

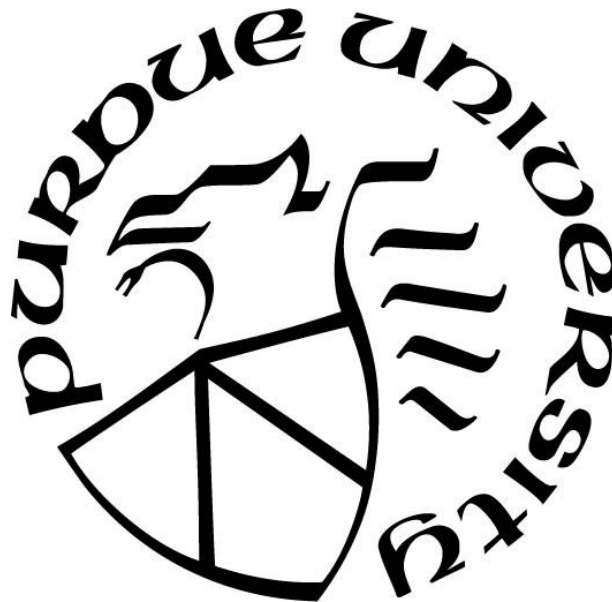
**ANALYZING THE COMMERCIAL AIR TRAVEL EXPERIENCE  
FOR PASSENGERS WITH DISABILITIES**

by  
**Wesley L. Major**

**A Dissertation**

*Submitted to the Faculty of Purdue University  
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**THE PURDUE UNIVERSITY GRADUATE SCHOOL**  
**STATEMENT OF DISSERTATION APPROVAL**

Dr. Sarah M. Hubbard, Chair

School of Aviation and Transportation Technology

Dr. Thomas Q. Carney

School of Aviation and Transportation Technology

Dr. Julius C. Keller

School of Aviation and Transportation Technology

Dr. Darcy M. Bullock

Department of Civil Engineering

**Approved by:**

Dr. Richard O. Fanjoy

Head of the Graduate Program

Special thanks to my family members and friends. An unexpected motorcycle accident has diverted us from a “normal” path, however, that diversion is the basis and motivation for this research. The unwavering support from my parents, Bernadette and Wesley, as well as from my younger brother, Jordan, has always meant the world to me. Thanks to Nala for being my sidekick and shadow throughout my time at Purdue. Thanks to Kelsey Vance for being the foundation I needed whenever times were stressful.

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## **LIST OF ABBREVIATIONS**

ACAA – Air Carrier Access Act

AC – Advisory Circular

ACS – American Community Survey

ADA – Americans with Disabilities Act

ANOVA – Analysis of Variance

BTS – Bureau of Transportation Statistics

CFR – Code of Federal Regulation

CRO – Complaint Resolution Officer (designated airline employee or airport employee)

DOJ – Department of Justice

DOT – Department of Transportation

FAA – Federal Aviation Administration

IRB – Institutional Review Board

PAX – Passengers

PWD – People with Disabilities

PxWD – Passenger(s) with Disabilities

SARP – Standards and Recommended Practices

SIPP – Survey of Income and Program Participation

TSA – Transportation Security Administration

US – United States

USC – United States Code of Laws

## **GLOSSARY**

14 CFR Part 382 – Refers to the Code of Federal Regulations Title 14 (Aeronautics and Space) and those guidelines outlined in Part 382, Nondiscrimination on the Basis of Disability in Air Travel.

42 U.S. Code § 12101 - § 12213 – Refers to the Code of Laws of the United States of America Title 42 (The Public Health and Welfare) and those guidelines outlined in Chapter 126, Equal Opportunities for Individuals with Disabilities (also known as the Americans with Disabilities Act or ADA), Titles I, II, III and V (issues related to full participation in all parts of society).

49 U.S. Code § 41705 – Refers to the Code of Laws of the United States of America Title 49 (Transportation) and those guidelines outlined in Chapter 417, Operations of Carriers, pertaining to the discrimination against handicapped individuals, known as the Air Carrier Access Act (ACAA).

Disability – An individual with a disability is defined by the Americans with Disabilities Act as a person who has a physical or mental impairment that substantially limits one or more major life activities (ADA National Network, n.d.).

H. R. 4 – Federal Aviation Reauthorization Act of 2018 issued by the 115<sup>th</sup> Congress of the United States. Addresses five areas: funding authorizations, airline customer service, aviation safety, airports, and unmanned aviation systems.

## **ABSTRACT**

Author: Major, Wesley, L. Ph.D

Institution: Purdue University

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Title: Analyzing the Commercial Air Travel Experience for Passengers with Disabilities

Major Professor: Sarah M. Hubbard.

Airlines are legally required to provide adequate service to passengers with disabilities; this research examines the quality of service provided based on the analysis of airline complaint data and the results of a survey of passengers with disabilities. The provision of adequate service to airline passengers is challenging since passenger counts continue to rise and passengers are increasingly diverse. Airline passengers with disabilities are protected by federal legislation under the Air Carrier Access Act (ACAA), 49 U.S. Code § 41705, which prohibits discriminatory treatment of people with disabilities in air transportation. Regulations outlined in 14 CFR Part 382, Nondiscrimination on the Basis of Disability in Air Travel, require that airlines and airports are accessible, and require that airline, airport and contract personnel provide appropriate accommodations and services to people with disabilities.

To track operational efficiency and compliance with the ACAA, the Department of Transportation collects data on airline performance. Data are published in monthly and annual reports. One component of these reports is complaint data. Complaints are an important metric because they identify deficiencies in service.

Individual complaints are forwarded to airport and airline service providers for investigation; however, complaint data do not appear to be used to systematically assess

the adequacy of service, as evidenced by a disproportionately high and rising number of disability complaints.

The objective of this research is to investigate the provision of air service for passengers with disabilities. This investigation includes identification of the regulations that affect commercial air travel for passengers with disabilities, an examination of disability-related complaints, specifically the number and rate of these complaints compared to complaints for all travelers, and an assessment of service based on a survey of passengers with disabilities.

