Promoting Transportation Equity Among Older, Homebound Adults through Technology-Enhanced Data Collection

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Presentation for:
Transportation Center For Livable Communities

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Presentation Purpose

• Summarize findings from an assessment of the transportation mobility gaps for low-income, transportation disadvantaged older adults living in a low density urban environment in Tarrant County, Texas

• Offer recommendations for reducing transportation mobility gaps

• Offer recommendations for leveraging use of app technologies to enhance transportation data collection
What we did...

- Custom-designed an app, *MyAmble*, to measure transportation disadvantage, holistically, among populations whose transportation needs historically have been neglected in transportation planning

- Sought to measure
  - Planned trips
  - Unplanned trips
  - Missed trips
  - Impact of missed trips on quality of life
  - Relationship between transportation disadvantage and social exclusion
Social Exclusion

• The process of being denied access to the multiple dimensions of a community, including economic opportunities, civic processes, social engagement, environmental health, and quality of life
Domains of Social Exclusion

Resources
- Material/economic
- Access to public/private services
- Social resources

Participation
- Social participation
- Culture, education, and skills
- Political and civic participation

Quality of Life
- Health and well-being
- Living environment
- Crime, harm, and criminalization
Transportation & Social Exclusion

TRANSPORTATION

- Job
- Grocery Shopping
- School
- Healthcare
- Spiritual Practice
- Voting
### MyAmble vs. Traditional Data Collection Methods

<table>
<thead>
<tr>
<th>Features/Data</th>
<th>Paper/Website Travel Diary</th>
<th>Smartphone Travel Diary App</th>
<th>MyAmble</th>
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<tr>
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<td>*Impact on mood</td>
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<td>*PURPOSE</td>
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<td>*REASON FOR NO TRIP</td>
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<td>SOCIAL EXCLUSION AND TRANSPORTATION</td>
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<td>TRAVEL HISTORY</td>
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<td>Visual record of challenges</td>
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</table>

*Indicates required features for MyAmble.
MyAmble Features

- Daily Trip Planner
- Challenge Logger
- Travel Buddy
- Travel Story
Welcome to MyAmble!

Choose an option from below:

- Daily Trip Planner
- Challenge Logger
- Travel Buddy
- Travel Story
Daily Trip Planner
Challenge Logger
Challenge Logger Example

• Participant 6 utilized this feature multiple times throughout the study, noting challenges he faced ambulating in the community with his motorized-wheelchair. In a few instances, he noted a sidewalk problem, located at the following GPS coordinates (32.627935, -97.348715). The image above identifies sidewalk construction that is especially challenging for him, as he shared he had to travel on the street while this sidewalk construction was taking place.
The challenge logger enabled participants to document real-time transportation barriers through videos and/or photos. Sample view from database below:

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Travel Buddy

User

Resources

Participation

Quality of Life

Questions

How do you get out of the house to see friends and family?

Type a Question

Question here

Send Question

I take my power chair downstairs and enjoyed my company with my friends. I didn’t take the bus to any location that I want to. Basically my getting out of the house is to be able to breathe and feel the freedom of what is needed. I rely on the transportation for being there so that I can do what I need to do my friends.

Chat Text here

Send

Welcome to MyAmble!

Choose an option from below:

☑ Daily Trip Planner

Alert: Travel Buddy
You received a message

☑ Travel Buddy

☑ Travel Story
Travel Buddy Example

“How does transportation access affect your overall quality of life?”

I rely on bus, MITS and other transportation for grocery, personal care, outings, visiting friends, and just seeing the city of Fort Worth. If my mode of transportation is ...not available, then it would be hard for me to accomplish any of the aforementioned reasons that I used the local transportation. I’ll go I can find a bus route to go to certain places the drop-off location is quite a distance from where the bus stop is. Like today being that my regular driver was not available I would have had to take the bus. The bus stop for my doctor was 15 minutes away from his office. That would require me to drive my power chair 15 minutes both ways. This would have been an inconvenience for me so therefore I had to cancel the doctor’s appointment. I hope this explains how things run when you’re disabled and need transportation.
Travel Story

• The Travel Story was a feature that contained a series of questions that study participants were able to complete on their own throughout the study period.

