code	Mastered Progressing Not mastered	
	Enter credit/gift card information	Mastered Progressing Not mastered	
	Create a passkey	Mastered Progressing Not mastered	
3. Request a ride	Choose the ride request tab	Mastered Progressing Not mastered	

Activity	Skill(s) expected to master	Level of competency after training	Notes
	Enter the destination	Mastered Progressing Not mastered	
	Choose ride options	Mastered Progressing Not mastered	
	Confirm pick up	Mastered Progressing Not mastered	
4. Enter tips for driver	Enter tips for driver	Mastered Progressing Not mastered	
5. Rate your ride	Rate your ride	Mastered Progressing Not mastered	

Appendix C: Training Evaluation Worksheet

Please share your opinion of the **Rideshare App researcher training**. Rate how much you agree with the following statements.

1=totally disagree

2=disagree

3=neutral

4=agree

5=strongly agree

Evaluation Items	1	2	3	4	5
1. The training helps me understand the content.					
2. The training engages me in learning the content.					
3. The training motivates me to learn the content.					
4. The training is appropriate for its content.					
5. The content is logically sequenced.					
6. The content is easy to understand.					
7. The overall quality of it is good.					

Then, the researcher will review each activity in the training and ask the participant:

- What activity went well? Why did it go well?
- What activity needs improvement? In what way?
- What problems did you experience? What can be done to solve the problems?
- Overall, what would you have change in the training?

Appendix D: Trainer Self Reflection Guide

Reflection guiding questions:

Review each activity in the training and answer:

- What activity went well? Why did it go well?
- What activity needs improvement? In what way?
- What problems did you observe? How do you plan to solve the problems?
- Overall, what would you have done differently in the training?

Appendix E: Co-Design Storyboard

Co-Design Storyboard

Agenda Item	Goal	Strategy	Steps/timing
1. Welcome (10 minutes)	○ Get acquainted ○ Understand challenges ○ Find design opportunities	○ Impromptu networking ○ Group Discussion	- Facilitator welcomes participants, have the group sign the Group Confidentiality Agreement, and reiterate that participation in this research study is voluntary, and participants may withdraw at any time, without penalty. - Facilitator asks the question: When using the rideshare app, what is the one biggest challenge? - Each participant first reflects on the question individually. - Facilitator pairs participants into groups of two to discuss their thoughts and summarize their group discussion. - The whole group convenes and summarizes the discussion. List the main points.
2. Problem identification (15 minutes)	○ Define problem ○ Identify design requirement	○ Min specs ○ Group Discussion	- Facilitator asks the questions: What are the two to five features a rideshare app must have for seniors to effectively use it? What are the two to five features the rideshare app must avoid for seniors to effectively use it? - Each participant first reflects on the questions individually using the <i>Prototype Generation & Evaluation Summary Worksheet</i>. - Facilitator pairs participants into groups of two to discuss their thoughts and summarize their group discussion. - The whole group convenes and summarizes the discussion. List the main points using the <i>Prototype Generation & Evaluation Summary Worksheet</i>.