## CHAPTER 1. INTRODUCTION

### 1.1 Statement of Problem

The needs of people with disabilities (PWD) are often overlooked. These needs can be infringed upon in a variety of ways and may result from a variety of causes including individual behavior, institutional policies and practice, poor facility design, and natural events. Figures 1 through 7 illustrate physical examples in which the needs of PWD are not being met. Figure 1 depicts a vehicle parked in a reserved area. Parking in this buffer space renders the adjacent disabled parking space unusable for someone who uses a wheelchair or other assistive device and needs this area to access their vehicle. Figure 2 illustrates a police vehicle and business advertisement that block an accessible pathway.

The changing of seasons can also present challenges for PWD. Snow removal practices may reduce the number of disabled parking spaces (Figure 3a) and may result in snow pushed into the area between the parking spaces and sidewalk (Figure 3b), restricting access to the ramp and sidewalk. In other cases, snow may obstruct the visibility of signs, making it difficult to locate accessible entrances (Figure 4). Leaves can also present a challenge since they may accumulate near drains and create pools of standing water (Figure 5).

In other cases, design is simply inadequate. Figure 6 illustrates a design failure for a pedestrian crossing. In this case, the design requires a pedestrian to enter the adjacent roadway to access the curb cut. This requires extra distance and also may present a safety threat due to vehicle traffic in the roadway. The final example illustrates a situation in

which the clearance area provided for a vehicle ramp is inadequate (Figure 7); in this case, there is no room to exit the ramp and open the door.



1a. A SUV parks in a reserved area



1b. A motorcycle parks in a reserved area

*Figure 1. Blocked access to parking*



2a. A police vehicle blocks access to a curb cut



2b. A business advertisement board blocks full curb cut access

*Figure 2. Examples of an accessible pathway being blocked*



3a. Snow removal plowed into a reserved parking space



3b. Access area between parking spaces and sidewalk not clear

*Figure 3. Seasonal weather impacting parking and access*



4a. Sign for accessible building entrance visible



4b. Snow obstructing view of sign for accessible building entrance

*Figure 4. Seasonal weather obstructing waypoint finding*

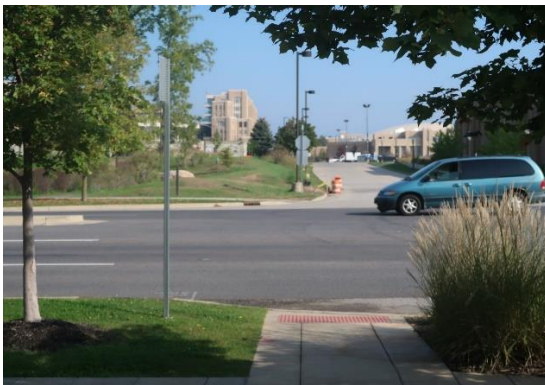


5a. Leaves accumulating on top of a drainage cover



5b. Result of rain when drain is blocked

*Figure 5. Parking spot assigned to an accessible apartment floods*



6a. Pedestrian view of starting location to cross intersection



6b. Pedestrian view of ending location to cross intersection

*Figure 6. Design faults for pedestrians when crossing an intersection*



*Figure 7. Vehicle lift without adequate clearance to door*

Violations such as these limit access and create barriers that prevent inclusion of PWD. Negative impacts include physical exclusion of PWD due to a lack of accessibility. Violations in the aviation environment may not only exclude PWD, but also stress operations (e.g., cause delays due to an insufficient number of personnel to provide wheelchair assistance or an aisle chair in a timely manner) and result in negative impacts on the individual. Problems that may occur during commercial airline travel include wheelchair damage, inadequate aisle chair service for boarding and deplaning the aircraft, and challenges related to wayfinding in the terminal, since primary paths are designed for escalators rather than elevators (Figure 8). Ensuring all individuals receive adequate service is not only the right thing to do, but in the case of commercial air travel, is required by law.



8a. Aisle chair on aircraft (Edinburgh Airport, n.d.)



8b. Passenger gets his wheelchair back damaged after his flight (United Spinal Association, 2017)



8c. Escalators pose a problem for people in wheelchairs (Rutherford, 2017)

*Figure 8. Disability-related issues in the aviation environment*

Airlines and airports that operate in the United States (US) are required to follow federal statutes and regulations for the provision of commercial air transportation services for individuals with disabilities. Discriminatory practices and treatment of PWD in air transportation are prohibited by 49 U.S.C. § 41705, the Air Carrier Access Act (ACAA), with specific regulations outlined in 14 CFR Part 382, Nondiscrimination on the Basis of Disability in Air Travel. A study performed by Simon Darcy (2012) found that globally,

“air travel practices routinely contravened disability discrimination legislation” (p. 91), a finding that is consistent with the evidence related to commercial airline service in the US, as well.

## 1.2 Research Questions

The purpose of this study was to investigate the commercial air travel experience of passengers with disabilities. This investigation included documenting an understanding of the regulations surrounding commercial air travel for passengers with disabilities, examining the number and rate of disability-related complaints, and exploring the user perception of the service provided.

The research questions are:

**Research Question 1 – Regulations.** What regulations and policies govern airport and airline service for passengers with disabilities in the United States?

**Research Question 2 – Complaint Data.** Based on the number and rate of disability-related complaints and consumer-based complaints, is service for passengers with disabilities equivalent to service for all passengers?

**Research Question 3 – Service Equivalence.** Using the rate of disability-related complaints as an indication of service, do all airlines provide equivalent service for passengers with disabilities?

**Research Question 4 – Survey Results.** How does the disabled community perceive the service provided by airlines and airports?

### 1.3 Scope

This research focused on regularly-scheduled commercial airlines and the Part 139 airports that serve these airlines in the US. These airlines and airports operate under Federal Aviation Administration (FAA) regulations and certification, and are governed by the ACAA and the Americans with Disabilities Act (ADA). This research examined service for passengers with disabilities (PxWD) using scheduled commercial air service in the US. Service was evaluated based on the complaint data published by the Department of Transportation (DOT) in the *Annual Report on Disability-Related Air Travel Complaints* and *Air Travel Consumer Report* for the years 2010 through 2016<sup>1</sup>. To supplement DOT complaint data and provide a more robust understanding of user perceptions, an internet-based survey of PxWD was conducted to collect quantitative and qualitative data.

