

ASSESSING THE RELATIONSHIP BETWEEN ACUTE AND CHRONIC
HEALTH CONDITIONS AND TRANSPORTATION DISADVANTAGE AND
QUALITY OF LIFE AMONG OLDER ADULTS IN
TARRANT COUNTY, TEXAS

by

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THESIS

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ABSTRACT

Assessing the relationship between acute and chronic health conditions and transportation disadvantage and quality of life among older adults in Tarrant County, Texas

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By the year 2035, for the first time in US history, there will be more older adults in the US than individuals under the age of 18 (Vespa, 2018), and Tarrant County, Texas is the fastest growing community in the country (US Census Bureau, 2018), with older adults comprising a significant portion of that growth (United Way Tarrant County Community Assessment, 2015). Accompanying this, older adults are among the most at-risk individuals for acute and chronic health problems and are the highest utilizers of health care (Health and Aging Policy Fellows Program, 2018). Syed, Gerber, and Sharp (2013) report the greatest barrier to better health for older adults in the US is transportation. Tarrant County, its residents, and its resources are widely dispersed, and Tarrant county's second-largest city, Arlington, is the largest city in the US without a public bus system,

which makes transportation and concern for quality of life simultaneously imperative and challenging for older adult residents of Tarrant County. Therefore, this thesis investigated the impact previous medical events had on transportation and quality of life for older adults in Tarrant County, Texas. Results suggest that for those experiencing transportation disadvantage, health status influences the types of trip planned for and completed, that transportation comes with multiple burdens, and quality of life is often complicated and compromised by the interplay between health and transportation. In conclusion, health, transportation, and quality of life are inextricably linked, and although relatively unexplored, an important means for improving health and quality of life for older adults is transportation.

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Dedication

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“The paradox of education is precisely this –
that as one begins to become conscious,
one begins to examine the society in which he is being educated.”

– James Baldwin, “A Talk to Teachers” speech, 1963

Chapter 1: Introduction

The older adult population, which is comprised of individuals 65 years of age and older, in the United States (US) is growing faster than almost any other country in the world (Sade, 2012). It is projected that by the year 2035, for the first time in US history, there will be more older adults than individuals under the age of 18 (Vespa, 2018). By the year 2060, one in every four Americans is expected to be over the age of 65 (Vespa, Armstrong, & Medina, 2018). This demographic shift is what has been referred to as the graying of America, and accompanying this change are changes in health and lifestyle.

Older adults are among the most at-risk individuals for acute and chronic health problems and are the highest utilizers of health care (Health and Aging Policy, 2018). The most common chronic health problems for older adults in America include cardiovascular, cerebrovascular, and metabolic diseases, cancer, and dementia (Older Adults, n.d.). Common acute health problems include wounds, sprains, strains, and pain, often related to accidents, especially falling (Falls, 2016; Weiss, Wier, Stocks, & Blanchard, 2014). Whether acute or chronic, the most common health-related issues impact older adult independence through various aspects of physical and environmental immobility (Ahlqvist, Nyfors, & Suhonen, 2015), with one of the top mobility challenges being transportation (Syed, Gerber, & Sharp, 2013).

Syed, Gerber, and Sharp (2013) report that the greatest barrier to health care and better health for older adults in the US is transportation, perhaps due to the US' dependence on private automobiles for transportation. The most common form of transportation in the US is traveling by way of private car, otherwise known as automobility (Rosenbloom, 2001). On average, older adults in the US noticeably begin to reduce their automobility, by limiting their driving, around 70 years of age, while, unfortunately, still having many transportation-related needs (Adler &

Rottunda, 2006). Also, this transportation reduction is not experienced equally among men and women, as women overwhelmingly begin to self-impose limits on or cease driving years before men (Siren, Hakamies-Blomqvist, & Lindeman, 2004).

In general, there are a number of disparities that exist for older adult Americans that make health and a healthy lifestyle, including transportation, more difficult. Females, those who have a lower-income, and/or racial and ethnic minorities consistently report disproportionate risks for negative outcomes related to health, health care, transportation, and levels of independence (Bailey, 2004; Chronic Care, 2009; Dellinger, Sehgal, Sleet, & Barrett-Connor, 2001). The result is limited independence and ability to age in place, by living the duration of one's life remaining in one's home and community (Aging in Place, 2013). In sum, these factors pose a significant threat to prolonged high quality of life (QOL) among older adults.

Reflecting the US older adult population boom, the Fort Worth and Arlington area of Texas is the fastest growing community in the country (New Census Bureau, 2018), and older adults comprise a significant portion of that growth (United Way, 2015). Assuming the older adults of North Texas share similar interests in QOL with the represented older adult US population, they want to remain in their homes and community as they age. However, there are factors in the Fort Worth and Arlington area that can challenge that desire.

First, Tarrant County, like the US as a whole, has more women than men (U.S. Census Bureau, 2017), and, as women live longer than men, they will live alone more often, stop driving sooner, and, on average, be more financially limited, all of which exacerbate problems related to mobility, traveling and participating in one's community, and remaining in one's home (Dellinger, Sehgal, Sleet, & Barrett-Connor, 2001; Mutchler, Li, & Xu, 2016). Second, Tarrant County has a growing population of people of a racial and ethnic minority status (U.S. Census

Bureau, 2017). Similar to older adult women, racial and ethnic status is associated with more limited transportation and social isolation and less access to resources for aging in place (Bailey, 2004). Third, Tarrant County, its residents, and its resources are widely dispersed, and its second-largest city, Arlington, is the largest city in the US without a public bus system (Barry, 2013). These factors may make transportation and mobility particularly challenging among older adult residents of Tarrant County as they find that their family, friends, shopping for daily needs, health care, social services, and social engagements are widely dispersed. In sum, the environment may make it difficult for them to remain independent, age in place, and experience a desirable QOL.

In order to better understand the unique position and needs of the transportation limited residents of Tarrant County, the study, *Transportation Mobility Among Low-Income, Transportation Disadvantaged Older Adults Living in a Low Density Urban Environment Using Innovative Data Collection Methods* (Fields, Cronley, & Mattingly, 2016), was created and conducted. Developing and utilizing an electronic transportation diary app, MyAmble, a key feature of the above study was to track daily travel, both planned and unplanned, investigate that impact on the participants, and, overall, better understand the daily life experience of transportation disadvantaged (TD) older adults in Tarrant County. TD is defined by the US Government Accountability Office as any persons “who cannot drive or have limited their driving, and who have an income constraint, disability, or medical condition that limits their ability to travel” (Transportation-Disadvantaged Seniors, 2004, para. 1). Specific to this thesis investigation is the impact previous medical conditions and events have on transportation and quality of life for older adult residents of Tarrant County, Texas.

This thesis may have many important implications for social policy, practice, and research. First, this investigation could provide valuable insight for policy related to local transportation infrastructure, health care, especially for the many vulnerable populations of older adults, and an array of related social services. Furthermore, in terms of social services, social work practice can grow from this research through a better understanding of the wants and needs of the rapidly growing aging population and the many subgroups of older adults that represent people who have historically been underrepresented, not understood, and not been provided the attention, care, and support they need most. Finally, this thesis study represents an opportunity to contribute to several developing bodies of research, including transportation planning and transportation equity, social determinants of health and health disparities, health equity, healthy aging, and quality of life for older adults and their communities across the US and specifically in Tarrant County, Texas.

Chapter 2: Literature Review

Older Adults in America

Size, cohorts, and growth The population of older adults in America is growing rapidly. In 2014, there were 46.3 million adults over age 65 in America, and this population is expected to double in the next 40 years (Colby & Ortman, 2014). In fact, the older population is growing faster than any other age cohort in America, and the largest period of growth is expected in the next ten years, between 2020 to 2030 (Colby & Ortman, 2014). The Baby Boomers, who are largely responsible for this growth, will all have aged into older adulthood by 2030, and this will create a shift in the overall population, in which older adults, who were 13.7 percent of the population in 2012, will be 20.3 percent of the population in 2030 (Ortman, Velkoff, & Hogan, 2014).

Among the older population, there are various cohorts with varied composition. For example, older adults are often further classified as the young old, the middle old, and the oldest old, ages 65 to 74, 74 to 84, and 85 and over, respectively. Growth is projected for all of these cohorts, and in specific subcategories, such as gender and racial and ethnic minorities. It appears that the percent of men will increase over the next few decades. While only modest increases for men as a percent of the older population are projected for all adults over the age of 65, there is an expected 5 percent increase in the number of men who will live to 85 years and older (Ortman, Velkoff, and Hogan, 2014). However, projections through 2060 show the total number of older adult women still significantly outnumbering men (Vespa, Armstrong, & Medina, 2018). Furthermore, as the US population ages, it will become more racially and ethnically diverse. Vespa and colleagues (2018) reports growth from 8% to 11% in all minority racial and ethnic categories between 2020 and 2050, while the white alone group is only expected to grow by 7%.

Therefore, from 2020 to 2050, the racial and ethnic minority populations over age 65 are expected to grow from 24.6 percent of the older adult population to 40 percent. Importantly, for these and other groups of older adults, growth, or in this case, increased quantity of life, is not necessarily equal to improved quality of life (QOL).

Quality of Life The World Health Organization's WHOQOL: Measuring Quality of Life report (2018) begins to define Quality of Life (QOL) by organizing it into six domains: (1) physical, (2) psychological, (3) social, (4) environmental, (5) spiritual, and (6) level of independence. QOL is then subcategorized by an array of features, which include everything from health, wealth, family, friends, transportation, participation in the community, and access to social services (WHOQOL, 1997). With this understanding, the WHOQOL (2018, para. 2) defines quality of life (QOL) as:

“an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, personal beliefs, social relationships and their relationship to salient features of their environment.”

Ultimately, QOL is subjective and always subject to change (Barcaccia, et. al., 2013). Acknowledging the many possible features associated with QOL, its subjective nature, and the aforementioned demographic changes of the older adult US population, further investigation reveals the disproportionate impact on and experience of QOL for certain older adults in the US.

Class, race, and gender First, socioeconomic status is found to be a crucial variable in the quality of life for older adults in America (DeNavas-Walt & Proctor, 2014; Huguet, Kaplan, & Feeny, 2008). Although approximately 10% of American older adults currently live below the

poverty line, which is less than both 21% of American children and 14% of American adults from age 18 to 64 (How is Poverty Measured, 2017), this status is likely not shared equally. The U.S. Department of Health and Human Services (2016), reports that 19.2% of older adult African Americans and 18.1% of older Hispanic adults live in poverty, compared to 8.7% of older adult White Americans. As well, poverty statistics, based on either the Supplemental Poverty Measure or the US Health and Human Services official poverty threshold, may not fully depict whose lives are affected by financial limitations (How is Poverty Measured, 2017). The University of Massachusetts Boston's Elder Economic Security Standard Index estimates that approximately 50% of older adults who live alone and approximately a quarter of older adults from a two-person older adult home do not have the financial means to pay for basic daily needs (Mutchler, Li, & Xu, 2016). Again, older adult racial and ethnic minorities are being impacted disproportionately, with up to 75% of Hispanic Americans and 67% of African Americans experiencing economic insecurity, compared to 50% for older adult White Americans (Mutchler, Li, & Xu, 2016). As well, older adult women experience this economic insecurity at higher levels, with 21% of women living below the poverty line and 57% living in economic insecurity, according to the Elder Index, compared to 16% and 46%, respectively, for men (Mutchler, Li, & Xu, 2016). Finally, The U.S. Department of Health and Human Services Administration of Aging's report, A Profile of Older Americans: 2016, suggests that the reason for increased economic insecurity for older adults is predominantly due to out-of-pocket medical expenses, and those with lower incomes require more medical goods and more medical services (DeNardi, French, Jones, & McCauley, 2015).

Health Issues Among Older Adults

Accounting for both acute and chronic health conditions, the Institute of Medicine US Committee on the Future Health Care Workforce for Older Americans (Retooling for an Aging America, 2008) reports that one of the most influential factors over quality of life, level of independence, and aging in place, is health status.

