A Transportation Study with Implications for Those with Disabilities

By

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Introduction

This study explores how a society recognizes an individual as a valued part of a community's economy, culture, and spirit and the role transportation access plays. The Americans with Disabilities Act (ADA) serves as a starting point and provides background for the study. This study then moves to an examination of the transportation system for someone with an ambulatory or visual disability. The results indicate that the difficulty in using, and the unpredictability of the transportation system have a pronounced effect on those with an ambulatory or visual disability. The phrase "difficulty in navigating the transportation system" is derived from this. After all, transit often thought to be "accessible" is full of accommodation issues, lack of information, and unpredictability for someone with or who may develop a physical or visual limitation. This difficulty in navigating the transportation system then became the basis of the research question and hypothesis that is woven throughout this study.

Research question: What is the experience of transportation users with ambulatory or visual disability?

The hypothesis: People with ambulatory or visual disability endure physical and experiential challenges with transportation.

The results from this research question and hypothesis were coded and then broken into themes. From these themes separate chapters were created around discrimination, changing needs of the aging Baby Boomer generation, and travel by air. Furthermore, chapters two, three, and four are each designed to be a standalone paper.

The specific chapters are:

Chapter 1: History of Transportation and the Disability Rights Movement.

Chapter 2: How Unintentional Discrimination in the Transportation System May Cause Individuals with Disabilities to Become "Discouraged Workers" at Great Cost to Individuals, Families, and Communities.

Chapter 3: Maintaining Transportation Accessibility for an Aging Baby Boomer Population.

Chapter 4: Discriminatory Implications for People with an Ambulatory Disability Caused by the Systemic Design of the Airline Industry.

This first chapter introduces the role of transportation in the disability rights movement and the struggle against discrimination. It starts with servicemen returning from war and being needed in the workforce, to the history of the work to eliminate discrimination in the transportation system throughout the 20th century, and finally the justification for the Americans with Disabilities Act of 1990 (ADA). While the ADA has reduced active discrimination, different types of discrimination persist today for those with an ambulatory disability.

The second chapter starts with the foundation of the ADA to eliminate discrimination in transportation. Going through the most frequently used transportation modes, this chapter investigates the question of whether unintentional discrimination is still occurring in today's transportation system for those with a visual or ambulatory disability. The third chapter is built around the need for a more inclusive transportation system to meet the needs of an aging population at risk of developing a disability. The fourth chapter centers on the intersection of theory and policy regarding current accessibility topics within the airline industry.

While the first three chapters are more generalized about all forms of transportation, the fourth chapter focuses specifically on the airline industry. This chapter investigates the new federal policy of reporting wheelchair mishandling statistics required by the FAA

Reauthorization Act of 2018, the release of the Airlines Passengers with Disabilities Bill of Rights in 2022, and new regulations regarding lavatories on single-aisle aircraft in 2023.

Chapter 1, Section 1.0: History of Transportation and the Disability Rights Movement

On November 2, 1972, in New York City, fourteen protesters entered the intersection of Madison Avenue and 45th Street during the evening rush hour. For fifty-five minutes, these protesters stopped traffic in this intersection and the surrounding streets. This protest was in response to President Nixon's veto of the Rehabilitation Act, which would have provided federal funds and regulations to establish centers for those suffering prolonged kidney ailments and spinal cord injuries; and who are deaf, blind, and with limited mobility (Carmel, 2020).

During the protest, the police were on hand. However, the police stood by the side even though the city officials demanded that the protesters be arrested. When the media questioned the police captain about shutting down the protest, the police captain responded, "And where would we get the vehicles if we did something like that?" (The New York Times Archives, 1972). The reason for the police captain's statement was that the protesters were in wheelchairs, and the police vehicles to transport them were not wheelchair accessible.

The situation above was the midpoint of the disability movement, a movement that paralleled both the civil rights and the LGBTQ+ equality movement. However, this protest was the first time those with a disability would find that by banding together they could defend against discrimination and demand access to employment, transportation, public buildings, and government programs and services.

At its core, the disability rights movement was about independent living. This included the ability of an individual with physical limitations to educate themselves, pursue a career, and live independently. Further, this movement was so those with a disability could actively

participate in cultural and social activities, live in comfortable housing, and, most importantly, be considered a valued part of the community.

The need for those with a disability to live independently is where transportation comes into play. The ability to travel is so important that Thomas Jefferson believed that the right to travel is derived at birth. In the Jefferson papers (1770), he states:

> *Under the law of nature, all men are born free, everyone comes into the world with a right to his own person, which includes the liberty of moving and using it at his own will. This is what is called personal liberty (Jefferson, 1770).*

This belief in personal liberty is why transportation and the disability rights movements are so interlinked (Sobel, 2014). Transportation is how trade takes place, ideas are exchanged, education takes place, and one becomes an active part of the community. Without access to transportation, it is difficult to participate in society, because it severely limits one's freedom.

1.1.1 Transportation Design

Two hundred years ago, transportation for most individuals was limited to human or animal power. While rivers, lakes, and oceans provided some form of mass transportation, most of society relied on either their own legs or the legs of a domesticated animal. Those who were unable to walk were outcasts from society, be it a young child born with a disability or a tradesman who was injured on the job.

Then came the industrialized era, during which steam engines revolutionized travel with steamships and railroads. Humans no longer had to rely as much on their legs or animals for transportation. Instead, machines could provide a faster form of transport. However, those who traveled during the Industrial Revolution were able-bodied, meaning they had fully functioning legs and arms, and tended to be male. As a result, the transportation systems during the Industrial

Revolution were designed and built around these able-bodied, male individuals. This approach then set a precedent for the design of all future transportation. For example, streetcars, and later buses and trains, all had several steps up from the ground into the vehicles, a design that would persist until the 1990s. Steamships even required someone to board a plank to access the ship.

1.1.2 Transportation Design after World War II

Service members returning from World War I, World War II, as well as individuals impacted by the polio epidemic, sowed the seeds of the disability movement. Coming back as heroes, over 204,002 servicemen were injured in World War I, and over 670,846 were injured in World War II (*America's Wars*, 2021). After these wars, there was so much demand for men in their 20s to work in factories that wounded soldiers were seen as a valuable part of society, even if they had a disability. This need for labor is where people started to ask how the built environment can be made more inclusive to those with a disability (Williamson, 2019). Then in the 1930s through the 1950s, the polio plague struck terror with families. Polio was a fast-acting contagion that could paralyze someone in a matter of a day. Throughout the 1950s, people in the United States feared death or becoming disabled and then being excluded from society as transportation was inaccessible to someone who could not climb the stairs of a streetcar, bus, or enter an automobile. To illustrate, when President Franklin Roosevelt became paralyzed because of polio, his wheelchair and adaptions to the presidential trains were hidden from the media's view because of the attitude that someone with a disability would likely not be a productive part of society (Williamson, 2019).

1.1.3 Civil Rights Movement as an Inspiration

In the 1960s, the Civil Rights Movement demonstrated the power of people organizing to express their needs and wants. By the 1970s, those with a disability realized that individuals

could change society by working collectively. That is where a summer camp in the Catskill Mountains in 1971 gave birth to the disability rights movement.

As explained in the movie *Crip Camp* (Lebrecht & Newnham, 2020), Camp Jened was where those with a disability could have the same summer camp experience as those who were able-bodied. After the summer of 1971, those from the camp sought formal education, with the most vocal individuals attending Berkeley in California and creating the Center for Independent Living and an advocacy group called Disabled in Action. Led by Judith Heuman, this center became the nucleus from which the demand for accessible transportation would begin. As Judith Heuman states in a 2021 interview with PBS Newshour:

> *Discrimination against disabled people has existed from the beginning of time. And we're in a place right now where, because of other movements…the civil rights movement, the women's movement, Black Lives Matter movement, et cetera, people are speaking up and out. One of the first pieces of legislation that the disability community really engaged in was getting regulations developed for a provision of law Section 504. Section 504 says you can't discriminate against someone who has a disability if the entity is receiving money from the federal government.* (Williams, 2021, 1:33)

1.1.4 Disability Rights: Section 504 fight

In Berkeley, California, the Center of Independent Living was run by and for those with a disability and focused on wheelchair repair and transportation. This center became the centerpiece of the protest that culminated in the Section 504 fight, which would become the foundation for the Air Carrier Access Act of 1986 and the Americans with Disabilities Act of 1990.

The Rehabilitation Act of 1973 was passed to provide vocational rehabilitation services for those with a disability. This act also protected against discrimination by federal agencies and expanded services to those with a severe disability. Included at the end of the act was a small section 504 that was added with very little debate. Ironically, section 504 would become the unifying agent for those with a disability. Section 504 reads:

> *No otherwise qualified individual with a disability in the United States, as defined in section 705(20) of this title, shall, solely because of her or his disability, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance or under any program or activity conducted by any executive agency or by the United States Postal Service.* (Rehabilitation Act of 1973, 1973, section 504).

President Nixon vetoed the legislation. This veto resulted in the blockade of Madison Avenue in New York by protesters with a disability, which was right outside President Nixon's reelection headquarters. The blockade received national attention as no one knew what to do with 14 protesters in wheelchairs blocking and closing the intersection of Madison Avenue and 45th Street during rush hour. After all, if arrested, the police had no transportation options to transport them (The New York Times Archives, 1972).

Eventually, President Nixon signed the legislation. However, then there was the issue of enforcing and implementing regulations and the laws to make all federally funded transportation accessible. The outcomes of Section 504 were that it would require every institution that receives federal funds to make facilities accessibility for those with a disability. Schools, hospitals, and universities were affected by this new legislation. However, transportation became the center point as airports, railroads, and transit received federal dollars. So, while transportation was not

the focus of the bill, by default, federally funded transportation networks had to follow Section 504 as well.

While President Nixon eventually did sign the Rehabilitation Act of 1973, creation of regulations and enforcement of the legislation was passed to the Ford Administration, who delayed and attempted to rewrite the legislation. In 1978 the new Carter Administration's Secretary of Education, also refused to sign the regulations allowing Section 504 to be enforced. This refusal to sign the regulations resulted in a 28-day sit-in protest in San Francisco and smaller sit-ins nationwide (Carmel, 2020). What was exceptional about these protests was that, for the first time, those with a disability were visible and got cross-country attention from the media. On December 7th, 1974, regulations that would enforce Section 504 were finally signed, and all federally funded transportation in the United States had to become accessible for those with a disability.

1.1.5 Disability Rights: Effects of Section 504

Like the Stonewall Inn moment for the LGBTQ+ community, section 504 gave a voice to a minority across the United States. While regulations for Section 504 were signed, the Reagan Administration fought to repeal Section 504. Further, only those organizations that received federal funds had to comply, so private businesses did not need to make their facilities accessible. Even accessibility of federally funded transportation was up to interpretation as Section 504 only states "that an individual with a disability is not discriminated against and have access to the same transportation options as those who are able-bodied" (Rehabilitation Act of 1973, 1973, section 504). However, there were no specifics on what this policy statement meant.

In 1986, an independent federal agency called the National Council on Disability, issued a report that examined the effect of federal laws towards increasing the independence and full

integration into society of those with a limitation. The report recommended comprehensive civil rights legislation for those with a disability, which became the foundation for the Americans with Disabilities Act (ADA).

1.1.6 Disability Rights: Capitol Crawl

On May 9th, 1989, Senator Tom Harkin of Iowa introduced the bill that would eventually become the Americans with Disabilities Act. However, frustration grew with the bill's progress as it appeared to stall in 1990. "All the i's have been dotted, and all the t's have been crossed," Rep. Major R. Owens, a primary backer of the ADA, said of the law at the time. "There have been enough negotiations — delay is the real enemy" (Carmel, 2020). Frustration grew, and on March 12th, 1990, over 1,000 protestors with a disability from across the nation gathered in Washington, DC. The next day, 60 individuals gathered at the bottom of the stairs to the U.S. Capitol, left their wheelchairs and mobility aids, and crawled up the 83 stairs to the Capitol, chanting, "What do we want? ADA!…When do we want it? Now!" (Lebrecht & Newnham, 2020, 1:33:52). The event's media coverage was instrumental in the passage of the ADA (Sonneborn, 2023). President George H. Bush signed into law The Americans with Disabilities Act of 1990, which prohibits discrimination against those with a disability in all areas of public life, including jobs, schools, transportation, and all public and private sector places that are open to the general public (*An Overview of the Americans with Disabilities Act*, 2017). This law was by far the most encompassing and progressive legislation towards accommodating those with a disability in the United States and the world. Perhaps the most significant benefit of the ADA was that it set the standard for the accessible design of buildings and transportation worldwide.

Title II and III of the ADA include all publicly funded transportation. Further, the ADA applies if a private company offers transportation, including, but not limited to, airport shuttles,

intercity bus companies, and hotel-provided transportation (*An Overview of the Americans with Disabilities Act*, 2017)

1.1.7 Disability Rights: Beyond the ADA

Thirty-three years since the signing of the ADA, there remain struggles for those with a disability. While federal laws now require all transportation systems to be accessible, the term "accessible" is up to interpretation and misrepresentation.

After all, if a passenger with a disability cannot access a narrowbody aircraft lavatory on a 6-hour flight, is that aircraft truly accessible? Or is forgoing the use of a transit bus because of the social anxiety of delaying the bus due to securing one's wheelchair the same experience as other passengers have? What about the fact that to use paratransit services, one must plan their trip two workdays in advance, as opposed to an able-bodied individual who can call Uber or Lyft? While someone with a disability is not being directly discriminated against, the design and complexity of the transportation system results in individuals being excluded. This exclusion is the core of this study.

Chapter 1, Section 2.0: Difficulty in Navigating the Transportation System

Most transportation research has focused on the physical design of vehicles and facilities. However, even if someone can be physically accommodated on a vehicle, the transportation systems can be complex, overwhelming, unpredictable, and full of bureaucratic red tape, making it unusable for someone with a disability. This complexity in using the various modes of transportation also means that it has been very hard to capture in research the struggles for those with an ambulatory or visual disability finding a way to easily use the transportation system. These struggles became the idea behind investigating the difficulty in navigating the transportation system.

There is no established definition for the concept of “difficulty in navigating the transportation system.” So, for this study, the definition is one given by Terry Schlicting (former Accommodations Specialist with Disability Services at Colorado State University):

> *“Uncertainty or confusion created by attempting to use the transportation network that results in unnecessary delays or being unable to complete a mission”* (T. Schlicting, personal communication, November 5, 2019).

This uncertainty, unpredictability, and confusion is the core of what “difficulty in navigating the transportation system” signifies.

Chapter 1, Section 3.0: Social Justice and the Theoretical Models of Disability

When it comes to transportation design, it is not just equal access that is needed, rather it is equitable access that is desired. This parallels the concept of social justice, which the United Nations has made a core concept of their charter, with the belief in fairness, respect, and access to employment with transportation for everyone in the world.

Social justice is defined by the United Nations as:

> *Values of fairness, equality, respect for diversity, access to social protection, and the application of human rights in all spheres of life, including in the workplace* (*World Day of Social Justice*, 2023)

This thought on social justice leads to theories on accommodation for a person with a disability. The individual theory on disability is the historical model used prior to the 1970s and is the belief that society does not have a responsibility to accommodate individuals who suffer from a disability. The more modern social theory of disability claims that the built environment and society's attitude put limits on an individual with a disability, and therefore society should

design the built environment to be more inclusive and accessible. This way everyone can achieve the ability to support themselves and fully participate in society.

As realized with the disability rights movement, transportation is not just a means to get from place to place but rather is key to an individual's ability to be visible in the community, support oneself, and be an active part of society. Without access to reliable and accessible transportation, one is left unemployed, reliant on others, and isolated. This is why social justice in transportation for those with a disability is key to a healthy and productive community.

1.3.1 Equality versus Equity

While some individuals may consider the terms equality and equity as interchangeable, the terms are in fact, quite different. Equality focuses on giving equal access to the average able-bodied individual in society. This strategy is still built upon designing access to a transportation system around the average body shape and capability and then everyone else who does not fit this norm has to adapt. Building a system that is "equitable" means not only providing access to everyone who can walk, see, hear, and who may speak a different language, but these individuals receive the same usefulness from those systems.

The problem is that equal access does not mean everyone will have the same utility from transportation. For example, the metro bus can be easy to use for someone who can see. However, for someone with a visual disability who cannot see signage and cannot see out the windows, riding the bus can be a stressful experience.

Conversely, equity means everyone can have the same utility out of the transportation system. It means that someone in a wheelchair can experience the same use of a bus or train as someone who is able-bodied, using ramps or boarding platforms without the need to be secured by a driver. The issue is that the United States has built transportation systems to accommodate

only the average size individual. From the driving position in an automobile to the size of an airplane seat to the steps leading into a bus, the transportation system was designed around the average human size, build, and capability. This design around the average is logical, considering that investment in transportation technology and infrastructure is costly and is often based on the philosophy of the greatest good for the most significant number of people.

However, this is where equity comes into play. Humans come in various sizes and with various capabilities. After all, a person might be 198 pounds but measure 6 feet 7 inches tall and, as a result, cannot fit into a standard economy airline seat. Alternatively, an able-bodied individual who is 4 feet 10 inches tall may not be able to reach the handles on subway trains or transit buses. Another individual may have limited visual capabilities. As a result, this individual cannot see the messages at a bus stop, such as that a bus route was canceled. Then, there may be an individual who cannot stand up, walk, or climb stairs. These are all examples of where people have very different experience and different usefulness from a mode of transportation, even though they have equal access. As recently as 30 years ago, someone with an ambulatory limitation would most likely be excluded from most modes of transportation. This fear of being shut out led to the ADA, which allowed Americans of various sizes and capabilities equal usage of buildings, transportation, and education contributing to their ability to be a productive part of the community.

After all, the ability to travel is a fundamental right, even guaranteed in the United States Constitution (U.S. Const. amend XIV, §1), and is the reason that this study is focused on the experience of someone with an ambulatory or visual limitation navigating the social and emotional experience of the transportation system. The next chapter addresses how unintentional discrimination in transportation may cause individuals with disabilities to become discouraged

and unable to fulfill their potential as members of society and the workforce, resulting in extensive societal costs.

Chapter 2: How Unintentional Discrimination in the Transportation System May Cause Individuals with Disabilities to Become "Discouraged Workers" at Great Cost to Individuals, Families, and Communities.

Abstract

Transportation is essential to an individual's livelihood and well-being. It is a means for an individual's employment, social inclusion, and educational attainment. However, transportation is also a barrier for individuals that prohibits them from working and pursuing a better life. The Bureau of Labor Statistics calls these individuals "Discouraged Workers," someone who wants to work but cannot due to constraints such as a disability and inequitable design of the public transportation system.

While the goal of the Americans with Disabilities Act of 1990's was to eliminate all types of discrimination against those with a disability, this study is designed to investigate if both active and unintentional discrimination are still occurring in transportation. This study focused on the experiences and choices that twelve individuals with an ambulatory disability, a visual disability, or are a caregiver; and the experiences they have when navigating the transportation system in the fast-growing, high-public transit access communities of Fort Collins, Colorado and Madison, Wisconsin, as well as in northern Illinois and Croatia.

In some cases, unintentional discrimination led to individuals with a disability not being employed, while in other cases individuals and employers had to make special accommodations for employees with a disability because of the unpredictability of the public transportation system.

Chapter 2, Section 1.0: Introduction

A healthy community that provides its residents with social, physical, and mental well-being requires a productive labor force to drive economic development and social cohesion. Nevertheless, when it comes to labor force participation, economists and policymakers tend to focus on those who are either employed or are seeking employment. However, there is "hidden unemployment." These individuals want to work but cannot, and those with a disability are often part of this hidden unemployment. Further, someone being unable to be employed because of a disability may affect the entire family and especially the caregiver. These individuals fall into the category of "Discouraged Worker" by the Bureau of Labor Statistics (BLS), and is defined as:

> *Those persons not in the labor force who want and are available for work and have looked for a job sometime in the prior 12 months but were not counted as unemployed because they had not searched for work in the past four weeks. Among the marginally attached, discouraged workers were not looking for work precisely because they believed no jobs were available or there were none for which they would qualify* (U.S. Bureau of Labor Statistics, 2023).