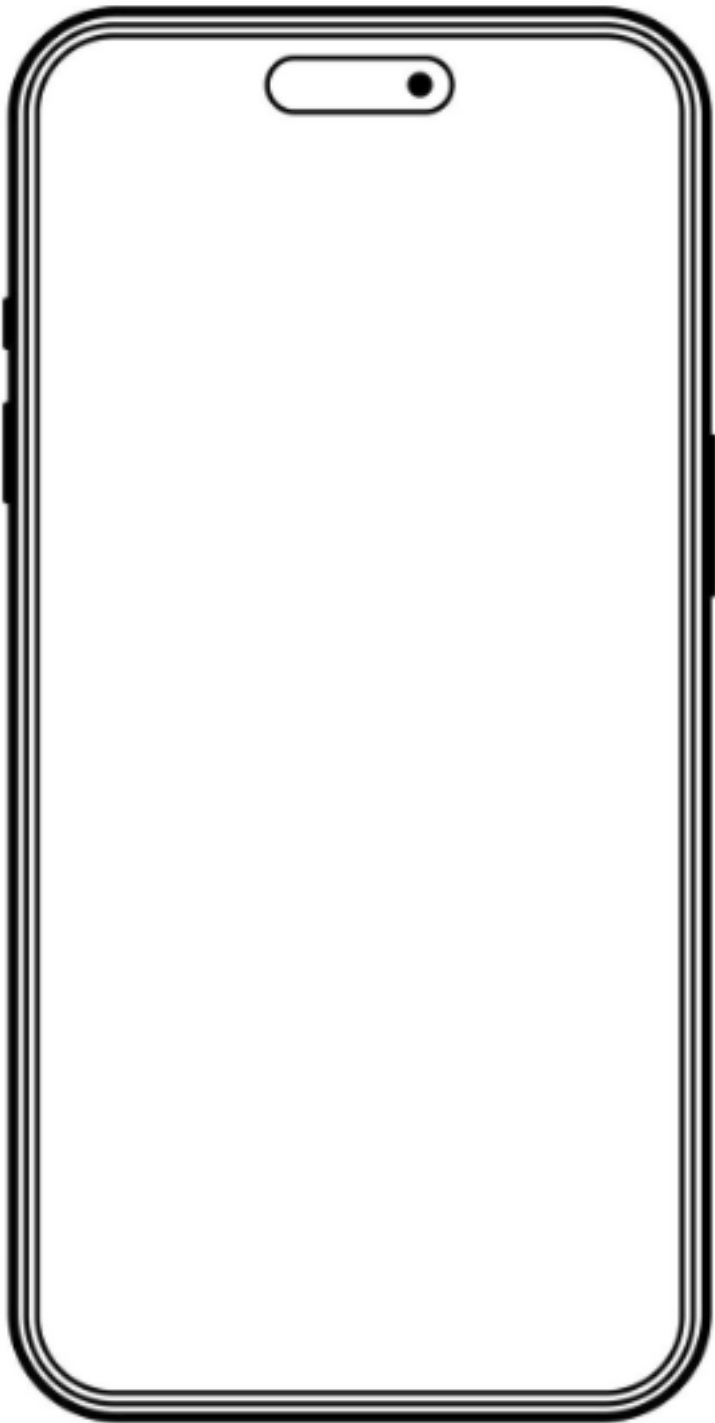
Agenda Item	Goal	Strategy	Steps/timing
3. Break (5 minutes)			
4. Prototype creation	○ Create prototype	○ Group discussion	Time: 20 minutes e. Each participant is given paper and pens. f. Facilitator presents the summary of the previous discussions on a screen. g. Each participant is asked to draw the rideshare app interface they hope to use. h. Facilitator pairs participants into groups of two to compare their prototypes and summarize the features on their prototypes. i. The whole group convenes and summarizes the features on their prototypes. Add to or revise the features Listed in the <i>Prototype Generation & Evaluation Summary Worksheet</i> created in Step 2.

Agenda Item	Goal	Strategy	Steps/timing
5. Prototype evaluation & wrap up (10 minutes)	○ Evaluate prototype ○ Thank participants	○ Group Discussion	a. Facilitator asks the participants to use the <i>Prototype Generation & Evaluation Summary Worksheet</i> to rate on a 1 to 5 scale how useful each feature in the prototype would be for them and the reasons of their rating. b. Each participant first conducts the evaluation individually. c. Facilitator pairs participants into groups of two to discuss their ratings and reasons and summarize their group discussion. j. The whole group convenes and summarizes the discussion. List the main points using the <i>Prototype Generation & Evaluation Summary Worksheet</i>. d. The whole group use the agreed upon checklist to evaluate the interface prototype crated in Step 3. e. Facilitator wraps up the workshop by thanking the participants.