Chronic health problems A chronic health condition, as defined by Hwang, et al (2001), is any health condition that limits activities of daily living, requires ongoing medical attention, and lasts for one year or more. The CDC (Falls, 2016) reports one in every four Americans has multiple chronic health conditions compared to three out of four for older adults. The National Council on Aging (Healthy Aging Facts, n.d.) specifies that 80% of older adults has one chronic health condition, and 77% have at least two chronic health conditions, with some older adults having five or more (Chronic Care, 2009). The National Council on Aging (Healthy Aging Facts, n.d.) goes on to detail that among the chronic health conditions faced by older adults four diseases are most prevalent: cardiovascular disease, cerebrovascular disease, cancer, and diabetes. Other conditions commonly experienced by older adults include congestive heart failure, hypertension, chronic obstructive pulmonary disease, arthritis, mobility decline, hearing and vision loss, cognitive decline, dementia, and depression (Campbell & Putnam, 2017). In fact, the Institute of Medicine US Committee on the Future Health Care Workforce for Older Americans (Retooling for an Aging America, 2008) reports that mental health, in general, including most commonly, depression and anxiety, is another significant chronic health condition that older adults face, as stress, aging, and the combination of stress and aging increases vulnerability to mental health conditions. Included in the stressors faced by older adults, impairments and functional losses in Instrumental Activities of Daily Living (IADLs) and

Activities of Daily Living (ADLs) further increases risk and incidence for mental health challenges. Additionally, as mental health worsens incidence of suicide increases. Finally, the Carter Center (2003) finds that mental health and physical health are interdependent, as older adults with physical disabilities are reporting higher rates of problems with mental health and people with mental health conditions experience more physical illnesses and other acute medical events and subsequent increases in health care utilization and need for long-term care (Retooling for an Aging America, 2008).

Acute medical events Along with chronic conditions, older adults also experience a number of acute medical events. For the purpose of understanding the course of changing health and functional status in older adults, acute medical events will be defined as any health condition that is either abrupt or rapidly progressive and requires immediate medical attention or hospitalization. Russo and Elixhauser (2006) report that the most common reasons for hospitalization among older adults, which often originate as trips to the Emergency Department (ED) due to acute complications from diagnosed or undiagnosed chronic conditions (Weiss, Wier, Stocks, & Blanchard, 2014), most often include: vascular issues, such as myocardial infarction or stroke; infections, including septicemia and pneumonia; and musculoskeletal and mobility problems, such as physical rehabilitation care, hip fracture, and falls (Campbell & Putnam, 2017; Russo & Elixhauser, 2003). In fact, the CDC reports that in 2014 older adults in America had 29 million falls with a resulting 7 million injuries, and, for US older adults, falls are the leading cause of injury and death from injury (Falls, 2016). However, not all trips to the ED result in inpatient hospitalization. The most common acute medical events for older adults that result in discharge from the ED include urinary tract infections, open wounds, superficial

injuries, sprains and strains, back pain, abdominal pain, or non-specific chest pain (Weiss, Wier, Stocks, & Blanchard, 2014).

Who Is Most At Risk

In general, being poorer or lower in socioeconomic status, female, or of a racial or ethnic minority status puts an older adult at greater risk for both acute and chronic disease (Lopez & Gadsden, 2016). As well, these vulnerable populations disproportionately experience problems associated with these conditions such as timely disease diagnosis, appropriate treatment, patient response to treatment, progression of the disease, loss of daily functional ability, caregiving received, social support, and quality of life (Berkowitz, Seligman, & Choudry, 2014; Crimmins, Hayward, & Seeman, 2004; Healthy Aging Facts, n.d.; Perissinotto, Stijacic Cenzer, & Covinsky, 2012; Snowden, 2003).

Low income Evidence clearly demonstrates a direct relationship between income and health; as income goes down, so too does health. In fact, there is a 500% difference in the number of people reporting fair or poor health among people with the lowest income compared to those with the highest (Braverman & Egertrier, 2008). As well, they experience greater complications from these diseases, as they are less able to acquire and attend all ongoing and necessary medical care and less able to afford materials, activities, and supports for healthier lifestyles (Christ & Diwan, n.d.). In contrast, Crimmins, Hayward, and Seeman (2004) provide evidence that people in higher socio-economic positions either have fewer chronic health problems, are more able to appropriately manage their illness, have greater access to medical care, receive better treatment, or have the resources for healthier living.

Women Like people with lower incomes, women also experience health problems disproportionately. For example, as women age they experience higher levels of vascular diseases compared to men, like hypertension and stroke (Regitz-Zagrosek, 2006). As well, women have higher incidences of kidney disease, autoimmune disease, fibromyalgia, arthritis, and diabetes (Silbiger & Neugarten, 2008; Regitz-Zagrosek, 2012; Zandman-Goddard, et. al., 2012), and the latter predisposes women to higher risk of heart disease and death from heart attack than men (Kautzky-Willer, 2012). These findings may be partly due to hormonal differences in men and women, although some conditions, like stroke, may be simply due to age since women generally outlive men (Regitz-Zagrosek, 2012). However, these disparities may also be related to the finding that medical research, historically, has been done less with women compared to men, does not discriminate disease processes and treatment differences between women and men, and, therefore, medical interventions and medical care may be less appropriate and less timely for women compared to men (Regitz-Zagrosek, 2012). In addition, more women live alone than men (Ortman, Velkoff, and Hogan, 2014), and more women live in poverty than men, again, with older adult African American and Hispanic women experiencing this at disproportionate rates compared to older adult White women (Mutchler, Li, & Xu, 2016).

Racial and ethnic minority status The health of Americans of racial and ethnic minority status suffers disproportionately compared to Americans of non-minority status. For example, Hispanic older adults experience higher rates of diabetes, obesity, and end stage renal disease than Whites (Chronic Care, 2009; Diabetes Facts, n.d.; Healthy Aging Facts, n.d.). Furthermore, Hispanic and African American adults are more likely to die of causes related to diabetes compared to white adults (Chronic Care, 2009), and both Hispanic and African American adults are two to three times as likely to have diabetes-related amputations (Diabetes Facts, n.d.)

Finally, African Americans, overall, experience higher disease and death rates in almost all categories, including heart disease, cancer, cerebrovascular diseases, influenza and pneumonia, diabetes, arthritis, mobility and ADL functional losses, and with any other diseases that are not categorized (Crimmins, Hayward, & Seeman, 2004; Hummer, Benjamins, & Rogers, 2004). It is believed that in conjunction with less education, less financial resources and opportunities, lower socio-economic status, and multiple indicators of poorer medical care, that the stress associated with racial and ethnic minority status in America is another significant factor that underlies many of the aforementioned conditions (Crimmins, Hayward, & Seeman, 2004). In fact, the American Psychological Association (Fact Sheet: Health Disparities and Stress, n.d.) recognizes perceived discrimination and acculturation, among other factors, as potential sources of stress that increase health disparities. For example, cardiovascular reactivity, which is characterized by physiological arousal and increased heart rate and blood pressure, is a typical response to stressful events, and, for African Americans, perceived discrimination is a common form of stress that leads to more frequent and prolonged cardiovascular reactivity which results in higher rates of hypertension (Williams & Neighbors, 2001). Another common physiologic response to chronic stress is prolonged elevations of cortisol, which dysregulates glucose control and increases incidence or worsens outcomes of diabetes, and significant numbers of Hispanic and Latino Americans report experiencing racial and cultural discrimination that is associated with acute and chronic physiologic impairment of glucose control, psychological distress that leads to poor management of diabetes, and, overall, progressive problems with diabetes (LeBron, Spencer, Kieffer, Sinco, & Palmisano, 2018).

Intersectionality LeBron and colleagues (2018) go on to suggest that discrimination and accompanying stress and poorer health outcomes may not only be a product of race or ethnicity

but a confluence of social statuses such as place of birth, language, gender, age, ability, SES, and health status. The theoretical framework, intersectionality, which will be detailed more fully in its own chapter, posits that outcomes, in this case health-related outcomes, cannot be explained by one factor but are a product of multiple factors that create, exacerbate, and compound disadvantage (Crenshaw, 1989; Lopez & Gadsden, 2016). For example, individually, having a lower income, being female, or of a racial or ethnic minority status is associated with worse health outcomes, but when combined, the statuses compound to create much worse health outcomes. Alvarado and Chi (2016) reports that an African American woman with a lower income experiences a significant increase in reporting fair or poor health compared to any other single status or combination of statuses.

Activities of Daily Living

The aforementioned health conditions and disparities have an impact on or are impacted by the many domains and features of QOL, especially level of independence. A review of studies from Ahlqvist, Nyfors, and Suhonen (2016) finds that the most common health changes for older adults are also among the greatest challenges to independence and immobility, either as a side effect of chronic disease and declining overall health, or as direct challenges to mobility through losses in general functional capacity, falling, and Activities of Daily Living (ADLs). Lin, Beck, Finch, Hummer, and Master (2012) define and classify ADLs as (1) Instrumental Activities of Daily Living (IADLs), including such things as shopping for groceries, preparing meals, housework, or even making telephone calls, and (2) Activities of Daily Living (ADLs), including the most basic daily needs of dressing, feeding, using the toilet, and bathing, and they report that the successive waves of current older adult cohorts in America are more disabled in their IADLs and ADLs and predict this trend to continue. It is suggested that this finding of increase in IADL

and ADL disability may be due to a combination of factors, including advanced medical technology that allows more frail older adults to advance in age, increased reporting of disability to receive benefits, and because more older adults are living at home, more older adults are included in sampling, as they are not excluded due to living in a nursing home or other institution (Lin, Beck, Finch, Hummer, & Master, 2012). Furthermore, Aging in Place in America (2010) finds that older adults fear losing independence (26%) far more than death (3%). Also, in terms of independence, older adults are more concerned about moving into a nursing home (13%) and giving up driving (11%) than death (3%) (Aging in Place in America, 2010). Finally, according to US Department of Housing and Urban Development (Aging in Place, 2013), aging in place, which is defined as the ability to remain in one's own home and community and continue one's typical daily routines, is the desire of most Americans, but homes and communities are simply not built to accommodate the changing functional daily living needs of US older adults (Aging in Place, 2013).

Transportation Issues of Older Adults

Multidimensional health status is an important factor that impacts older adults' ability to move around their homes and communities, and that includes transportation. This finding aligns with Syed, Gerber, and Sharp (2013), reporting that the greatest barrier for older adults to health care and better health, and, therefore, independence and QOL, is transportation. To understand transportation as it relates to older adults in the United States, it is important to define two key aspects: automobility and transportation disadvantage.

Automobility and Transportation Disadvantage Automobility is defined by the number of trips, length of trips, and types of trips an individual takes that are supported by a private car, and it is reported that as more Americans age into older adulthood, the older adult

population is significantly increasing its automobility (Rosenbloom, 2001). However, not all older adults are experiencing an increase in automobility. In contrast to Rosenbloom, the University of Michigan Transportation Research Institute (Sivak, 2013) finds that car ownership, in general for the US, has been declining since 2008, potentially due to increases in telecommuting and public transportation. Whether by way of public or private transportation, there are still individuals who are limited in their ability to travel, and this may be a product of transportation disadvantage. According to the US Government Accountability Office, transportation disadvantaged (TD) are those “who cannot drive or have limited their driving, and who have an income constraint, disability, or medical condition that limits their ability to travel” (Transportation-Disadvantaged Seniors, 2004, para. 1). Like the many aforementioned impacts on health, TD is experienced differently among different populations. The statuses that are most associated with poorer health outcomes, being female, of a racial or ethnic minority status, or having a low income, are also among the most common statuses that challenge automobility and exacerbate TD.

Low income and TD In an investigation cited by AARP, DeGood (2011) reports that older adults with incomes less than \$30,000 per year, which is more than half of the older adult population in America, reported being much more likely to have limited or ceased driving. Carp (1988) has found that older adults on a fixed income have less money available for the available alternative forms of transportation. As well, automobility is defined by taking trips by way of private a car, and older adults with lower incomes have fewer financial resources with which to own and operate their own automobile. In a qualitative study on driving habits of older adults, Adler and Rottunda (2006), cite one study participant who stated, when asked why she had stopped driving, “Finances.... I live on social security” (p.230).