From the January 2023 Current Population Survey, the Bureau of Labor Statistics estimates that over 99 million individuals fall into the category of "Discouraged Workers" (U.S. Bureau of Labor Statistics, 2023b). According to the report "Travel Patterns of American Adults with Disabilities," the U.S. Department of Transportation identifies that "disability" is the largest category as to why an individual between 25 and 54 years is a "discouraged worker." Further, this report states that 25.5 million Americans have a travel-limiting disability (Stephen Brumbaugh, 2018). Thus, there is a connection between this travel limitation and why so many individuals with a disability are discouraged workers. Further, this study has revealed that

unintentional discrimination in transportation is occurring, which is likely causing one to be a discouraged worker.

2.1.1 Policy and the Fight Against Discrimination

The origins of discrimination can be traced back to how disability has historically been conceptualized. Under the outdated medical definition of disability, it was believed that the individual is broken and must be "enabled" to become part of a well-functioning community. However, under the more modern social construct of disability, it is the built environment that makes one "disabled." Transportation is not only a large part of the built environment, but also leads to an individual's visibility in society. This is why discrimination in transportation has played a significant part in the disability rights movement and in changing the perspective on the rights of an individual with a disability. As Judith Heuman, a leader in the disability rights movement describes the fight against discrimination:

> *I think the average person, they see disability as a threat, as a threat to not being able to do things as people have typically done them. And I think there's truth in that. But the question is, is it because one has a disability or because society itself has constructed itself in such a way because they haven't seen us?* (Williams, 2021, 1:10)

This lack of visibility is one reason why The Americans with Disabilities Act of 1990 and subsequent amendments in 2008 made great strides in making public transportation accessible and avoiding discrimination. "Inclusive transportation 'sends a message', as well as facilitates the reality that our society wants, expects and creates the resources for people with disabilities to get there and be there to participate in everything" (World Institute for Discovery, n.d., p. 3). The ADA defines discrimination as: "because of such disability, be excluded from participation in or

be denied the benefits of services, programs, or activities of a public entity or be subjected to discrimination by any such entity." (ADA Amendments Act of 2008, 2008)

The ADA then goes on to cite what can be construed as "discrimination" in each mode of transportation. For example, with public buses discrimination can be characterized as: "It shall be considered discrimination… and if such bus, rail vehicle, or other vehicle is not readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs." (ADA Amendments Act of 2008, 2008, § 12142)

2.1.2 Unintentional Discrimination

While the Americans with Disabilities Act's goal was to eliminate discrimination, unintentional discrimination is occurring due to a policy or system design that has a disproportionate and adverse impact on a protected group, such as those with a disability. Cornell Law School scholars call this "disparate impact", and defines it as:

> "Refers to unintentional discriminatory practice. A disparate impact policy or rule is one that seems neutral but has a negative impact on a specific protected class of persons" (Bagenstos, 2015).

For this study, "unintentional discriminatory practice", "disparate impact", and "indirect discrimination" will all be classified as "unintentional discrimination" across transportation policy, design, and practice.

Chapter 2, Section 2.0: Social Justice

The concept of social justice dates to the Greek philosophers Socrates and Plato and provides the very foundation for how a civil society should operate and treat each of its citizens. This philosophy continued through the Enlightenment and into modern society. In the 20th

Century, social justice was further developed by philosophers such as John Rawls whose thoughts were published in the "Theory on Justice" and contend that the foundation of civility is freedom, equality, and fairness (Sandel, 1994). These philosophical ideologies were then further refined regarding differences in human rights; specifically economic, social, and cultural rights; and the idealism of social justice can even be seen as the inspiration for Michael Oliver and his investigation into the social theory of disability (Terzi, 2004).

Paralleling this change in thought on social justice was the United Nations (UN) which in 1944 took social justice as a value. Throughout its existence the UN General Assembly has continued to make disability rights an agenda item. First, the UN adopted the Universal Declaration of Human Rights (UDHR) in 1948 which "promoted the right to life, liberty and security of all persons in society, including the fostering of such rights in the event of a disability" (Bas & Padova, 2019, pg. 3). The United Nations continued to further develop their focus on disability with the Declaration of Human Rights of Mentally Retarded Persons in 1971, followed by the Declaration on the Rights of Disabled Persons in 1975. This second declaration in 1975 is especially notable as it was the first time that social integration for those with disability into mainstream society was conceptualized into policy. This means that having a disability was no longer looked at as a medical condition, but rather a human rights issue on equality.

The UN agenda was then followed in 1982 by the World Program of Action Concerning Disabled Persons (WPA) which focused on the barriers faced by those with a disability, including both environmental and attitudinal experiences. This was followed by the Decade of Disabled Persons from 1983 through 1993 which further supported the inclusion of those with a disability in education and employment, as well as increased participation in the community.

By the 2000s the disability movement that had started within the United States had now expanded around the world and became a high-level agenda item to the UN General Assembly. This movement resulted in the Convention on the Rights of Persons with Disabilities (CRPD). Signed in 2006 and entered into force in 2008, the CRPD became a landmark international human rights law. According to the UN Flagship Report on Disability:

> *This landmark convention is truly a benchmark instrument to ensure the equal enjoyment of universal human rights and fundamental freedoms by persons with disabilities. Together with other international human rights and development instruments, it provides a comprehensive framework for national policymaking and legislation, including international cooperation, for building an inclusive society, and for development* (Bas & Padova, 2019, pg. 27).

Following the CRPD, in 2013 the United Nations General Assembly continued to call high-level meetings on disability and development. As a result, in 2015 member states adopted the belief that all persons with disability should be included in the Sustainable Development Goals (SDGs) for 2030, with a specific linkage between disability and sustainable development. A specific emphasis was on education, growth, employment, inequality, accessibility of cities, data monitoring, and accountability.

2.2.1 The United Nations Sustainability Development Goals (SDGs):

Frequently those with a disability hit a barrier that prevents them from participating in community activities beyond the neighborhood. These transportation barriers prevent those with a disability from greater community participation abroad and are the core of social justice in transportation for those with a disability and the need for equitable access. As mentioned earlier, disability has been at the forefront of United Nations policy since the organization was charted in

1945. Over time disability then became a part of the SGDs for the world of 2030. As a result, disability is included in nearly all seventeen SDG goals (excluding goals 12 through 15, and goal 17). SDGs goals involve poverty, ending hunger, health, gender equality, clean water, clean energy, and innovation. However, with this study focusing on the intersection of transportation and disabilities, these following goals are worth a further discussion:

SDG 8, Decent Work and Economic Growth

SDG 10, Reduce Inequalities

SDG 11, Sustainable Cities and Communities

These three goals were chosen because they relate to the concept of discrimination and the impact that discrimination has on an individual with a disability.

2.2.2 Details on the Selected Goals:

SDG 8:

Decent Work and Economic Growth. This goal is to promote sustained economic growth through increasing productivity and innovation. The goal is for everyone to achieve fully productive and fair employment (*Goal 8: Decent Work and Economic Growth*, 2015, p. 8).

> Target 8.5 "By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value"

While not mentioned specifically in SDG 8, poor transportation can limit one's ability to achieve full-time employment if the transportation system is unreliable and inefficient. This includes the bureaucracy surrounding the ability to use a transit system, such as with paratransit.

SDG 10:

Reduced Inequalities. Income inequality continues to increase everywhere in the world. As a result, policies are needed to empower those with lower incomes or who have a disability and are limited in their ability to earn to their full potential (*Goal 10: Reduced Inequalities*, 2015, p. 10). Further, targets that support this goal are:

> Target 10.2: Promote universal social, economic, and political inclusion. "By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status".
>
> Target 10.3: Ensure equal opportunities and end discrimination "Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies, and practices and promoting appropriate legislation, policies and action in this regard".

The main component of SGD 10 is discrimination. Discrimination in transportation can be in two forms: direct, and unintentional. While in the U.S. direct discrimination has been minimized due to the ADA, unintentional discrimination is still an issue that can discourage an individual with a disability from using a form of transportation. This discouragement then limits an individual's access to jobs, social activities, and fully engaging with the community.

SDG 11:

By 2050, it is estimated by the United Nations that two-thirds of the human population will be living in cities. Therefore, improving public transportation, affordable housing, and

promoting society and culture are the focus of this goal (*Goal 11: Sustainable Cities and Communities*, 2015, p. 11). Further, targets that support this goal that involve disability include:

> Target 11.2: "By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons".
>
> This target has one Indicator: Indicator 11.2.1 is the "Proportion of population that has convenient access to public transport, by sex, age, and Persons With Disabilities".[11] Improving transport systems to refine the use of accessibility is key because due to physical or mental disabilities, impaired sight or hearing, carrying heavy bags or traveling with small children, as this causes an average of 25% of the population to experience a degree of reduced mobility.

SDG 11 has the greatest connection to this study on individuals' difficulty in utilizing the transportation system as transportation is mentioned several times in the targets. According to the United Nations, individuals with a disability find that across the world over 30% of public transportation is not accessible. Further, the barriers are not necessarily physical, but can include discrimination, stigmatization, and lack of community support (Bas & Padova, 2019). Finally, there is the relationship with the built environment design that includes both transportation and housing, and the need for more affordable housing development around transit and universal design.

2.2.3 The Theoretical Models on Disability:

Throughout most of history, a person with a disability was thought to be an unfortunate individual who became ill or impaired. It was then up to the individual to adapt to participate in society. This philosophy is the individual doctrine of disability and is based upon prejudice (Oliver, 1996). After all, in the past laws explicitly excluded people with disabilities from holding public office, marrying, bearing children, attending school, and even being seen on public streets (McCluskey, 1987). Further, McCluskey believes prejudice-based perceptions are the primary cause of relative disadvantage for people with disabilities and that the prejudice against people with disabilities is often invisible (1997).

In the second half of the 20th Century, the social theoretical model of disability was adopted and looks at disability as a social construct created by the surrounding barriers (Samaha, 2007). This philosophy is that individuals working in government, public spaces, and businesses must change access so everyone can achieve their full potential. The result is a need to lower or remove barriers to promote equality by looking at ways to improve accessibility, independence, and opportunity for those who do not conform to the traditional human design. The ADA and modern theory on disability were developed using this social model. Therefore, “accessibility” as a social construct is mentioned frequently and is the focus of this paper. It is the idea that by removing barriers, society can adapt to meet the needs of everyone, and as a result, society will be more inclusive, innovative, and productive.

2.2.4 Social Justice in Transportation:

Transportation planning is a highly technical and costly endeavor. As a result, most transportation planning reverts to traffic engineering, whereby flows of people, goods, and vehicles are used in determining how and where transportation resources are allocated. The

issue is that traffic engineering tends to circumvent social justice. This results in a transportation system designed for the fully capable, average sized person. Until the 1980s, those who do not fit the norm were left out of the transportation system, which is the reason that the disability rights movement, and the ADA, were so focused on making transportation accessible. However, as demonstrated by the UN's sustainability goals, civil society requires not just equal but equitable accessibility, meaning that everyone derives the same utility from a mode of transportation to live to attain full employment and be an active part of the community.

Chapter 2, Section 3.0: Literature Review

Transportation is essential for one's ability to live and prosper. Many times the Supreme Court has upheld that the right to travel is a fundamental right given to all Americans (Sobel, 2014). After all transportation can also be a catalyst for societal change and freedom. During the slave era, while the "underground railroad" was not a mechanical form of transportation, it was a transportation system that led to freedom. Then, on a city bus, Rosa Parks made her stand against inequality of not only transportation but of blacks in general society. This is why transportation often symbolizes someone's freedom and is involved in the battle against discrimination, and so it is logical why transportation would be at the center of the disability rights movement. After all the fundamental thrust of the ADA was to integrate people with disabilities into mainstream society (Dempsey, 1990).

Prejudice against people with disabilities has consistently been a fight. As mentioned by McCluskey, as recently as 50 years ago, someone with a disability would be unable to hold a job or receive an education. It was not until the Education for the Handicapped Act of 1975 that mainstreaming of students with a disability was permitted in education, but this act finally gave those individuals with a disability a voice (McCluskey, 1987). However, unlike race, those with

a disability do not fit into a single category. After all, it is hard to define someone with a disability since every limitation is slightly different. For example, McCluskey questions if a pregnant woman should be classified as disabled or is someone aging and naturally losing their ambulatory skills disabled (McCluskey, 1987)? Further there is the issue of hidden disabilities which are not easily apparent or even identified.

It not only becomes an issue of disability but also an issue of prejudice. According to Dempsey, "Slightly more than half of the population of the United States expresses positive attitudes towards the disabled. The rest openly admit to negative attitudes. This cohort of individuals see people with disabilities as different and, in some ways, inferior to other people (Dempsey, 1990). This perception of inferiority is why discrimination has been a struggle for those with a disability.

In early 2023, a paper published in Transportation Research Part D attempted to identify all outstanding research in transport for those with a disability (Shen et al., 2023). The findings of this paper conclude that:

> 1) Additional work should be conducted to guide empirical research, especially on the interaction effects between disability type, features of the built environment, and the social environment.
>
> 2) While studies have identified features of the environment that make transportation more inclusive, more studies are needed on features of transportation that exclude individuals with a disability.

3) More research is needed on emerging technologies in mobility for those with a disability, including apps and location-based technologies that would benefit those with a disability.

Shen also highlights that women with disabilities are generally less inclined to travel, those with large extended families are more likely to travel, and those with a disability and live alone are the least likely to travel and participate in cultural activities. As someone with a disability ages, they are also less likely to travel. Those with a long-term disability are more aware of options to address their needs to travel than someone who has developed a recent or temporary disability. Finally, those without a visible disability may suffer neglect when traveling, while those with a visible disability may receive unwanted attention or comments from fellow passengers. Both result in discrimination while traveling (Shen et al., 2023).

2.3.1 The Experience of Someone Traveling with a Disability

The realization that traveling with a disability is a horrible experience and is rife with discrimination goes back to section 504 in the Rehabilitation Act of 1973, the protests that followed, and the founding of the American with Disability Act of 1990. As Darcy succinctly explains, “Economic issues and the ability to travel are endemic to the whole notion of travel. However, they affect people with disabilities in a more pronounced way.” Further, “Travelling with a disability is a never-ending nightmare, hell on earth, indescribable nerve wracking stomach churning, unbelievably expensive experience." (Darcy & Daruwalla, 1999, p41)

2.3.2 Transportation and the Tourism Industry

Ironically, it has not been the transportation companies or planners that see an opportunity to create a more inclusive transportation system, but rather the tourism industry. As McKercher, Packer, Yau, and Lam explain in their paper about retail opportunities for more

business, “Travel agents fail to recognize that people with disabilities offer opportunities for the retail sector. Once a person with a disability finds a reliable travel agent, he or she will likely become a loyal customer” (McKercher et al., 2003, p. 472).

Lack of information is a recurring theme, in addition to the actual physical accessibility. As McKercher points out, “virtually all study participants indicated that they had to undertake substantial independent research to verify that the destinations they intend to visit, the hotels they intend to stay in, and the activities and attractions they intend to participate in were accessible for their particular disability” (McKercher et al., 2003). This need for planning information supports similar findings with Darcy that “A consistent theme is the lack of accurate information by providers of tourism experience.” (Darcy & Daruwalla, 1999, p. 43), and furthered by Gladwell, “Factors may act as barriers and constraints to traveling. Some primary obstacles to travel are lack of time, poor health, disability, financial limitations, safety/security concerns, and a lack of information” (Gladwell & Bedini, 2004, p. 687).

However, the issue of attitudes toward those with a disability is significant and likely the basis of discrimination. It is difficult and virtually impossible to legislate against negative attitudes toward people with disabilities. These negative attitudes are based on a historical context and refer to the poor treatment and devaluation of people with disabilities through time. These negative attitudes are the most challenging barrier to overcome (Devine & Dattilo, 2000; Oliver, 1989).

2.3.3 Transportation and Caregiving for Those with a Disability

Finally, Gladwell and Bedini investigated the role of the caregiver when traveling and discovered that the issues are social and emotional, not just for the individual with the disability but for the caregiver traveling with the individual with a disability. Despite the changes

mandated nationally by the ADA in 1990, accessibility of services was still a barrier to travel for many of the caregivers, and many of the spousal caregivers missed their spouse or "travel buddy." They thus were less enthusiastic about traveling without him or her" (Gladwell & Bedini, 2004, p. 692). As a result, transportation being accessible is not only a barrier to the individual with a disability but to the caregiver. However, it is essential to remember that the barriers are not just physical. Gladwell further explains: "Many of the respondents indicated that except for finances if they were able to negotiate the physical barriers to leisure travel, they might be blocked by social barriers. Likewise, suppose they were able to negotiate physical and social barriers. In that case, the emotional barriers might prevent their leisure travel," and "Sensitivity training is needed to address the issues of attitudes (and ignorance) of some service providers in the various facets of the tourism and hospitality industries" (Gladwell & Bedini, 2004, p. 692). The result is that making transportation accessible is not just so that someone with a physical limitation can use the transportation mode, but rather the issue is much more complex.

2.3.4 Air Travel

This study also examined traveling by air which is often the most controversial forms of transportation, both for lack of substitutes for long distance travel, and because the airline industry is not covered by the ADA. In "Flight Experiences of People with Disabilities," Poria, Reichel, and Brandt find that participants in their study confronted physical and social difficulties that result in humiliation and suffering when traveling by air (Poria et al., 2010). Further, crew members' behavior towards people with disabilities indicates the need for more training and education for airline employees (Abeyratne, 1995). While difficulties with wheelchair users are in boarding and disembarking, lavatory use was a core issue. Specifically, the issues were in attempting to maneuver to the lavatory and trying to enter the lavatory due to

its small size. In several cases, those with a disability chose to use catheters, forced to urinate or defecate in diapers, or fast for several days to avoid using a lavatory on the aircraft (Poria et al., 2010, p.221).

Rosen found that the Air Carrier Access Act (AACA) that covers the airline industry is limited because it was written by those who work for the suppliers, airlines, and airports. In addition, the act does not inform persons with a disability on how to travel. Finally, the air traveler with a disability faces three problems (Rosen, 2007):

- The inconsistency of accessible air service by air carriers
- The problem of code sharing (where one airline sells seats on another airline)
- The difference in delivered services by air carriers.

Further, Rosen found that when traveling internationally, many countries do not require accessible air travel within their country. With code share flights, air travelers with a disability are more likely to experience discrimination in inaccessible facilities and lack reasonable accommodations such as wheelchair assistance (Rosen, 2007).

Chapter 2, Section 4.0: Methods

This study aimed to explore the experience of those with a visual or ambulatory disability as they travel through the transportation system and the resulting decisions these individuals make. Therefore, this study uses a qualitative method to hear the “voice of the user” and is based upon a study conducted by the authors in 2020 on transportation for an aging population in Wisconsin.

The first step in this study was an in-depth, open-ended question from a representative from the Colorado State University Disability Center. Based upon feedback from this interview,

this study took a multi-disciplinary strategy of reviewing the existing literature on transit options for those with a disability and attending the Transportation Research Board Conference in 2020, 2021, and 2023 to examine disability topics and ideas. This review of literature and conference presentations became the basis for questions given to a convenience sample of twelve volunteers who were interviewed in 2022 and 2023. Finally, a review of popular media was conducted to get a holistic picture of the advancing transit technology now appearing in the marketplace.

Questions were then constructed and given to the participants before the interview. Interviews were conducted from August 2022, until January 2023 via Zoom (or phone call if the participant preferred). Table 2.4.0.1 contains the open-ended survey questions that were asked to each participant with an ambulatory or visual disability:

Table 2.4.0.1

Open ended questions for those with a visual or ambulatory disability

Item:	**Category:**	**Question:**
1	Demographic	How old are you? (20s, 30s, 50s, 60s,70s,)
2	Demographic	Can you describe your limitations due to your disability?
3	Demographic	What are ways that your limitations make it difficult for you travel? (Outside the home, within the community, across the state, across the county, international
4	Demographic	How frequently do you travel? (Within the above communities)
5	Living Situation	What type of home do you live in?
6	Living Situation	Do you live in supportive housing?
7	Living Situation	Have you ever moved to accommodate a disability?
8	Living Situation	Have you ever considered moving for better access to a transportation system?
9	Employment Status	What is your current work status? (Student, full-time, part-time). How long is your commute? Is public transit available for your commute? If you do drive, do you have concerns about losing your ability to drive?
10	Employment Status	Have challenges finding reliable transportation affected your employment in any way?
11	Transportation Choices	Do you have experience riding: Public buses, coach buses, trains (including subways), airplanes? (For each story asked: Why did you choose that transportation mode? What challenges did you have with that transportation mode? Are there any good experiences you have had with this form of transportation?