### 1.4 Significance of Problem

The aviation industry has long recognized the importance of the unique service needs for PxWD. On October 2, 1986, President Ronald Reagan signed the ACAA into law. This legislation specifically affects airlines and requires the DOT to identify the distinct needs of PxWD and develop regulations and policies to ensure that PxWD are treated without discrimination as they navigate through the nation's commercial air travel system. Specific regulations are outlined in 14 CFR Part 382, which provides requirements for accessible facilities (aircraft and airport facilities), the provision of services and equipment, seating accommodations, treatment of mobility aids/assistive

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<sup>1</sup> Most recent data available at the time of analysis

devices, service animals, and airline personnel training (US Department of Transportation, n.d.).

The ACAA establishes minimum service standards for PxWD; however, these service standards are not always upheld. Inadequate service standards are documented in media accounts (Cullen, 2016; Fox News, 2017; Gray & Roth, 2015; Jansen, 2017b; Patterson, 2018) and evidenced by DOT reprimands and fines. Since 2002, there have been more than 60 aviation enforcement orders involving disability-related issues (US Department of Transportation, 2016b). Enforcement orders are issued by the DOT's Office of Aviation Enforcement and Proceedings, and result from continued noncompliance with regulations. In recent years, three of the four largest US airlines received a DOT enforcement order for violations related to the provision of service for PxWD.

- In February 2011, Delta Air Lines was fined \$2 million for violating the requirement to provide assistance getting on and off the airplane, frequently not providing an adequate written response to disability complaints from passengers, and failure to properly report each disability complaint (US Department of Transportation, 2011).
- In November 2013, US Airways, now part of American Airlines, was fined \$1.2 million for failure to provide wheelchair assistance to PxWD at their Philadelphia and Charlotte locations. This service failure lead to missed connections during which PxWD were left unattended for long periods of time (US Department of Transportation, 2013a).

- In January 2016, United Airlines was fined \$2 million for failing to provide PxWD with prompt and adequate assistance during aircraft enplanement and deplanement, as well as traveling through the terminal (US Department of Transportation, 2016d).

The DOT's *Annual Report on Disability-Related Air Travel Complaints* publishes complaint data related to individual airlines. Data are reported to the DOT by each airline. In 2016, an interesting trend can be seen among the four major US airlines regarding the breakdown of complaints:

- American Airlines had 45% of disability-related complaints attributed to failure to provide adequate wheelchair assistance (Figure 9).
- Delta Air Lines had 62% of disability-related complaints attributed to failure to provide adequate wheelchair assistance (Figure 10).
- Southwest Airlines had 26% of disability-related complaints attributed to failure to provide adequate wheelchair assistance (Figure 11).
- United Airlines had 65% of disability-related complaints attributed to failure to provide adequate wheelchair assistance (Figure 12).

DOT complaint data provide one method to assess the service provided by individual airlines and the aviation system as a whole; however, these complaint data do not provide a robust narrative to illustrate the nature of the complaints or the kinds of challenges faced by PxWD. Survey results of PxWD, specifically wheelchair users, was used to provide additional information about the issues and challenges during air travel.

Detailed Breakdown of Disability-Related Complaint Data Reported to DOT by AMERICAN AIRLINES, INC. (2016)														
Total number of complaints reported to DOT: 6,309														
	Vision Impairment	Hearing Impairment	Vision & Hearing Impairment	Paraplegic	Quadriplegic	Other wheelchair	Oxygen	Stretcher	Other Disability	Other Assistive Device	Mentally Impaired	Communicable Disease	Allergies	Total of Category of Complaints
Refusal To Board Passenger	0	2	0	0	0	4	5	0	13	0	2	0	0	26
Refusal to Board w/o Attendant	0	0	0	0	0	0	0	0	1	0	1	0	0	2
Security Issues Regarding Disability	0	1	0	0	0	3	0	0	3	0	0	0	0	7
Aircraft Not Accessible	0	0	0	0	0	5	0	0	5	1	0	0	0	11
Airport Not Accessible	0	0	0	1	0	4	0	0	4	0	0	0	0	9
Advance Notice Dispute	0	0	0	0	0	11	0	0	7	1	1	0	0	20
Seating Accommodation	5	3	1	3	0	39	1	0	595	2	4	0	6	659
Failure to Provide Assistance	31	24	4	9	5	2811	14	0	813	73	13	0	31	3828
Damage to Assistive Device	0	1	0	1	0	67	1	0	11	38	0	0	0	119
Storage and Delay of Assistive Device	0	0	0	2	1	55	1	0	68	134	1	0	0	262
Service Animal Problem	0	1	0	0	0	0	0	0	415	4	3	0	7	430
Unsatisfactory Info	4	9	0	0	0	29	2	0	47	6	0	0	5	102
Other	7	10	5	0	0	280	8	0	416	51	4	0	53	834

Figure 9. American Airlines' disability-related complaint data from 2016

Detailed Breakdown of Disability-Related Complaint Data Reported to DOT by DELTA AIR LINES, INC. (2016)														
Total number of complaints reported to DOT: 6,121														
	Vision Impairment	Hearing Impairment	Vision & Hearing Impairment	Paraplegic	Quadriplegic	Other wheelchair	Oxygen	Stretcher	Other Disability	Other Assistive Device	Mentally Impaired	Communicable Disease	Allergies	Total of Category of Complaints
Refusal To Board Passenger	0	0	0	1	0	0	4	0	8	0	0	0	0	13
Refusal to Board w/o Attendant	0	0	1	0	0	0	0	0	1	0	0	0	0	2
Security Issues Regarding Disability	0	0	0	0	1	0	0	0	0	0	0	0	1	2
Aircraft Not Accessible	0	0	0	1	0	3	0	0	1	0	0	0	0	5
Airport Not Accessible	0	0	0	0	0	4	0	0	2	0	0	0	0	6
Advance Notice Dispute	0	0	0	0	0	0	3	0	3	0	0	0	4	10
Seating Accommodation	5	4	4	0	0	58	1	0	349	0	1	0	10	432
Failure to Provide Assistance	23	21	43	1	4	3801	30	0	556	14	2	0	139	4634
Damage to Assistive Device	0	0	0	0	2	119	0	0	0	168	0	0	0	289
Storage and Delay of Assistive Device	0	0	0	0	0	37	1	0	40	119	0	0	0	197
Service Animal Problem	1	1	0	1	0	2	0	1	256	0	1	0	1	264
Unsatisfactory Info	0	1	0	0	0	0	0	0	1	0	0	0	1	3
Other	0	1	3	1	1	147	7	0	71	8	0	0	25	264