Women and TD Overwhelmingly, in studies that examine the difference in male and female drivers, women stop driving before men (Dit Asse, Fabrigoule, Helmer, Laumon, & Lafont, 2014; Hakamies-Blomqvist & Wahlström, 1998; Jette & Branch, 1992; Siren, Hakamies-Blomqvist, & Lindeman, 2004; Stewart, Moore, Marks, May, & Hale, 1993). It is posited that women's social roles experienced over a lifetime, such as not being the primary driver and having less overall driving experience, in combination with perceptions of health and loss of functionality with advancing age leads to higher TD experienced by women (Dellinger, Sehgal, Sleet, & Barrett-Connor, 2001). More concretely, women often report lower incomes than men, especially as they age, which places them at higher risk of TD. Regardless, women experience TD sooner and more frequently than men, and, as women live longer than men, earlier driving cessation for women means that they live longer without driving, at risk of or experiencing TD longer than men (Burkhardt, Berger, & McGavock, 1996).

Racial and ethnic minority status and TD Bailey (2004) reports that older African American and Hispanic adults drive disproportionately less than their older adult White American counterparts, with only 16% of older White adults reporting not driving, relative to 39% of older Hispanic adults and 42% of older African American adults. More so, this also means that older adult minority groups are more isolated than older adult whites, as Bailey (2004) reports that 34% of Hispanic older adults and 36% of African-American older adults are confined to their home on any given day compared to just 22% of white older adults in America. As limiting or stopping driving is often a product of both poor health (Ragland, Satariano, & MacLeod, 2004) and being poor, for racial and ethnic minorities, TD is likely a product of being both poorer and in poorer health.

Location and TD Like many of the experiences and effects previously mentioned, isolation of older adult non-drivers is experienced disproportionately across the country, with lowest levels across the Midwest mountain region states, like Arizona, Nevada, Colorado, and Utah, and the highest levels across the South in states like Alabama, Mississippi, Louisiana, and Texas (Bailey, 2004). Also, throughout the different regions of the country, older adults are spread out over urban, suburban, and rural areas. Older adults report rural settings as potentially providing more opportunity for greater QOL, but for older adult non-drivers in rural communities, especially in areas that lack adequate public transportation, isolation increases and QOL decreases (Baernholdt, Yan, Hinton, Rose, & Mattos, 2012). Urban settings are also noted to have similar limitations, as urban pedestrian and transportation infrastructure is being found to be a poor fit for older adults and, again, isolating them from the services and socialization they need (Joint Center for Housing Studies of Harvard University, 2014). Finally, Frey (2007) reports that the baby boomers, by in large, are a suburban generation. As most older adults want to age in place, suburban living leaves older adults aging in low density neighborhoods, with shopping, social services, including health care, and social opportunities more spread out and harder or more time consuming to access, which has a net effect of isolating older adults and reducing QOL (Golant, 2009). Golant (2009) also notes that as neighborhoods and communities are more impoverished or have higher crime, older adults become even more immobile and isolated, as they are intimidated to leave their homes.

Intersection of health and transportation

Similar to intersectionality applied to health, intersectionality applied in transportation and health is relevant. Depending on their condition and number of comorbidities, older adults with chronic health conditions are up to seven times more likely to be hospitalized, in a given

year, than older adults with one or no chronic health condition (Chronic Care, 2009).

Compounding matters, according to Boyd et. al. (2008), approximately half of all older adults hospitalized due to an acute medical event become functionally impaired in their ADLs during and after their hospitalization, despite being successfully treated for the acute medical emergency (Covinsky, et. al., 2003). Furthermore, a review of studies from Ahlqvist, Nyfors, and Suhonen (2015) finds that among the greatest threats to independence are either issues directly related to mobility, such as functional losses in ADLs, falling, and general immobility, or indirectly via chronic disease states or their side effects that create or contribute to progressive immobility, and by definition, immobility related to medical conditions is transportation disadvantage. Bailey (2004) reports that older adult non-drivers make 15% fewer trips to see doctors, 59% fewer trips for shopping and dining, and 65% fewer trips for social, family, and religious activities than their driving counterparts. Finally, Fiske, Wetherell, and Gatz (2009) find that reductions in daily activities is the most common reason for older adult depression, and depression is leading contributor to reduced quality of life. Similar to intersectionality applied to physical health, being a widow, being “socioeconomically disadvantaged”, experiencing ongoing stress, and lacking social support are among the greatest risk factors for older adult depression (Fiske, Wetherell, & Gatz, 2009, p.13, Tracy, 2017), and the older adults most likely to match that criteria are women with a low-income and of a racial and ethnic minority status.

Summary, Gaps, and Scope of Investigation

In summary, the older adult population is the largest growing segment of our nation’s population. As a whole for our older adults, the greatest interest is quality of life through independence and aging in place. In order to attain and maintain this independence, it appears that a few key, interrelated factors must be present: transportation, mobility, and health.

However, the factors that are already known to contribute to or challenge transportation, mobility, and health, are not experienced equally among all older adult Americans. Generally, older adult women, or older adults with a low income, or older adults of a racial or ethnic minority status experience more challenges and poorer outcomes. However, theoretically and empirically, as will be explore more fully in the following chapter, it is at the intersection of gender, income, and race where the challenges are even more complex and the outcomes correspondingly worse. What is less well known is exactly what are the daily challenges with transportation, mobility, and health that these vulnerable people experience, how transportation disadvantage is impacting their health, how their health has and is impacting their transportation disadvantage, and how their local environments, including their city and its transportation infrastructure, are impacting these outcomes.

Recognizing the impact of the many factors associated with transportation disadvantage, immobility, and health among older adults, and accounting for their additive and compounding effects, especially among the most vulnerable, it is imperative to understand the relationship of these factors and the impact it has on the health, quality of life, and daily lived experience of people experiencing transportation disadvantage in specific locations. Therefore, the purpose of this investigation is to better understand how health and transportation status are related to older adults' self-reported health and quality of life among one sample of lower-income older adults living in Tarrant County, Texas.

Chapter 3: Theoretical Framework of Intersectionality

Introduction to Intersectionality

Among a myriad of aging life experiences, including health and transportation, individual's outcomes are often explained via a singular demographic focus. For example, as identified in the literature review, being a woman, or identifying as racial or ethnic minority, or having a lower income is associated with worse health and transportation-related outcomes (Adler & Rottunda, 2006; Bailey, 2004; Dit Asse, Fabrigoule, Helmer, Laumon, & Lafont, 2014). However, a singular focus or general grouping may not suffice to explain variation in outcomes, especially variation within any one category, nor to recognize and create necessary change for all individuals within that category of focus. For example, for the category of women, it is likely that an older adult woman of a racial or ethnic minority status with a lower income may have very different health and transportation outcomes and experiences than an older adult white woman with a higher income (Warner & Brown, 2011). In this case, the creation of a new category, an intersection that accounts for gender, and minority race/ethnic status, and having a low income, reveals not only differences in outcomes, but outcomes far worse than are seen in any of the aforementioned categories alone or added together (Alvarado & Chi, 2016). This theoretical framework is known as intersectionality (Crenshaw, 1989).

Origins and Evolution of Intersectionality Theory

In her book, *All the Women are White, All the Blacks are Men, But Some of Us are Brave*, Kimberle Crenshaw, professor of law, first named and articulated the theory of intersectionality, which was originally intended to explore the unique experience of being a Black woman in the United States compared to white women (Crenshaw, 1989). Crenshaw (1989) posits that race and gender are not mutually exclusive; race and gender are not “single-axis” categories that fully

account for and explain Black women's experience of racism, discrimination, and marginalization, and that an ongoing critical analysis of the multidimensionality of Black women's experience is needed to fully understand, bring to light, and positively engage and impact the lives of Black women in America (Crenshaw, 1989).

Crenshaw (1989) demonstrates how gender or race alone cannot fully account for discrimination by citing a legal case where all of the Black female employees were fired during seniority-based layoffs at General Motors, as the black women were the most recently hired because no Black women were hired before the Civil Rights Act of 1964. Brought to court as a case based on discrimination against Black women, a case of combined race and gender discrimination, the court dismissed the gender claims, as White women had been hired prior to the Civil Rights Act of 1964. The court suggested that the case be subsumed in a separate race claim against the same employer. The plaintiffs said that a case based only on race would defeat their purpose and not fight the discrimination they had experienced, which the plaintiffs argued was clearly based on both race and gender. The court responded by stating that the race statute, Title VII, does not differentiate between, for example Black men and Black women, and to do so could create unequal standings within that group and prospectively open "Pandora's box" (Crenshaw, 1989, p.143). It is from here that Crenshaw reasons, "the boundaries of sex and race discrimination doctrine are defined respectively by white women's and black men's experiences" (Crenshaw, 1989, p.143). Based on this case and Crenshaw's findings, Calasanti and Giles (2018) succinctly declare that "black women were too black to be female, and too female to be black... They experience racism and sexism in ways not reducible to one or the other" (p. 69). Single categories are not sufficient to explain the disparate outcomes evidenced among what some would consider similar people and populations.

Interestingly, as Bowleg (2012) points out, although this concept and experience was not theoretically framed in terms of intersectionality by Crenshaw until 1989, recognition of this issue has been noted in the U.S. experience at least as far back as the mid-nineteenth century. Challenging the notion that race and gender are mutually exclusive, Sojourner Truth, a freed slave, at a Women's Convention in 1851 explains in her speech, *Ain't I a Woman?*,

“that man over there says that women need to be helped into carriages, and lifted over ditches, and to have the best place everywhere. Nobody ever helps me into carriages, or over mud-puddles, or gives me any best place! And ain't I a woman?” (p.1268).

Developing Truth's insight, Crenshaw (1989), demonstrates that it is not enough, however, to define intersectionality and the associated racism, discrimination, and marginalization as a Black woman's experience, as there is great difference within the category of Black women. This finding highlights two key areas of contemporary intersectionality: (1) there is heterogeneity found within social, human grouping or categorization, and (2) for any defined group or category, the most privileged within that group or category are recognized and served while the more underprivileged are under-recognized and underserved, if not completely excluded. Crenshaw (1989) recognizes that the combination of race and gender is more complex and nuanced than simply adding together the two identifiers and their relative outcomes. She writes, “this focus on the most-privileged group members marginalizes those who are multiply-burdened and obscures claims that cannot be understood as resulting from discrete sources of discrimination” (p. 140).

Building the race and gender intersectional paradigm illuminates intersectionality's utility. As shown, the experience in society as a woman, woman as a single and comprehensive category, can vary quite dramatically. Within that category, the difference in experience and

outcomes between White women and Black women may be great. Furthermore, combining race and gender to create a new category, Black women, is also not sufficient. The within group difference in experience between a Black woman with a higher income, for example, compared to a Black woman with a lower income can vary rather dramatically. Still more, while Crenshaw founded intersectionality on gender and race, specifically being Black and a woman, intersectionality is being evidenced among and used to define a great variety of poor outcomes and experiences of discrimination, marginalization, and exclusion. It is as important to consider within group differences as it is to consider between group differences. Continuing to build on the race and gender paradigm, it is necessary to consider just how many different intersections may be present at any one time and just how much variation could exist among individual experiences and outcomes. For example, it is a worthy exercise to consider the intersection and outcomes including location, language, sexual orientation, and religious identification or affiliation, as the lived experience in a conservative community for an English-speaking heterosexual Black woman with a higher income and higher education who identifies as Christian may be radically different from a non-English speaking, lesbian Black woman with a lower income and lower education who identifies as atheist. Failing to consider and recognize intersections and the within group differences is a failure to consider differential risk for negative outcomes.

Critiques and Counterarguments

There may be any number of critiques of the theoretical framework of intersectionality. However, when the critiques are recognized and addressed, they could strengthen the theory and improve the explication and application of it. First, much of intersectionality's original work was constrained to only gender and race (Crenshaw, 1989). Of course, as has been explained above,

there are a great number of categories that can and should be considered within the impact of intersectionality. However, given that Black women have historically experienced great discrimination and marginalization, opposing the use of Black women as the essential figure of intersectionality may repeat the cycle of and serve to further discriminate and marginalize Black women. This quandary may be evidence that the process and practice of categorization, which is used for intersectionality's formulation is, itself, a process of marginalization and exclusion. More privileged, profitable, or popular categories or intersections could receive more attention, playing into the dominant paradigm and thus creating and obscuring underrecognized categories and intersections. Conversely, as categorical thinking is a natural and necessary human cognitive process (Siegler, DeLoache, Eisenberg, & Saffran, 2014), categorical thinking, especially in terms of intersectionality, may be a necessary reminder that people and investigators are already unconsciously categorizing, thus, potentially privileging and marginalizing. Therefore, one needs to be aware that this cognitive process is always occurring, it may have unintended consequences, and correcting inappropriate application of this cognitive action requires a conscious effort. Finally, as intersectionality moves from purely theoretical to being empirically evidenced, Nash (2008) suggests a lack of methodology may be another area of concern. Again questioning the other side of this critique, perhaps a less rigid, more flexible or adaptable methodology reflects the very nature of the experiences and outcomes that are reflected through intersectionality, which are unique, individual and multidimensional.