12	Transportation Choices	Have you used Uber/Lyft or other ride-sharing services?
13	Transportation Choices	Have you used paratransit services?
14	Transportation Choices	What is the primary information source you use when planning your trip? (IE Google Maps, public transit websites, telephone?)
15	Universal Design	What aspects of universal design do you appreciate? (I give a brief explanation of universal design)
16	Open-ended	Any other recommendations regarding improvements in navigating the transportation system?

Recruitment of caregivers was accomplished by referral from participants with the disability. The caregiver's interview was structured in the same manner as the interview for those with a disability. However, the questions were slightly modified to gather information on the caregiver and the individual cared for. Preference was given to family caregivers, but close friends were also included in the interviews. The individuals with a disability who were cared for did not participate in the caregiver interview, and none of the participants with a disability had a professional caregiver.

Table 2.4.0.2

Open ended questions for caregivers

Item:	Category:	Question:
1	Demographic	How old are you? (20s, 30s, 50s, 60s,70s,)
2	Demographic	Can you describe the person with a disability's support network for transportation? (Self-transit/individual, family, friends, public transit use, private transit use
3	Demographic	How does that person's disability make it difficult for them to travel? (Outside the home, across town, across the state, across the country, international)
4	Demographic	Do you live with the person who has a disability?
5	Living Situation	What type of home do you live in?
6	Living Situation	What type of home does the individual being cared for live in? (Single family, apartment, condo, etc)

7	Living Situation	Have you ever considered moving for better access to a transportation system?
8	Employment Status	What is your current work status? (Student, full-time, part-time). How long is your commute? Is public transit available for your commute? If you do drive, do you have concerns about losing your ability to drive?
9	Employment Status	Has being a caregiver affected your work status?
10	Transportation Choices	Do you have experience using these services? (public buses, coach buses, trains [including subways], airplanes) …then for each of these stories ask: Was the individual you cared for on any of these trips? Why did the individual with the disability use that transportation mode? What issues did they have with that transportation mode?
11	Transportation Choices	Do you have experience using these services? (public buses, coach buses, trains [including subways], airplanes) …then for each of these stories ask: Was the individual you cared for on any of these trips? Why did the individual with the disability use that transportation mode? What issues did they have with that transportation mode?
12	Transportation Choices	Do you have experience using these services? (public buses, coach buses, trains [including subways], airplanes)…Then for each of these stories ask: Was the individual you cared for on any of these trips? Why did the individual with the disability use that transportation mode? What issues did they have with that transportation mode?
13	Transportation Choices	What is the primary information source you (the caregiver) use when planning your trip? (IE Google Maps, public transit websites, telephone?)
14	Universal Design	What aspects of universal design do you appreciate? (I give a brief explanation of universal design)
15	Open-ended	Any other recommendations regarding improvements in navigating the transportation system?

By using open-ended questions, this study used a context-specific approach whereby participants would describe a situation and how that experience unfolded when using a specific mode of transportation. Then, the participants would describe their need for that mode of transportation and typically their best and worst experiences with that mode. Participants would then be asked their opinions on theories regarding the built environment, such as their opinion and experience with universal design and thoughts on emerging technologies such as autonomous vehicles.

Sample participants were initially recruited through two organizations in Fort Collins, Colorado: The ARC of Larimer County and Vocational Rehabilitation for Colorado. Participants volunteered to be interviewed and they received no compensation. However, only two participants were recruited in this manner. As a result, recruitment was extended to Madison, Wisconsin, and participants were selected through a snowball approach, whereby one participant would recommend others. This snowball approach turned out to be a much more effective recruitment process as the endorsement by one participant made the other participants feel comfortable volunteering for an interview.

Regarding case studies using this system, thirteen separate interviews were conducted with twelve individuals from August 2022 until January 2023.

- Two individuals were blind, one from birth and the other due to age.
- Six individuals had physical disabilities that required either part-time or full-time use of a wheelchair.
    - Three of the six individuals had developed their disability in their 20s, while the other three individuals were born with the disability.
- Four caregivers were also interviewed, three being family members of an individual with a disability and one being a friend. Caregivers were particularly difficult to recruit since it may have been uncomfortable for them to discuss someone else's disability.
- David, who has an ambulatory disability and requires the use of an electric wheelchair, was interviewed twice. Once before his trip to Croatia and again after the trip.

Table 2.4.0.3

Aliases and background of participants

Alias	*David*	*Tyler*	*Tori*	*Madison*	*Jessica*	*Jason*	*Hannah*	*April*
Age	40-50	30-40	20-30	20-30	40-50	30-40	20-30	60-70
Gender	Male	Male	Female	Female	Female	Male	Female	Female
Location	Fort Collins, CO	Madison, WI	Madison, WI	Madison, WI	Madison, WI	Fort Collins, CO	Northern Colorado	Northern Colorado
Limitation	Ambulatory	Ambulatory	Ambulatory	Ambulatory	Ambulatory	Ambulatory	Visual	Visual
Period of disability	Lifelong	Lifelong	Approx. 3 years	Lifelong	Accident 20 years ago	Appx 15 years	Lifelong	Appx 5 years
Wheelchair User	Full Time	Partial	Partial	Partial	Full	Partial	No	No
Able to drive	No	No	Yes	No	Yes	No	No	No

Table 2.4.0.4

Aliases and background of caregivers

Name:	*Dan*	*Cheryl*	*Mary*	*Megan*
Age:	40s	70s	70s	30s
Gender:	Male	Female	Female	Female
Location:	Fort Collins, CO	Wisconsin	Northern Illinois	Northern Illinois
Caregiver for	David	Jessica	A person not interviewed for this study	A person not interviewed for this study

For the analysis, each conversation was recorded and transcribed. Then, the transcription was coded, a content analysis was conducted, and the content was categorized into themes. Then,

those themes from each interview were combined across all participants to identify trends and issues in navigating the transportation system.

Finally, the author's observations of persons with an ambulatory disability coping with their transportation needs were combined with the research above to create a holistic view of the experience of someone with a disability navigating the transportation system.

Chapter 2, Section 5.0: Results

The code "discrimination" was applied to any situation in which the participants with a disability were given different treatment than a fully-abled-bodied individual. Discrimination was then divided into cases of active discrimination and unintentional discrimination. "Active discrimination" was only mentioned by participants in twenty-eight out of the hundred- and twenty-six-times discrimination was mentioned by both those with a disability and the caregivers. Even faced with active discrimination, individuals with a physical limitation often completed their trips as participants mentioned only five times active discrimination took place and prevented them from not completing their mission in the past. Three of those five times were because of overcrowding of busses, and two times were because of issues handling the wheelchair. Therefore, it can be concluded that active discrimination is not the primary concern for those with a disability using the transportation system.

It is important to recognize that most discrimination is commonly a passive act with non-malicious intent and often a combination of individual acts and institutional design. This is why most of the discrimination took place in subtle ways, such as the simple design of the transportation system (mentioned fifteen times) or embarrassing the individual with the limitation (mentioned sixteen times) or having to travel separately from caregivers or travel

companions (twelve mentions). Even the flow and transfer of information were mentioned eight times in situations where unintentional discrimination took place. Also, it was found that flying was the mode of transportation with the most mentions of discrimination with thirty-seven mentions of some sort of discrimination. Public buses were the next most mentioned in terms of discrimination and was mentioned seventeen times.

"Feeling stress" was another major issue as "stress" was mentioned fifty-seven times by both those with a disability and the caregivers. Most of these stressful situations were with flying (thirty-three mentions), and the second being transit buses (sixteen mentions). When flying wheelchairs, lavatories, and TSA caused the most stress. While buses were mentioned for stress from the dehumanizing experience of having to move other passengers, being pushed by passengers and staff, and not being seen by drivers at bus stops.

Table 2.5.0.1

Themes mentioned by participants with an ambulatory or visual disability

Items Mentioned	Number of Mentions
Total Mentions (all modes of transportation)	652
Planning Issues	85
Discrimination - Unintentional	75
Reliability Issues	33
Identity/Respect Issues	27
Discrimination – Active	23
Wheelchairs	16
Stress	12
Bathroom Issues	12
Design	12
Being Separate from Caregiver/Partner/Family/Friends	10

Embarrassment	8
Information Issues	8
Inconvenience (all modes)	6
TSA	4
Positive Notes	19

Table 2.5.0.2

Themes mentioned by caregivers.

Items Mentioned	Number of Mentions
Total mentions by caregivers (all modes)	202
Stress	28
Discrimination - Unintentional	23
TSA	14
Wheelchairs	13
Bathroom Issues	11
Embarrassment	8
Discrimination – Active	5
Reliability Issues	4
Design	3
Being Separate from those with a disability	2
Identity/Respect Issues	1

2.5.1 Details of Each Transportation Mode

Public Transit Bus

The metro, or city transit bus, had some of the greatest complaints, with trouble with buses mentioned ninety-five times by the participants out of six hundred fifty-two responses.

This large number of mentions of the bus is likely because participants in Madison and Fort Collins had access to a robust bus network. Of those ninety-five remarks, sixteen were mentions of stressful situations and nineteen mentions regarding discrimination of some kind. The reliability of the bus was only mentioned twice, which in the interviews of the participants made it one of the most reliable forms of transportation outside of a private van or car.

Paratransit

Paratransit is a specialized extension of public transit buses, but unlike buses that run on a set route and schedule, paratransit typically operates on call with flexible routes and special accessible vehicles. Paratransit was mentioned forty-seven times, with reliability issues being mentioned seventeen times (composing 36% of the mentions). Complaints about planning for paratransit were also prevalent with eleven mentions. Stressful situations only came up once, and that was regarding drivers not properly securing individuals on the bus. Although these results may have been skewed as several participants were University of Wisconsin-Madison students and the university provides a specialized paratransit service, which is different than Madison metro's city provided paratransit. Paratransit services in Fort Collins were not used by the participants, mostly due to lack of service to some areas or better alternatives.

Other issues mentioned during the interviews regarding paratransit are the amount of bureaucracy and red tape needed to participate in a service. For example, for someone to use paratransit services, they must make a reservation well in advance, such as making a call at 6am several days ahead to schedule the service. Then when the service is to be performed, there is no communication as to the service's actual arrival time or delays. Further, there are so many bureaucratic obstacles in qualifying for the service, including the application form. For instance, in Fort Collins the application form when trying to sign up for the service is so complicated that

the paperwork becomes the barrier. Whereas Madison Metro paratransit application asks no detailed questions, Fort Collins paratransit application asks several personal questions (TRANSFORT, 2023). These questions by Fort Collins include:

"Are you able to recognize printed information?"

"Are you able to recognize changes in your mental/emotional state?"

"Have you ever had training to use fixed-route buses…and who performed the training?"

"Are you able to wait at an ADA accessible bus stop without seating?"

So, while it is not active discrimination, these added layers of red tape can be interpreted as an additional type of unintentional discrimination.

Bus Rapid Transit (BRT)

BRT is an express type of bus service that is being initiated in several cities across the US. BRT was very well-liked by the two participants who used it in Fort Collins. The only complaint about those systems was the reduced hours of the Fort Collins MAX bus line since the 2020 pandemic. None of the Wisconsin area participants had used a bus rapid transit system, but some participants were interested in the system which should be operational in Madison by 2024.

Flying

There were one hundred and seventy-six instances in which difficulty with flying was mentioned. Within that total, discrimination was coded forty times. Stress was the second most common issue associated with flying with thirty-three mentions. Notably, when the participants

were asked why they chose not to fly, their responses overwhelmingly suggested concern for damage to their wheelchairs.

In contrast, there were seven positive instances of flying, as Tyler mentioned getting specialized treatment by the airline became the best day of his life.

Trains, Subways & Light Rail

Trains, subways, and light rail were the least used, but the most liked. Train users found them very easy to use and a very good experience. The main issues were not with the trains but the maintenance of elevators in the stations, specifically for subways. Problems using the bathroom onboard was mentioned as an issue by one participant as the bathrooms on the long-distance Amtrak trains are not accessible. There was also no mention of discrimination on the trains in the United States.

One participant, David, noted that there was a stark difference in trains regarding accessibility in the United States compared to Croatia. When riding trains in Croatia, David mentioned “Stepping into a train station in Croatia is like stepping back in time. They didn't even sell me the right ticket for the right car with the wheelchair section. It was slow, so it was obvious that they had not invested in their infrastructure, train wise, which I was a little surprised by, because everybody, you know, everybody who says, oh you're in Europe. Take the train. Well, that's not the case in Croatia.”

While David had high regard for trains in the United States, in Croatia, David mentioned stress and discrimination many times while traveling, including the worry that there were only two spaces for wheelchairs on the train. David felt that this is likely because of the people in

Croatia's attitudes and expectations for someone with a disability not being a productive part of the community.

Taxis

Only two participants stated that they rode in taxis. Both participants who used taxis referred to them as expensive and felt that they could easily be taken advantage of by the taxi driver due to their disability status. One participant, however, stated that taxis can be very valuable when a trusting relationship develops with the taxi driver.

When it came to discrimination, taxis were mentioned only five times. It was felt by the participants that the taxi drivers purposely overcharged those with a disability. This example of discrimination was therefore not about a denial of service, but instead, with regard to perceived price-gouging.

Ride Hailing Services

Uber was used by several individuals:

- Those who were blind loved Uber, although there were issues with payment since not everyone had a credit card.
- Those who use a wheelchair used Uber but only when they were part of a large group and did not advise the driver that they were in a wheelchair until after the car had arrived. Further, the participants were in a manual wheelchair and not an electric wheelchair.
- Notably, none of the participants had used Uber's Wheelchair-Accessible Vehicle (WAV) program.

Autonomous Vehicles

All participants were very interested in the future of autonomous vehicles but knew very little about this emerging technology. Although, there is concern that autonomous vehicles will not be affordable for the average individual.

Sidewalks

While not a vehicle, sidewalks are a critical component of transportation infrastructure. The quality of the sidewalk's surface was mentioned several times. However, the practice of expanding outdoor seating on sidewalks during the pandemic was a major issue. As Jessica explained "(restaurants/shops) are like amoebas, slowly taking over the sidewalk", but Jessica mentioned that regulations or laws are not necessarily needed. Rather, she felt that "the best solution is just having a conversation with the owners of the restaurants and shops."

Another issue was cars on the sidewalk. As mentioned by David while in Croatia: "I was trying to get around a parked car, and I have the tilt on my chair. Well, I brushed up against some bushes and the bushes hit my tilt button, and caused me to tilt back, and I fell over backwards, and then three people stopped to help, and none of them spoke English. It wasn't till a like a fourth younger person who spoke English, and then I could tell him what to do. I did not know to plan for people who park on the (expletive) sidewalk."

Here in the US, there is the issue of cars emerging from driveways. Mobile wheelchairs operate at speeds faster than 10 mph, so a car about to cross the sidewalk might not see someone in a wheelchair before turning into or out of a driveway. For example, Tyler was hit by a car when traveling on the sidewalk.

Bike Paths

Bike paths were also mentioned several times, mostly in a positive context as they allowed safe and fast travel for those in a electric wheelchair. Ice and snow removal were the main negative mentions. Although sharing the bike paths with rude bikers is also an issue, especially when an individual with an ambulatory limitation is unable to turn their head to check for bikes approaching from behind.

Chapter 2, Section 6.0: Discussion

If the trip is too unpredictable, or too much of a hassle, someone with a physical or visual limitation will frequently avoid that transportation mode. The problem is there are limited transportation alternatives for those with a disability. For short, last-minute trips the participant will rely on their own resources such as riding in their own wheelchair or accessible personal vehicle. As trips become longer participants will avoid making the trip altogether; resulting in being excluded from job opportunities and/or social activities. This occurred when Tyler mentioned that he avoided a wedding due to the hassle of travel, Jason mentioned that he was unable to participate in a graduate school trip, and April in being unable to secure a job. These exclusions of activities are an effect of unintentional discrimination taking place in transportation–whereby someone is not actively discriminated against, but rather is not given access or is discouraged from using the available transportation.

Unpredictability of the transportation system for someone with a disability could be limiting these individuals' access to jobs, education, or engaging in social activities. This unpredictability also leads to added costs to employers when the individual with a disability is late to work, not being able to perform according to a planned work schedule, and being unable to participate when the job requires travel (FHWA Office of Operations, 2019). The result is that

employers have a disincentive to hire someone with an ambulatory or visual disability because of access, unpredictability, and bureaucracy in transportation even though those with a disability go to great lengths to prepare and plan their transportation.

While great strides have been made in the United States due to the ADA, there is still a tremendous amount of improvement needed in transportation design before someone with an ambulatory disability or who is blind is able to enjoy the same freedoms as someone who is fully able-bodied. At the very least, the ADA has provided some sort of standardization. This way, someone using a bus in any city across the US can know what to expect as a basic level of accessibility. As David stated: "I know in the United States, not everything is accessible, but when it is accessible, I know I can use it." What David is saying is that because of the ADA he can expect the same standards of accessibility with the Madison Metro buses in Madison, WI, Transfort Buses in Fort Collins, or the buses operated by New York City Transit.

While the ADA has standardized public transportation, there are still significant accessibility issues across modes. For example, there is no standardization in accessibility within ride hailing companies as the automobiles are provided by private individuals. Therefore, the ADA does not even apply. Furthermore, the airline industry is not covered by the ADA, which results in this transportation sector's classification of what is "accessible" being very different from other modes of transportation.

The issue is that making transportation access equal is not the same as making transportation equitable. To demonstrate this difference in equity, an individual who is blind, an individual who is in a wheelchair, and an individual who is able-bodied may have equal access yet very different experiences. For example, when utilizing a community's transit, the able-bodied individual can board the bus and choose to sit or stand. They will likely experience no

embarrassment of having to make people move or having people stare at them. Further, the able-bodied individual–not having a visual impairment–may reference bus signage or look out the window to know where they are on the route.

Whereas someone who is blind will have a very different experience of not knowing where to stand or sit, or even what is the next stop. On that same bus, someone in a wheelchair will then have a drastically different experience. For instance, several participants in a wheelchair cited having to make people move, delaying the bus, and not knowing where they are as the reason they avoid using a metro bus. Therefore, while access to a bus may be equal, the experience of riding the bus is not equitable.

2.6.1 Planning and Paperwork

Even after adaptations to public transportation due to the passage of the ADA, those with a disability live by planning. While the ADA has required physical accommodations on transportation, the system is still designed to be most efficiently used by the "average" able-bodied male. So, for someone with a visual or ambulatory disability identifying obstacles, having contingency plans, and being prepared for erratic standards is the norm when traveling. Even then, someone with a disability must be prepared to not succeed in their journey due to unforeseen obstacles.

Besides planning, the other issue is the amount of bureaucracy and red tape needed to participate in a service. For example, to use paratransit services one must be up at 6am to make a reservation. Then when the service is to be performed there is no communication about a delay, or if the service is going to even arrive. Then there are many bureaucratic obstacles in signing up for the service that the application process itself becomes a barrier.

In addition, there is the lack of uniform protocols. For example, if someone in a wheelchair wants to fly from Madison, WI, to Chicago, IL; all aircraft are supposed to be accessible, but this is not the case. In fact, while United Airlines has a large amount of information on its website regarding the accessibility of its services, it is still up to the individual to sort through the data and determine if the flight is feasible. After all, there are no standards on accessibility information in the booking process, and it is only after making the reservation that the airline reaches out to confirm accommodation.

To explain this example of complexity and lack of information on March 19th, 2023, these were the flights that United Airlines operated between Madison and Chicago:

Table 2.6.1.1:

United Airlines flight schedule between Madison, WI and Chicago O'Hare on March 19th, 2023

Departure Time	*Flight Number*	*Aircraft*
6:50 am	UA 691	Boeing 737-800
8:45 am	UA 5300	CRJ 200
10:58 am	UA 1598	Airbus A320
12:12 pm	UA 5303	CRJ 200
3:55 pm	UA 3509	ERJ 175
5:30 pm	UA 3743	CRJ 200

Only the most seasoned traveler will know the drastic differences between the aircraft types. For example, the 6:50am and the 10:58am are operated by United Airlines on aircraft with over 150 seats. On these aircraft, the cargo doors are 48 inches tall (United Airlines, 2021a). This means wheelchairs can be loaded upright into the baggage hold and are less likely to be damaged.