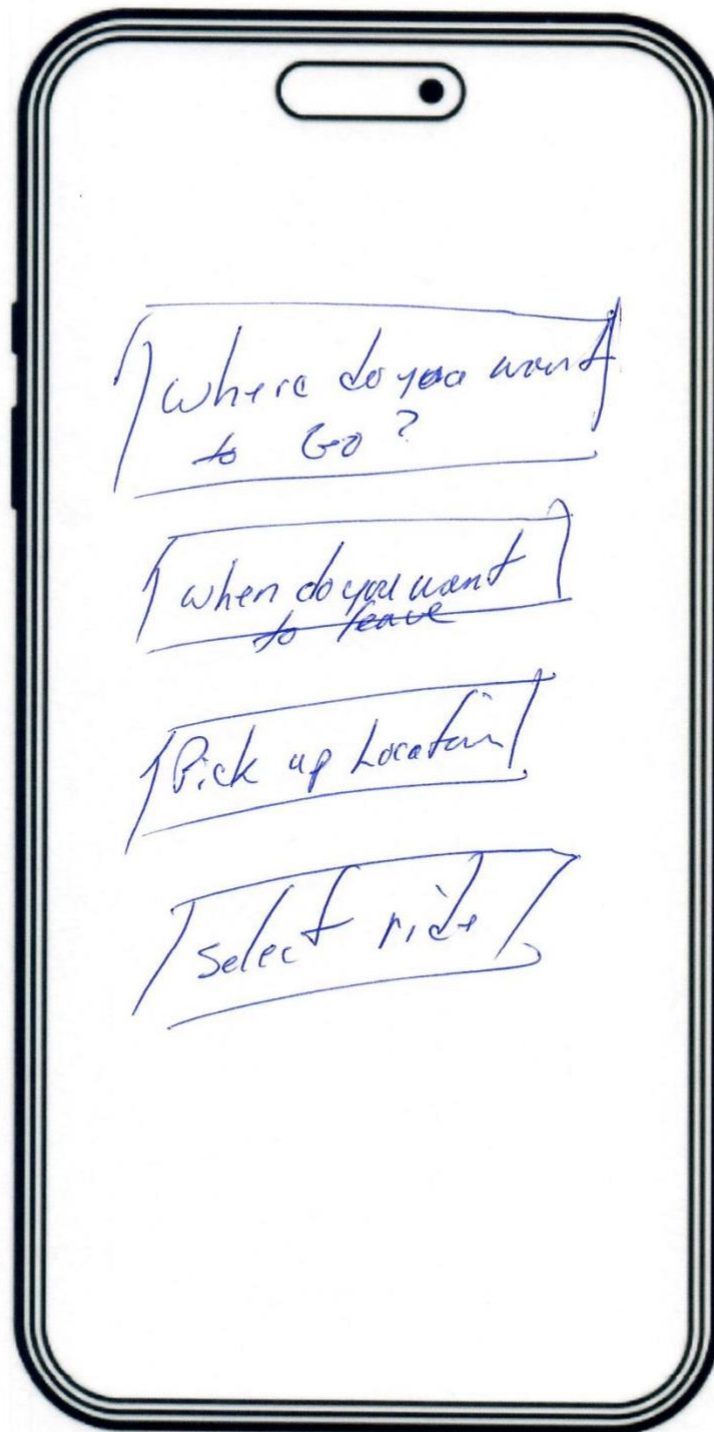
Appendix F: Co-Design Log

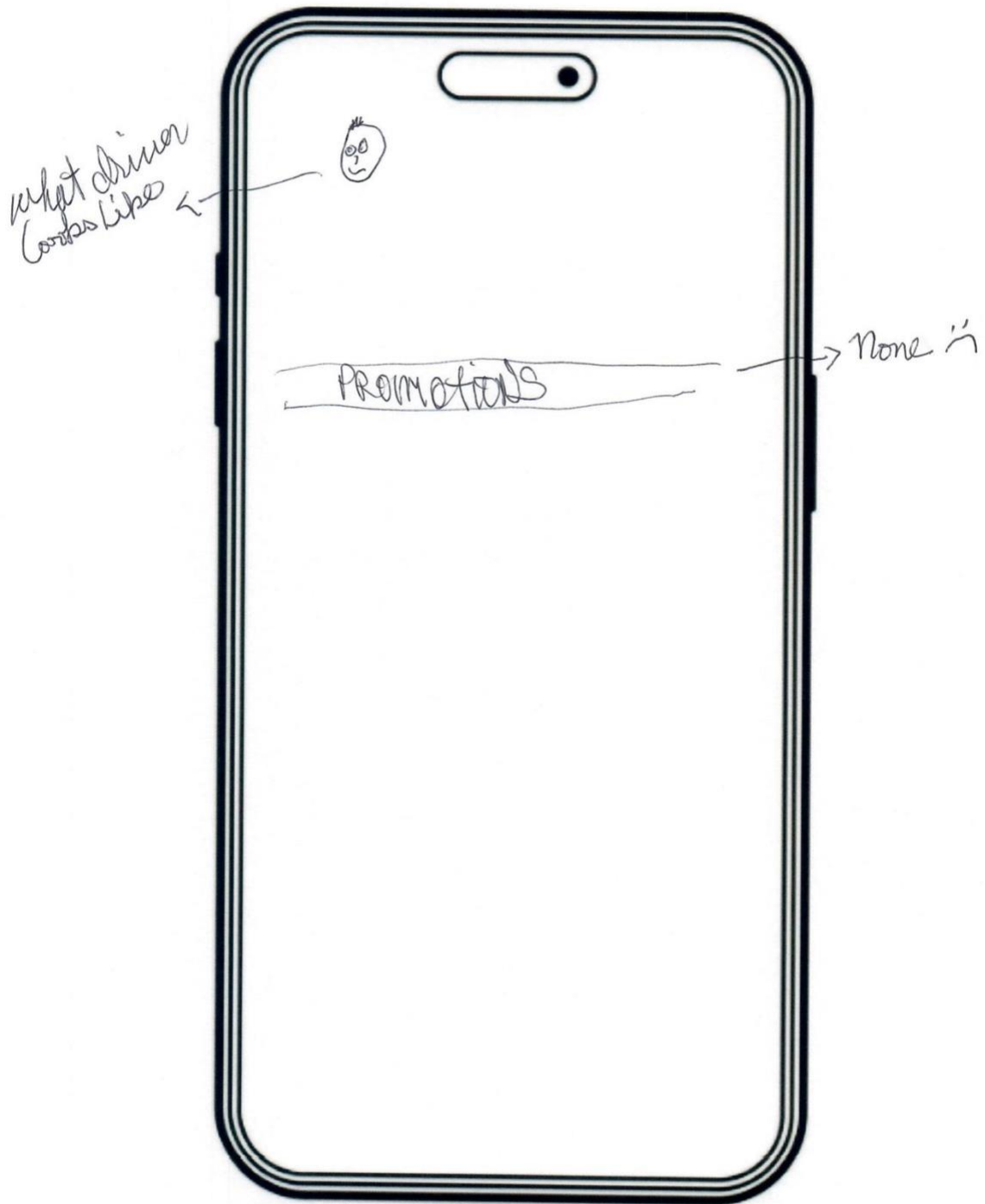
Co-Design Activity	What did the researcher do?	What did the participant do?	Results/Outcomes	Notes