From Theory to Empiricism

Despite and also including the aforementioned critiques and counterarguments, intersectionality has been useful in empirically exploring and explaining an array of different lived experiences and outcomes in a wide variety of issues. Alvarado and Chi (2016) report that

an African American woman with a lower income, the intersection of 3 identified categories, race, gender, and income, experiences a significant increase in reporting fair or poor health compared to any other single status or combination of statuses. In their review of empirical studies applying an intersectionality framework, Warner and Brown (2011) found that few studies have been done to examine the intersection of race/ethnicity, gender, health, and older adulthood. Of the studies conducted, Warner and Brown (2011) demonstrated that compared to older White men, all other categories of older adults had worse health. Specifically, functional disability levels were found to be lowest among older adult White men, moderate disability levels were found among older White women and older minority men, and the greatest level of disability was found among older adult minority women. As detailed in the literature review, from functional disability comes decreases in independence, decreases in travel for medical, leisure, and social needs, decreases in quality of life, and increases in depression and future health risks, and the older adults most likely to match that criteria are found at the intersection of women with a low-income with a racial and ethnic minority status (Ahlqvist, Nyfors, and Suhonen, 2015; Bailey, 2004; Depression in Elderly, 2017; Fiske, Wetherell, & Gatz, 2009). Corroborating this theoretical framework, its application, and the aforementioned findings, and adding important qualitative data to the limited literature on intersectionality and transportation disadvantage, especially in Tarrant County, Texas, Adorno, Fields, Cronley, Parekh, and Magruder (2016) report from an African-American focus group on transportation,

“African-Americans, you know, basically don’t [age well] because we generally have more health issues. If you don’t have that [transportation] mobility, you’re not getting to the doctor, and you’re not going out. So yeah, there is a definite discrepancy between the

racess on how we're ageing and how it's affecting us. And it's impacting African-Americans negatively" (p.20-21).

Conclusion

At its core, intersectionality is about getting beneath the surface, exploring deeper vectors of sameness and difference, and looking within to find, understand, and help people with problems that would otherwise be overlooked and lives that would otherwise be made progressively worse. Intersectionality suggests that it is likely not any factor or category alone, but the unique combinations and compound effects that account for disproportionate and unaddressed outcomes. Therefore, this thesis investigation goes deeper and seeks connectivity to examine how factors such as SES, gender, age, ability, location, life history, and social context are related to transportation disadvantage and how those may be related to healthier aging and a better quality of life for all.

Chapter 4: Methodology

Research Questions

For people who report an adverse health event in the last five years, how does this impact the types of trips they take on a daily basis? It is hypothesized that people who report more adverse health events in the last five years will report differing amounts of planned, unplanned, or missed trips compared to those who report less adverse health events in the same time period. The second research question is how does experiencing an adverse health event affect transportation and quality of life among a sample of transportation disadvantaged older adults?

Design

This thesis relied on secondary data collected through an interdisciplinary study, *Transportation Mobility Among Low-Income, Transportation Disadvantaged Older Adults Living in a Low Density Urban Environment Using Innovative Data Collection Methods* (Fields, Cronley, & Mattingly, 2016). In this study, data were collected using an app-based ecological momentary assessment (EMA) design. By using digital transportation diaries on a portable electronic tablet, this allowed participants to repeatedly provide data in real time and in their natural, daily settings. These features of EMA combined with the digital diaries are well suited to allow for reductions in recall and testing biases, which would theoretically provide more accurate data. With these data, it is the aim of this investigation to gain a better understanding of how medical incidents are changing and challenging the preparation, prioritization, execution, and completion of daily trips for transportation disadvantaged older adults in Tarrant County, TX. Using digital transportation diaries, along with baseline questions about medical history and ability to care for oneself and live independently, this investigation explored potential relationships between health and transportation; specifically, the type and amount of daily trips

experienced by transportation disadvantaged older adults and the impact this experience had on quality of life.

Sampling Plan

In order to study the relationship between health and transportation among older adults, this study relied on a purposive sample of older adults. The purposive sample ($n=10$), all Meals on Wheels (MOW) Tarrant County clients, were identified as lower-income, transportation disadvantaged by case managers at MOW. MOW staff provided researchers with the names of persons interested in volunteering for the study who met study inclusion criteria. All recruitment activities were conducted by the research team.

Setting

This study occurred in Tarrant County, Texas, in the cities of Arlington and Fort Worth. Tarrant County is the third largest county in Texas. According to the United Way of Tarrant County (2015) report, Tarrant County is one of the fastest growing communities in the country, with projected growth of more than 2 million people by 2020. As of 2018, Fort Worth and Arlington, in terms of population, were the first and second largest cities in Tarrant County, respectively. Older adults, adults 65 years of age and older, represent 10.8% of Tarrant County's population (U.S. Census Bureau, 2017), and has been the fastest growing segment of the population (United Way of Tarrant County, 2015). As well, Tarrant County is composed of 51% females, 13.6% of total residents are experiencing poverty, 28.4% of residents are Hispanic or Latino, and 16.7% are African American (U.S. Census Bureau, 2017). Furthermore, Tarrant County has 2,094.7 people per square mile and a total population of 2,016,872 over 863.61 square miles (U.S. Census Bureau, 2017). For comparison, Chicago, Illinois, has a population of 2,704,958 over 227.63 square miles, which equals 11,841.8 per square mile (U.S. Census

Bureau, 2017) Comparing Chicago, Illinois to Tarrant County, Texas, Tarrant County's population per square mile accentuates that the residents of Tarrant County live in a rather dispersed region. Finally, Arlington, which covers nearly 100 square miles, is the largest city in the US without a public bus system.

Data Collection

Relevant to this investigation, study data were collected from participants in three primary ways: (1) baseline interviews, including questions related to general health, ability to care for oneself, and independent living over the previous five years to present; (2) electronic transportation diaries kept for 14 days; and (3) pen-and-paper diaries kept for 14 days.

Daily transportation diary: MyAmble The research team created and used an electronic app named MyAmble. MyAmble allows its user to answer a variety of open and close-ended questions related to the user's daily activities and transportation experiences and how their current transportation circumstance is affecting their access to life resources, social activities, and overall quality of life. A key feature of MyAmble, specific to this investigation, is the Daily Trip Planner.

Daily Trip Planner The Daily Trip Planner collects information about the user's daily travel plans and actual travel experiences as they relate to the user's daily needs and wants. The Daily Trip Planner is designed to be user-friendly and walk participants step-by-step through a series of questions and answers that will log planned, unplanned, and missed trips. Also, it allows participants to rate the relative importance of planned and unplanned travel, and its impact on the quality of daily living. The Daily Trip Planner feature, which is the first feature participants were asked to use each day, collected information about daily travel plans and actual travel experiences as they relate to the participants' daily life needs and wants. After logging in

MyAmble that the participant was traveling to or interested in travel that day, the participant was taken to a screen, see Figure 1, which asked the participant to select a specific type of travel plan for the day.

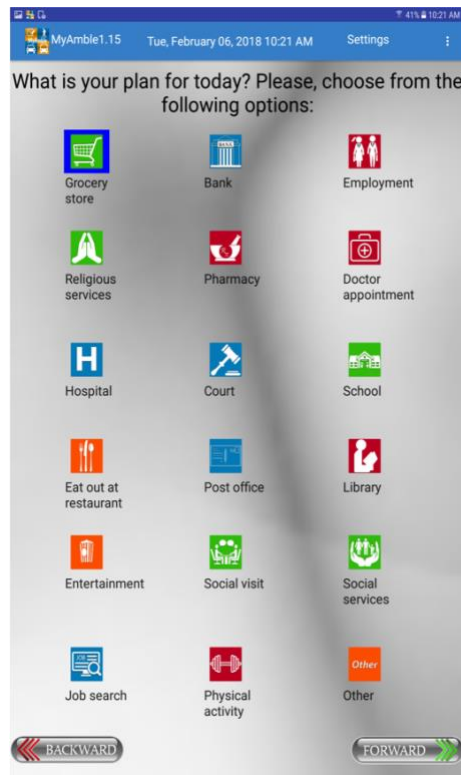


Figure 1

After selecting a particular travel plan for the day, the participants were asked a series of questions related to that specific travel plan. Participants were asked open and close-ended questions in the morning, before beginning daily travel, in order to outline, prioritize, and describe intended or desired travel for the day. For example, questions participants were asked, see Figures 2, 3, and 4, included their specific travel destination, what mode of transportation they would take, when they were planning on going, and how important each trip was to them. These questions were answered using short answer, multiple choice, or Likert scale options.

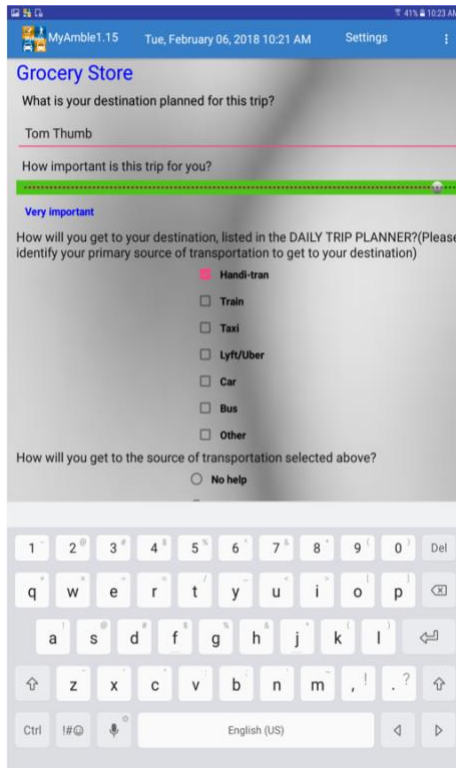


Figure 2

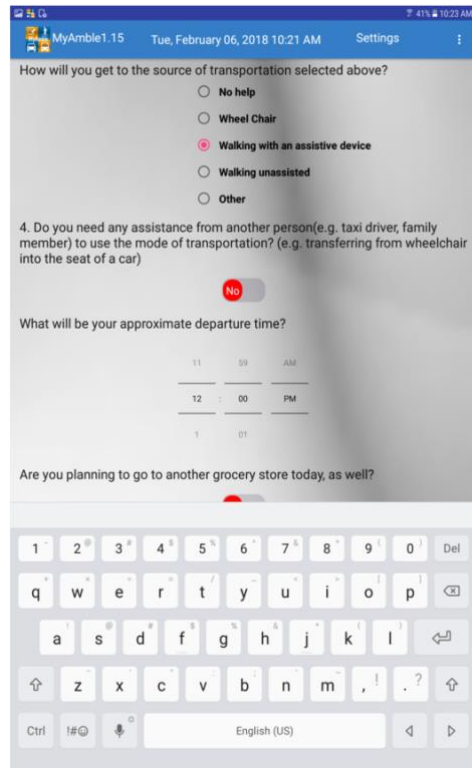


Figure 3

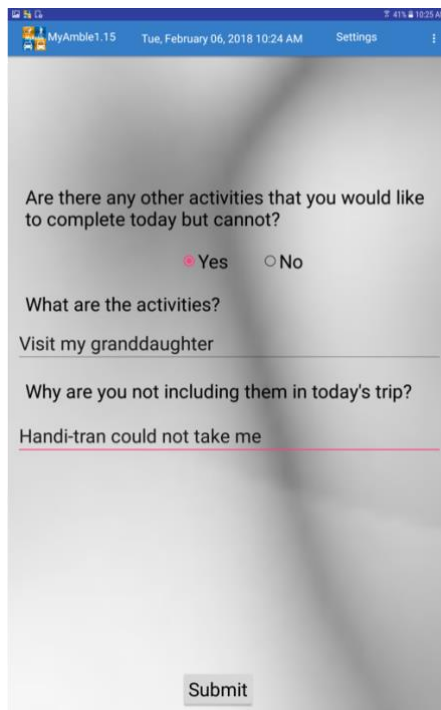


Figure 4

At the end of the day, participants were asked to log back into the Daily Trip Planner and report actual travel experiences compared to the planned travel, using the Daily Trip Planner Evening Review Journal. Example questions in the Evening Review Journal feature, as shown in Figure 5, included if the participant was able to complete the trip, how the trip impacted their mood, and how important the trip ended up being for them. Also, there were questions about trips needed after the daily plan was logged, if the trips were completed or not, and, if they were missed, why they were missed. Again, participants answered open and close-ended questions through short answer, multiple choice, and Likert response options.