The other flights in this schedule are operated by United's partner airlines operating under the United Express agreement. In this example SkyWest Airlines, Republic Airways, and Air Wisconsin operate the 8:45 am, 12:12pm, 3:55pm, and 5:30pm flights.

These companies employ different personnel and use distinctly different aircraft types, such as the Embraer 175 and the CRJ 200. United Airlines' website gives no details on cargo hold door heights, or locations for these aircraft type, but only that the Embraer 175 and the CRJ 200 cargo hold doors are 43 inches wide (United Airlines, 2021b). To an individual with a disability planning their trip they would have no idea that the ERJ 175 cargo hold is under the floor, while the CRJ 200 is behind the main passenger cabin between the engines. It is not mentioned on the website, but this cargo hold position on the CRJ 200 aircraft could lead to weight and balance issues if a 250 lb+ electric wheelchair is placed in that baggage hold. In these situations, the wheelchair and passenger will be denied boarding, as occurred with David. There is no way someone planning the trip would know this in advance.

This lack of information and standardization puts an unnecessary burden on the passengers with a disability which leads to denied boardings and unintentional discrimination. On the CRJ 200 flights a wheelchair user may be discriminated against, in the name of "safety". While on the other contracted flights the wheelchair may be damaged due to the size of cargo doors and cargo compartments. The result is flying is an extremely risky and discouraging experience for someone with a disability and therefore leading to unintentional discrimination.

Chapter 2, Section 7.0: Conclusions

While there were some cases of direct discrimination, most prevalent were cases of unintentional discrimination where participants avoided certain types of transportation due to:

For bus transport: (1) embarrassment or (2) unanticipated difficulty.

For paratransit: (3) the hassle of the advanced planning and (4) unreliability of the service.

For ride hailing: (5) having to hide their disability or (6) issues with form of payment.

For bike paths: (7) issues with obstacles by other individuals.

For flying: (8) basic fear of damage to wheelchairs and inhumane care.

The fact is that those with a disability have a very different experience in navigating the transportation system than an able-bodied individual. As mentioned by April it has led to her not having a job, or Jason having to move in search of affordable housing next to transit, or Tyler having the added cost of providing his own transportation. Also, every participant in the study mentioned stress and anxieties when attempting to navigate the public transportation system.

According to the results of this study, individuals with a disability are having to deal with increased costs, limited accessibility, and limited opportunities for work, education, and social activities. This results in discrimination for someone who is blind or someone in a wheelchair to move freely, where they want to, when they want to, and in a manner that is equitable. This study finds that unintentional discrimination is occurring due to the current design of our transportation systems. This therefore calls into question the mission of the US Department of Transportation which claims to “support and engage people and communities to promote safe, affordable, accessible, and multimodal access to opportunities and services” (U.S. Department of Transportation, 2022).

This unintentional discrimination in transportation is at a great cost to the individual, their families, communities, and to society in terms of workers discouragement. Transportation is essential to everyday life and is a requirement for education, work, social activities, and community engagement. While great strides have been made in the past decades due to the adoption of the ADA, not having equitable access to transportation systems is still a recurring issue for a large and growing minority who are not able to achieve their potential. As a result, there is still a need for more studies into making transportation vehicles and facilities accessible, additional studies on those with a disability navigating the system, as well as policy changes that support these efforts.

Chapter 2, Section 8.0: Policy Implications:

As pointed out by the United Nations, social justice is an aspiration for the future. This aspiration is for everyone in society to have access to productive employment, a reduction in inequalities, and to empower those with a disability to live to their potential and become active participants in not only the local neighborhood but in the national and international community. Of course, equitable transportation is critical to these social justice goals.

Due to the ADA, physical accommodation on public transit is not a major issue, but rather the greater issue is difficulty in navigating the transportation system. This includes the experience of planning to use the transportation system, as well as reducing the complexity and embarrassment for someone with a disability utilizing a bus or plane. Finally, the complexity needs to be reduced in utilizing such systems, such as paratransit, so an individual with a disability may enjoy the same freedom to make last-minute transit decisions as an able-bodied individual.

The overall goal of the ADA and the civil rights movement was to reduce discrimination. While the results of this study declare that active discrimination against those with a disability is still occurring, the bigger issue is unintentional discrimination. This unintentional discrimination is at a great cost to the individual, their families, communities, and society as it results in increased costs, limited accessibility, as well as limited work, educational, and social activities. Unintentional discrimination is not only a result of poor system design but also a result of the unpredictability of the transportation system for someone with a disability. After all, if a trip is too unpredictable or too much of a hassle, that form of transport will be avoided. This avoidance of a transportation mode, such as a public bus or the airlines, can then limit access to jobs, education, as well as community activities. To overcome this unpredictable universal design needs to be further developed into transportation, as well as adopting more transit-oriented communities built around light rail, bus rapid transit, or rail stations.

Finally, to overcome unintentional discrimination and unpredictability in transportation, providing real-time, standardized information is key. This could be current transit bus loads, bus stop design, standardized airline websites, or just simply updating Google Street View. Further there is a need for providing real-time snow and ice clearance on bike paths and sidewalks during inclement weather. so those individuals can anticipate problems ahead of time based on their own disability.

Chapter 2, Section 9.0: Areas of Further Study

The US transportation system is used by nearly every American on a daily basis, including millions of Americans with disabilities. Therefore, this study just scratched the surface of how those with a disability interact and use transportation systems. Further research is needed for both the individual's experience with different modes of travel, especially in different

locations, and how emerging technologies will be adapted for those with a disability. Further, this study only focused on those with a visual or ambulatory disability. There is a large opportunity to study the experiences of individuals with a developmental or intellectual disability and how they use the transportation system.

The creation of "accessible boulevards" are worthy of studying since it was mentioned by one of the participants with a visual limitation. Rather than upgrading every sidewalk, road, and intersection to be accessible, main routes could be developed with enhanced accessible features. Perhaps, such updates could mimic the early design and development of bike paths, and include bright signage, pavement that provides location feedback (such as rougher texture along the edges and smooth texture in the center), and large signage on the pavement.

Regarding airlines, studies are needed on ways to make airline websites standardized in information and proactive regarding accessibility. As mentioned above, it is after the airline reservation has been made that a special services agent inquiries about the airline passenger's disability. Could this be completed before the ticket is purchased so an individual can make a better choice? For example, American Airlines has very little information regarding accommodations, while United Airlines has a small app for wheelchair accommodation buried in its accessibility pages. It would be better if all airlines had this app, which could be connected to the booking process. Further, it would be helpful if accessibility content was standardized across all airline websites.

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Chapter 3: Maintaining Transportation Accessibility for an Aging Baby Boomer Population

Abstract

By 2029 all of the Baby Boomer generation will be over 65 years old, and they will compose an estimated 20% of the US population. However, the challenge is as this generation ages they will be likely to develop a disability that may preclude them from driving, which can result in isolation and depression, as well as poverty. This study investigates the current transportation needs of the Baby Boomer generation and explores how to best meet their transportation needs in the future as they develop travel-limiting ambulatory and visual disabilities. The findings of the study were combined into a projection of what transportation struggles the Baby Boomer generation will have to face in the future and recommendations on how to address those issues.

Major findings of this study include the following: First, the greatest cost-to-benefit outcome is to help reduce uncertainty in navigating the transportation system. Reducing this uncertainty includes using phone and social media applications to give those who struggle with an ambulatory disability real-time information. Consequently, access to real time information will minimize surprises, allowing individuals to plan for obstacles ahead of time including snow/ice clearing of bike paths, full accessibility inventory of bus stops and stations, crowded vehicles, and alerting the drivers ahead of time of the individual with a disability's plans. The next finding of the report concerns the application of universal design to increase accessibility for a range of individuals, as well as developing transit-oriented development to allow one to age in place. Other areas that concern the aging Baby Boomer cohort include emerging technologies

such as ride-hailing services and autonomous vehicles are a major concern given their disincentives in providing accessible vehicles for those with an ambulatory disability.

Chapter 3, Section 1.0: Introduction

In the next twenty years, the transportation needs of the Baby Boomer cohort (those born between 1946 and 1964) will change dramatically. Indeed, this generation grew up in automobile-dependent, suburbanized America. However, as this generation ages, it is likely for them to develop ambulatory or visual disabilities that would prevent them from driving. This loss of ability to drive includes the risk that this aging generation can become separated from the community given their lack of transportation options. A more significant issue pertains to the family structure of Baby Boomers. In comparison to previous generations, Baby Boomers may have less family resources to draw upon as their children tend to be more mobile and may live too far away to provide transportation for their aging parents. As a result, there is growing concern regarding the future transportation needs of this large cohort of nearly 73 million individuals (America et al., 2019).

This research study investigates the current transportation needs of the Baby Boomer generation and makes recommendations on how to best meet their future transportation needs. This research includes a quantitative study utilizing government data sources as well as a qualitative study of four individuals in their 40s, 50s, and 70s, who have an ambulatory disability or have family members with an ambulatory disability.

3.1.1 Description of the Problem

Transportation needs are fundamental to an individual's ability to live and work. Therefore, the aging Baby Boomers cohort's lack of access to transportation alternatives can

contribute to their social, physical, and psychological isolation. While the adoption of the Americans with Disabilities Act of 1990 (ADA) and other policies such as the Rehabilitation Act 1973, great strides have been made in bringing accessibility into mainstream policy. However, more work is needed as someone with a disability still encounters significant unpredictability in transport, must deal with poor system design, or may be excluded from services altogether. Consequently, there is still a need for improvement in transportation design and the availability of planning information to meet the needs of the Baby Boomer cohort.

3.1.2 The Population with a Disability

The aging Baby Boomers comprise over 20% of the US population. This cohort of approximately 73 million individuals has already or may develop a disability in the future. According to Erickson et all (2014), 21.8% of those over 65 are likely to develop a disability and this probability increases with age. However, this issue is more significant for many states with a higher proportion of aging Baby Boomers. For example, in 2020, 18% of Wisconsin's population was over 65 years old. Fifteen other states have a Baby Boomer proportion that is greater than Wisconsin and likely to grow in the future (US Census, 2023). As a result, a significant number of states are seeing the median age of their population increase resulting in a larger proportion of their population being at risk of losing the ability to drive, which is their only form of available transportation.

3.1.3 Policy Implications: Providing Public Transit Beyond Urban Areas

With the Baby Boomer cohort, the greater issue is not accessibility of vehicles and facilities, rather the Baby Boomer cohort struggles concern where they live and continuing to provide public transportation as they age in place and are no longer able to drive. According to U.S. Census bureau, over 17.5% of individuals 65 year and older are now living in rural areas

where the automobile is the only form of transportation (Smith and Trevelyan, 2020). According to Frey (2003), over 70% of those who live in the suburbs of major metropolitan areas belong to the Baby Boomer cohort where the automobile is also the primary form of transportation (although some public transportation is available). The issue for policy makers is to provide transportation when these individuals are no longer able to drive. Further policy makers also need to consider public transportation options that crosses multiple municipal borders, such as with the suburbs or small rural towns.

Chapter 3, Section 2.0: Social Justice:

The concept of social justice dates back to antiquity but has continued to evolve over time. In the 20th Century, social justice was developed by philosophers such as John Rawls whose thoughts published in the "Theory on Justice" and contend that the foundation of civility is freedom, equality, and fairness (Sandel, 1994). These philosophical ideologies were then further refined regarding differences in human rights; specifically economic, social, and cultural rights; and the idealism of social justice can even be seen as the inspiration for Michael Oliver and his investigation into the social theory of disability (Terzi, 2004).

Paralleling this change in thought on social justice is the United Nations. In 1944, the United Nations made social justice the value system by which it would then develop human rights for those with a disability, in 2015 ultimately making disability part of its Sustainable Development Goals (SDGs) and targets for 2030.

3.2.1 The United Nations and Disability Rights

The focus of this study has been the US transportation system meeting the needs of an aging American population. However, America is not alone in struggling with an aging

population as many developed countries also have an aging populace. This international concern about an aging population that might develop a disability has resulted in disability rights becoming a high-level agenda item to the UN General Assembly in the 2000s. This movement resulted in the Convention on the Rights of Persons with Disabilities (CRPD). Signed in 2006 and entered into force in 2008, the CRPD became a landmark international human rights law. According to the UN Flagship Report on Disability:

> *This landmark Convention is truly a benchmark instrument to ensure the equal enjoyment of universal human rights and fundamental freedoms by persons with disabilities. Together with other international human rights and development instruments, it provides a comprehensive framework for national policymaking and legislation, including international cooperation, for building an inclusive society, and for development* (Bas & Padova, 2019, pg. 27).

Following the CRPD, in 2013 the United Nations General Assembly continued to call high-level meetings on disability and development. As a result, in 2015 member states adopted the belief that all persons with disability should be included in the Sustainable Development Goals (SDGs) for 2030, with a specific link between disability and sustainable development. A specific emphasis was on education, growth, employment, inequality, accessibility of cities, data monitoring, and accountability.

3.2.2 The United Nations Sustainability Development Goals (SDGs):

Frequently those with a disability are prevented from participating in community activities beyond the neighborhood, be it an educational trip, wedding, or public service, due to limitations with transportation. These transportation barriers prevent those with a disability from community participation and are the core of social justice in transportation for those with a

disability. At the international level, these barriers led to the United Nations including disability rights when in 2015 it created the SGDs for the world of 2030.

The overarching aim of the SDGs is to provide a blueprint for peace and prosperity by ending poverty, reducing inequality, and spurring economic growth in both developing and developed nations. These goals range from SDG 1, no poverty; to SDG 6, Clean Water and Sanitation; to SDG 16, Peace, Justice, and Strong Institutions.

Disability is included in most of the seventeen SDG goals (excluding goals 12 through 15, and goal 17). SDGs goals 1 through 7 concern poverty, ending hunger, health, gender equality, clean water, clean energy, and innovation. However, with this study focusing on the intersection of transportation and disabilities, the following goals are worth a further discussion:

SDG 10, Reduce Inequalities

SDG 11, Sustainable Cities and Communities

These two goals were chosen because they relate to the transportation issues of an aging population that might develop a disability.

3.2.2.1 Details on the Selected Goals:

SDG 10:

Reduced Inequalities. Income inequality continues to increase everywhere in the world. As a result, policies are needed to empower those with lower incomes or who have a disability and are limited in their ability to earn to their full potential (*Goal 10: Reduced Inequalities*, 2015, p. 10). Further, targets that support this goal are :

Target 10.2: Promote universal social, economic, and political inclusion. "By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status".

Target 10.3: Ensure equal opportunities and end discrimination "Ensure equal opportunity and reduce inequalities of outcome, including eliminating discriminatory laws, policies, and practices and promoting appropriate legislation, policies and action in this regard".

The main component of SGD 10 is discrimination. Discrimination in transportation can be in two forms: direct, and unintentional. While in the U.S. direct discrimination has been minimized due to the ADA, unintentional discrimination is still an issue that can discourage an individual with a disability from using a form of transportation. This discouragement then limits an individual's access to the community and can result in isolation and depression.

SDG 11:

By 2050, it is estimated by the United Nations that two-thirds of the human population will be living in cities. Therefore, improving public transportation, affordable housing, and promoting society and culture are the focus of this goal (*Goal 11: Sustainable Cities and Communities*, 2015, p. 11). Further, the targets that support this goal include:

Target 11.2: "By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons".

This target has one Indicator: Indicator 11.2.1 is the "Proportion of population that has convenient access to public transport, by sex, age, and Persons With Disabilities". Improving transport systems to refine the use of accessibility is key because due to physical or mental disabilities, impaired sight or hearing, carrying heavy bags or traveling with small children, as this causes an average of 25% of the population to experience a degree of reduced mobility.

SDG 11 has the greatest connection to this study with individuals' difficulty in utilizing the transportation system, especially when a significant number of older adults live in suburban and rural areas not served by a robust public transit network. Further, the barriers to transportation are not necessarily physical, but can include discrimination, stigmatization, and lack of community support (Bas & Padova, 2019). Finally, there is the relationship with the built environment design that includes both transportation and housing, and the need for more affordable housing development around transit so that those who are aging can work, and remain a part of the community.

3.2.3 Social Justice in Transportation:

Transportation planning is a highly technical and costly endeavor. As a result, most transportation planning reverts to traffic engineering, whereby flows of people, goods, and vehicles are used in determining how and where transportation resources are allocated. The issue is traffic engineering tends to circumvent social justice and the changing needs of individuals as they age. As demonstrated by the UN's sustainability goals, civil society requires not just equal but equitable accessibility, meaning that no matter the age or disability, everyone derives the same utility from a mode of transportation to be an active part of the community.

Chapter 3, Section 3.0: Background

Arguably, the most important component of the built environment is transportation, and this is why transportation was so pivotal in the disability rights movement as transportation is the way one accesses and is visible in the community. The concern is that most communities built since the 1940s are auto oriented, meaning an automobile is required for daily activities such as shopping, education, and social activities. The issue is to drive an individual must be able to see and operate a vehicle. However, as one ages, they are at risk of losing their eyesight and capabilities to drive.

A solution to the auto-oriented community is designing the built environment to be more inclusive around public transportation. Two ways to accomplish this is by designing communities using universal design and the transit-oriented development movement. These communities are compact and easy to navigate for individuals of every size and capability and will benefit aging individuals who wish to remain part of the community.

3.3.1 Designing for Everyone: Universal Design

Traditionally, when developing technology, the emphasis is on the performance of the technology rather than the variety of individuals who will use the technology. The problem with this approach in design is how technology is designed for the population's norm, or average, and therefore can exclude individuals who do not fit the average. Instead, universal design forces engineers to think more innovatively and inclusively to examine the different ways to utilize a piece of technology by someone who is of incongruous size or who has physical limitations.

For example, electric doors in buildings and ramps benefit not only those in a wheelchair but also those pushing strollers or carts. Another example is the aircraft loading bridge. Before 1970, passengers had to walk out on the ramp and climb a staircase to the aircraft. Climbing the

stairs to an aircraft was a simple design process but was slow and cumbersome. Those who could not walk long distances or climb stairs could not fly. Then came the universal design of the loading bridge, which allowed both the able-bodied and those with a disability to board the airplane. However, the effect was far beyond simple accessibility to all. Due to universal design, planes could be loaded and unloaded faster due to the loading bridge. Passengers could also avoid the weather, bring their luggage onboard and, most importantly, those with a disability and the elderly could now fly.

3.3.2 Transit-Oriented Development

Since the 1990s, Transit Oriented Development (TOD) has regained recognition across the United States from major transportation projects such as Denver Union Station in Colorado and Miami Central Station in Florida to smaller projects such as Mockingbird Station in Dallas and Lake and Nicollet Station in Minneapolis. Even smaller cities, such as Fort Collins, Colorado, have redesigned their city centers into TODs centered around new bus rapid transit systems. These old-fashioned designs include a transit hub, such as a port or a train station, surrounded by mixed-use developments with retail on the first floor and apartments or offices above. The core idea behind TOD is to reduce distances between destinations, thereby reducing the overall need for transportation. After all, the shorter the distance from one's home to work, shopping, or a leisure location, the less need for transportation. The irony is that city grid designs prior to the 1950s were much better for those with a disability than the car-oriented suburban sprawl of today.

TOD is important because it can provide a community that is not auto dependent. Afterall, although transportation and community development are considered separate, they are closely linked together as the ability to travel provides the ability to participate in the

community. By designing our communities around public transit, and with a reduced need for transportation this design is not just better for those with a disability but is incredibly valuable to a Baby Boomer who wants to remain active in the community and not rely on the automobile.