Figure 10. Delta Air Lines' disability-related complaint data from 2016

Detailed Breakdown of Disability-Related Complaint Data Reported to DOT by SOUTHWEST AIRLINES CO. (2016)														
Total number of complaints reported to DOT: 4,475														
	Vision Impairment	Hearing Impairment	Vision & Hearing Impairment	Paraplegic	Quadriplegic	Other wheelchair	Oxygen	Stretcher	Other Disability	Other Assistive Device	Mentally Impaired	Communicable Disease	Allergies	Total of Category of Complaints
Refusal To Board Passenger	0	1	0	0	0	0	11	0	15	1	1	0	2	31
Refusal to Board w/o Attendant	0	1	0	0	0	2	0	0	0	0	0	0	0	3
Security Issues Regarding Disability	0	0	0	0	0	2	0	0	2	0	0	0	0	4
Aircraft Not Accessible	0	0	0	0	0	2	0	0	3	0	0	0	0	5
Airport Not Accessible	0	0	0	0	0	5	0	0	5	0	0	0	0	10
Advance Notice Dispute	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seating Accommodation	2	2	0	0	0	14	6	0	243	0	3	0	4	274
Failure to Provide Assistance	16	19	2	1	1	1148	3	0	227	6	13	0	32	1468
Damage to Assistive Device	0	0	0	0	0	58	2	0	6	39	0	0	0	105
Storage and Delay of Assistive Device	1	1	1	0	0	38	5	0	79	307	0	0	1	433
Service Animal Problem	2	0	0	0	0	0	0	0	463	0	0	0	1	466
Unsatisfactory Info	1	2	0	0	0	5	5	0	50	3	2	0	4	72
Other	18	36	4	1	0	85	18	0	1119	26	22	1	274	1604

Figure 11. Southwest Airlines' disability-related complaint data from 2016

**Detailed Breakdown of Disability-Related Complaint Data  
Reported to DOT by UNITED AIR LINES, INC. (2016)**

**Total number of complaints reported to DOT: 4,163**

	Vision Impairment	Hearing Impairment	Vision & Hearing Impairment	Paraplegic	Quadriplegic	Other wheelchair	Oxygen	Stretcher	Other Disability	Other Assistive Device	Mentally Impaired	Communicable Disease	Allergies	Total of Category of Complaints
Refusal To Board Passenger	0	0	1	1	0	5	3	0	5	0	2	1	1	19
Refusal to Board w/o Attendant	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Security Issues Regarding Disability	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Aircraft Not Accessible	1	4	1	0	0	14	1	0	8	0	0	0	0	29
Airport Not Accessible	0	0	0	0	0	2	0	2	2	0	0	0	0	6
Advance Notice Dispute	0	0	0	0	0	3	0	0	0	0	1	0	0	4
Seating Accommodation	7	4	4	2	1	102	3	0	341	1	24	0	10	499
Failure to Provide Assistance	25	19	7	6	10	2618	1	0	140	9	5	0	4	2844
Damage to Assistive Device	0	0	1	1	1	32	0	0	3	12	0	0	0	50
Storage and Delay of Assistive Device	1	0	0	3	2	35	2	0	54	52	0	0	0	149
Service Animal Problem	4	4	3	0	0	3	0	0	55	0	138	0	10	217
Unsatisfactory Info	1	7	0	0	0	12	4	0	25	7	1	0	9	66
Other	2	20	2	0	0	110	4	0	88	12	9	1	30	278

*Figure 12. United Airlines' disability-related complaint data from 2016*

### 1.5 Assumptions

The following assumptions were inherent to the pursuit of this study:

- All complaints filed with the airlines and DOT are legitimate complaints.
- Passenger counts regarding PxWD are equally-distributed across airlines.
- All survey participants are disabled individuals and represent views of the community.
- All survey participants are answering truthfully.

### 1.6 Limitations

The following limitations were inherent to the pursuit of this study:

- The level of detail regarding complaint data is limited to the information provided by the DOT.
- The increasing rate of complaints for PxWD to 2016 may be due to a variety of factors, which may include diminished service, higher service expectations for PxWD, greater awareness of how to file a complaint, or an increasing number of PxWD utilizing commercial air service. All these factors are difficult to measure and as a result, the potential impact of each factor cannot be assessed in this analysis.
- The percentage of commercial airline passengers aware of their ability to file a complaint is undetermined.
- Surveys were predominately distributed through personal contacts, at disability expos, and at wheelchair sporting events, which may introduce

sample bias since respondents may represent a more active and physically-agile group of individuals. The people who complete the survey may be able to accommodate situations that other PWD cannot manage. As a result, the people surveyed may not be as vulnerable as the users who filed ADA and ACAA complaints identified in the DOT reports.

- Survey results are based on a convenience sample and may not adequately represent the functional range and perceptions of all wheelchair users.
- The potential for researcher bias exists when analyzing qualitative research pertaining to narratives and text responses. Researcher bias can result from selective recording of information and by allowing personal views to affect data interpretation.
- This research may not fully capture the extent of the issues PWD face while traveling, due to PWD choosing not to travel by air.

### 1.7 Delimitations

The following delimitations were inherent to the pursuit of this study:

- Research examined complaint data reported to and by the DOT between the years of 2010 to 2016. These years represent the service trends in recent years.
- The survey focuses on wheelchair users. This is an important cohort, since complaint data reveal that wheelchair-related disability complaints represent over 50% of all disability complaints filed with the DOT.