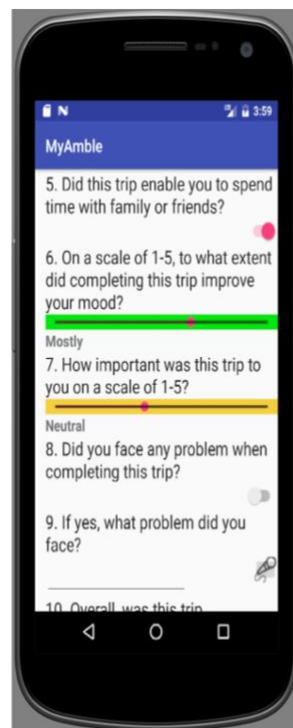


Figure 5

The Daily Trip Planner had a total of 15 questions. The questions covered critical transportation and social experiences, including mode and purpose of transportation; departure time, origin and destination of travel, and GPS confirmation of travel; trip importance, success,

and challenges, including visual records, and impact on mood; reason for missed trips and consequences; interaction with friends and family and social exclusion related to transportation.

Travel Buddy Travel Buddy, which was designed to be a significant source of qualitative data, is a process akin to text messaging. Travel Buddy was to be used more freely and at the discretion of both the research team and the participant. Participants could initiate communication and communicate in real time with the research team about personally relevant travel experiences and impact on quality of daily living. Also, the research team could initiate communication through open-ended questions relative to three domains of social exclusion: resources, participation, and quality of life. Questions included in Travel Buddy conversation, which can be seen in Figure 6, included: “how do you get out of the house to see family and friends?”; “how safe do you feel leaving your house or traveling around your community?”; and “how does your access to transportation affect your overall quality of life?”.

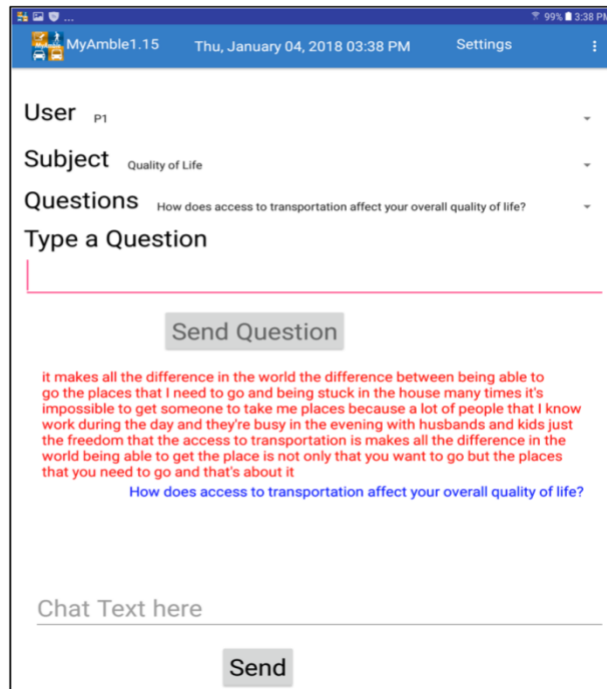


Figure 6

Pen and Paper diary For the other 14 days of the study, participants recorded a detailed inventory of their travel experiences using a traditional pen-and-paper diary. The pen-and-paper diary was formatted to collect the same information, in the same sequence, as the Daily Trip Planner from MyAmble.

Data collection process To facilitate the data collection process and properly train participants to use the electronic tablets and the MyAmble digital diary app, four research assistants and the co-principal investigators (co-PIs) worked individually with the 10 participants. The four graduate research assistants (GRAs) were all graduate students in the School of Social Work at the University of Texas at Arlington. The co-PIs were an Associate Professor and Assistant Professor in the School of Social Work at the University of Texas at Arlington. The GRAs were each assigned two participants, along with both co-PIs assigned one participant each, for a total sample of 10 participants (n=10). To train the participants to use the tablet and MyAmble and collect the data, the GRAs and co-PIs arranged a time to meet with each participant assigned to them at the participant's home. The GRAs and co-PIs then traveled to participant homes, on two separate occasions, first, to provide hands-on training of the use of the tablet device, and, second, to complete the baseline survey. The baseline surveys were formatted in and administered using Qualtrics, an online, electronic survey format. The research team read the survey aloud to the participants and recorded the answers digitally using the tablet device. The participants were then asked to use the MyAmble app via the tablet for two weeks (or 14 days). Specific to this project, the participants were asked to record their daily travel plans, using the Daily Trip Planner every day, for the next 14 days. After 14 days, they were asked to switch to a pen-and-paper version of the daily trip planner and to record their daily trip plans for a subsequent 14 days. The participants were asked to plan and record, each morning,

their daily travel plans, and then, in the evening, review and record their actual travel experience for that day. This included their planned trips, unplanned trips, and missed trips, and the relative impact of these experiences on their quality of living. As the interactive and storage features of MyAmble are Wi-Fi dependent, all data collected via MyAmble were automatically stored securely in the MyAmble cloud. Both the baseline survey data and MyAmble data were transferred to and analyzed using SPSS. Pen-and-paper data were transferred manually into the same database. Finally, in terms of confidentiality, individual participation and any identifying participant information has been and will be kept confidential.

Measures and Variables for Quantitative Analysis

Dependent variable The dependent variable was types and number of trips: planned, unplanned, and missed trips that participants report. Data for this variable came from the Daily Trip Planner and the pen-and-paper diaries. Specifically, the app asks, “what type of trip” and responses can be “planned,” “unplanned,” or “missed.” The researcher added the total number of planned, unplanned, and missed trips across the 4-weeks of data collection for each participant.

Independent variable The independent variable for this investigation was history of medical incident within the last five years. Data for this variable came from a three-part question, Question 36, from the baseline survey. Part one of question 36 asks, “in the last five years, have you experienced a medical incident related to any of the following” and the response options include: cardiovascular health, cerebrovascular health, cancer, diabetes, orthopedics, arthritis, physical mobility, vision, pain, psychological health, memory, and other (please describe)?” If the participant answers *yes* to any of the above options, the researcher will code 1 = adverse health event. If the participant does not answer “yes” to any of the options, the researcher will code 0 = no adverse health event.

Descriptive variables The research team collected a variety of demographic information, which included common variables such as age, race, ethnicity, and gender. As well, data was collected on their employment history, current relationship status, living arrangement, transportation history, and experience with technology. The domains of data collected were as follows: general demographic, health, transportation mobility, and technology use experience. Basic demographics included 17 multiple choice or short answer questions. Transportation mobility included eight multiple choice and short answer questions. Experience with Technology included four multiple choice and Likert response questions. Health was fully comprised of the Medical Outcomes Study: 20-Item Short Form Survey Instrument (MOS SF-20). The MOS SF-20 consists of 20 multiple choice and Likert response questions. The MOS SF-20 represents six domains of health: physical functioning, role functioning, social functioning, pain, mental health, and current health perceptions (More About the 20-Item Short Form Survey (SF-20), n.d.) This instrument was scored by summing each section, reversing the scores of the physical, role and mental health functioning, so that higher scores represent better health, and each section was summed and transformed to a 0 to 100 scale with higher scores equaling better health, with the exception being the pain score, where a lower score is a better pain score (Free Online SF-20 Score Calculator, n.d.). A final health-related question and an accessory question to the independent variable, part two of question number 36 on the baseline survey asked, “in the last 5 years, if you experienced a medical incident listed above, did this medical incident in any way challenge your ability to take care of yourself or live independently? Yes or no?”

Quantitative data analysis

All quantitative data were analyzed using SPSS v. 24, and descriptive analyses were used to describe the sample including race, gender, age, current relationship status, living

arrangement, transportation history and current status, employment history, and domains of QOL. Descriptives included means, standard deviations, and ranges for continuous-level variables and frequencies and percentages for categorical and ordinal-level variables.

To answer research question #1, the researcher ran three t-tests to test for mean differences in the types of trips taken (planned, unplanned, and missed) between participants experiencing more adverse health events within the past five years and those experiencing less adverse health events. Due to the small sample size and low sample power, and thus the low likelihood of detecting statistical significance, the researcher computed the effect size, as well as calculated for statistical significance. Missing data was treated with listwise deletion and mean substitution.

Qualitative Data Source

Qualitative data were collected in MyAmble through text responses and transcription in the Daily Trip Planner and text communication through the Travel Buddy feature. The transcripts were stored in an online Excel data base and then transferred to a Word document for analysis.

Qualitative Data Analysis

For research question #2, the researcher conducted a conventional content analysis (Hsieh & Shannon, 2005) of the Travel Buddy data. Using iterative coding (Strauss & Corbin, 1998), the researcher, through a multi-step process, analyzed the data to identify and organize data under themes related to physical health and transportation and quality of life. Specifically, the researcher began by transferring all data to a Microsoft word document. Then the researcher read the transcripts to get a general understanding of what had been communicated by the participants. Next, the researcher reread the transcript while making summary notes of each data entry. From there, the researcher reread the transcripts and summaries and created several

comprehensive summary categories. Next, the researcher grouped all data entries under the summary categories they most appropriately belonged. Finally, from these categories, all data was reread once more and final themes emerged, as did subthemes. The researcher's graduate advisor reviewed random samples of the transcripts to verify themes. When necessary, the researcher and graduate advisor employed member checking and deviant case analysis to confirm themes.

Chapter 5: Results

Quantitative Results

Demographics

Mean age was 69.56 years ($s.d.=3.75$), with a minimum age of 64 and a maximum age of 76. The sample was 70% ($n=7$) female, 50% African American, and 70% living alone.

Participants had lived in their current cities for an average of 21.40 years ($s.d.=26.21$), with a range of 70 years. See Table 1 for full description of demographic characteristics.

Table 1
Demographics (N=10)

	Frequency	%
Gender		
Male	3	30
Female	7	70
Race/Ethnicity		
African American/Black	5	50
Caucasian/White	5	50
Relationship Status		
Divorced	3	30
Living with another	1	10
Married	1	10
Separated	1	10
Single	2	20
Widowed	2	20
Employment Status		
Out of work and looking for work	1	10
Retired	6	60
Unable to work	3	30
Current Living Arrangement		
Alone	7	70
With spouse	1	10
With non-family caregiver	1	10
With others	1	10
Current Residence		
Own home	4	40
Senior housing complex/apartment	6	60

Health Statistics

The mean for total number of reported adverse health events was 4.9 (s.d.=2.29) with a minimum of 2 adverse health events and a maximum of 9. Participants were evenly distributed between 2-4 adverse health events and 5-9 adverse health event groupings. See Tables 2 and 3 for full details.

Table 2
Self-reported Types of Adverse Health Events, Frequencies and Percentages (N=10)

	Frequency	%
Cardiovascular	4	40
Cerebrovascular	2	20
Cancer	0	0
Diabetes	5	50
Orthopedic	3	30
Arthritis	7	70
Physical Mobility	5	50
Vision	5	50
Pain	9	90
Psychological	5	50
Memory	1	10
Other	3	30

Table 3
Adverse Health Grouping (N=10)

# of Adverse Health Events	Frequency	%
2-4	5	50
5-9	5	50

From the Medical Outcomes Study survey, with scoring ranging from 0 to 100, with scores closer to 0 equating to poorer health, the mean score for physical functioning was 44.17, the mean score for role functioning was 30.00, and the mean score for health perceptions was 47.83, all relatively low scores out of 100. For pain, in which a higher score, closer to 100, is equivalent to a more severe experience of pain, the mean score was 70.00. See Table 4 for full details.