Chapter 3, Section 4.0: Literature Review

Table 3.4.0.1

Categories, areas of studies, results, sources, and sample size of the reviewed literature

Area of Focus	*Subject of Study*	*Results*	*Source*	*Sample Size/Source*
Accessible design of transit	Redesign of transit busses and accessibility of those with a physical disability	Recommendations on design of transit busses, which were implemented in the 1990s	Petzall, 1993	22 individuals, 8 with a serious ambulant disability, 13 had dysfunction in their legs/arms/hips, and 11 had less seriously ambulant disabilities
Accessible design of transit	Study on the use of transportation by those with a physical disability	Over 560,000 people with a disability do not even leave the home because of difficulties with transportation	Bezyak, Sabella, & Gattis, 2017	4,161 of respondents from a web-based survey who met the disability criteria
Accessibility for an aging population	Challenges for persons who develop a disability after age 50	Persons reported issues with all forms of transportation, except driving. The use of riding sharing services such as Uber and Lyft are limited, and wheelchair accommodation is a great problem. Also, that financial challenges remain for those with a disability	Remillard, 2021	180 individuals, with 60 having an ambulatory disability
Accessibility as a construct	The concept of accessibility in terms of the ADA, and accessibility in terms of planning	A shift needs to take place from the mobility oriented (how far you can get in a period of time) approach in transportation planning to one of accessibility planning (how much can you reach in that period of time)	Handy, 2020	0 – evaluation of theory, rather than research
Aging and changing mobility needs	The use of public transportation by those unable or unwilling to drive	The older generation has different uses far beyond the traditional user. This includes access to people & places, psychological uses, & for local community involvement	Metz, 2000	Research Theory
Aging and changing mobility needs	Effects of lack of access to transportation for those over 65 years	Lack of transportation can result in declines in cognitive functions, depression, and reduced physical activity that can lead to cardiovascular mortality among those who are 65 years or older	Marottoli, et al., 2000	2,812 men and women
Aging and changing mobility needs	Anticipating the needs of the aging with the existing transportation system	The Baby Boomer generation will have very different expectations on the transportation services provided to them as they age in place. This is a great challenge since most will live in rural or suburban settings where a car is required.	Coughlin, 2009	US census data and literature

Aging and changing mobility needs	Recommended areas of study and problem statements for an aging demographic	Identifies key transportation research questions, policy issues, and practical implications associated with an aging America.	Suen & Sen, 2004	Analysis of other disability research
Aging and changing mobility needs	Travel patterns of the elderly and their use of transit	The transit systems tend to be designed for those who commute to work. However, the elderly use transportation for very different reasons and in very different ways than other demographics	Titherage, Achuthan, Mackett, & Solomon, 2009	Data from the Great Britain National Travel Survey aggregated from 1997 through 2001
Difficulties with transportation	Analysis of paratransit cost issues, examine the need for, and recommend possible solutions for the Greater Richmond Transit Company	Changes in fare structures are needed to better match usage. Making fixed-route transit services more available to those with a disability. Need for education of users. The adoption of feeder services, taxis, and group rides into the paratransit mix.	Fei & Chen, 2015	Ridership data from the National Transit Database and the Greater Richmond Transit Company.
Disability and Employment	Employment of those with a disability and the companies that tend to make accommodations	Larger businesses are more likely to hire and accommodate someone with a disability	Jasper & Waldhart, 2012	2008 Survey of Employer Perspectives on the Employment of People with Disabilities conducted by the US Department of Labor, Office of Disability Employment Policy
Disability and Employment	Employment characteristics of those with a physical disability	Those with a disability are more likely to underemployed or unemployed	Houtenville, Brucker, & Lauer, 2014	U.S. Census Bureau and the American Community Survey
Transportation Justice and Accessibility	General population of Modesto, California	That growth and change are hard in maintaining good accessibility. Additionally, that social network, better information, and community involvement are concerns	Cooper, 2000	Eleven structured interviews
Mobility vs. Accessibility	Difference between public transportation design and network accessibility of the system	While transport may be available to someone with a disability, it is the number of destinations and ease of accessing those destinations, which matter more to the older generation	Levine, Grengs, & Merlin, 2019	Research book based on a review of existing literature and research
Urban design	Using a redesign of mass transit system to make more cities more livable	Fort Collins, CO designed their whole city center around a new bus rapid transit system that is more accessible for all individuals	Project for Public Spaces, Inc., 1997	Focus group meetings with local transit officials in 10 communities. Phone surveys of transit officials in six cities across the US.

Transportation for those with a disability is not only a means to employment but also provides access to social activities and psychological well-being as seniors and those with a disability tend to use transportation more for social activities and a sense of community. A review of studies focused on mobility among those with a disability and/or elderly indicates that transportation is used to fulfill different needs than that of a middle-aged able-bodied person. Metz states that transportation accessibility for those who are elderly includes 1) Access to

desired people and places, 2) Providing the psychological benefit of movement, 3) Exercise, and 4) Involvement in the local community (Metz, 2000).

Employment was very important to the participants, for those who are employed full-time access to transportation was a consideration in where and what type of housing they lived. For those participants who retired, part time work not only provided additional income, but more importantly provided an opportunity to still be a productive part of the community. However, those with a disability are much more likely to be lower paid and have a greater unemployment rate (Houtenville, Brucker, & Lauer, 2014). Another study by Jasper and Waldhart (2012) found that employer concerns toward hiring varied significantly by employer size, with employers with more workers being more likely to hire those with a disability than those with fewer workers. According to the Bureau of Labor (BLS) news release, barriers to the employment of those with a disability include lack of education or training, lack of transportation, and lack of special accommodations (Bureau of Labor Statistics, 2013). So, it can be concluded that there is a direct relationship between a lack of transportation and employment opportunities for someone who has a disability.

There is then the issue of those who may develop a disability in the future due to aging. In 2029, the whole Baby Boomer generation will be 65 years or older and will represent over 20% of the US population (Colby & Ortman, 2014), but in many states, this cohort is going to be a greater part of the population. For example, in 2010, only 13.7% of Wisconsin's population was over 65 years old, but by 2020 the population over 65 years old had risen to 17.9% (US Census Bureau, 2020). By 2030 it is estimated that 22.3% of Wisconsin's population will be over 65 years old, and 23.7% by 2040 (Curtis & Lesson, 2014).

As cited by Suen and Sen (2004), seniors who remain active and mobile will live longer, while seniors without alternatives may suffer loneliness and depression. Suen and Sen further state that "The freedom to move is life itself" (Suen & Sen, 2004, pg. 97). They add that this "gray power" will be a challenge for policymakers and transportation providers as this Baby Boomer cohort will be more affluent, more vocal, and are used to claiming their rights. Coughlin (2009) agrees with these concerns, as he finds that the Baby Boomer cohort has experienced seamless affordable mobility, new technology, new style, and the constant promise of improvement, which are expected to continue into retirement. Further, Coughlin (2009) states that this demand reflect this cohorts improved health, higher education, more tech-savvy, and larger incomes than previous generations. Also, women will play a different role than in previous generations as they hold more advanced degrees than men with an estimation that 70% of women will work part-time or full-time into old age (Coughlin, 2009). According to Remillard et al. (2022) those who are aging have reported issues with all forms of transportation, except driving. The use of riding sharing services such as Uber and Lyft are limited, and wheelchair accommodation is a great problem. Also that financial challenges remain for those with a disability (Remillard et al., 2022).

The challenge is that this aging Baby Boomer cohort's transportation demands will change over time. While the elderly tend to make fewer trips overall, a much more significant percentage of the trips are for social and leisure reasons than for younger cohorts. According to research conducted by Titherage et al. (2009), those over 60 make 33% more trips than the average person for shopping and personal purposes. They found that overall journey time is not the primary issue when using public transit. Instead, for those over 60, it is the complexity of the journey that is the more difficult barrier, with the primary complaint being the need to change

buses during a journey, especially when the buses have infrequent service (Titheridge et al., 2009). Coughlin (2009) found that with the preference of the Baby Boomer generation to age in place, over 75% of those who are 65 or over will be in rural or suburban communities where the automobile is the required form of transportation. Further, even when public transit is available, those systems tend to be built around the typical 9 a.m. to 5 p.m. commuter (Coughlin, 2009). Therefore, these systems do not meet the needs of those traveling for non-work reasons outside normal work hours.

In terms of research related to disability and transportation access, the paper by Bezyak et al. (2017) entitled "Public Transportation: An Investigation of Barriers for People with Disabilities" is the only study that discusses the fact that people with disabilities travel less frequently and rely more on public transportation than other Americans. Additionally, over 560,000 people do not even leave their homes because of transportation difficulties. Hence, they argue that policymakers need to consider the barriers to transportation for older adults, which is expected to double by 2050 (Bezyak et al., 2017).

The challenge for transportation agencies is to provide services to the suburban and rural areas and even within urban areas with poor transit access. Paratransit service is required under the Americans with Disability Act of 1990 (ADA) and, in some cases, fills this void. However, the challenge for transit agencies is the rising costs of such a system. In a survey of 15 paratransit agencies, Fei and Chen (2015) identified that paratransit costs run ten times higher than the collected fare and are a universal issue across transit agencies (Fei & Chen, 2015). The recommendation by Fei & Chen was to attempt to move as many trips as possible by someone with a disability to a fixed bus route or a fixed route that can deviate on demand rather than increase para transit services (Fei & Chen, 2015). According to Handy, a shift also needs to take

place with theory on transportation decision. That planners need to move from the mobility oriented (how far you can get in a period of time) approach in transportation planning to one of accessibility planning (how much can you reach in that period of time) (Handy, 2020). Handy's theories follow the idea of walkable, mixed use, denser areas that are the basis for transit-oriented development.

Finally, while one might not think of buildings when discussing transportation for those with a disability, the built environment has far-reaching effects on one's ability to move. As mentioned earlier, the closer one's home is to the destinations, the less the need for transportation. For example, the 1997 Transportation Research Board paper "The Role of Transit in Creating Livable Metropolitan Communities" states that the community of Fort Collins, Colorado, can redesign their mass transit systems to make their community more livable, denser, and better designed for the elderly to age in place by building mixed use development around a transit hub (*The Role of Transit in Creating Livable Metropolitan Communities*, 1997).

Chapter 3, Section 5.0: Methods

This study took a multi-disciplinary strategy of reviewing the existing literature, completing an inventory of transportation services in the state of Wisconsin, and conducting five interviews with a convenience sample of four participants (a husband and wife were interviewed separately and then again as a couple). The interviews were with open-ended questions. Conference results from the 2020, 2021, and 2023 Transportation Research Board Annual Meetings in Washington, DC were then used to identify new and upcoming research on transportation for the Baby Boomer generation. A literature review and conference presentations then became the foundation for the open-ended questions. Finally, popular media was reviewed to understand the advancing transit technology in the marketplace.

In terms of the case studies, five interviews of four individuals were conducted using open-ended questions. All individuals grew up in the Southeastern Wisconsin and Northern Illinois region. All still live in this location, except for one individual who now lives in Colorado. These individuals have also traveled extensively across the United States and to many other countries. Three of the individuals were from the Baby Boomer generation. Two of these Baby Boomer individuals are now grappling with their potential to develop an ambulatory disability. These same Baby Boomers raised a child with an ambulatory disability and cared for a parent with both an ambulatory and visual disability. The third Baby Boomer participant has struggled with multiple sclerosis for the past ten years and is now limited to using a walker or wheelchair. The fourth individual is in his early 40s and has had an ambulatory disability since birth requiring the use of an electric wheelchair.

Table 3.5.0.1

Aliases and background of participants

Participant Alias:	*Bill*	*Carol*	*John*	*David*
Age	70s	70s	50s	40s
Limitation	Full mobility, but early onset of Parkinson's Disease	None	Walker & manual wheelchair	Electric wheelchair
Onset of disability	Late 60s	None	Late 40s	Lifetime
Location	Southeastern Wisconsin	Southeastern Wisconsin	Northern Illinois	Northern Colorado (grew up in Illinois)
Other Notes:	Married to Carol	Married to Bill		

Chapter 3, Section 6.0: Results

Of the participants in the Baby Boomer generation, the most topic mentioned was "reliance on family and friends" for transportation needs (mentioned thirty-five times). This is to be expected as transportation for someone who has a disability becomes the responsibility of either the parents or the siblings. Likewise, transportation for the elderly becomes the responsibility of their children and grandchildren. In many cases, providing accommodations to someone with a disability resulted in a family having to either "move", or "make multiple moves" (mentioned eleven times) to live in an accessible home or move to be closer to other family members.

While accessibility tends to focus on the "physical limitations" (mentioned six times), the bigger issue may be the psychological "fear of isolation", as that fear was the fourth most frequently mentioned subject (eleven times). "Being part of a community" was the sixth most mentioned subject (ten times), and "discrimination" ranked fifteenth most important. What was surprising is the number of times that "mainstreaming with abled-bodied students" was mentioned (eight times). This subject was frequently connected to the community (ten times) and schooling (eight times) in that those who struggle with a disability do not want to stand out and be different. Although participants said that they want to be part of a larger community, they also do not want to be the lone person with a disability. They want others like them in the same community so that they can relate, share resources, and come up with creative solutions to problems (mentioned four times) to adapt to the greater community. Of course, also rated were "personal choice/decisions" in the accessible environment. Specifically, those who struggle with a physical disability do not want to be told what to do or how to use something, and thus the

reason “personal choice” was mentioned seven times regarding driving or where they should live.

In terms of transportation infrastructure, the value of “bike paths” was mentioned frequently (nine times). “Availability of sidewalks” was mentioned three times, and even “audible crosswalks” were all mentioned in positive regards by the individuals interviewed as these forms of transportation infrastructure increased safety and provided a level terrain. “Weather” was also the main concern of those interviewed, especially when bike paths were used for commuting to work during the winter. As for vehicles, personally, modified minivans/vans were mentioned as the primary mode for those who are in a wheelchair, while standard cars were used by those who were still able to walk limited distances. Commuter trains were mentioned as the preferred form of public transit (three times), with bus rapid transit also being mentioned twice. The participants who were not limited to a motorized wheelchair had all used ride-hailing services such as Uber and Lyft and had positive experiences. However, the individual in a motorized chair did not use ride-hailing due to a lack of accessibility. One of the participants used light rail/streetcars and mentioned it as a positive experience. The other three participants had not ridden light rail/streetcars.

Surprisingly “money” (mentioned seven times), “disability resources” (two times), and “employment “(two times) were not a priority compared to social themes such “reliance on family and friends” (mentioned thirty-five times), “fear of isolation” (eleven times), and “being part of a community” (ten times). All the individuals in the study were middle class, employed, and with college degrees; so, this may have skewed the responses on these four topics. However, when participants were asked directly if the government should provide subsidies to buy resources such as accessible vehicles and home modifications beyond what Medicaid or

Medicare pay for today, all responded “No, the government should not”. The overall feeling is that if direct payments are made then others who do not have a disability would abuse those programs which would then frame a negative image of those who have a disability. Rather, adapting the environment through “universal design” (mentioned eight times) and increasing the “ease of use” (mentioned nineteen times) was preferable since it allows someone with a disability to make a living and be a productive part of society without the need of direct government subsidy.

Also, what is surprising is how frequently technology was discussed (ten times). Specifically mentioning “ease of use” (mentioned nineteen times) and included wayfinding/mapping apps, real-time bus information, and most importantly the improvement in voice recognition. Of major interest among the group was navigating apps that provided personalized routes based on their disability/capabilities. For example, seeing the status of bike paths and sidewalks that are clear of snow (mentioned 5 times), the location of curb cutouts on maps, improved bus stops that have cement sidewalks for loading, and passenger occupancy information of an oncoming bus; were all mentioned by the participants.

Table 3.6.0.1

Top 20 themes mentioned by the Baby Boomer participants

Items Mentioned	Number of Mentions
Total mentions	285
Family and friends	35
Ease of use	19
No public transit	14
Isolated	11
Moved because of disability	11

Community, part of	10
Technology	10
Bike paths	9
Use of local transit	9
Universal design, the importance of	9
Mainstreamed, wanting to be in education	8
Money	7
Personal choice, the importance of	7
Discrimination	6
Physical limitations in everyday life	6
Rural transportation issues	5
Weather	5
Accessibility	4
Creativity/adaption	4

Chapter 3, Section 7.0: Discussion

As the Baby Boomer generation ages and develops ambulatory disabilities, the first challenge will involve being able to move around their home and the neighborhood in devices such as wheelchairs, walkers, and canes. Costs for acquiring these personal mobility assistive devices range from a few dollars for assistive canes to over $35,000 for an electric wheelchair (Permobile, 2020). Traditionally the individual, insurance, or government assistance will pay for these costs. Although as travel distances increase, transportation costs increase and travel itself becomes much more complex than for someone who is able-bodied.

3.7.1 Mobility Options with Existing Transportation Technology

While personal transport is required for movement around the home and neighborhood, to venture beyond into the city or village usually requires other forms of transportation. Use of a private automobile by someone who has an ambulatory disability can range from the use of a standard stock car for short trips during the day to the use of a specially modified vehicle that costs nearly $38,000 beyond the cost of the stock vehicle and can include ramps, drop floors, and extended roofs (*Build Your Own Custom Wheelchair Van*, 2023). These vehicles are traditionally paid for by the individual, or their family, according to the participants in this study.

As distance from home increases public transportation becomes more valuable to an individual with a disability as modified buses, paratransit services, and light rail systems tend to be accessible and easy to use. Except for paratransit, most of the costs for providing accessible public transit are embedded in the universal design of the system, so no added cost is typically incurred by the agency to accommodate someone with a disability. For example, transit buses pick up someone with a disability just like they pick up any other passengers. The same is true for light rail systems. Thus, by including universal accessibility in the design, someone who is elderly or has a disability can be accommodated at no added operational expense to the agency.

For intercity trips, just a few hundred miles apart, driving a personal vehicle that is either stocked or modified for accessibility is preferred. For those without a personal vehicle, options frequently do exist with coach bus travel but take a significant amount of planning. As with local public transit, the costs for providing accessible service on a coach bus in line with ADA guidelines are traditionally part of the sunk cost of buying the vehicle to provide the services, although there may be an added cost of driver training. For example, a coach bus can be

equipped with a lift and dedicated door which is just part of the vehicle purchase price. The same is true for the train or subway.

Then as distances increase, airlines become the preferred mode of transport. Although for airlines there may be the extra direct cost for including those with a disability in the airport as dedicated staff and equipment frequently must be provided to assist those with a disability in airline hubs.

3.7.2 Emerging Transportation Technologies and its Implications

3.7.2.1 Way Finding Services

Often overlooked, but with the greatest potential for assisting those who are older or have a disability, is phone app wayfinding services. When considering the painstaking planning and strategizing someone with a disability must take to travel; wayfinding apps could significantly decrease the amount of stress and time someone with a disability experiences. For example, seeing in the app something as simple as a bus stop with a bench and sidewalk that leads to a continuous curb could make a trip a success for someone with a disability. Today the individual must venture out on their own to test and observe the environment to find out if a trip would be possible. However, an app that can plan a route for someone in a wheelchair that takes into consideration curbs, hills, and sidewalks can open new worlds for an individual who does not have the means to explore on their own. When combined with voice recognition software, whole new worlds could be opened for the elderly who are unsure and unfamiliar with navigating cities and regions. The issue with developing apps specifically for someone with a disability is the relatively small and limited market, therefore incorporating new functions into mass-market apps is a better solution.

Already today, YouTube, online maps, and video social media are often important resources for those with a disability. The issue is that the data and pictures in these apps are not frequently updated. As mentioned in the cases, reading directions can be prone to misinterpretation and new obstacles can have appeared since the picture was taken (such as construction blocking sidewalks). However, if the data is kept current the user with a disability would feel much more confident and be willing to try to use public transit. Further, having videos such as “fare collection”, “boarding”, and “trip planning” that are produced by local transit agencies would significantly increase the confidence of an individual, who is elderly or has disability, in taking public transit and navigating city streets.

3.7.2.2 Ride-Hailing Services – Uber/Lyft

The ride-hailing app services Uber and Lyft have exploded in popularity over the past decade, but these companies avoid ADA requirements because the companies themselves claim to just be platforms that organize the rides, and drivers are classified as independent contractors. Further, there are several reasons a contractor would be discouraged from providing accessible vehicles. As mentioned previously, handicapped-accessible vehicles cost significantly more to own than standard vehicles. The second issue is the extra time involved serving those customers with a disability as a driver must assist with boarding, disembarking, and storing the wheelchair. This reduces the number of customers that a driver can assist and requires more of a driver’s effort than the traditional rider. Third, the driver needs to be experienced in assisting those with an ambulatory disability. Finally, the user must be able to use the apps and/or form of payment which could be an issue for someone with a disability and who has limited financial resources.