• The travel story allowed for the examination of the contextual factors behind the participants’ lived experiences with transportation. At least four participants answered each question.
Participant Demographics

• Ten (10) older adult participants
• Mean age was 69.56 years ($SD = 3.75$, $median = 70$)
• Majority were female ($n = 7$, 70%), retired ($n = 6$, 60%), non-Veterans ($n = 10$, 100%), of Christian faith ($n = 8$, 80%), and spoke English as their primary language ($n = 10$, 100%)
• Most lived alone ($n = 7$, 70%) in a senior housing complex ($n = 6$, 60%) and had lived in their place of residence for longer than five years ($n = 6$, 60%)
• Participants, on average, had lived in their city of residence for 21.35 years ($SD = 26.16$, $median = 7.5$)
Participants’ Transportation Habits

• Majority reported that they do not drive \((n = 9, 90\%)\), do not own a car \((n = 9, 90\%)\), and do not have a valid driver’s license \((n = 8, 80\%)\)

• Most \((n = 8, 80\%)\) reported using para-transit services or a public bus \((n = 5, 50\%)\) as their primary forms of transportation
Participants’ Self-reported Health

- Half reported their current physical health as good, very good, or excellent ($n = 5, 50\%$), but three (30\%) reported being satisfied or very satisfied with their physical health.

- An overwhelming majority reported experiencing pain ($n = 9, 90\%$) and arthritis ($n = 7, 70\%$) and half ($n = 5, 50\%$) reported mobility concerns, diabetes, visual impairments, and psychological health concerns (e.g., depression, anxiety).

- A majority ($n = 6, 60\%$) required assistive devices for mobility (e.g., cane, walker, wheelchair, motorized scooter), but the sample was largely able to complete activities of daily living independently, including feeding ($n = 10, 100\%$), bathing, dressing, and toileting ($n = 9, 90\%$).
Participants’ Experiences and Comfort with Technology

• Most owned a phone \((n = 8, 88.9\%)\)

• Prior to this study, three (33.3\%) had never used a tablet device.

• Some were able to access the Internet from their homes \((n = 5, 55.6\%)\) and others occasionally accessed the Internet from public spaces

• Two (20\%) had never accessed the Internet prior to this study
Trip Data

• The ten participants successfully logged 60 daily trip plans throughout the course of the study period.

• More than half were planned \((n = 36, 60\%)\)

• Most were reported as of great importance to participants \((n = 43, 71.67\%)\)

• Trip destinations most often included the grocery store \((n = 11, 18.33\%),\) medical appointments \((n = 9, 15\%),\) social visits \((n = 9, 15\%),\) and the bank \((n = 8, 13.33\%)\)

• There were only 18 reports about whether or not a trip was successful. Of those responses, over three quarters reported successful trip completion \((n = 14, 77.78\%)\)
<table>
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<th>M (SD)</th>
<th>Median</th>
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<td>Missed Trips</td>
<td>0-2</td>
<td>.90 (.88)</td>
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### Trips & Adverse Health Events

<table>
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<tr>
<th></th>
<th>Reported 2-4 adverse health events in past five years (n=5)</th>
<th>Reported 5-9 adverse health events in the past five years (n=5)</th>
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<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td></td>
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<tr>
<td>Planned Trips</td>
<td>4.600 (4.22)</td>
<td>4.20 (1.10)</td>
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<tr>
<td>Unplanned Trips</td>
<td>1.40 (1.34)</td>
<td>3.60 (5.94)</td>
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<tr>
<td>Missed Trips</td>
<td>.80 (.84)</td>
<td>1.00 (1.00)</td>
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</table>
# Trips & Self-reported Health Status