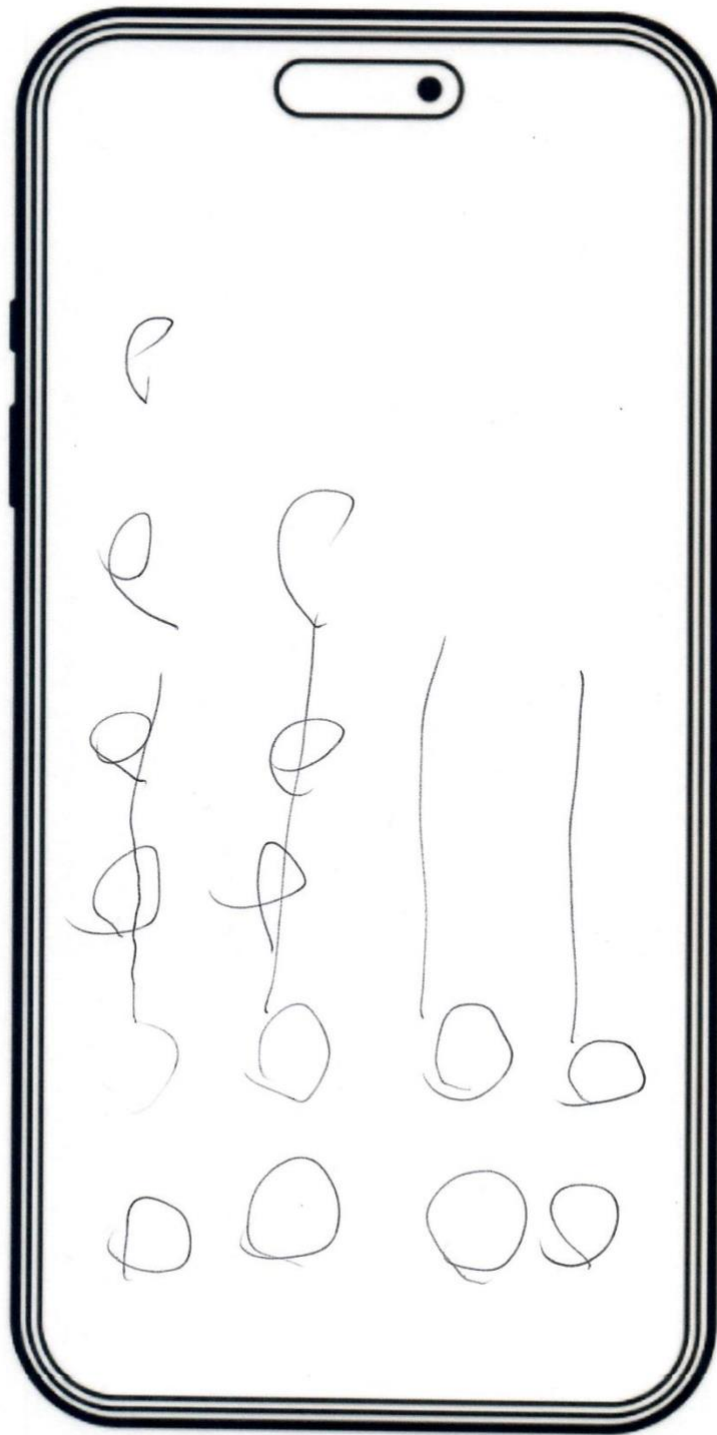
Appendix G: Smartphone Wireframe



Appendix H: Participant Sketches of Rideshare App Interface







Appendix I: Prototype Generation & Evaluation Summary Worksheet

Feature	Problem addressed	Proposed solutions	Evaluation

Appendix J: Interview Protocol

The researcher will conduct two interviews with each participant. This document describes the purposes of the interviews and lists the sample questions in each interview.

First Interview

The first interview will be an individual interview to be conducted after the one-on-one training session. The interview will last for about 40 minutes.

Purposes:

- Understand how seniors use technology and how future technology training can be designed to meet their needs.
- Identify problems/needs based on the training session
- Provide suggestion on the training and mobile app design

Sample Questions:

- Demographic information
 - What is your highest education level achieved?
 - What is your current living situation?
 - What is your current job or your job before retirement?
- Technology use and needs
 - At what age did you first regularly use a computer (desktop or laptop)?
 - How long have you owned and regularly used a smart phone?
 - Did you regularly use information and communication technology tools (e.g., desktop, laptop, tablet) in the job before you retired? If you are currently working, think about your current job. If you regularly used information and communication technology tools (e.g., a desktop, laptop, or tablet) in your current job or in the job you held before retiring, please briefly describe how you used those tools. If your answer is no to the previous question, please skip this question.
 - What type of mobile device do you currently use most often? (Check all that apply)
 - What mobile apps or functions do you use on your mobile devices? How often do you use them?
 - What are your feelings towards technology?
 - When using mobile technology, what are the biggest challenges you face?
 - If you need help using a mobile device, what are your preferred way to seek help?
 - If you ask someone for help, whom do you prefer to ask?

- If you ask someone for help with technology use, how many people are available to help?
- If you were to receive training, what topics would be most helpful to you?
- How would you prefer to receive technology training?
- Effectiveness of the training
 - Does the training help you understand the rideshare app? Is the video tutorial or the researcher training more helpful?
 - Without help, are you able to request a ride using the app now?
- Perception of training
 - What part of the training do you find most helpful? Why?
 - What part of the training do you find least helpful? Why?
- Barriers to use the rideshare app after training
 - What parts still confuse you?
 - How do you want to change the app so that it is less confusing to you?