## 1.8 Summary

This chapter introduced the foundation of this dissertation and its scope. It has outlined the background and significance of the problem, and the purpose of this study. In addition, it has presented the assumptions, limitations, and delimitations. This foundation, background, purpose, limitations and delimitations provide the direction and constraints for the study.

## CHAPTER 2. LITERATURE REVIEW

The literature review includes an examination of current statistics and projected trends in the US related to PWD and commercial airline passengers. The literature review also provides a context for an examination of the current regulations and policy that affect US airports and airlines. Regulations and policy establish minimum service requirements for airports and airlines that serve PWD. Violations of minimum service requirements may result in complaints, which are illustrated using descriptive statistics for airline complaints filed with the DOT. Lastly, the literature review examines research related to service for PWD, including service provided in related sectors such as the tourist industry.

### 2.1 Disability Statistics

The US government's definition of disability is "a physical or mental impairment that substantially limits one or more major life activities" (ADA National Network, n.d.). The federal agencies that collect and report statistics regarding PWD may present dissimilar data, due to different interpretations of the definition and different survey questions. This research presents data collected through the US Census, the Survey of Income and Program Participation (SIPP), and the American Community Survey (ACS).

#### 2.1.1 US Census

The census takes place once a decade and collects basic information that influences planning, development, and overall quality of life (Central Bureau of Statistics, n.d.). Data are collected at the national and local levels. The decennial census

classifies a disability into one of four categories (sensory, physical, mental, and self-care) based on the following definition:

“People 5 years old and over are considered to have a sensory, physical, mental, or self-care disability if they have one or more of the following:

- (a) Blindness, deafness, or a severe vision or hearing impairment;
- (b) A substantial limitation in the ability to perform basic physical activities, such as walking, climbing stairs, reaching, lifting, or carrying;
- (c) Difficulty learning, remembering, or concentrating; or
- (d) Difficulty dressing, bathing, or getting around inside the home” (Erickson & Lee, 2005, p. 1)

For the determination of whether an individual has a disability, the census relies on an affirmative answer to one of the two questions related to vision, hearing, physical activity, or mental impairments (Waldrop & Stern, 2003) (see Appendix A for the list of questions). In 2000, 19.3% of the population, or 49.7 million people<sup>1</sup> reported a disability in the US (Waldrop & Stern, 2003). The most prevalent disability category was physical with 21.2 million individuals reporting physical difficulties (Waldrop & Stern, 2003). The Census Bureau stopped collecting disability-related data in the decennial census, and the SIPP and the ACS now collect these data.

### 2.1.2 Survey of Income and Program Participation

The SIPP is a longitudinal, household-based survey, with 2½ year studies that focus on different areas of interest each term (US Census Bureau, 2016). In 2004 and

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<sup>1</sup> Civilian, non-institutionalized individuals aged 5 and older who reported a sensory, physical, mental, or self-care disability.

2008, the US Census Bureau conducted the SIPP, which included disability-related data. The SIPP defines disability based on two categories, severe and nonsevere, with the main distinction being whether an individual is able to perform a task (Brault, 2012). The SIPP also classifies disability by type: sensory, physical, mental, and activity limitations (see Appendix B for the list of survey questions).

SIPP survey results indicate that 56.7 million people<sup>1</sup>, or 19% of the US population, reported a disability in 2010 (Brault, 2012). Similar to the Census 2000 data, individuals who had difficulty walking or climbing stairs, or use a wheelchair, cane, crutches or walker, represent the largest cohort with, 30.6 million people; this is more than half of those reporting a disability (Brault, 2012). The survey also found the probability of a severe disability increases with age. Considering people with a disability, one in 20 people that are age 15 to 24 years old report a severe disability, and one in four people who are age 65 to 69 years old report a severe disability (Brault, 2012).

### 2.1.3 American Community Survey

The ACS is an annual survey conducted by the Census Bureau that collects information about a wide range of topics, including occupations, education, race and gender, home ownership, and disability status (US Census Bureau, 2018). The ACS recognizes six categories of disability: hearing, visual, cognitive, ambulatory, self-care, and independent living. The ACS relies on a direct question format and asks six questions such as:

- Is this person deaf or does he/she have serious difficulty hearing?
- Is this person blind?

---

<sup>1</sup> Non-institutionalized people of all ages; institutions include prisons, hospitals, and care centers

- Does this person have serious difficulty walking or climbing stairs?

People are classified as having a disability if they answer affirmatively to at least one of the disability-related questions. A complete list of questions is provided in Appendix C. In the 2015 ACS, 12.6 percent of individuals<sup>1</sup> reported a disability; this equates to 40 million of 317 million people in the US (Erickson, Lee, & von Schrader, 2017). Similar to the census and SIPP data, the most prevalent disability category was ambulatory, with an estimated 6.6 percent of the US population, or 20.9 million people, reporting this disability (Erickson et al., 2017). Figure 13 illustrates disability trends over time, as reported by the ACS.