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<th>Excellent to good health ((n=5))</th>
<th>Fair to poor health ((n=5))</th>
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</thead>
<tbody>
<tr>
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<td>5.00 (4.24)</td>
<td>3.80 (.45)</td>
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<tr>
<td>Unplanned Trips</td>
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<td>3.80 (5.85)</td>
</tr>
<tr>
<td>Missed Trips</td>
<td>1.00 (.70)</td>
<td>.80 (1.10)</td>
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Travel Buddy Themes & Social Exclusion

Diminished emotional well-being

• [I]t gets very depressing when you don't have transportation to get to some of the places that you would like to go and spend time there...
• Due to our health issues most of our so-called friends have disappeared. One of the few left has a house I cannot get in with a wheelchair. As for family (sic), Dawn [her partner] has no family left. I have my 84 year old mother who lives in Keller, but MITS won’t go there.

Barriers to community engagement

• Transportation prevented one participant from being engaged in volunteer activities/community life. She really wants to give back but was limited by transportation, saying, “I would love to volunteer...nursing homes, hospitals... I love meeting new people.” Actively getting around in the community was found to be different every day.
Travel Buddy Themes (continued)

Constrained Autonomy

• One conversation emphasized the participant’s reliance on others to get out of the house in order to see family and friends and to complete errands, such as taking a trip to the pharmacy.

• The researcher asked, “How do you get out of the house to see friends and family?” To this question, the participant replied: “They come see me or pick me up to go places.”

• In another instance, this same participant had an emergency trip. The researcher probed the participant, stating, “I saw that you had an unplanned trip to the pharmacy. I hope that you are feeling okay. If you need services like the pharmacy on a short notice, how do you get out of the house to get the services that you need?” The participant replied, “[I] have to wait for a ride from my sister.”

• In one final example conversation, the research asked, “How do you get out of the house to see friends and family?” To which this participant replied that, “My brother comes and sees us.”
Travel Buddy Themes (continued)

Resource Intensive

• Public transportation was found to be a financial and time-burden on many participants.

• One participant shared that using the city bus can be an all-day ordeal, and took away from his already limited finances. This was especially true in examples such as when the bus was not on time as scheduled, when he had to transfer buses, and when he had more than one doctor’s appointment scheduled in one day.

• This participant stated that he would rely on an alternative mode of public transit, MITS; however, “the cost for senior citizens and disability people is $4.50 one way so therefore the total cost is $9 for the doctor's appointment travel. if you have more than one doctor's visit per month let's say 5 appointments, it will cost the senior citizen $45 in transportation fee. This therefore takes away from there medicine and food allowance.”
Travel Story Data

For all questions in the Travel Story, the average number of responses was about 6 ($m = 6.4$, $SD = 1.67$, median = 6).

Example response – If you stopped driving, when did this happen?

• I stopped driving about seven years ago when I was diagnosed with degenerative bone disease

• This happened about 15 years ago. I didn’t have a car, but still had my driver’s license

• When I could not longer afford to maintain a car. I would still be driving if I had a car.
Lessons Learned – User Feedback

• Participants were asked a number of Likert-scale questions, with response options ranging from one to five. Higher scores indicate greater satisfaction.

• For the overall experience, the mean score was a 4.6 ($SD = 0.73$, $median = 5.0$), indicating that participants fell between somewhat satisfied and very satisfied.

• Participants reported more favorable scores regarding the app providing a new experience ($m = 4.5$, $SD = 1.27$, $median = 5.0$), staff assistance ($m = 4.7$, $SD = 0.48$, $median = 5.0$), instructors’ abilities to answer questions ($m = 4.5$, $SD = 0.53$, $median = 4.5$), comfort answering questions ($m = 4.6$, $SD = 0.52$, $median = 5.0$), and staying engaged because of the Travel Buddy feature ($m = 4.6$, $SD = 0.74$, $median = 5.0$).
Lessons Learned – User Feedback

• Participants reported less favorable scores regarding the ease of using the keyboard ($m = 3.6$, $SD = 1.13$, median = 4.0) and microphone and camera ($m = 3.6$, $SD = 1.33$, median = 3.0), receiving notifications ($m = 3.6$, $SD = 1.13$, median = 4.0), transitioning between screens ($m = 3.6$, $SD = 1.01$, median = 4.0), and ability to log trips without issues ($m = 3.6$, $SD = 1.24$, median = 4.0).