However, there is the risk that segregation may occur whereby drivers label a passenger with a disability as problematic, and other drivers can then refuse to offer rides. This is a great

concern as public transit providers contemplate ways to make ride-hailing services part of their future strategy. Uber and Lyft both have the WAV (wheelchair-accessible vehicle) programs, but both programs are very unclear about service areas as a user must request a WAV ride and then wait to see if any accessible vehicles respond. This has led to reports of excessive waits for rides in the cities that the program services (Hawkins, 2021) and the U.S. Department of Transportation has even filed suit against Uber and Lyft due to excessive charging of those with a disability due to wait times (*Justice Department Sues Uber for Overcharging People with Disabilities*, 2021). Further Lyft has fought multiple claims that the ADA does not apply to them (Maldonado, 2019). Finally in several cities Lyft just refers individuals with a disability to paratransit and taxi options rather than providing an accessible service (Lyft, 2023).

3.7.2.3 Autonomous Vehicles (AV)

While AVs are highly anticipated, the truth is that full-level five autonomous vehicles are not going to be available for several years, if not decades (Paniati, 2019), which limits their usefulness to an aging Baby Boomer generation. Vehicle autonomy is divided into five categories by the National Highway Traffic Safety Administration. Levels 0 through 3 require that a licensed driver be in control. Level 4 is high autonomy whereby the vehicle can drive itself, but human interaction is still needed. Level 5 is full autonomy where a driver is no longer needed (*Automated Vehicle Safety*, 2023). The most famous AV system is Tesla's autopilot, which only reaches level 2 autonomy (Bobrowsky, 2023) (Korosec, 2019). Level 4 autonomy is currently being tested in San Francisco by Google's Waymo and the startup company Cruise (Bobrowsky, 2023). While advancements are being made it is still very uncertain when level 5 autonomy will be reached.

Even if full level 5 vehicle autonomy is achieved nationwide, there are serious questions regarding accessibility. There are currently no federal laws covering the development of accessible AVs. Of the AVs currently in operation on closed tracks, these vehicles only include an extendable ramp and not universal design elements that would give full accessibility. Further, AVs are likely to be private vehicles that are not covered by the ADA. Finally, AVs will likely not have a human assistant, in which case anyone who requires human assistance will be unable to even consider using an AV.

Chapter 3, Section 8.0: Conclusions and Implications for Policymakers

As the 73 million Baby Boomers age their transportation needs will change due to developing an ambulatory or visual disability that may preclude them from driving. With over 1 in 5 of those over 65 in rural areas where driving is required, the question becomes how planners and policymakers can best allow this generation to age in place?

3.8.1 Accessibility of Current Transportation

A surprising result of the research is that the difficulty of navigating the system was a constant theme and not the physical accommodation on vehicles. In the research, it appears that an individual who has a disability or is elderly but with a strong family network can adapt to inaccessible transportation by relying on private transportation. However, for individuals who are on their own, their concerns include everything from the knowledge of the bus driver in assisting someone with a disability, to snow removal on bike paths, to the location of bus stops with sidewalk connections, to unfamiliarity with procedures and processes, to the reliability of paratransit service, to even adapting to new transportation technologies. It is therefore reducing the uncertainty of travel for the Baby Boomer passenger with a disability that would have the greatest impact.

3.8.2 Cost Benefit Options

The area of greatest benefit to those with a disability is for the state or local municipalities to assist in reducing unpredictability in navigating the system by using mass-market apps. This would include providing more information on amenities of all stops on the system, snow/ice removal status bike paths, real-time status of the system (including bus loads), and standardizing practices on how this communication is collected and displayed to the public in such applications as Google Earth/Maps or Apple's Find My Friend. This would require agencies to give a complete inventory of fully accessible bus stops (such as full sidewalks, benches, and shelter) as well as standardized information on disability services. The benefit of allowing increased job opportunities for those who have a disability or are elderly would outweigh the initial economic costs to the agencies. However, the issue is updating the built environment data as the apps are run by private companies and the built environment can change frequently.

Further, the day is likely approaching whereby everyone who uses large transit systems will be able to get real-time information on crowded vehicles, which will be very beneficial to a Baby Boomer who is older, has a disability, and would like to avoid crowds. As part of this evolution, implementing technology that allows a rider with limited mobility to message the bus ahead of time could go a long way towards not only reducing anxiety but also making it easier for the bus driver to plan their route.

Also, this recommendation on reducing the uncertainty of navigating the system is making wayfinding information onboard the vehicles more visible to those who are older or have a disability. Specifically, installing stop announcement monitors onboard the transit buses that

are visible from the wheelchair position and/or priority seats, especially when someone is required to be positioned facing the rear.

In terms of large-scale transit projects such as light, commuter, and/or high-speed rail as well as bus rapid transit; while cited highly by those with a disability for their accessibility these projects can cost hundreds of millions of dollars, even up to $128 billion (CHSRA, 2023). As a result, they cannot be justified alone on the benefits to those who are older or have a disability. However, when these transportation projects are approved for the general population the growth that will occur around the stations should be universally designed transit-oriented development (TOD) which includes low-income housing. This community design with easy access to public transit will allow individuals to age in place.

Finally, using advanced wayfaring apps bus routes could be modified on-demand, meaning a potential passenger could someday notify the transit agency that they would like to travel, and a bus route will be automatically modified to accommodate this request. This would reduce the costs of paratransit services for the community and allow the individual with a disability to be more unconstrained since paratransit reservations need to be made several days in advance.

3.8.3 Accessibility in Emerging Technologies

There is a question of the role that new technologies such as autonomous vehicles (AV's) and ride-hailing services will play to accommodate an aging Baby Boomer who may have a disability. Uber and Lyft have their WAV (wheelchair accessible vehicle) programs, but these programs are still limited to just a few major cities in the US. As for AVs, Waymo has a human driver WAV program, while Cruise announced a 2024 launch for a wheelchair accessible robo taxi (Hawkins, 2023). However, this technology is still in its prototype stages.

3.8.4 Design by the Aging Baby Boomer Cohort

Finally, the system needs to be designed with input from those who have a disability. Too many times well-intentioned engineers try to design accessibility into a vehicle or system, but changes result in the engineered solution causing even more difficulty than the original problem. Disability advocate Liz Jackson calls these well-intentioned but unrealistic engineering solutions "disability dongles" and includes engineered designs for accessibility that are too expensive, not wanted, or even just scary. Such inventions include the stair climbing wheelchair (too scary) or even building curb cutouts that are unmarked which are tripping hazards (Jackson, 2019).

Therefore, as states attempt to fulfill the transportation needs of an aging Baby Boomer cohort it would be wise to let those who struggle to use the system design it. After all, as mentioned in the cases those with a disability have not only experienced the uncertainty in travel and difficulties in navigating the system; but also experienced the social, psychological, and financial issues that are associated with lack of accessible transportation.

3.8.5 Coordination Across Municipalities

The overall fear of the Baby Boomer generation is developing a disability and losing one's ability to drive. This fear is because in rural and suburban areas the automobile has been the primary mode of transportation. However, when one can no longer drive the individual has the choice to either move or stay in place and risk isolation. The problem is most public transit systems are run by large urban municipalities, whose focus is on urban residents. However, developments of state and regional transportation authorities would help expand public transportation options to reach those in the suburbs and rural areas. The issue is, in states like Wisconsin, these regional transportation districts are illegal.

Chapter 3, Section 9.0: Areas of Future Studies

The automobile is essential to everyday life in the US as it has become the predominant form of transportation for the Baby Boomer generation. The challenge is that this study was completed in suburban and rural areas of the Midwest. Studies in other parts of the country and/or urban areas may yield different results especially where there already is a large and established senior population, such as Florida.

Additionally, modern transit-oriented development design tends to be based on office, retail, and apartments designed for those in their 20s and 30s. However, more research is needed on amenities and the design of senior-oriented communities around transit stops as well as consideration for alternative forms of transportation not studied here. For example, golf carts are a popular form of transportation for seniors, especially in warmer communities. This study did not include golf carts as an option in lieu of driving an automobile. Then when it comes to autonomous vehicles, accessibility needs to be included in the design. After all a self-driving autonomous vehicle could open all new worlds to those who have an ambulatory or a visual disability.

Finally, this study only focused on those with an ambulatory or visual disability. In the future perhaps designing a study to include those with an age-related intellectual disability regarding their use of the transportation system should be considered.

Chapter 4: Discriminatory Implications for People with an Ambulatory Disability Caused by the Systemic Design of the Airline Industry.

Abstract

Those with an ambulatory disability must overcome extreme hurdles, risks, and uncertainty when traveling by air to achieve the same freedoms as an able-bodied individual. The results of this study conclude that flying is an unpredictable, risky, and inhumane experience for someone with an ambulatory disability. This study concludes with three major takeaways. First, that wheelchair damage, lavatories, and lack of planning information are the greatest issues for those with a disability. Second, aircraft accessibility information needs to be standardized across all airline websites. Finally, the Air Carrier Access Act (ACAA) of 1986 needs to be reevaluated and updated to more closely align with the Americans with Disabilities Act (ADA) and the social theory of disability.

Chapter 4, Section 1.0: Introduction

Air travel is the predominant form of long-distance travel with very few substitutes. As a result, to participate in society today, one often must travel by air. However, those with an ambulatory disability must overcome extreme hurdles, risks, and uncertainty to achieve the same freedoms as an able-bodied individual. After all, a single flight may involve weeks of planning, hours of worrying, risk of damage to their wheelchair, and injury to themselves.

Published by the Federal Highway Administration, the National Household Travel Survey reports that 25.5% of Americans self-report that they have a disability. Of this group, 11.6% travel in wheelchairs, and 22.9% use a walker (*Travel Patterns of American Adults with Disabilities*, 2018). In this same study, 6.7% of those 50 years old and older reported having a

travel-limiting disability, 18.4% of those in their 70s, and 31.9% of those 80 years and older. With an aging Baby Boomer generation of 73 million individuals, a large percentage of the population is likely to develop a travel-limiting disability (America et al., 2019).

While there are various ways to classify a disability, the two predominant models are the individual model and the modern social model of disability. With the individual model, it is up to the individual who must adapt to participate in society. Further, under the individual model it is believed that society does not have an obligation to accommodate all individuals, and those unfortunate individuals with a disability can be left out of the community. This model resulted in discriminating laws that excluded people with a disability from holding public office, marrying, bearing children, attending school, and even being seen on public streets (Oliver, 1996). The more modern disability construct is the social model, whereby it is not the individual, but rather the built environment which makes one "disabled". According to Michael Oliver, who is cited for developing the social model in the 1970s:

> *It is all things that impose restrictions on disabled people, ranging from individual prejudice to institutional discrimination, from inaccessible public buildings to unusable transport systems, from segregated education to excluding work arrangements. Further, the consequences of this failure do not simply and randomly fall on individuals but systemically upon disabled people as a group who experience this failure as discrimination institutionalized throughout society.* (Oliver, 1996, p. 35).

It is not just an issue of access but a fundamental flaw in the social construct that governs the airline industry, whereby the responsibility is placed on the individual with an ambulatory or visual disability to adapt for accommodation on an aircraft. This problem stems from the Air Carrier Access Act of 1986 (ACAA), which was passed just as the social model of disability was

being developed. As a result, the ACAA was highly influenced by the established individual model of disability, allowing the airline industry to avoid being subject to the Americans with Disabilities Act (ADA) of 1990.

This change in philosophy regarding disability can be seen in the two acts that govern accessibility of transportation. Most public transportation is covered by the ADA which was written under the social construct of disability. However, the airline industry is covered by the ACAA, which is built around the individual model of disability. This is the reason there is no space for electric wheelchairs in an aircraft cabin, nor lifts or large signage. Even accessible bathrooms are not required on aircraft with a single aisle today, although on August 1, 2023, the U.S. Department of Transportation issued a final ruling that accessible bathrooms will be required in new aircraft delivered after 2033. However, airlines are not required to retrofit existing aircraft which means most single-aisle aircraft will remain without handicapped accessible bathrooms for the next several years.

There is very little research into the experience of someone with a disability navigating the commercial flight experience. Therefore, this study attempts to fill in the gaps of why someone with a disability chooses to make a journey by air, and the barriers and hurdles those individuals experience. A specific emphasis of this study centers around boarding and deplaning, electric wheelchair handling, lavatory access, and trip planning information available to passengers with a disability. Finally, it is worth noting that when an individual with a disability has a bad experience there can be long-lasting effects after the actual travel experience, such as damage to one's wheelchair or injury when transferring into seats.

The challenge with this research is that individuals with a disability are a very diverse group, since the type and severity of the disability may vary considerably. For example, one who

uses crutches may only need extra time boarding an aircraft, or an elderly individual may only need a wheelchair for the long walking distances within the terminal. Both individuals may be fully capable onboard the aircraft. Meanwhile, those restricted to a wheelchair may be able to move about the terminal freely but are completely "disabled" on an aircraft; even being unable to use a lavatory.

Chapter 4, Section 2.0: Theories and Models on Disability

4.2.1 Social Justice:

Paralleling the disability rights movement in the United States was a change in thought on social justice. Beginning with its charter in 1945, the United Nations made social justice it's value system. By 2015, the UN would make human rights for those with a disability part of the agenda, ultimately making disability part of its Sustainable Development Goals (SDGs) and targets for 2030.

4.2.2 The United Nations and Disability Rights

Preceding and paralleling the US disability rights movement in the U.S. has been the United Nations, whose charter in 1945 "recognizes the inherent dignity and worth and the equal and inalienable rights of all members of the human family as the foundation of freedom, justice, and peace in the world" (*Convention on the Rights of Persons with Disabilities*, 2006, pg.1).

From this charter, the UN General Assembly has continued to make disability rights an agenda item. By the 2000s the disability movement that had started within the United States had now expanded around the world and became a high-level priority for the UN General Assembly. This movement resulted in the Convention on the Rights of Persons with Disabilities (CRPD). Signed in 2006 and entered into force in 2008, the CRPD became a landmark international human rights law. According to the UN Flagship Report on Disability:

> *This landmark convention is truly a benchmark instrument to ensure the equal enjoyment of universal human rights and fundamental freedoms by persons with disabilities. Together with other international human rights and development instruments, it provides a comprehensive framework for national policymaking and legislation, including international cooperation, for building an inclusive society, and for development* (Bas & Padova, 2019, pg. 27).

Following the CRPD, in 2013 the United Nations General Assembly continued to call high-level meetings on disability and development. As a result, in 2015 member states adopted the belief that all persons with disability should be included in the Sustainable Development Goals (SDGs) for 2030, with a specific linkage between disability and sustainable development. A specific emphasis was on education, growth, employment, inequality, accessibility of cities, data monitoring, and accountability.

4.2.3 The United Nations Sustainability Development Goals (SDGs):

The overarching aim of the SDGs is to provide a blueprint for peace and prosperity by ending poverty, reducing inequality, and spurring economic growth in both developing and developed nations. These goals range from SDG 1, no poverty; to SDG 6, Clean Water and Sanitation; to SDG 16, Peace, Justice, and Strong Institutions.

As mentioned earlier, disability has been at the forefront of United Nations policy since the organization was charted in 1945. Over time disability then became a part of the SGDs for the world of 2030. As a result, disability is included in nearly all seventeen SDG goals (excluding goals 12 through 15, and goal 17). SDGs goals 1 through 7 involve poverty, ending hunger, health, gender equality, clean water, clean energy, and innovation. However, with this

study focusing on the intersection of air transportation and disabilities, the following goals need to be discussed further:

SDG 8, Decent Work and Economic Growth

SDG 10, Reduce Inequalities

SDG 11, Sustainable Cities and Communities

These three goals were chosen because they relate to the concept of equitable intercity air travel. Transportation accessibility is also a target mentioned specifically in SDG 11.

4.2.4 Details on the Selected Goals:

SDG 8:

Decent Work and Economic Growth. This goal is to promote sustained economic growth through increasing productivity and innovation. The goal is for everyone to achieve fully productive and fair employment (*Goal 8: Decent Work and Economic Growth*, 2015, pg. 8).

While not mentioned specifically in SDG 8, air travel has played a role in allowing an individual with a disability to be visible and a part of the greater community. In modern society, not being able to travel by air can have profound effects on an individual's ability to economically support oneself and being separated from family.

SDG 10:

Reduced Inequalities. Income inequality continues to increase everywhere in the world. As a result, policies are needed to empower those with lower incomes or who have a disability

and are limited in their ability to earn to their full potential (*Goal 10: Reduced Inequalities*, 2015, p. 10). Further, targets that support this goal are:

> Target 10.2: Promote universal social, economic, and political inclusion. "By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status".
>
> Target 10.3: Ensure equal opportunities and end discrimination "Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies, and practices and promoting appropriate legislation, policies and action in this regard".

Like the ADA, the Air Carrier Access Act of 1986 (ACAA) goal was to reduce discrimination. However, air travel is often a terrible experience for an individual with an ambulatory disability which discourages that person from using air transportation. This discouragement then limits an individual's access to jobs, social activities, and fully engaging with the community.

SDG 11:

By 2050, it is estimated by the United Nations that two-thirds of the human population will be living in cities. Therefore, improving public transportation, affordable housing, and promoting society and culture are the focus of this goal (*Goal 11: Sustainable Cities and Communities*, 2015, p. 11). Further, the targets for this goal are:

> Target 11.2: "By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public

transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons".

While not specifically mentioned, intercity travel is included in SDG 11 since it is part of a city's transportation system. Further, the barriers are not necessarily physical, but can include discrimination, stigmatization, and lack of community support (Bas & Padova, 2019).

4.2.5 The Theoretical Models on Disability:

Throughout most of history, a person with a disability was regarded as an unfortunate person who did not conform to society. This implied that it was the responsibility of this individual to adapt to society in order to participate in societal events and activities (Oliver, 1996). This perception that it is up to the individual to adapt is called the individual theoretical model of disability.

In contrast, the social theoretical model looks at disability as a social construct created by the surrounding barriers (Samaha, 2007). The social model is a philosophy that individuals working in government, public spaces, and businesses must change access so everyone can achieve their full potential. The result is a need to lower or remove barriers to promote equity by looking at ways to improve accessibility, independence, and opportunity for those who do not conform to the traditional human design. The ADA and modern theory on disability were developed using this social model. By removing barriers, society can adapt to meet the needs of everyone, and will be more inclusive, innovative, and productive.

4.2.6 Social Justice in Transportation:

Air Transport is a highly technical and costly endeavor. As a result, most aerospace design revert to basic engineering, and tends to ignore social justice and equity in its design.

This has resulted in an air transportation system designed for the fully capable, average sized persons. However, as demonstrated by the UN's sustainability goals, civil society requires not just equal but equitable accessibility, meaning that everyone derives the same utility from air transportation to attain full employment and be an active part of the community.

Chapter 4, Section 3.0: Background and Recent Events

The U.S. Department of Transportation has begun monitoring wheelchair damages in 2019, issuing the Airline Passengers with Disability Bill of Rights of 2022, and more recently issuing new regulations for accessible lavatories on aircraft with one aisle, in the summer of 2023. A component of this problem is that unlike most transportation networks, the airline industry is not covered by the ADA. This is the primary reason why one will not find dedicated space for electric wheelchairs on aircraft as they would on a public bus, and individuals do not have "a right to action", meaning the right to sue for damages from the airlines.

4.3.1 Policy: The Air Carrier Access Act (1986), not the American's with Disabilities Act

The ACAA goes into significant detail about the rights of passengers with a disability in the terminal, while boarding and deplaning, as well as acceptance of wheelchairs, and prevention of discrimination. Despite this ACAA provides very limited consideration for the individual with a disability onboard the aircraft. For example, the only accommodations required for airlines under the ACAA is that aircraft (*Passengers with Disabilities*, 2022):

- With 30 or more seats, provide moveable armrests.
- With more than 60 seats, must have a wheelchair that fits down the aisle.
- With over 100 seats, have storage for a manual wheelchair.
- With two aisles, must have an accessible lavatory.