Second interview

The second interview will be a focus group interview to be conducted after the small group co-design workshop. The interview will last for about 30 minutes.

Purposes:

Reflect on the mobile app design and research experience

Questions:

- What did we achieve/not achieve in this research study?
 - Do you think you will be able to use the app to request a ride independently? If yes, will you use it to request a ride? If not, what still confuse you regarding the use of the app?
 - How did the design process help you understand more about the app?
 - What is one thing that stood out in the study that you would like to share?
 - Is there any problem during the process you would like to share?
 - Are you more motivated to learn to use mobile technology tools after this study?
- What are your opinions on the achievement/non-achievement?
 - Is participation in this study helpful to you? If yes, in what way? If not, why don't you think it is helpful?
 - If you will not use the rideshare app even if you are able to request a ride, what makes you hesitant to use it?
 - If you do not feel more motivated to learn and use mobile technology tools, what makes you hesitant to try them?

Appendix K: Recruitment Postcard Front and Back

ARE YOU 65 YEARS OLD OR OLDER?

Want to learn how to use rideshare apps?

IF YOU'RE CURIOUS ABOUT USING RIDESHARE APPS BUT NOT SURE WHERE TO START, WE INVITE YOU TO JOIN A RESEARCH STUDY AIMED AT IMPROVING THE RIDESHARE APP USER EXPERIENCE FOR SENIORS. IF YOU ARE INTERESTED, PLEASE:

EMAIL

OR

CALL AND LEAVE A MESSAGE

OR

SCAN THE QR CODE TO TAKE A SURVEY 

QUALIFIED PARTICIPANTS RECEIVE A \$25 GIFT CARD!



Discover how easy it is to order a ride!

Appendix L: Consent Form

Informed Consent Form

This is a design research study, and your participation is voluntary. If you have questions at any time, please contact the Research Ethics Board at the Ontario College of Arts and Design (OCAD) University at research@ocadu.ca.

Title of Study: Improving Seniors' Access to and User Experience of Rideshare Apps

Faculty Mentor Name/Contact Information: Michelle Wyndham-West
mwyndhamwest@ocadu.ca
416-977-4588 (Canada)

Student Researcher Name/Contact Information: Liangyue Lu
luliangyue@ocadu.ca
614-522-9880 (US)

DESCRIPTION OF THE RESEARCH

You are invited to participate in a design research study about how to improve seniors' access to and user experience of Rideshare Apps. The research will be conducted by a graduate student researcher at the Ontario College of Arts and Design (OCAD) University as partial fulfillment for the Master of Design degree in Inclusive Design.

For research purposes, the researcher would like to ask you to participate in two meetings for a total time of 190 minutes. In Meeting #1, you will participate in a one-on-one training session and one individual interview. In Meeting #2, you will participate in a small group co-design session and one focus group interview. To ensure confidentiality during the meetings, the researcher will facilitate the meeting in a private room at a public library or another suitable community space. I will record the activities using observation checklist, and audio and video recording devices. The worksheets and artifacts you create in the co-design session will also be used for analysis. Table 1 on Page 5 listed the activities, purposes, data collected in and estimated duration of each activity.

Participation in this research study is voluntary, and you may withdraw at any time, without penalty, before the final report is published in late August 2026. If you decide

to withdraw, you may contact the researcher using email, phone call or text messages to indicate your intent. In that case, no information provided by you will be used.

YOUR RISKS AND BENEFITS

The risk of participating in this study is that any anxieties that you may have towards using rideshare apps or other digital technology tools (if any) may be triggered. The researcher will minimize this risk by emphasizing to you that the purpose of the study is to improve seniors' access and user experience to rideshare apps, not to assess your ability to use a mobile app or any other digital technology tools. Your participation in this study will not be used for any evaluation purposes. Risks for you to participate in this study are minimal and are no greater than those that you may experience when using any digital technology tools. You may skip any task, take breaks, or withdraw from the study at any point without penalty.

A second potential risk is that you may experience physical fatigue, eye strain, or general bodily discomfort during the training or co-design sessions. To mitigate this risk, the researcher will implement mandatory rest periods during the sessions and provide additional frequent breaks whenever necessary or requested by you.