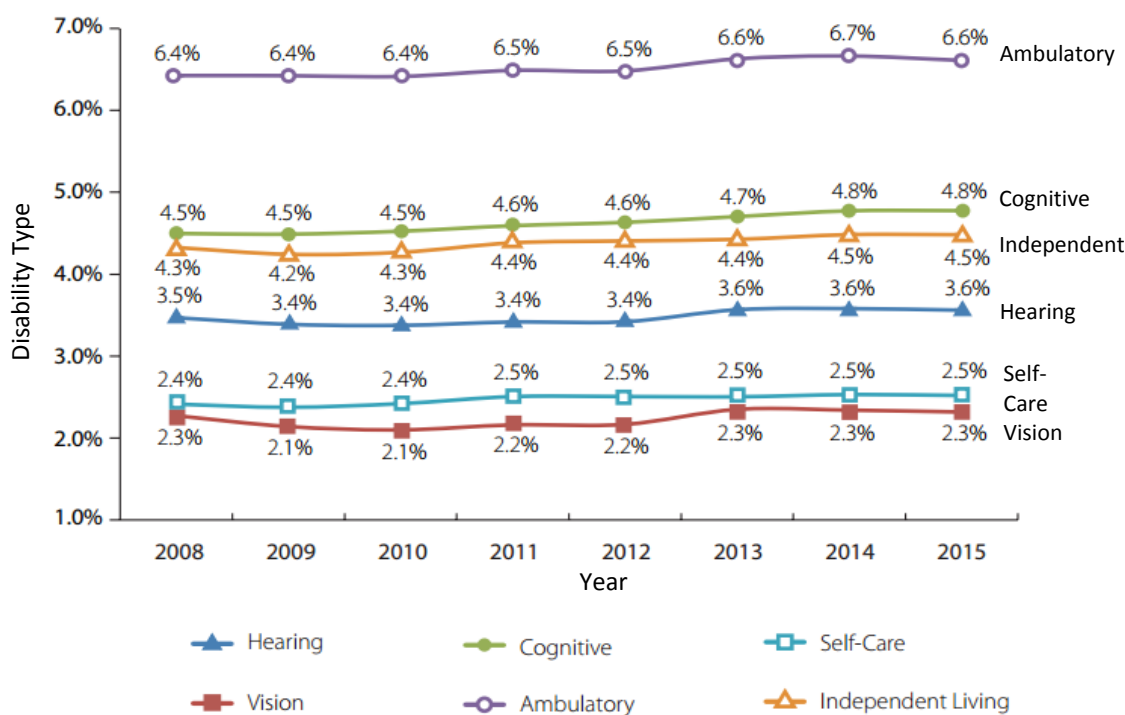


Figure 13. Prevalence by disability type and year, 2008 through 2015 (Kraus, 2017)

<sup>1</sup> Non-institutionalized people of all ages; institutions include prisons, hospitals, and care centers.

#### 2.1.4 Disability Population Trend

Since the questions for each survey are different, the results and the number of people that report a disability vary. The number of people that report a disability based on ACS data is lower than the number of people that report a disability based on the SIPP data or the census data. The census, SIPP, and ACS data demonstrate PWD constitute a significant number and percentage of the US population. Moreover, the number of people reporting a disability is expected to increase as the population ages and as medical science advances. By 2029, all of the baby boomers will be 65 or older, and this demographic group of 70 million people will comprise 20% of the total population (Colby & Ortman, 2014; Ortman, Velkoff, & Hogan, 2014). Currently, over a third of adults 65 or older report a disability (Centers for Disease Control and Prevention, 2015). If a third of the baby boomers have a disability, there will be 25 million people with a disability in this cohort alone, which represents approximately half of the current disabled population. The population of PWD will probably not increase by quite this much, and future disabilities may be less severe, due to medical advances and more active lifestyles; nonetheless, trend analysis suggests that the number of PWD is likely to grow in the future.

The increased number of PWD is of interest to airlines and airports for two major reasons. First, PWD comprise a large market. It is estimated that PWD represent \$200 billion in discretionary spending (Brault, 2012), which is a potentially profitable market segment (Chan, 2010; Hung, Petrick, & O'leary, 2007). The market is even larger when research conducted by Legacy Now (n.d.) is considered; this research suggests that only 29% of PWD travel alone. Second, an increase in the number of PWD is of interest to

airlines and airports because the law requires equitable service for all passengers and annual passenger counts are expected to increase.

## 2.2 Airline Passenger Trends

Passenger enplanements have increased since 2009 and enplanements reached almost 1 billion in 2016 (Table 1); there have been increases for all passengers, including PxWD. Passenger counts are provided by the Bureau of Transportation Statistics (BTS) through the T-100 Market data<sup>1</sup>, which tracks passengers based on flight number. The FAA projects a passenger growth rate of 2.1% per year for the next 20 years (Federal Aviation Administration, 2016). This may be a conservative projection, based on increases of 5.5% in 2015 and 3.8% in 2016 (Table 1).

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<sup>1</sup> [https://www.transtats.bts.gov/Data\\_Elements.aspx?Data=1](https://www.transtats.bts.gov/Data_Elements.aspx?Data=1)

Table 1

*T-100 Airline Passenger Data*

<b>Year</b>	<b>Passengers with Disabilities<sup>1</sup></b>	<b>Passengers without Disabilities</b>	<b>Total Passengers<sup>2</sup></b>	<b>Passengers with Disabilities (%)</b>
2004	17,000,000	746,709,691	763,709,691	2.23
2005	17,000,000	783,849,909	800,849,909	2.12
2006	17,000,000	791,103,211	808,103,211	2.10
2007	17,000,000	818,510,422	835,510,422	2.03
2008	17,000,000	792,821,893	809,821,893	2.10
2009	19,000,000	748,816,588	767,816,588	2.47
2010	20,000,000	767,478,056	787,478,056	2.54
2011	20,000,000	782,134,793	802,134,793	2.49
2012	20,000,000	793,123,365	813,128,058	2.46
2013	20,000,000	805,007,332	824,967,603	2.42
2014	21,000,000	830,613,523	851,517,209	2.47
2015	22,000,000	874,602,288	896,602,288	2.45
2016	22,484,000	909,498,972	931,982,972	2.41
2017	23,046,100	941,716,831	964,762,931	2.38

<sup>1</sup> Annual Report on Disability-Related Air Travel Complaints (US Department of Transportation, 2017). Value for 2016 is calculated based on DOT's 2015 estimate and the FAA's projected annual passenger increase.

<sup>2</sup> Bureau of Transportation T-100 Market Data (Bureau of Transportation Statistics, 2018).

### 2.3 Disability Laws

There are several laws and supporting policies that govern air transportation service for PxWD. The two primary laws are the Air Carrier Access Act (ACAA) and the Americans with Disabilities Act (ADA).

The ACAA requires the DOT to develop service requirements to ensure PxWD do not face discrimination in commercial air service, as mandated in 14 CFR Part 382. This legislation specifically affects airlines, and sets rules for a variety of topics, including accessible facilities, services, equipment, and seating, as well as airline personnel training

(US Department of Transportation, n.d.). The ACAA applies to all commercial air service in the US, including flights to or from the US operated by foreign airlines.