4.3.2 Airline Passenger with Disability Bill of Rights

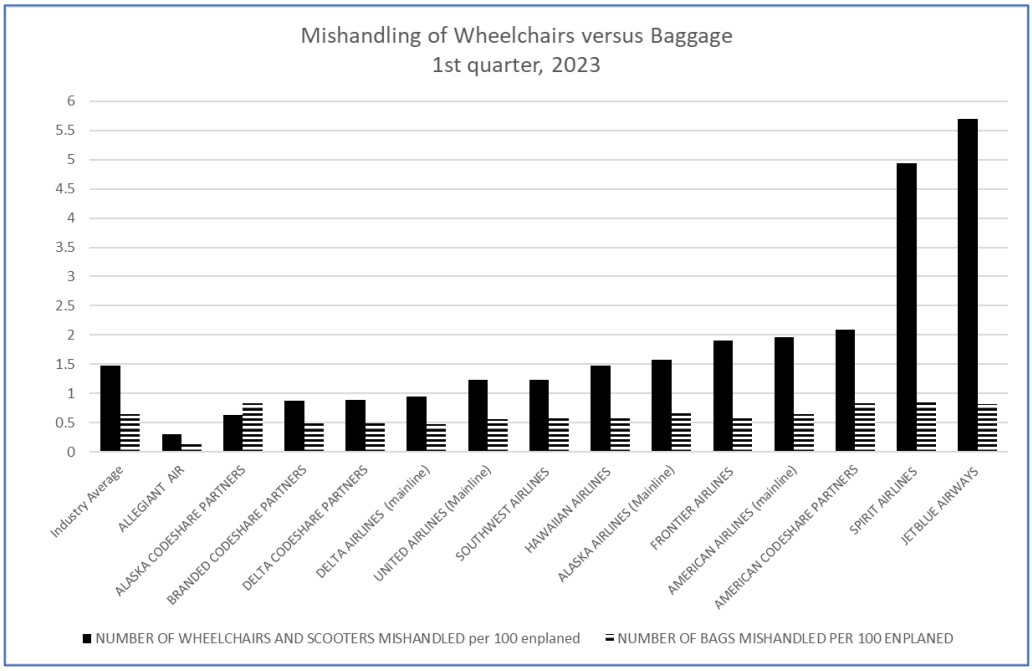
In 2022, U.S. Transportation Secretary Buttigieg's office released the Airline Passenger with Disabilities Bill of Rights (Airline Bill of Rights), which outlines the laws in the ACAA that cover accessibility of air travel. While the Airline Bill of Rights makes it easier for those who have a disability to understand their rights while traveling with an airline, it is just a restatement of the existing airline regulations under the ACAA.

4.3.3 Mishandling of Wheelchairs

Beginning in 2019, the Federal Aviation Administration Reauthorization Act of 2018 required US airlines to report mishandled, lost, or damaged wheelchairs to the U.S. Department of Transportation. Prior to 2019, wheelchairs checked in the baggage hold were considered as checked luggage, meaning there was no way to identify the mishandling rate for wheelchairs as those wheelchairs would have been reported as mishandled passenger bags. However, with this change in 2019 new data became available on mishandled wheelchairs. Table 4.5.3.3.1 has the 2023 first quarter rates of wheelchairs and baggage mishandling. For comparison, there were 1.53 mishandled wheelchairs per every hundred checked, whereas 0.65 bags were mishandled per every hundred checked. This means a mishandling rate for wheelchairs that is 2.35 times more than that of conventional checked baggage.

Table 4.5.3.3.1:

Mishandled wheelchairs versus baggage mishandling, First quarter 2023; (Air Travel Consumer Reports | US Department of Transportation, 2023)



While reporting mishandling of wheelchairs separate from passenger baggage is a great step forward, it is worth noting that there is no specific definition of a “mishandled wheelchair” in federal regulations. Instead, the Code of Federal Regulations still refers to mishandled wheelchairs and assistive devices as mishandled baggage being defined as “a checked bag that is lost, delayed, damaged, or pilfered, as reported to a carrier by or on behalf of a passenger” (14 CFR 234.2, 1987). This is important because it may indicate that wheelchairs are still viewed as checked passenger luggage, even though wheelchairs are significantly more important as they are essential to a person’s mobility.

4.3.4 Regional Carriers and Code Shares

Another primary issue with flying is that frequently the airline that sold the ticket and the airline operating the flight are not the same. While a major carrier may have sold the ticket, the flight could be operated by either a regional partner or another major airline. This agreement with one airline to sell a ticket on another airline is called a "code share" and the operating airline is the codeshare partner. SkyWest and Republic are two such regional airlines that fly smaller aircraft for their partners United, Delta, American, and Alaska Airlines under code share agreements. Therefore, a passenger with a disability may have bought a ticket thinking they would be flying on a major airline but did not read the footnote on the ticket that they would be flying with a regional airline that operate smaller and less accessible planes. Further the passenger with a disability cannot contact those regional airlines operating the flight to plan a future flight or resolve a past issue as the airline that issued the ticket is responsible for mishandling issues.

When it comes to codeshare with an international airline that will be operating the flight, an individual must check the operating carrier's website or contact them directly for accommodation. The confusion is that the ticketing carrier is responsible for accessibility, according to the ACAA, but the ticketing carrier has no operational control over the codeshare operator, especially if it is an international flight. Additionally, if a passenger bought a ticket on a codeshare partner, but that codeshare partner does not fly to the U.S., the ACAA regulations would not apply. For example, in the scenario where one buys a ticket on United from Chicago to Athens via Frankfurt, the passenger will check in with United in Chicago and may learn just then that the Frankfurt to Athens leg is on Aegean Airlines. Since Aegean Airlines does not fly to the US, Aegean Airlines does not need to comply with the ACAA and may have different

accessibility standards than United. Most passengers with a disability are not likely aware of this and may believe they are flying on a United Airlines aircraft with U.S. standards for accessibility for the whole route.

4.3.4.1 Recent Events in Airline Accessibility

Air travel accessibility is an evolving topic with rules and regulations changing frequently. Recently there has been a change by the airline industry to make airline travel more accommodating for those with a disability. In 2021, the Department of Transportation released a study regarding wheelchair accommodation in the aircraft cabin. In 2022, the Department of Transportation released the Airline Passengers with Disabilities Bill of Rights. In June of 2023, Delta Airlines revealed a new airline seat that can be folded away to allow someone to remain in their electric wheelchair onboard the aircraft (Sampson, 2023). In July of 2023, the US Department of Transportation released new regulations requiring single aisled aircraft to have handicapped accessible bathrooms. Finally, in late September 2023, United Airlines announced that they will be releasing a new web-based tool that will allow individuals to choose flights based upon accommodation of their wheelchair. This announcement by United also includes a refund if there is a price increase between a substandard flight and the optimal flight for handling the wheelchair (Perez-Moreno, 2023).

Chapter 4, Section 4.0: Literature Review

4.4.1 Individuals with a Disability Flight Experiences

Over the years, attitudes, and prejudice regarding people with a disability has been a long and consistent struggle. Be it a physical obstruction, attitudinal barrier, or a regulatory hurdle; the fight for accessibility has been a struggle for recognition and equity. As recently as 50 years

ago, someone with a disability would be unable to get married, hold a job, or receive an education (McCluskey, 1987, p863). It was not until the Education for the Handicapped Act of 1975 that allowed the mainstreaming of students with a disability were individuals with a disability were given a voice (Dempsey, 1990). When it comes to attitudinal barriers, according to Dempsey, "slightly more than half of the population of the United States expresses positive attitudes towards the disabled. The rest openly admit to negative attitudes. This cohort of individuals see people with disabilities as different and, in some ways, inferior to ordinary people" (Dempsey, 1990, p. 312).

Considering that the Baby Boomer generation is the largest cohort in many states and is a large potential voting bloc; policymakers appear to be paying more attention to the air transportation needs of those with a disability. For example, the Federal Aviation Administration Reauthorization Act of 2018 includes several provisions focused on those with a disability including new monitoring of airlines' handling of checked wheelchairs (FAA Reauthorization Act of 2018, 2018) and conducting a study on wheelchair securement concepts which involves adapting aircraft to allow an individual to sit in their electric wheelchair for the flights (National Academies of Sciences, 2021).

In "Flight Experiences of People with Disabilities", Poria, Reichel, and Brandt find that participants in their Israeli study were confronted with physical and social difficulties that resulted in humiliation and suffering when traveling by air. Further the behavior of crew members towards people with disabilities indicated the need for more training and education for airline employees (Abeyratne, 1995). While there are difficulties for wheelchair users boarding and disembarking, lavatory use was the core issue. In several cases, those with a disability

reported having to urinate in bottles in their seat, use a diaper, or fast for several days to avoid the use of a lavatory on the aircraft (Poria et al., 2010).

In early 2023, a paper by Shen et al. published in Transportation Research Part D, attempted to identify all outstanding research in transportation for those with a disability. The findings of this paper include that 1) more work needs to be done to guide empirical research, especially on the interaction between disability type, and the features of the built and social environment 2) while studies have been done on features of the environment that make transportation more inclusive, more studies are needed on features of transportation that exclude individuals with a disability, and 3) more research is needed on emerging technologies in mobility for those with a disability including apps and location-based technologies that would benefit those with a disability. Highlights of this paper also include that women with disabilities are generally less inclined to travel, those with large extended families are more likely to travel, and those with a disability who live alone are the least likely to travel and participate in cultural activities. Those with a long-term disability are more aware of options to address their travel needs than someone who has developed a recent or temporary disability. Finally, those without a visible disability may suffer from neglect when traveling, while those with a visible disability may receive unwanted attention or comments from fellow passengers. Both result in discrimination (Shen et al., 2023).

There have been multiple studies that attempt to analyze how those with a disability are an untapped travel market. In “Trouble with Travel”, Darcy and Daruwalla argue that “traveling with a disability is a never-ending nightmare, hell on earth, indescribable nerve-wracking, stomach-churning, unbelievably expensive experience, which leads to those with a disability being discouraged from travel” (Darcy & Daruwalla, 1999, p. 41). However, Upchurch and Seo

believe that limitations to travel with a disability are a financial hardship to the travel industry that must be overcome, but once the financial investment is made, efforts taken to comply can result in financial gain for the industry (Upchurch & Seo, 1996). Avis, Card, and Cole believe that to grow this market, a larger circle of individuals in government, care providers, and travelers with a disability and without, must work together to design a transportation experience that is barrier free (Avis et al., 2005).

However, it is not just social or physical access that is needed for someone with a disability. Perhaps the most important component in allowing someone with a disability to travel is information. In "Enabling Access to Tourism through Information Schemes", Eichhorn, Miller, and Michopoulou argue that there is a need for interdisciplinary studies between human ecology and disabilities. Combining the two perspectives can reveal ways for those with a disability to travel (Eichhorn et al., 2008). Further, the reliability of information is crucial. The data needs to be accurate, recent, constantly updated and accessible to those with different disabilities (Eichhorn et al., 2008).

Finally, a study by Gladwell and Bedini recognizes that the accommodation of individuals with a disability is not the lone issue. Rather, when looking at older travelers as the largest growing demographic for those who travel, attention also needs to be paid to the caregiver, especially when the caregiver is a spouse or family member that restricts their travel to places accessible and familiar to the individual with a disability. Additionally, Gladwell and Bedini found that physical, social, and emotional obstacles remain even after the ADA was signed into law (Gladwell & Bedini, 2004).

Chapter 4, Section 5.0: Methods

This study employes a qualitative method to hear the "voice of the user with a disability" and has a multi-disciplinary strategy which began with a preliminary review of the issues on air transportation as well as attending conferences, such as the Transportation Research Board Annual Meetings in Washington DC, in 2019, 2020, 2021, and 2023. Questions were then constructed and given to the participants before the interview. During the Zoom interview (or phone call if the participant preferred), the interviewer would pose questions to the participant.

The open-ended questions were then used to start a situation-specific conversation whereby participants would describe a situation and how that experience unfolded when using air transportation. Participants would describe their need for air transportation and their best and worst experiences. Additionally, participants would then be asked their opinions on theories regarding the airports and the process for getting to the aircraft, as well as their experience boarding and deplaning the aircraft. The interviews were then transcribed, coded, and themes were identified using a content analysis procedure.

Participants were initially recruited through two organizations in Fort Collins, Colorado: The Arc of Larimer County and Vocational Rehabilitation for Colorado. Participants volunteered to be interviewed and did not receive any compensation. Only two participants were recruited in this manner. So recruitment was extended to Madison, Wisconsin, and took place through a snowball approach, whereby one participant would recommend others. This turned out to be a more effective process of recruitment as the endorsement by one participant helped peers to feel comfortable participating in an interview.

Table 4.5.1

Aliases and background of participants

Alias	*David*	*Tyler*	*Tori*	*Madison*	*Jessica*	*Jason*	*Hannah*	*April*
Age	40-50	30-40	20-30	20-30	40-50	30-40	20-30	60-70
Gender	Male	Male	Female	Female	Female	Male	Female	Female
Location	Fort Collins, CO	Madison, WI	Madison, WI	Madison, WI	Madison, WI	Fort Collins, CO	Northern Colorado	Northern Colorado
Limitation	Ambulatory	Ambulatory	Ambulatory	Ambulatory	Ambulatory	Ambulatory	Visual	Visual
Period of disability	Lifelong	Lifelong	Around 3 years	Lifelong	Accident 20 years ago	Around 15 years	Lifelong	Around 5 years
Wheelchair User	Full Time	Partial	Partial	Partial	Full	Partial	No	No
Able to drive	No	No	Yes	No	Yes	No	No	No

Thirteen separate interviews were conducted with twelve individuals from August 2022 until January 2023.

- Two of the individuals suffered from blindness; one since birth and the other due to age.
- Six individuals had physical disabilities that required either part-time or full-time use of a wheelchair.
- Three of the six individuals had developed their disability in their 20s while the other three individuals were born with the disability.

- Four caregivers were also interviewed, with three being family members and one being a friend of someone with a disability. Caregivers were particularly hard to recruit, as it may have been uncomfortable for them to discuss someone else's disability.
- David was interviewed twice, once before his departure on a trip to Croatia, and interviewed again upon his return.

Table 4.5.2

Aliases and background of caregivers

Name:	*Dan*	*Cheryl*	*Mary*	*Megan*
Age:	40s	70s	70s	30s
Gender:	Male	Female	Female	Female
Location:	Fort Collins, CO	Wisconsin	Northern Illinois	Northern Illinois
Caregiver for	David	Jessica	A person not interviewed for this study	A person not interviewed for this study

Of those interviewed:

- Four were from the Fort Collins, Colorado area.
- Six were from the south-central area in Wisconsin.
- Two individuals were from the Chicago suburbs in Illinois.

Although the interviews focused on participants' experiences with all transportation modes, traveling by air was mentioned extensively as the participants were allowed to add personal stories and their personal opinions. As a result, the discussion frequently expanded to include allowing electric wheelchairs onboard aircraft and other personal stories when traveling both within the United States and abroad. There was no time limit set for the interviews, so they ranged from 38 minutes to over 1 hour, 39 minutes.

For the analysis, each conversation was recorded and transcribed. The transcription was coded and categorized into themes. Themes from each interview were combined across all participants to identify what areas were most important.

These results were then combined with the author's observations and experiences of traveling with someone with an ambulatory disability. This allowed the researchers to create a holistic view of the experience of someone with a disability navigating the transportation system.

Finally, statistical data was collected from the Bureau of Transportation Statistics on wheelchair mishandling and an inventory of major airline's website information on disability services and handling was created in March of 2023.

Chapter 4, Section 6.0: Results

Those with a visual disability had some issues with flying, but those issues mostly involved difficulty in navigating the airport and the preference to have a friend or relative travel with them, rather than an airport employee. Complaints about the Transportation Security Administration (TSA) or accommodation on the airplane were minimal from those with a visual limitation.

On the other hand, those with an ambulatory disability had major concerns with flying; specifically, wheelchair handling, lavatory use, and access to information, all of which is talked about in detail in the following sections.

Table 4.6.0.1

Top themes mentioned by participants with an ambulatory disability.

Items Mentioned	Number of Mentions
Total Mentions, All Modes of Transportation	526

Total Mentions for Airlines	104
Discrimination – Active	6
Discrimination – Unintentional	16
Wheelchair (all mentions)	15
Wheelchair Damage	13
Stress	6
Lavatories	5
Information Issues	5
TSA	4
Design	3
Embarrassment	0
Positive Notes	7

Caregivers who travel with an individual with an ambulatory disability wanted to talk more about flying than any other mode of transportation (sixty-nine out of two hundred and two remarks). For comparison, vans and automobiles were mentioned by caregivers in only twenty-nine out of two hundred and two remarks. The most mentioned subject by caregivers about flying was that it was a stressful experience (mentioned twenty-seven times). Eleven of those stressful situations revolved around discrimination when traveling, five of those remarks were about traveling with wheelchairs; and the largest stressor for the caregiver was the experience of someone with a disability going through the TSA (fourteen mentions). Ironically, those with a disability mentioned the TSA less (four mentions). It is interesting to note that three of those with an ambulatory disability mentioned how flying was stressful (three mentions), while the caregivers focused on the stress of flying significantly more. This is likely because those with a disability were much more concerned with damage to their wheelchairs and their well-being on

the airplane than the TSA or airport experience while caregivers were more concerned about the individual with the disability being respected.

Table 4.6.0.2

Top Themes mentioned by caregivers for those with an ambulatory disability.

Items Mentioned	Number of Mentions
Total mentions by caregivers, all modes of transportation	202
Total Airline mentions by caregivers	69
Stress	27
Discrimination - Unintentional	14
Discrimination – Direct	3
TSA	14
Wheelchairs (all)	13
Bathroom Issues	10
Wheelchairs (only damage mentioned)	9
Embarrassment	7
Design	2
Informational Issues	0
Positive Notes	0

However, not all the feedback on air travel was negative. Tyler even went as far as to say airline personnel giving him preferential treatment turned his day of flying into the best day of his life!

4.6.1 Wheelchairs

By far, the most important issue for those with an ambulatory disability were electric wheelchairs mentioned fifteen times, with damage being the top subject (mentioned thirteen

times). In fact, of the four participants with an ambulatory disability who flew, three mentioned that their electric wheelchairs were damaged. Participants also indicated that there were other issues with electric wheelchairs including the fear of being separated from their wheelchair and excessive waits for the ramp crew to bring the chair to the airplane door. It should be noted that several participants said that they wanted to know why electric wheelchairs cannot be accommodated in the aircraft cabin.

Also, several of the participants mentioned that they cannot fly alone. They need a companion to handle the boarding and to prepare the chair for transport, such as removing cushions and armrests which are then brought into the cabin. An extreme case occurred when David was denied boarding because of his electric wheelchair. David was traveling from Denver to Frankfurt to Zagreb, Croatia on a ticket sold by United Airlines. David and his caregiver were checked in by United at Denver, then flew to Frankfurt to connect on to Zagreb. The flight from Frankfurt to Zagreb was operated by code share partner Lufthansa City Wings. The aircraft was a 90-seat CRJ 900 regional jet with the baggage hold located at the rear of the aircraft between the two rear engines. Since David's electric wheelchair was over 300 pounds, David was denied boarding due to weight and balance safety issues. He and his caregiver then had to wait for a larger aircraft that left seven and half hours later while the rest of his travel party departed on the original Lufthansa City Wings flight. While the safety issue was understandable, there was no way David could have anticipated his wheelchair causing a weight and balance issue. Although this issue could have been identified by United, since United was the airline that sold David the ticket and checked him in at Denver International Airport.

4.6.2 Lavatories

Perhaps the most disturbing part of this study was the lavatory situation on the aircraft. Of the one hundred and seventy-six comments about airplanes, fifteen of those comments involved avoiding the use of lavatories. Most of the comments were about the lavatory on the airplane, but three of those comments were about bathroom locations in the airport, in this case, Denver International Airport.

The caregiver Mary mentioned that when flying with her brother, who was unable to walk, her brother began starving himself and reducing liquids the day before the flight to be assured that he would not have to use the aircraft lavatory. These flights lasted about three to four hours on a single aisled aircraft. Under federal law, aircraft with two aisles must have one accessible lavatory. Aircraft with one aisle currently do not need an accessible lavatory, but in 2023 the U.S. Department of Transportation issued new regulations requiring single aisled aircraft over sixty seats to have an accessible lavatory by 2033.

The response by participants about lavatories is very concerning. On a wide-bodied aircraft with an accessible lavatory, David went eleven hours without going to the bathroom even though he was flying with a caregiver. Lufthansa assigned David and his caregiver a standard economy seat in the middle of the aircraft. David has immobilized legs and with the restricted legroom in standard economy he was unable to move from the seat during the eleven-hour transatlantic flight. So, David avoided all liquids on the flight, risking dehydration. Finally, it was also mentioned by Megan that she refuses to use the lavatory on an airplane due to being the center of attention.