Table 4
MOS SF-20

	Mean	Median	Standard Deviation	Minimum	Maximum
Physical Functioning	44.17	45.85	35.57	0.00	83.30
Role Functioning	30.00	0.00	42.16	0.00	100.00
Social Functioning	64.00	70.00	39.78	0.00	100.00
Mental Health	73.20	74.00	14.61	44.00	92.00
Health Perceptions	47.83	35.00	30.89	10.00	91.80
Pain	70.00	60.00	14.14	60.00	100.00

(Footnote: Scoring ranges from 0-100 with 100 being best condition, except for pain. Pain scoring is inverse with 0 being best condition.)

Transportation Statistics

The mean for planned trips was 4.40 (s.d.=2.91), with a minimum of 2 planned trips and a maximum of 12. The mean for unplanned trips was 2.50 (s.d.=4.22), with a minimum of 0 unplanned trips and a maximum of 14. The mean for missed trips was 0.90 (s.d.=0.88), with a minimum of 0 missed trips and maximum of 2. See Tables 5 and 6 for full transportation-related details.

Table 5
Driving Status (N=10)

	Frequency	%
Do you currently drive?		
Yes	1	10
No	9	90
Do you own a car?		
Yes	1	10
No	9	90
Do you have a valid driver's license?		
Yes	2	20
No	8	80

Table 6
Trip Statistics

	# of trips	Frequency	%
Planned Trips	2	2	20
	3	2	20
	4	4	40
	6	1	10
	12	1	10
Unplanned Trips	0	4	40
	1	1	10
	2	2	20
	3	2	20
	14	1	10
Missed Trips	0	4	40
	1	3	30
	2	3	30

Relationship between Health Events and Mean Number of Trips

Results did not support the hypothesis. However, average unplanned trips for people with 5 to 9 health events occurred 2.57 times more often compared to people who reported 2 to 4 health events ($M = 3.6, s.d. = 5.941$ vs. $M = 1.4, s.d. = 1.34164$). This difference was not statistically significant ($t(df = 8) = -.808, p = .443$). The mean differences were .40 for planned trips, 2.20 for unplanned trips, and .20 for missed trips. See Table 7 for full details.

Table 7
Health and Type of Trip

Type of Trip	# of Adverse Health Events	N	Mean	Standard Deviation	t	p	d																				
Planned	2 – 4	5	4.60	4.219	.205	.843	.130																				
	5 – 9	5	4.20	1.095				Unplanned	2 – 4	5	1.40	1.342	-.808	.443	-.511	5 – 9	5	3.60	5.941	Missed	2 – 4	5	0.80	0.837	-.343	.740	-.217
Unplanned	2 – 4	5	1.40	1.342	-.808	.443	-.511																				
	5 – 9	5	3.60	5.941				Missed	2 – 4	5	0.80	0.837	-.343	.740	-.217	5 – 9	5	1.00	1.000								
Missed	2 – 4	5	0.80	0.837	-.343	.740	-.217																				
	5 – 9	5	1.00	1.000																							

Qualitative Results

The research question for the qualitative exploration asks: how does experiencing an adverse health event affect transportation and quality of life among a sample of transportation disadvantaged older adults? The data from Travel Buddy conversations indicate that (1) *transportation is multiply burdensome*, and (2) *quality of life is measured by complicated, compromised, and sometimes confounding health outcomes*. See Table 8 for a summary of themes and subthemes.

Table 8
Qualitative Results

Theme	Subthemes
Transportation is multiply burdensome	Option limited Time consuming Financially challenging Increased danger
Transportation paves a varied road within health and quality of life	Simultaneously bettered and worsened Psychosocially compromised Adaptive, resourceful, and resilient

Theme 1: Transportation is Multiply Burdensome

The evidence suggests multiple burdens experienced by the participants related to transportation. There are many reports of time lost, challenging wait and travel conditions, financial pressures, and still unsatisfying options for desired transportation.

Subtheme 1: Option limited. *Overall, the travel options for the sample were quite limited, with the majority of participant cited transportation destinations limited to healthcare and basic shopping. Several participants reported that their transportation opportunities were almost solely limited to healthcare related needs. As one participant discussed, "...to get out of the house...my private driver... is provided by my insurance company. This is basically used to go to and from my doctor's office."* Another participant shared a similar experience about a

government supported healthcare and transportation service, “I use the car with LogistiCare... just to get out of my house so that I could go and see my doctor.” As well, another participant echoes the use of LogistiCare and another local transportation service, Mobility-Impaired Transportation Service (MITS) and its limited healthcare-related use “LogistiCare only take you to the doctor's appointment and CVS pharmacies that's all. MITS will take you to more places, but you have to pay MITS every time you ride it.”

Not all travel options are healthcare related, although much of it seems to be necessity-based and less for leisure. One participant, when asked what they would do when able to get out, again reflected healthcare as the primary travel destination but then goes on to mention shopping, “will go to doctor’s visit, if any, or go to grocery shopping.” For others, there appears to be more destination options, however, they do seem to be limited to healthcare, basic shopping, and eating (which may work in opposition to healthcare). One participant described,

My favorite bus run takes me down to the main terminal where I can catch almost every bus. that way I can go to Baylor Scott & White Hospital, Harris Methodist Hospital, Firehouse Sub. bus 72 and it's continued route can take me to places like the US Postal Service, Goodwill, Walmart, Walgreens, Dollar Tree, Aldi's, Albertsons and Sonic. Also... you can catch bus 6 in either direction, to Hulen Mall, and the doctor's office.

As the options for travel destination may be more diverse for some, still other limitations, like location, have been noted. “I’ll go if I can find a bus route to go.” Another participant mentioned a doctor’s appointment that would have to be cancelled due to “the bus dropping me off 15 minutes away from (the) doctor’s office.” She went on to say, “this explains how things run when you're disabled and need transportation.” One participant appreciated the use of public transportation but, again, noted its limitations, “bus transportation is good to (a) certain extent...

they sometimes do not get you to the direct location you need.” Similarly, one participant who seemed to be happy with their travel abilities noted their travel distance and diversity was limited saying, “usually don’t go far, just JPS (the county hospital), Walmart and the dollar store down the street.” Ultimately, when asked how convenient the transportation options are, a participant simply replied, “not very”, with another participant summarizing transportation limitations saying, “either way it goes, it's pretty hard to get around if you don't have someone to take you or your own transportation.”

Subtheme 2: Time consuming. *Whether it was for public, shared, or private transportation, most participants detailed time-related burdens in their daily transportation experiences.* As one participant succinctly noted, “we have (to) wait (a) long time for pickup.” Another participant recalled, “they (MITS) just have a huge time window that can be difficult. Today we were finished with our shopping but had to wait over an hour for our scheduled pick up time.” This same participant recalled another incident in which time waiting for MITS was a factor. “...One lady who walked to the store offered to go home and get her car to give me a ride home so I wouldn't have to sit there for another hour waiting for MITS”. Once a person is riding on the transportation system, even more time may be consumed, as one participant evidenced, “...it’s hard on MITS because it goes too many other places and make too many stops.”

Importantly, the cost of time is not just limited to public and shared transportation systems, and the time cost may be burdensome in other ways, such as to one’s health. Overnight, one participant had to make an emergency trip to the pharmacy. When asked how they get out of the house to get services they need on short notice, they replied, “have to wait for a ride from my sister depending on gas!” Similarly, another participant noted that if a prescription weren’t ready

by the end of the day on a day she could travel, it would three or four more days until she could travel to the pharmacy and get her prescription.

Unlike traveling with your own automobile, in which exact departure times, to some degree, can vary by personal need and not affect arrival outcomes, requiring public or shared transportation to get around requires one to be hyper-punctual. “I wanted to plan a trip this a.m. I slept late. If I don’t get out early, I can’t go.” Another participant described this experience saying, “it's hard when you have to depend on people for transportation because you have to be there on time and not late.”

Subtheme 3: Financially challenging. *Whether planning how to use funded ride services, paying friends and neighbors for simple daily travel, or leveraging one’s food and medicine budget to pay for vital healthcare trips, participants described many financial challenges with daily transportation.* Another identified burden, which may not be commonly considered among public transportation, is the financial impact, which may vary from requiring planning and attention to a source of significant strain. One participant detailed how she plans various trips based on what she can afford or what is paid for. “On my power chair I'm able to go to places free of charge.” Of course, an important caveat to going places free of charge on a power chair is that obtaining and maintaining a power chair comes with financial impacts. The participant goes on to describe what she spends on other sources of travel and how she plans. “I paid \$2.50 for an all-day pass that takes me pretty much any where's with in Tarrant County. With a handicapped accessible van I get 36 single trips or 18 round trip paid for by my insurance company.” Again, using these services depends on having enough money, which some note running out of by the end of the month, and having insurance coverage that supplies this type of transportation.

It was evidenced that not everyone had the aforementioned resources or access to them. When asked how a participant travels to get to the store, they responded, “my son or someone else living in the building. I ask them (to) give me a ride to the store and give them \$10 to take me and bring me back home.” Without family, friends, or neighbors as an options, another participant expressed, “if I have the money to pay for a MITS trip, that's what we use, like going to the store or doctor's office.” However, the amount of money needed for MITS trips may be quite significant. Adding up the actual financial cost of a MITS trip, a different participant said,

I would use (a) mode of transportation called MITS but 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 their medicine and food allowance.

Echoing the high price and pay-per-trip structure, another participant noted, “it was expensive because I used the MITS bus... I believe mitts has raised their prices for this year... with mitts you have to pay going and coming back... so you have to pay twice.”

Subtheme 4: Increasing danger. *A variety of threats to personal safety and risks of increased danger were evidenced among this sample when describing day-to-day travel.* As evidenced in the previous section, an individual could incur so much transportation-related costs that it threatens their ability to pay for food or medicine, which would clearly increase danger to one's health. However, there are other ways in which issues of increased danger and personal safety have been evidenced. One participant described physical mobility danger saying,

...It is hard to access bus transportation due to repairs on the property. Before, I could take the back elevator and the bus transit was there. Now, I have to go out a side door... I went out the side door this a.m. and not (being) use(d) to the walker, almost fell.

Once out of the home, there are other means of transportation that could be dangerous. A different participant described “using the power chair on sidewalks (or) in crosswalks and things like that.” There are many safety threats potentially associated with that including impassable terrain and inconsiderate or inattentive drivers and pedestrians. Another participant, on the safety concerns of traveling in a chair, detailed,

people in wheelchairs seem to have a bulls-eye target on them and I get scared sometimes when I get too many people around me that I don't know....some criminals will attack someone in a wheelchair because they are seen as an easy target who would put up little or no resistance.

Similarly, another participant stated, “I only feel unsafe when I travel by myself.” Continuing with the concerns of environmental safety and criminal activity, one participant said, “I feel safe traveling around my neighborhood during the day but not at night.” Another participant echoed this, saying

... where we stay there are no lights no street lights lit up... when you are waiting on the bus to come after 8 it's dark at the bus stop... and here we are senior citizens and no lights for protection.

In contrast, another participant noted feeling “very safe” saying, “we know the officers in the area, and they lookout for us.” Unfortunately, if one does not know their local officers or the local officers are not accessible or attentive, the outcomes may be similar to the aforementioned danger and safety concerns. Ultimately, many aspects of the transportation environment appears

to be a significant consideration for people experiencing TD, as one participant noted, “I generally don't go places where I might feel unsafe.” Importantly, what could feel safe and free of danger to a person with transportation and good health might be experienced as very unsafe to those experiencing health problems and transportation disadvantage.

Theme 2: Transportation Paves a Varied Road Within Health and Quality of Life

Quality-of-life, when specifically broached by the researchers and participants, most often was communicated in health narratives. Whether physical, psychological, or social health, the participant's proxy for quality of life, was reported, often times by the same individual, to be both bettered and worsened, through the interplay of existing health status and transportation. The results suggest that experiences of and relationships among health, quality of life, and transportation were found to be complicated, compromised, and confounding, and ultimately reflecting an inextricable link between quality of life, health, and transportation.