Because this study includes co-design sessions and focus group interviews, a third risk is that participants may disclose information shared during the session to outsiders. While the researcher will implement strict measures to protect your identity and privacy, absolute confidentiality and anonymity cannot be guaranteed by other group members. The researcher will implement the following strategies to mitigate this risk:

- Before beginning co-design sessions, all participants must sign a collective confidentiality agreement. This emphasizes the importance of respecting peer privacy.
- All sessions will occur in private meeting rooms within public libraries or other suitable community space to prevent incidental disclosure to bystanders.
- All participants will be de-identified using pseudonyms during the co-design session and focus group interview.
- Video and images of participants are strictly for analysis and will not be published. Only images of hands or work products (e.g., co-design artifacts) will be shared, with any identifiable features cropped or blurred.

Another potential risk is that you may concern about data security when the rideshare app asks you to provide payment information. The researcher will minimize this risk by providing a 25-dollar gift card to you at the beginning of the training session. During

training, when asked to enter payment information, you may choose to use the gift card and enter your own debit/credit card as backup payment. Therefore, the gift card is both a small token of thanks to your participation of this study and a protective measure to minimize the risk of accidental charges to a participant's personal account because the rideshare app applies gift card balances to the next trip by default.

The benefit of your participation in this study will be receiving personalized training on how to use the rideshare platform effectively, enhancing your ability to access transportation and community resources independently. Beyond individual skill-building, your lived experiences will directly inform the development of an improved user interface prototype. This research contributes to a broader understanding of inclusive design, providing technology companies with actionable insights to create more equitable and accessible services. Ultimately, the advancement of accessible design facilitates greater connectivity to essential resources that enhance the overall quality of life for older adults.

COMPENSATION/PAYMENTS

A twenty-five-dollar gift card will be provided to you at the beginning of the training session. If you choose to withdraw after receiving the gift card, you will not be asked to return the card.

DATA STORAGE TO PROTECT CONFIDENTIALITY

The researcher will employ strict confidentiality and privacy protection procedures throughout this study. Electronic data, including textual data, images, and audio/video recordings, will be stored ONLY in the researcher's OCAD University OneDrive account. Only the researcher will have access to the data. The research data will be stored for the duration of the research and one year after the final report is published.

The audio/video recordings will be transcribed within two weeks after each activity. Any personal identifiers, such as real names or locations, in the recordings will be disguised during the transcription. After transcribing, the transcriptions will not associate subjects. This means that a number will be assigned to a participant's responses, and only the researcher will have the key to indicate which number belongs to which participant. The master linkage list will be stored separately from de-identified transcripts in a password-protected file.

TIME INVOLVEMENT

Your participation in this study will take approximately 190 minutes.

HOW RESULTS WILL BE USED

The results of this study will be used by the researcher to generate suggestions on how to improve seniors' access to and user experience of rideshare apps. The final report will be uploaded to the OCAD University Open Research Repository (<https://openresearch.ocadu.ca/>). You will receive a link by email or text message to the final report when it is available. Additionally, the results of this study will be shared with researchers and designers in graduate programs, at conferences/forums, and in campus, state/province, and national entities (including information technology companies) to provide guidance on designing service apps for seniors.

All information provided during this study will be kept strictly confidential. Any subsequent publications or presentations will utilize pseudonyms, and all personally identifiable details will be omitted to protect your privacy. Data will be aggregated and research findings will be reported in a manner that ensures individual responses cannot be traced back to any specific participant. While the researcher will maintain this standard, please note that confidentiality within the co-design and group interview sessions is shared among all participants. Therefore, absolute anonymity cannot be guaranteed by the group members.

BENEFITS TO THE RESEARCHERS

While this study is currently conducted for academic research purposes, the findings and the resulting mobile app interface design have the potential for future commercialization. The primary researchers may seek to develop a commercial mobile application based on the user needs and design preferences identified in this study. Consequently, the researchers may hold intellectual property rights, patent ownership, or financial interest in any products or services that result from this study. In addition, the student researcher may benefit from potential employment opportunities resulting from conducting this study. However, there are no other personal benefits, such as consultancies or board memberships, to disclose currently.