Four years after the promulgation of the ACAA, the ADA was signed by President George H. W. Bush on July 26, 1990. The ADA is more comprehensive and detailed than the ACAA, because it affects not only airlines, but all public, private facilities that are open to the public, and federal facilities, and encompasses a wide-range of civil rights topics in a variety of public settings. The ADA prohibits discrimination on the basis of disability in employment, transportation, public accommodation, communications, governmental activities, and telecommunications. Title II and III of the ADA fall under the DOT's control, with Title II focusing on public transportation, and Title III focusing on public accommodations (US Department of Justice, 2009).

In 2010, the Department of Justice (DOJ) published an amendment to the regulations of the ADA. Referred to as the 2010 ADA Standards for Accessible Design, these improved regulations provide standards that limit architectural barriers and increase accommodations in all public places and commercial facilities. These requirements are applicable during design and construction, and must be reflected in the new design anytime buildings or facilities are altered (US Department of Justice, 2010). To assist with implementation of ADA standards, an independent federal agency, the US Access Board, provides information, publication, and technical assistance (US Access Board, n.d.-a). One important resource made available by the Access Board is the *Guide to ADA Standards*. This document explains the requirements of the ADA and includes illustrations that provide visual representations of ADA standards. The guide also

provides recommendations for best practices that exceed the minimum requirements (US Access Board, n.d.-b).

For matters involving PxWD, the service provided by air carriers falls primarily under the jurisdiction of the DOT's ACAA. Airport facilities, on the other hand, fall primarily under the jurisdiction of DOJ pursuant to the ADA (Briggs, 2013).

Air travel for PxWD has improved greatly as a result of the ACAA and the ADA. Improvements in aircraft accessibility (e.g., moveable armrests), seating accommodations, and the provision of services and equipment (e.g., training for all personnel who deal with the traveling public, assistance boarding, deplaning and moving within the terminal) are a direct result of this legislation.

Despite progress, many PxWD continue to encounter barriers in air travel. Barriers that may be encountered include inaccessible airplane lavatories, delays in the provision of required assistance (e.g., PxWD must wait for the provision of aisle chairs to board and exit the aircraft), and damage to assistive devices during transport (e.g., wheelchair damage). Access and service requirements are specifically outlined in 14 CFR Part 382 (see Appendix D for excerpts from legislation), and any violations or complaints can be reported for additional investigation.

Passengers can file air travel complaints through the DOT website<sup>1</sup> or directly with the responsible airline. Reported complaints are then reviewed and categorized according to the nature of the complaint; if it is a disability-related complaint, it is also categorized by disability type. Disability-related complaints require a response from the DOT<sup>2</sup>, as well as from the Complaint Resolution Official (CRO) at the implicated airline

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<sup>1</sup> <https://airconsumer.dot.gov/escomplaint/ConsumerForm.cfm>.

<sup>2</sup> see Appendix E for an example response from DOT.

or airport. Consumer complaints and disability-related complaints are reported monthly in the *Air Travel Consumer Report* (US Department of Transportation, 2017). A complete and detailed account of disability-related complaints can be found in the *Annual Report on Disability-Related Air Travel Complaints* (US Department of Transportation, 2018).

The disability type is recorded as one of the following:

- Vision impaired,
- Hearing impaired,
- Vision and hearing impaired,
- Mentally impaired,
- Communicable disease,
- Allergies (e.g., food allergies, chemical sensitivity),
- Paraplegic,
- Quadriplegic,
- Other wheelchair,
- Oxygen,
- Stretcher,
- Other assistive device (cane, respirator, etc.), and
- Other disability.

The nature of the disability complaint (e.g., discrimination or service problem) is recorded in one of the following categories:

- Refusal to board,
- Refusal to board without an attendant,
- Security issues concerning disability,
- Aircraft not accessible,
- Airport not accessible,
- Advance-notice dispute,
- Seating accommodation,
- Failure to provide adequate or timely assistance,

- Damage to assistive device,
- Storage or delay of assistive device,
- Service animal problem,
- Unsatisfactory information, and
- Other.

Documentation of complaints by PxWD is one important way to measure the adequacy of service and quantify airline performance for this demographic group.

Although the goal and intent of the ACAA is to provide adequate service to PxWD, there are still issues faced by this demographic group when traveling by air. Thirteen years after the ratification of the ACAA, the National Council on Disability (NCD) presented findings to Congress citing that PWD chose not to travel by air because they face physical barriers as well as prejudice, hostility, and disability stereotyping (National Council on Disability, 1999), evidenced by such problems as:

- Ineffective communication regarding flight information,
- Inaccessible seats,
- Inadequate boarding assistance, and
- Careless handling and stowage of wheelchairs and other assistive devices.

Unfortunately, many of these circumstances still exist. Since 2002, there have been more than 60 enforcement orders involving disability-related issues in the aviation industry (US Department of Transportation, 2016b). As mentioned in Chapter 1, section 1.4 Significance of Problem, in the past seven years, three of the four largest US airlines<sup>1</sup> have been fined more than \$1 million for violations of 14 CFR Part 382, with the most

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<sup>1</sup> Delta Air Lines, US Airways (now American Airlines), and United Airlines.

recent fine in 2016 (US Department of Transportation, 2011; US Department of Transportation, 2013; US Department of Transportation, 2016b).

The timeline below (Figure 14) highlights selected events related to the provision of airline service for PxWD. This timeline illustrates that 30 years after the introduction of the ACAA, service for PxWD is still insufficient, as evidenced by US DOT fines levied against air carriers. Complaints filed with the DOT are one source of data and one metric that can be used to evaluate service.