Subtheme 5: Simultaneously bettered and worsened. *Quality of life, transportation, and health was revealed to be a complicated relationship, in which transportation mediated both better and worse health and quality of life outcomes, often simultaneously.* Based on the participant responses to the question, how does access to transportation affect quality of life, quality of life was most often measured by participants' health perceptions. For example, when asked how access to transportation impacted quality of life, one participant seemingly positively responded, “it means I don't have to walk everywhere because I can't walk that good because of my knees and hips and back.” With the same question, another noted, “I can't always go. A lot of things depend on how I feel.” It is from here that the complicated nature of this issue begins to appear. According to most participant responses, transportation was either complicating health, health was complicating transportation, or both, with all of these scenarios complicating quality

of life. Simultaneously, and further complicating the issues, is the consistent finding that as some aspects of quality of life were bettered, others were worsened. As one participant notes, she got out for the day but has been physically challenged because of it. "I have been tired all day because of our trip to the store yesterday. It usually takes two days to get over it." Similarly, this participant noted on another day getting out for needed medication but the trip being physically exhausting. "I'm still a little tired after our trip to the JPS pharmacy Saturday... I'm ready for my nap." Another participant described their transportation experience being complicated due to a physical challenge but positive benefit. "Today it was It was kind of hard because I was short of breath, but I did...it was a good day." Another participant described how the unpredictability of one's health coupled with the inflexibility of available transportation can really be frustrating and reciprocally challenging by reporting,

If I wake up the day of a scheduled trip and don't feel well I still have to go, even if I would rather go back to bed. There just isn't an easy way to make adjustments and there have been times I didn't think about planning a trip because I didn't feel well but the next day I felt great by comparison and it wasn't possible to schedule a trip. I really need a working crystal ball to be able to accurately predict trips.

This participant, later, summarized the issue well, reporting that although transportation allows them to accomplish things that need to get done that contribute to some aspects of quality of life, the struggle to accomplish these trips simultaneously strains other aspects of the quality of life experience, especially health, saying,

...there are certain things I HAVE to do every month. Like grocery shopping on the first when Dawn gets her food stamp benefits, and non-food purchases when I get my disability on the third. And I have to purchase money orders to pay some bills that I have

to buy on the third or later as well.... Plus we both have doctor appointments that are scheduled one to six months in advance that cannot be changed, even if we don't really feel like going out.

Beyond physical health measures, quality of life complications related to transportation are reflected in mental, emotional, and psychological health. One participant notes, “my day-to-day life...is pretty boring since I'm house-bound and in a wheelchair” Another participant explained more grimly, “it 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.” A different participant summed up, “...anytime I miss the bus, it affects the outcome of my complete day.” In contrast and reflecting what a good transportation experience can provide, another participant stated, “I always feel better if I am able to get out some time during the day. I don't feel like a shut-in. I think it is important for seniors to be able to go out.”

Subtheme 6: Psychosocially compromised. *Based on their health and transportation statuses, many participants described psychosocially-related compromises they have made to mitigate negative experiences of quality of life or improve aspects of quality of life.* Extending from the psychological complications related to health, transportation, and quality of life is the evidence of participants being psychosocially compromised. When asked about getting out to be involved in the community, a participant reflected compromises they make, based on their health and transportation conditions. “We have been voting by mail for 2 years now. Cannot talk to anyone that way but we are able to vote!” The participant expresses excitement about being civically engaged but disappointment about being socially isolated. Another participant reflects the social compromises she makes with her volunteering, noting that she volunteers where she lives but would like to do more elsewhere. “I do volunteer work in the building... every third

Saturday... it's a blessing and I love doing it...I would love to volunteer at more places...I love meeting new people.” When asked if transportation affected her ability to volunteer, she responded, “...transportation is the biggest problem that I have.” Sometimes, socially compromised ends up being socially deprived. Demonstrating the connected impact transportation disadvantage can have, a participant reported,

...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,... I have my 84 year old mother who lives in Keller, but MITS won't go there.

Keller is a city in the same county as this participant, but there are no available transportation options for her to travel within county to socialize with her mother. Finally, other compromises may be about the most basic social outing, as one participant notes that it can be challenging to indulge in some of life's most simple pleasures. “Sometimes you just want to go get a hamburger, but you can't, so you do without” It seems that there are a wide range of experiences that can contribute to quality of life that and that these participants have too often had to compromise and do without.

Subtheme 7: Adaptive, resourceful, and resilient. *An extension of the previously described compromises and a confound of the transportation disadvantage and adverse health status intersection, participants often evidenced adaptation, resourcefulness, and resilience in response to their life, health, and transportation limitations.* While it is probably a stretch to report that participants see life as improved because of their condition and disadvantage, they do evidence positive responses to their situations. First, the participants express an adaptive ability to rise to the challenge, as many participants, despite physical health and mobility challenges and

high experiences of pain, describe walking whenever they cannot get a ride. Another participant described how she prepares for the challenges of the exhausting travel day by explaining,

We are used to their rules. Like when we have to go to the hospital for an appointment.

They want you to schedule your pick up time an hour and a half before your appointment and you're going home pick up at least 3 hours after your appointment time. So we take a bag with a blanket for Dawn when she gets cold, food so we can snack while waiting and plenty of water for me to drink.

Furthermore, participants often reflect great planning to carefully take advantage of all that they have, as exemplified by a participant describing,

We plan ahead as much as we can. Like Dawn gets her food stamps on the first of the month so we plan grocery shopping for that day. I get my disability on the third so we plan a trip for non-grocery items then.

This same participant goes on to detail an adaptive resourcefulness seemingly borne out of their challenging conditions saying,

Dawn has a problem if she has to stand for a long time. I solved that issue by buying a tote bag on wheels that has a fold-down seat. Then when she needs to sit, she sits and when she gets tired of sitting she can just stand up.

This same participant concludes by specifically noting her recognized adaptability, resilience, and resourcefulness reporting,

We are used to planning ahead. This has been going on for a number of years... I adapt well... I also try to use the brains God gave me to be a problem solver. I'm usually pretty good at that.

Another participant, when talking about the limitations of public and shared transportation, echoed and summarized adopting a positive, adaptive, and resilient attitude, saying that when you are relying on others for transportation, “you are really at their mercy so there’s nothing you can do but just go along for the ride.”

Chapter 6: Discussion

The older adult population in the U.S. is one of the fastest growing in the world (Sade, 2012), but with that boom comes challenges, including challenge to transportation, health, and quality of life. Nowhere may this be more relevant than in the county of investigation. Tarrant County, Texas currently has the fastest growing population in the U.S. (New Census Bureau, 2018), with older adults representing the largest percentage of that growth (United Way of Tarrant County, 2015), unique transportation challenges of being a low-density urban and suburban environment, and the largest city in the country without a public bus system (Barry, 2013). Altogether, Tarrant County, Texas represents an important location and population to examine the relationship between health, transportation and quality of life. Specifically, this investigation asked two research questions. First, for people who report an adverse health event in the last five years, how does this impact the types of trips they take on a daily basis? Second, how does experiencing an adverse health event affect transportation and quality of life among a sample of transportation disadvantaged older adults?

Research Question One (Quantitative)

The results indicate no statistically significant difference among the types of trips taken for people who reported more adverse health events (5-9) and people who reported less adverse health events (2-4). Although the findings were not statistically significant, results showed a moderate effect size for unplanned trips. This suggests that having more adverse health events may be uniquely related to likelihood of experiencing unplanned trips.

Generally, the results do seem to make sense. All of the participants, those reporting less health events and those reporting more, were health compromised and previously identified as having a low income and experiencing transportation disadvantage. Therefore, based on the

participants many similarities, it is reasonable to expect their outcomes to be somewhat similar, which they were. Differences in trip outcomes may not be statistically significant until older adults, similar to the ones in this sample, are compared with a more diverse older adult sample. It is almost certain that the small sample size affected the lack of statistical significance.

Despite the lack of statistically significant findings, there are outcomes that are noteworthy. First, there were slightly more planned trips among those with less health events, suggesting that less health events or better health may allow an individual to feel and be more able to travel and feel confident planning ahead. Given a larger or more diverse sample, with a bigger range of health status, this effect could be detected more easily. For unplanned trips, again although not statistically significant, there were 2.57 times more unplanned trips for those with more health events than those with less. Based on the qualitative findings, one explanation for this could be that people experiencing more health problems experience too many uncertainties to plan ahead and must make trip decisions in the moment. Finally, and again, although not statistically significant, there were slightly more missed trips for those with more health events than less. Similar to unplanned trips, this finding could suggest that those with more health events may have more trouble adhering to a schedule, potentially based on, at least according to the MOS SF-20 scores, physical functioning or pain. Again, based on qualitative findings, along with the planned and unplanned statistics, as with unplanned trips there are no planned trips to miss, the missed trips statistics could represent that these participants either are (1) not planning trips they do not believe they can make, therefore there is no trip to be missed, (2) simply cannot afford to miss trips as their trips are so often so vital to basic survival needs, (3) they are or have grown to be resilient and resourceful and simply find a way to accomplish trips, or (4) any combination of these.

Results also seem to fit with the theoretical framework of intersectionality. Consider the participant with 14 unplanned trips, which is 14 more unplanned trips than that of four of her peers. It did not suffice to think of this participant simply as an older adult. There is more needed to attempt to explain the difference. To better begin to understand what may influence such an outlier, it is imperative to look at within group differences. This participant is not only an older adult, this participant is female, but 70% of the sample is female, so there may be more. This participant is unable to work and has a low income, but this entire sample was identified and selected in part because of having a low income. Again, there may be more. This participant has no driving experience, across her entire life. This finding appears to be unique. This participant reported not finishing high school, which was seen for only 30% of this sample. This participant reported eight adverse health events and scores poor for physical functioning and health perceptions and second highest in subjective experience of pain, all of which puts her at the poorer health end of the 5-9 adverse health events sample. Finally, this participant is Black, but 50% of the sample was Black. Any one of the categories mentioned may be associated with worse outcomes, but in this case, at their intersection, the outcome evidenced is 14 times greater than that of four of her peers. Of her four peers that reported no unplanned trips, three of the four are White and all report a higher level of education. Rather unfortunately, this participant perfectly matches the literature of intersectionality of aging, health, and transportation disadvantage. Similarly, all of the participants with the most missed trips ($n=3$) were female. Two of three were Black and reported more than five adverse health events, and all three do not work and report experiencing high levels of pain.

The findings from this study and the reported experiences of transportation disadvantage and compromised quality of life may appear for a number of reasons. First, this is a

predominantly female sample (70%) and the literature clearly finds that women stop driving before men, more often live alone and on a lower income, which limits automobility and transportation, and, due to poor health perceptions, leads to a higher incidence of limited transportation (Dellinger, Sehgal, Sleet, & Barrett-Connor, 2001). Furthermore, the Black participants had an average pain score of 76 (closer to 100 is equated to worse pain), while the White participants had an average pain score of 60. In fact, 60 was the lowest score reported among all the participants, and all of the white participants reported a score of 60. Sensitivity to pain has been shown to be associated with cardiovascular reactivity and stress (Caceres & Burns, 1997), two conditions that have been shown to be elevated among the U.S. Black population at large (Fact Sheet: Health Disparities and Stress, n.d.). As well, Shrestha and colleagues (2017) find that pain significantly contributes to limited daily activities for older adults, including the use of all forms of transportation. Complicating the issue, with transportation limited, access is limited to healthcare and other personal and social needs that may reduce stress or strengthen health. From here, health may then be further compromised, and the cycle of physical, psychological, social, and transportation disadvantage spirals. The genesis of the spiral is unsettled, but as intersectionality logically concludes, it is likely unique to each individual. Nevertheless, some older adults are and will likely be in a situation of need that is greater than others. It is for those in most need, that policy, practice and future research need to pay attention.

Research Question Two (Qualitative)

The second research question aimed to assess the affect adverse health events had on transportation and quality of life among transportation disadvantaged older adults. Among the experiences, there are a few key areas that stand out and also support the theoretical framework of this investigation.

First, all participants reported adverse health events and many reported associated health impacts related to their day-to-day transportation experience. Therefore, it is generally concluded that health does interact with and impact transportation and quality of life. However, how health affects transportation and quality of life is more nuanced. As detailed in the literature review, quality of life is defined by WHO as being comprised of six domains: (1) physical, (2) psychological, (3) social, (4) environmental, (5) spiritual, and (6) level of independence, and nested within these six domains are subcategories such as safety, finances, opportunity and participation in recreation and leisure, energy and fatigue, pain and discomfort, relationships, and positive and negative feelings and emotions (WHOQOL: Measuring Quality of Life, 2018). All of these subdomains of quality of life were broached by the participants when describing their transportation and daily life experiences; some were positive, some negative, some common, but all were, to some degree, unique.