4.6.3 Informational and Procedural Issues

While there are significant concerns about the physical accommodation provided for those with a disability, another issue is the exchange of information. David mentioned over five times the issue of communicating with airline staff on the handling of his wheelchair. Before boarding the aircraft, David insists that a ramp supervisor meets with him to learn how the chair works and the best way to load it into the aircraft. David also puts easy-to-read directions on how to disengage the motors and where to lift the chair, in addition to the airline's forms that are filled out at check-in. Even with all these precautions, David's wheelchair was slightly damaged in transit during the study.

Further, when a flight arrives at the destination or arrives at a hub, various situations can occur. During David's trip to Europe, he was told that he would not have his chair at the layover in Frankfurt. Then the chair arrived at the loading bridge in Frankfurt without prior notice. At other airports, David mentioned that the airport crews had no idea or plan on how to handle a wheelchair. Further, on a flight from Zagreb to Frankfurt, the wheelchair was illegally carried because the smoke detectors in the baggage holds were inoperative (smoke detectors are required because of the batteries in the wheelchair). This nearly led David to be denied boarding once again due to accommodating his electric wheelchair.

Other participants emphasized their stressful flying experience. When flying from Wisconsin to Dallas, Cheryl, who is a caregiver for Jessica, stated that Jessica "Gets herself so worked up that she doesn't sleep the night before. She stays up all night. Then (once they arrive) she would sleep all day because she's been awake for 24 hours." When talking about flying, Jessica stated "my mom (Cheryl) did that whole thing. I would be so lost. I would not even know

what to do or how to organize it. Then again, what if something happens to my chair, it just gives me anxiety."

While not as extreme, Tori mentioned upon checking in at Madison Dane County Airport with Delta Airlines that she checked in at a self-serve unit and was advised by the system that an agent would be there shortly to assist her, but she was ignored by the check-in staff. So, she was forced to go to security and the gate by herself.

4.6.4 Positive Notes

It is also worth noting that participants also reported extraordinary service by airports and airlines. In Frankfurt, Germany; David mentioned that the airport staff who escorted him through the airport and continued to keep in touch with him throughout the layover were exceptional. Also in Frankfurt, other specialized agents would stop David and his caregiver to make sure they are taken care of. To quote David "Oh, yeah. You're not getting by with anything in Frankfurt. As we were sitting and eating, we had two people try to escort us, and we had to tell them 'No, we're working with this other woman (from Fraport special services).'"

Tyler mentioned it was the best day of his life when traveling from London to Wisconsin. According to Tyler: "We get to Heathrow, and they say, like, oh, yeah, we're not going to be able to take the wheelchair down at the gate. We will take the chair and put you in the Red-Carpet Club instead. Help yourself to any top-shelf cocktails". United not only accommodated Tyler in the premium lounge, but the whole class of students he was traveling with. Unfortunately, his wheelchair was damaged by the airline when he arrived in Wisconsin, but he was thankful for the service he received from customer service along the way.

The issue is air travel is very unpredictable for someone who has an ambulatory disability and is restricted to a wheelchair. If someone with a disability reaches an accommodating airline employee, they tend to have a great experience. However, an indifferent airline employee or an employee that lacks training (such as how to handle a wheelchair) can make for a horrible travel experience. The key is to make travel more predictable for someone with a disability.

4.6.5 Need for Information - Airline Websites

There is no standardization of information on airline websites for someone with a disability to access when they are making travel plans. According to the ACAA, the only requirement for an airline's website is that airline passengers be notified of their rights, and that the website itself be accessible.

Lack of standardization of airline websites makes it extremely difficult for someone with a disability to make customized travel plans. In March 2023, an inventory was taken of every major U.S. airline's website. Every airline has a link to the U.S. Department of Transportation's ACAA page, which is required under the ACAA. Beyond that, information available to the public ranged from a phone number to call after the reservation is made, to United Airlines having a link on their homepage to a dedicated accessibility page with a menu of details, including a basic app that would check if the wheelchair would fit on the airplane. United Airlines also includes accessible lavatory information (twin aisle aircraft only), procedures for submitting a claim if the wheelchair is damaged, as well as contact information in case of questions. While United (and to a slightly lesser extent Delta Airlines) had the most information about accessibility, American Airlines had very basic information with only a link to their rights as a passenger with a disability. At American, the procedure is that the individual with a disability needs to contact the airline when the trip is booked, then accommodations are made.

Table 4.6.5.1

Airline Accessibility websites for those with a disability

Airline	*Alaska*	*American*	*Delta*	*Frontier*	*jetBlue*	*Southwest*	*Spirit*	*United*	*Skywest*	*Republic*
Accessibility Advisory Board Information	No	No	Yes, detailed	No	No	no	No	Yes	No	
Contact Information, prior to booking	***Yes***	**Yes, detailed**	**Yes, detailed**	No	No	No	No	**Yes, detailed**	No	No
Contact Information, After booking (prior to check-in)	***Yes***	***Yes***	***Yes***	***Yes***	***Yes***	***Yes***	***Yes***	***Yes***	No	No
Information about handling of wheelchairs	***Yes***	No	***Yes***	No	***Yes***	***Yes***	***Yes***	***Yes***	No	No
Procedures for preparing the wheelchair	***Yes***	No	***Yes***	No	No	***Yes***	***Yes***	No	No	No
Aircraft loading/unloading procedures for wheelchairs	***Yes***	No	No	No	No	No	No	No	No	No
Access to Air Carrier Access Act Page	***Yes***	***Yes***	***Yes***	No	***Yes***	***Yes***	***Yes***	***Yes***	***Yes***	***Yes***
What to do if wheelchair is damaged	No	No	***Yes***	No	No	No	No	***Yes***	No	No
Details on weight and balance regarding electric chairs	No	No	No	No	No	No	No	***Yes***	No	No
Details on transport of caregivers	No	No	***Yes***	No	No	***Yes***	No	***Yes***	No	No
Accessibility of each individual aircraft type	Minimal	No	***Yes***	No	Minimal	No	***Yes***	***Yes***	***Yes***	***Yes***
Details on getting assistance at the airport	***Yes, Detailed***	No	***Yes***	***Yes***	***Yes***	***Yes***	No	***Yes***	No	No

Details on assistance onboard the aircraft	***Yes***	No	***Yes***	No	No	No	No	***Yes***	No	No

Chapter 4, Section 7.0: Discussion

Those with a disability must take on the responsibility to overcome barriers and uncertainty and take greats risks to achieve the same freedom as those who are able-bodied when traveling by air. With an aging Baby Boomer population of individuals who are likely to develop disabilities, demands for a more inclusive air transportation system are going to increase. The current design of the air transportation system results in the magnifying of one's disability rather than accommodating a disability. The issue is that there has been very little research on accommodation for those with an ambulatory disability traveling through the U.S. air transportation system. Even this research began as a study of an individual's experience with all forms of transportation, and only narrowed to air transportation halfway through the study process.

When a passenger books a ticket with a major airline, they are under the impression that the airline will be the one who handles their wheelchair, which in smaller cities is frequently not the case. At these smaller airports ramp handling is frequently outsourced to another airline or a company that specializes in ground handling. This may mean that the customer service handling and baggage loading may be performed by a company from the airline operating the flight. This adds a tremendous amount of complexity and potential information issues, as something as simple as how to handle an electric wheelchair must pass between multiple individuals among multiple organizations in the same departure airport. Further, there is the issue of employee turnover with contract companies at these smaller stations. The International Air Transport

Organization (IATA) has cited employee turnover rates as high as 50% among ground handling companies (*Reach for the Stars*, 2020). So, while ramp personnel do receive training on handling wheelchairs, the high turnover rate means it is likely that the individual has very little experience handling wheelchairs and may not even have received training. Further, with multiple companies involved it is very difficult to hold one company completely responsible when the mishandling of a wheelchair occurs. Finally, none of this information about multiple companies handling wheelchairs is available to passengers when booking their itinerary.

The lack of demand from passengers with a disability at smaller stations also means the individual airlines are not willing to invest in purchasing specialized handling equipment that would minimize risks in loading and unloading wheelchairs. To overcome these issues, having the airport authority, rather than the airline, responsible for equipment and crew specialization in handling wheelchairs should be considered, similarly to how an airport takes on responsibility for snow removal, deicing of aircraft, or customer service. This would allow both knowledge transfer among more airport personnel, purchase better equipment, and better overall handling of wheelchairs.

In the Federal Aviation Administration's Reauthorization Act of 2018 was a request for a study on the feasibility of in-cabin electric wheelchair restraint systems that would allow passengers to remain in their wheelchairs. In 2020, the Transportation Research Board created a committee to investigate the feasibility of electric wheelchairs in the passenger cabin. In September 2021 the committee released their report and found that "the committee did not identify any issues in this preliminary assessment that seem likely to present design and engineering challenges so formidable that they call into question the technical feasibility of an

in-cabin wheelchair securement system and the value of exploring the concept further." (National Academies of Sciences, 2021, p. 6). The primary questions of the committee were:

1) What is the crashworthiness of an electric wheelchair including the safety of both the occupant and those around the wheelchair during a crash.

2) Is the doorway of the aircraft large enough to accommodate an electric wheelchair?

3) Can the electric wheelchair maneuver onboard the aircraft?

4) Can the floor withstand the stresses of an occupied wheelchair?

The committee found that wheelchairs are already designed to exceed the lateral forces beyond a typical passenger seat certified by the FAA due to NHTSA certification for automobiles, but there was a question regarding vertical forces that would be experienced on an aircraft. As for the aircraft, the Boeing 737 and Airbus A320 would only need a closet and two rows of seats removed to accommodate electric wheelchairs (National Academies of Sciences, 2021).

According to the report, the greatest issue toward allowing individuals to remain in their wheelchairs is economic. Since an electric wheelchair is too wide to make it down the passenger aisle, the best location for the electric wheelchair would be next to the loading door in what is normally occupied by first class, or premium seats. As a result, the airlines would lose significant revenue from the loss of these premium seats (National Academies of Sciences, 2021).

As mentioned in the results, most participants avoided the use of a lavatory while onboard aircraft. While the requirement for single aisled aircraft to now have accessible lavatories is an advancement, implementation of the regulations is still three to ten years away.

Even then, there is still the issue of movement to and from the seat to get to the lavatory. Further, there is no requirement for the handicapped accessible lavatory location on the aircraft. For example, on a United 777-200 aircraft, the handicapped accessible bathroom is located in the economy section at row 40. On the United 777-300 aircraft, the handicapped accessible bathroom is in the business class section at row 9. As a result, it is unclear if someone with a disability would have to book a business class ticket to use the bathroom on a United 777-300. Further, what happens if there is a change of aircraft? So, while having accessible lavatories on all aircraft is good, more standardized policies are needed regarding lavatory location on the aircraft.

Both the literature and the study participants described those with a disability as being the ultimate planners when it comes to travel. After all, those with a disability recognize that there are going to be complications and unintended obstacles to overcome. Yet, for most participants, learning how to travel by air with a disability is a process of trial and error due to lack of information. This leads to the airline's website becoming the primary data source when a passenger is evaluating which airline to purchase a ticket from. In an inventory of websites, every airline had different formats of information, different procedures for requesting help, and different scopes of information. For example, American Airlines and Frontier simply had the procedure to contact reservations after the booking, which doesn't help someone decide when, where, and what aircraft to fly prior to confirming the reservation. Accessibility information needs to be standardized across all airlines, including stating the operating carrier and which organization performs customer service and ramp handling at each airport.

While airlines have been the focus of these issues, participants also noted that airports can also present challenges. When observing a participant at Denver International Airport, the

participant had to use an accessible, family bathroom. The terminal maps of Denver International Airport had no indicators of where the accessible/family bathrooms were. The participant just knew through previous travel experiences where those accessible/family bathrooms were located.

The challenge for designers is that information cannot be one size fits all. After all, those with a disability are a very diverse group and the accessibility of an aircraft can mean something very different between someone with a visual disability, someone with a temporary disability with crutches, and someone in a wheelchair. This is why accessibility information across all airlines should be standardized, and perhaps a coding or grading system is needed to distinguish the proper information and resources for the respective disability.

Finally, in 2021, Wisconsin Senator Tammy Baldwin introduced the Air Carrier Access Amendments Act. This bill was sent back to the committee and has yet to move forward, but there is a great need to update the regulations on airline and aircraft accessibility, not only to bring accessibility up to par with the ADA, but also change the law from the individual model of disability to the social model. This means a change from where the individual must adapt to the airlines and aircraft to travel by air, to instead the idea that it is the airlines and airplane manufacturers who must remove accessibility issues for those with an ambulatory disability.

Chapter 4, Section 8.0: Conclusions

When it comes to flying with a disability the responsibility is put on the individual. This is a barrier to those with an ambulatory disability using the air transportation system. The ACAA lacks any true specifics, compared to the ADA, when it comes to accessibility of aircraft.

Attempts need to be made to reduce the barriers faced by those with an ambulatory disability to allow inclusive use by everyone.

The power of regulation lies in standardization across all airlines. If all airlines are required to provide space for electric wheelchairs in the cabin and accessible bathrooms on single aisled aircraft, then all airlines will experience the same loss of opportunity costs due to lost seat revenue. However, it is important to realize that the intrinsic value of making an aircraft and airport experience more accessible benefits not just those with a physical limitation, but will be enjoyed by the able-bodied passenger as well. All passengers will enjoy larger lavatories, more open space near doors, and better seat design with more space. If the government were to require better accessibility, innovation will follow from airlines, vendors, and seat manufacturers.

Chapter 4, Section 9.0: Policy Implications

This study has focused on the two theoretical models for disability and to advance social justice, society must move away from the individual model to the social model where society designs the built environment to minimize issues with one's limitations. However, this transition in theories does not appear to have taken place with the airline industry.

Many of the participants did not realize that the airline industry is not covered by the ADA, instead the industry is covered by the ACAA which was ratified four years earlier than the ADA and does not have the same protections for accommodations and discrimination. As a result, the ACAA can be seen as outdated, especially when it comes to minimizing discrimination and accessibility aboard an aircraft. After all, those with a disability must take on great risk and uncertainty to enjoy the same freedom to travel by air as able-bodied individuals.

Three of the most prominent issues with air travel are wheelchair damage/loss, lavatories (on both single and double-aisled aircraft), and lack of information when making a reservation. As a result, this study finds that ACAA is outdated. Further the ACAA is based upon the individual model of disability as it puts responsibility on the individual with a disability to adapt to the requirements of the airline, rather than the airlines adapting to the needs of the individuals with a disability. Even though new policies are being implemented by the Federal Aviation Administration to have accessible lavatories on nearly every aircraft, this does not solve the issue of getting to the lavatory as well as where the lavatory is located on the aircraft.

Further, the reason for the ACAA to be updated is how caregivers felt that those with a disability were not being respected by the TSA and airport employees while traveling. This extends to the care of wheelchairs, which have a higher loss rate than traditional passenger baggage but are critical to an individual's mobility.

Finally, these revisions to the ACAA need to include content standards for airline websites. After all, those with a disability are the ultimate planners and need to be given the correct and current information to effectively plan their trip and anticipate any barriers. However, after taking an inventory of every airline's website, it was found that every airline had different information and different procedures for handling bookings for those with a disability.

Chapter 4, Section 10.0: Areas of Further Study

With an aging population, further studies into the accommodation of those with a disability are desperately needed. First, further research is needed into the major causes and locations of wheelchair damage when traveling by air. While the U.S. Department of Transportation now keeps track of mishandled wheelchairs and scooters, the data is only specific

to the airline that sold the ticket and does not include data on the airline that operated the flight, nor data on damage at a specific airport. Instead, data on airports and vending companies would provide significantly more transparency on when and how wheelchairs are being damaged.

Regarding accommodation for the electric wheelchairs in the cabin of the aircraft. The results of the study state that further research is needed to test and evaluate a selection of wheelchairs that would meet the FAA crashworthiness standards. Additionally, studies should be sponsored to assess the likely demand for air travelers who are non-ambulatory and could remain in their wheelchairs in flight. However, this analysis should also be expanded to include accessible designs for lavatories on aircraft.

Finally, this study had a very small sample N=12. Further research is needed into more individuals' difficulty in navigating the airline system and be expanded to include those with a hearing, intellectual, or developmental disability.

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Appendix A: Survey Questions:

Survey Question to Participants with a Disability for Chapter 1 & 3:

1) How old are you? Can you describe your limitations due to your disability?
2) What are ways that your limitations make it difficult for your travel?
    a. Outside the home
    b. Within the community
    c. Across the state
    d. Across the country
    e. International
3) How frequently do you travel? (within the community, across the state, across country, etc.)
4) What type of home do you live in? (Single family, townhouse, apartment, mobile home, etc.).
5) Do you live in supportive housing? (Assisted living, affordable, VA, etc.)
6) Have you ever moved to accommodate a disability?
7) Have you ever considered moving for better access to a transportation system?
8) What is your current work status?
    - Student (part time or full time)
    - Do you work full-time?
    - How long is your commute?
    - Is public transit available for your commute?
    - If you do drive, do you have concerns about losing your ability to drive?

9) Have challenges finding reliable transportation affected your employment in any way?

10) Do you have experience riding:

- Public buses (including bus stops)
- Coach buses
- Trains (including subway stops)
- Airplanes

For each of these stories, we ask:

- Why did you choose that transportation mode?
- What challenges did you have with that transportation mode?
- Are there any good experiences you have had with this form of transportation?

11) Have you used Uber/Lyft or other ride sharing services?

12) Have you used paratransit services?

13) What is the primary information source you use when planning your trip? (Google Maps, public transit websites, telephone)?

14) What aspects of Universal design do you appreciate? (I give a brief explanation of universal design)

15) Any other recommendations regarding improvements in navigating the transportation system. For example:

- Availability of real time status of bus crowding
- Bus stop design
- Weather status of bike paths

Caregiver Participant Questions for Chapter 1 & 3:

1) What age range do fall into (30s, 50s, 60s,70s, etc.? Can you describe the person you care for?
2) Can you describe the person with a disability's support network for transportation?
    a. Self-transit/Individual mobility
    b. Family
    c. Friends
    d. Public Transit use
    e. Private transit use
3) How does that person's disability make it difficult for them to travel?
    a. Outside the home
    b. Across town
    c. Across the state
    d. Across the country
    e. International
4) Do you live with a person with a disability?
5) What type of home do you live in? (Single family, apartment, condo, etc.).
6) What type of home does the individual being cared for live in? (Single family, apartment, condo, etc.).
7) Have you ever considered moving for better access to a transportation system?
8) What is your current work status?
    - Student
    - Do you work full-time? Part time? Retired? Unemployed?

- How long is your commute?
- Is public transit available for your commute?
- If you do drive, what fears do you have if you cannot drive?

9) Has being a caregiver affected your work status?

10) Do you have experience riding these services?

- Public buses
- Coach buses
- Trains
- Airplanes

For each of these stories, we ask:

  - Was the individual you cared about on any of these trips?
  - Why did the individual with the disability use that transportation mode?
  - What issues did they have with that transportation mode?

11) Do they use Uber/Lyft or other ride sharing services?

12) Do they use paratransit services?

13) What is the primary information source you use when planning your trip? (Google Maps, public transit websites, telephone)? Do these information sources change when you are traveling with an individual with a disability?

14) What aspects of Universal design do you appreciate? (I give a brief explanation of universal design)

15) Any other recommendations regarding improvements in navigating the transportation system. For example:

- Availability of real time status of bus crowding

- Bus stop design
-

Survey Question to Participants with a Disability for Chapter 2:

1) Ask about background information on disability, but only in terms of their ability to use mass transportation. (Note: Limited to physical disabilities only, and as it relates to the study of using transportation modes. it is totally up to the individual if they would like to share any information).
2) Do I have your permission to use your name in the study?
3) How frequently do you travel?
4) What type of home do you live in?
5) What is your current work status?
    - Do you work full-time?
    - How long is your commute?
    - Is public transit available for your commute?
    - If you do drive, what fears do you have if you cannot drive?
6) Do you have experience riding:
    - Public buses
    - Coach buses
    - Trains
    - Airplanes
7) For each of these stories, we then ask them to tell us about their experience.
    - How did they use that transportation mode?
    - What issues did they have with that transportation mode?

8) Do they use Uber/Lyft or other ride sharing services?
9) Do they use Dial a ride or Paratransit services?
10) What aspects of Universal design do you appreciate? (I give a brief explanation of universal design)
11) Any other recommendations they have regarding transportation in Wisconsin?