• Of those reporting issues with the app, 44% reported difficulties with the microphone and/or camera, 33% reported that the app was confusing to use, and 33% had difficulties with the app crashing.
Lessons Learned – User Feedback

• Some described enjoying the opportunity to learn a new technology and to record their travel experiences in the moment.

• One individual talked of how this experience helped him/her to better understand his/her own transportation disadvantage and its impact on his/her quality of life. He/she reported, “I enjoyed it and it helped me understand my dilemma more about how to get places and made me realize there are really a lot of places I could go if I had a car.”
Lessons Learned – User Feedback

• Participants were asked open-ended questions about what incentivized or motivated their participation in the study. Answers varied among participants, but the most commonly reported motivator was the ability to share their voice and the possibility of helping others \( n = 4, 40\% \).

• Other responses included being able to access the Internet, the ability to use the tablet for radio and games, participation as an activity to pass time, and the monetary incentives. Participants were offered ($20) gift cards to Wal-Mart for their participation with MyAmble.

• Several participants reported that they would be willing to volunteer for another research project in the future.
Lessons Learned – User Feedback – Training

• Participants’ opinions of the training varied. Although all participants reported the length of training as adequate (not too short or too long), some described aspects of the tablet and app that they feel could have been better explained during training.

• These include the microphone talk-to-text features, the camera, and troubleshooting the app when it crashes. Others, though, felt as though the training needs to be based on individual proficiency levels, with one person saying, “It [the training] covered absolutely everything. For someone like me, tell me once and leave me alone.”
Lessons Learned – Study Limitations

• Our original study had a sample of 20 older adults.
• 50% attrition rate
• Reasons for attrition included:
  • Health concerns
  • Challenges with the technology
  • Internet connectivity issues
• Perhaps consider a less high-risk (in terms of health and isolation) sample for future app testing
Lessons Learned – Study Limitations

• Wifi connectivity proved challenging even when using hotspots
• Many participants lived in lower-income neighborhoods with less reliable Wifi signals
• Currently working on a version of *MyAmble* in which all data are stored locally such that participant data are not lost if Wifi signal is dropped
Key Findings/Takeaways

• Surprisingly, half of trips were to grocery stores, highlighting the critical role transportation plays in food access for this population.

• Those with more health concerns reported more unplanned and missed trips – those in poor health may require a more flexible model of public transportation services.

• Current public transit services for this population constrain autonomy and require intense forethought and planning.
Implications for Transportation Planning

- *MyAmble* is an innovative tool for data collection that can be used for other EJ populations.
  - Currently pilot testing *MyAmble* with women who are staying in domestic violence shelters

- Infrastructure transformations may include more and more creative solutions for reducing the last-mile gap and leveraging new technologies such as Lyft, Uber, and app-facilitated ride-sharing to offer door-to-door and on-demand transportation to those for whom mass transit is not realistic, e.g., disabled and older adults or lower-income mothers.

- *MyAmble* data may also have practical implications for social services in terms of highlighting the role that transportation plays in individual general well-being. Case managers and social service providers may want to assess individuals for transportation and develop action plans and referral services to respond to transportation needs.
Thank You!

• North Central Texas Council of Governments
• Transportation Research Center for Livable Communities
• Meals on Wheels of Tarrant County
• UTA School of Social Work and College of Engineering
• Dr. Holli Slater of UTA School of Social Work
• Our amazing team of graduate research students!
• Our participants, who offered their time, attention, and trust to the MyAmble research team!!
Contact Us!

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