Table 1: Meeting and Activity Description

Project Stage	Meeting	Activity	Purpose	Data Collected	Expected Duration
Part 1	#1	One-on-one training session	● Train participants to use rideshare app ● Observe barriers in using the app	● Observation checklist ● Evaluation worksheets	60 minutes
		Individual interview	● Identify problems/needs based on the training session ● Provide suggestion on the training and mobile app design	● Audio recordings of interview conversations	40 minutes
Part 2	#2	Small group co-design session	● Create prototypes for improved interface of a rideshare app	● Video recordings and images of the session ● Artifacts produced during the session	60 minutes
		Focus group interview	● Reflect on the mobile app design and research experience	● Audio recordings of interview conversations	30 minutes

Ontario College of Arts and Design University

PARTICIPANT'S RIGHTS

Principal Investigator: Michelle Wyndham-West

Research Title: Improving Seniors' Access to and User Experience of Rideshare Apps

- I have read and/or discussed the Research Description with the researcher. I have had the opportunity to ask questions about the purposes and procedures regarding this study.
- My participation in research is voluntary. I may refuse to participate or withdraw from participation at any time without jeopardy to future medical care, employment, status or other entitlements.
- I may withdraw by emailing, calling, or texting the researcher **BEFORE** the final report is published in late August 2026. If I decide to withdraw, no information provided by me will be used. All information you provided will be permanently deleted immediately after the researcher receives your intent to withdraw.
- The researcher may withdraw me from the research at his/her professional discretion.
- If, during the study, significant new information that has been developed becomes available which may relate to my willingness to continue to participate, the investigator will provide this information to me.
- Any information derived from the research project that personally identifies me will not be voluntarily released or disclosed without my separate consent, except as specifically required by law.
- If at any time I have any questions regarding the research or my participation, I can contact the investigator who will answer my questions. The investigators contact information is listed on the first page of this form.

- If at any time I have comments or concerns regarding the conduct of the research or questions about my rights as a research subject, I should contact the Ontario College of Arts and Design University Research Ethics Board at research@ocadu.ca.
- I should receive a copy of the consent document and this Participant's Rights document.
- If video and/or audio taping is part of this research,
 - ☐ I consent to be audio taped.
 - ☐ I consent to be videotaped.
 - ☐ I do NOT consent to being audio taped.
 - ☐ I do NOT consent to being videotaped.
- Written, video and/or audio taped materials
 - ☐ may be used for analysis in this study
 - ☐ may be viewed in an educational setting outside the research
 - ☐ may NOT be viewed in an educational setting outside the research. The written, video and/or audio taped materials will be viewed only by the principal investigator and members of the research team.
- My signature means that I agree to participate in this study.

Participant's signature: _____ Date: ____/____/____
MM/DD/YYYY

Participant's Print Name: _____

Researcher's signature: _____ Date: ____/____/____
MM/DD/YYYY

Researcher's Print Name: _____

Appendix M: Group Confidentiality Agreement

Title of Study: Improving Seniors' Access to and User Experience of Rideshare Apps

Faculty Mentor Name/Contact Information: Michelle Wyndham-West
mwyndhamwest@ocadu.ca
416-977-4588 (Canada)

Student Researcher Name/Contact Information: Liangyue Lu
luliangyue@ocadu.ca
614-522-9880 (US)

As a participant in this co-design and focus group session, I understand that the researcher will maintain a secure and private environment to protect my personal information. While the researcher will implement strict measures to protect my identity and privacy, the nature of a group session means that absolute confidentiality and anonymity cannot be guaranteed by other participants.

By signing this agreement, I agree to the following:

- I will respect the privacy of my fellow participants and keep all identifiable information shared during this session strictly confidential.
- I will not discuss the specific comments, identities, or personal details of other participants with anyone outside of this research group.
- I understand that the session will be conducted in a private meeting room to prevent incidental disclosure to the public.
- I understand that my identity is protected through the use of pseudonyms in all final reports and publications.
- I understand that any video or images taken of me will be used exclusively for analysis by the researcher and will not be published.
- I acknowledge that only de-identified images of "work products" (e.g., sketches or hands) may be used in the final report, with any identifying features blurred or cropped.

Participant Signature: _____ **Date:** _____

Researcher Signature: _____ **Date:** _____