Physical impacts was likely the most obvious expression of how health and transportation affected quality of life. As one participant straightforwardly expressed, “I have been tired all day because of our trip to the store yesterday. It usually takes two days to get over it.” This clearly and succinctly details how compromised health and transportation intersect to impact quality of life, as a simple trip to the store for most people in better health and with better transportation does not beget two days of fatigue. Like physical health, psychological health and negative feelings and emotions were rather plainly reported. According to one participant, “it gets very depressing when you don't have transportation to get to some of the places that you would like to go.” Of course, the physical and psychological health impacts can be more nuanced, interconnected, and positive, as one participant notes, “I always feel better if I am able to get out some time during the day. I don't feel like a shut-in.” It is important to question how this person

feels better. It is likely that she feels better mentally, emotionally, and physically. Still more, an extension of physical and psychological health and a subdomain of quality of life, which reflects personal and environmental influences on quality of life, is safety. One participant describes, “when you are waiting on the bus to come after 8 it's dark at the bus stop... and here we are senior citizens and no lights for protection.” As is evidenced for almost all findings, there is an opposing experience within the same category of experience, such as noted by another participant who finds they feel “very safe” saying, “we know the officers in the area, and they lookout for us.”

Beyond the direct or more obvious reports of health, transportation and quality of life, there are reports that speak to the subdomains of quality of life. For example, financial resources are a matter of quality of life, and a matter that is clearly impacted by health, as one participant positively notes the transportation options available from health coverage, “with a handicapped accessible van I get 36 single trips or 18 round trip paid for by my insurance company.” More negatively reported of health, finances, and transportation impacting quality of life, a participant details, “...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 their medicine and food allowance.” Then there are other subdomains for which there is limited but still meaningful data, in areas like social, relationships, and opportunities for leisure and recreation. Depending on interpretation of the data, these areas may be under-reported by participants or unreported. It is possible, then, that no data is data; the lack of reporting on certain issues may be telling a story. Where there is little to nothing to say, there may be little to no experience, and a lack, a deficit, a living without, no doubt has an impact on quality of life.

Ultimately, the qualitative findings point to an inextricable link between health and transportation and quality of life and, importantly, as viewed through intersectionality, a unique, individual experience of this link and outcome. What impacts health, impacts transportation, impacts quality of life. As well, because these experiences are inextricably linked, it seems that the direction and degree to which one aspect is affected, the others are affected. A positive experience in a single domain potentiates and precipitates a positive outcome in all domains of health, transportation, and quality of life, while a negative experience potentiates and precipitates outcomes in the other direction for them all. And then, there is the counter-experience, the contradiction; each of these experiences has an opposing experience and outcome.

The constant, consistent exception is the finding that, despite negative experiences, so many of the participants demonstrate positive responses, including resourcefulness, resilience, and positive adaptations in attitude, approach and action. This finding reflects the Selection, Optimization, and Compensation (SOC) model created by Baltes and Carstensen (1996). SOC recognizes that older adults continually face change and depletion of resources, but those that age more successfully make the best of what they have by constantly updating their approach to and use of resources to maximize gains and minimize losses (Rozario, Kidahashi, DeRienzi, 2011). SOC and its descriptions seemingly demonstrate that more successfully aging older adults recognize, in some way, the interdependence of resources and one's health and quality of life and make adjustments wherever possible, based on the experiential understanding that one aspect of life is tethered to all the others. Possibly in best summary of the interconnection of health, transportation, and quality of life is the juxtaposition of holistic health reports from participants who detail the overall effect of transportation on their quality of life, "any time I miss the bus, it affects the outcome of my complete day," compared to "I always feel better if I

am able to get out some time during the day.” For people with a compromised health status and transportation disadvantage, transportation is simultaneously a terrific resource and terrible void.

In terms of the intersectionality, thinking about transportation, health, and quality of life from the perspective of older adults, singularly, does not suffice. There is tremendous within group difference. The experiences of the predominantly female, 50% Black sample with a low income is demonstrably different from that of a White or male segment of the population with a higher income. While race may be a questionable category to include as the sample was equally distributed by race, the Black participants reported a different level of pain, which in the US is associated with more health and stress challenges compared to White participants, and therefore, race is likely important to consider. Moving beyond the most obvious within group differences, it is clearly important to assess within group difference among the sample or within the larger group of transportation disadvantage. For example, location of residence makes a difference. As one participant noted, access to the bus stop from their home was challenging to navigate and limiting their travel. Another noted the need to pay family, friends, and neighbors for rides, and this may be more likely to happen in a city like Arlington, where there is no public bus system, compared to Fort Worth. Based on the qualitative findings, other intersectional categories that could be relevant within the studied sample or similar sample could be, to name a few, healthcare coverage and their associated benefits, health literacy, type of income, social networks, and personality trait, such as described in the five-factor model (McCrae & John, 1992). McCrae and John (1992) detail the five-factor model, the five dimensions of personality, as openness, conscientiousness, extraversion, agreeableness, and neuroticism, (OCEAN), and depending on how high or low an individual generally behaves in ways characteristic of those traits, it can be predictive of an individual’s responses to life circumstances. For example, maybe high openness

and extraversion could be predictive of more adaptive responses to the combination of adverse health events and transportation disadvantage, while high neuroticism could predict the opposite, and understanding certain propensities in concert with particular conditions could help create more flexible and individually fit transportation options. All in all, it appears that health, transportation, and quality of life frequently interact with one another, but like intersectionality reflects, just how so is often individually and contextually dependent.

Implications for Policy, Practice, and Research

Based on the holistic, interconnected, and interdependent nature of health, transportation, and quality of life, the quantitative and qualitative findings strongly suggest the need for interdisciplinary collaboration within and among policy, practice and future research. Social science, medical science, engineering, urban development, and government, to name a few, are all branches of the same tree, rooted in the aim to improve the lived experience, the quality of life, the health of the community and the individual.

Policy. Transportation needs to be accessible to more people, needs to be more flexible, and increase its reach, and to advocate for this need, health is an important platform. Currently, Medicare does not provide transportation (Ambulance Services, n.d.). Medicaid benefits, which are stated dependent, are limited in the state of Texas compared to other states, as Texas is one of 15 states rejecting federal aid, which for Texas equates to approximately 100 billion dollars rejected from the federal government (Texas, 2018). This Medicaid funding maneuver likely limits the transportation potential and could be a reason to advocate for accepting federal Medicaid funding. As well, adequately providing transportation for older adults with compromised physical function and mobility, of whom this population is currently growing (Lin, Beck, Finch, Hummer, & Master, 2012) may be far out of reach. Therefore, it may be necessary

to think about alternative measures to meet this population's needs, such as increasing a mobile healthcare workforce. Among a relatively younger, healthier, and more mobile healthcare workforce, structuring policy to allow more mobile healthcare and accepting and using untapped financial resources to support mobile healthcare, could be quite advantageous for the people and the community's many resources. Another aspect, one that will be considered in practice and research, is the developing understanding that health is a product of more than just medical care. Health is impacted by an array of physical, psychological, and social needs, too. Therefore, policies applying to healthcare need to be cognizant of and inclusive of more aspects of daily life that contribute to one's health status. Currently, Medicaid only provides transportation to locations that provide Medicaid services (Transportation, n.d.), but with the understanding that access to and participation in more physical, social and leisure activities positively impacts health, health policies related to transportation need to be more inclusive, especially in an area like service destinations.

Practice. In terms of social work practice, especially gerontologic and health social work, practice may first be impacted simply by awareness. Although lack of transportation may be commonly recognized, its impact may not. It is imperative that social workers and social work students be informed to and learn to recognize the impact, physically, psychologically, socially, even culturally, that lack of transportation can have on the individual and community. With this understanding and recognizing where transportation can be provided, social workers may work more diligently to connect those they serve to transportation. For gerontologic social workers, the recognition of intersectionality and within group difference could help these professionals to acquire additional resources for those in more disadvantaged positions. As transportation screening and resource connection is common practice in hospital social, in areas outside of the

hospital, including most forms of outpatient and clinical care, case managers would likely benefit the people they serve by screening for transportation disadvantage and keeping current the materials necessary to connect them to the most relevant transportation resources. In a more interdisciplinary approach, social and medical science can support biopsychosocial health-related interventions, such as Mt. Sinai Medical School's Visiting Doctors house call program, in which physicians provide in-home patient care, emotional support, and social services to homebound patients (Mt. Sinai Visiting Doctors Program, n.d.). Another interdisciplinary practice venture could see social science, engineering, and urban development creating technologies to improve access to necessity goods and services, such as grocery, pharmacy, or basic shopping delivery programs using or accepting available state and federal grants, supplemental income sources, and related resources. From these practices, social workers will function as a vital link in a better healthcare chain, and in the process, capture first-hand knowledge of what is working, what is not, how it is working, advocate for our aging community and related policy change, and be able to inform future research.

Research. First, expanding the sample size of this investigation would be an important next step in this line of research. As well, as a medium effect size was found for more adverse health events and unplanned trips, future research could look at severity of health status and types of trip or specific health conditions and types of trips. Also, given that the sample had higher (more unhealthy) mean scores for physical functioning and pain, research investigating accommodating physical functional deficits and, especially, pain could allow for quite specific and novel approaches to improving transportation. For example, social and medical science and engineering may use existing or developing technology to assess a range of biometrics that may be predictive of health status to help people better predict when travel may or may not be

possible or what and how special accommodations may be needed to improve the transportation experience. Included in health limitations and their impact on transportation and quality of life, the SOC model could be used to more specifically focus on what factors might be associated with some older adults positively adapting to their transportation disadvantage and experimenting with connection to resources, outside transportation, and their impact on responding more positively to transportation disadvantage. Furthermore, considering limited transportation and walkability of the county of investigation, studies in more transportation equipped communities across the US may beget different and important results, especially for informing policy and practice in the current county and state in question. Similarly, as the current investigation was limited to White and Black participants, in future research and to investigate associations of race and ethnicity and outcomes, it is important to include other minority groups, such as Hispanic and Vietnamese populations, which are both largely represented in Tarrant County, Texas. Finally, and as mentioned in policy considerations, more research into the impact of psychosocial-related activities on health must be considered. It would be important to investigate the various health impacts from improving transportation to family, social, religious, and community activities, such as weekly family visits outside the home, older adult exercise classes, regular participation and attendance at one's place of worship, and community volunteering. Using studies of this nature and drawing on the power of interdisciplinary collaboration, the potential for novel and impactful innovation and intervention is infinite.

Limitations

There were several limitations to the present study. One, the sample was small, limiting generalizability to the overall older adult population. Two, the sample was non-random, purposive. Again, this limits generalizability to the older adult population at large. Three, based

on the data collection method, the potential for self-report bias must be considered. Participants may have exaggerated their responses to make an issue appear to be worse or better than it actually is. Four, all of the participants reported adverse health events, thereby there were no adverse-health-event-free participants to compare the adverse health experience against. Five, no qualitative questions were included that specifically targeted one's health status related to transportation. Therefore, there was limited data specifically addressing health and transportation. Six, the data collection method is a limitation. Based on the comfort of the participant to use new technology, the potentially limited functionality of a new application, and problems connecting to Wi-Fi, these all limited the type and amount of data that was collected. However, the app technology did allow for data collection in real time, which likely allowed for more participation, as well as more accurate data, as real time data collection may reduce recall bias. Seven, is the potential for researcher bias. With a practice background in health and fitness, the researcher came into this study with biases and expectations which may have not all been recognized and accounted for in the collection and interpretation of data and results.

Conclusion

When transportation is limited, access to people, places, and things that provide for better quality of life, including healthcare, are limited. Quality of life appears to be a fabric, woven together, in part with transportation and health. Ultimately, the two are inextricably linked. If one is affected, all are affected. Maybe more appropriately, if one is infected, all are infected. To improve quality of life, it is already believed that you must improve health. However, what this study reveals, is that if one cannot improve health directly, then one must look more broadly, more holistically. For older adult health and quality of life, that can be transportation. Currently, in the U.S., the opportunities for transportation and health and quality of life are unequal. Our

older adults, especially our most vulnerable and marginalized older adults, deserve an equal opportunity for better health, and the mounting evidence suggests that the road to a richer, more meaningful quality of life, is, in part, found through improved accessibility, mobility, and equality of opportunity in transportation.

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