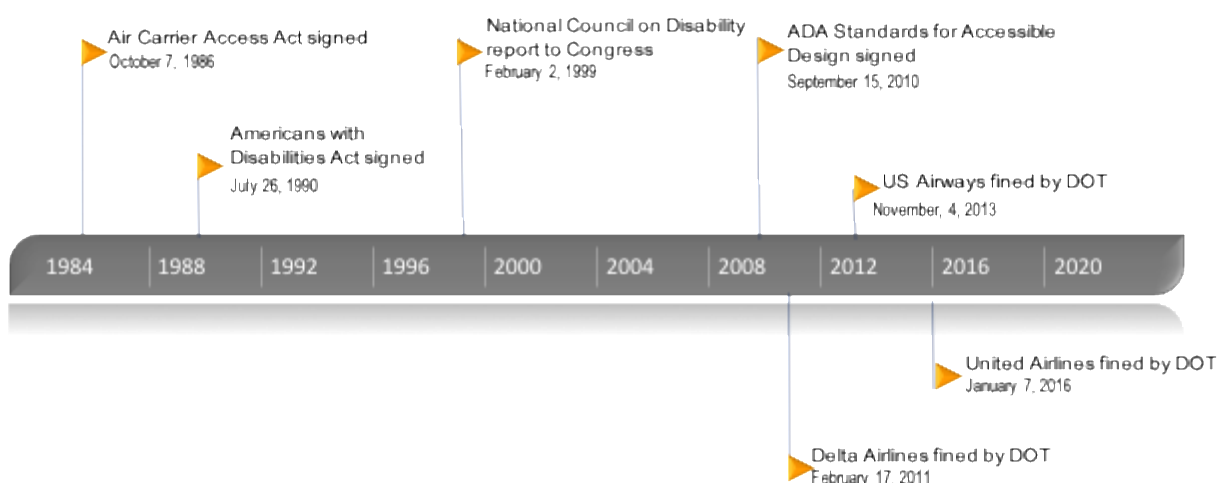
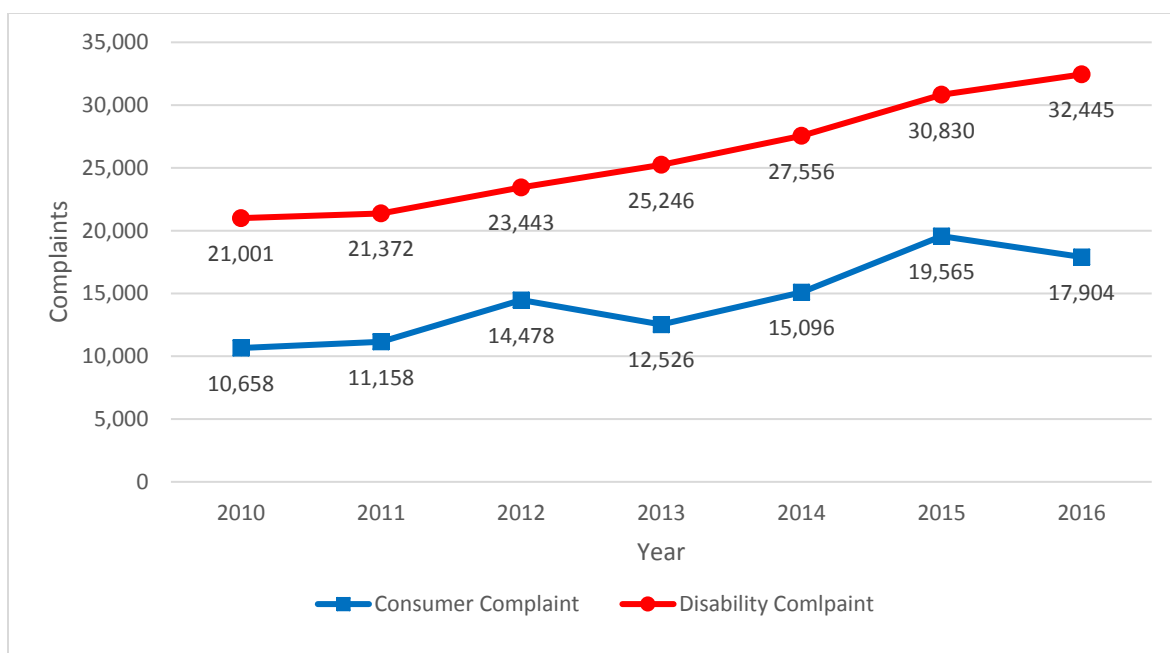


Figure 14. Timeline of disability-related events in air travel

## 2.4 Disability-Related Complaints for Airlines

The DOT reports complaint data for all consumers and for PxWD. Consumer complaint information can be found in the monthly *Air Travel Consumer Report*, while disability-related complaints can be found annually in the *Annual Report on Disability-Related Air Travel Complaints*. Annual complaints filed with the DOT between 2010 and 2016 are shown in Figure 15.



*Figure 15.* Disability-related and consumer complaints for 2010 through 2016 (Department of Transportation, 2017)

Consumer complaints peaked in 2015, and have decreased in 2016, despite increases in the total number of passengers traveling. Disability complaints, however, have increased each year, and were more than 35% higher in 2016 than in 2010. The statistics are even more striking when the distribution of travelers is considered (Table 1). As previously stated in section 2.1 Disability Statistics, less than 20% of the population is disabled, and the DOT estimates that only 2.5% of all airline passengers are disabled (US Department of Transportation, 2015). The 2.5% of PxWD generate twice as many complaints as the 97.5% of travelers without a disability. In 2016, the complaint rate per 10,000 passengers, was 144 for PxWD and 0.2 for all passengers (Table 1).

Since the rate of disability-related complaints is significantly higher than the rate of complaints for all passengers, it is useful to review literature related to air service for PxWD, as well as literature that examines how other sectors provide service for PxWD.

## 2.5 Customer Service for People with Disabilities

The law requires adequate service for PxWD. Deviations from the minimum service provisions in the commercial aviation sector can cause undue stress for PxWD and negative experiences. Numerous media accounts have documented the service problems boarding and deplaning an aircraft encountered by PxWD (Cullen, 2016; Fox News, 2017; Gray & Roth, 2015; Wilson, 2017)<sup>1</sup>. These accounts, combined with the large number of disability-related complaints in recent years, provide evidence that the service for PxWD is not being met. There is limited literature on this topic; however, there has been some related research documenting the needs of PWD in the tourism industry.

The provision of appropriate equipment (such as an aisle chair) and trained personnel to assist with the transition onto and off of the aircraft is one example of a possible failure point for PxWD. Kim and Lehto (2012) identified the following failure points as most prevalent for PxWD during travel:

- Poor service/product delivery: consists of poor designs for handicap access, slow service, and unavailable service.
- Unfulfilled special requests: includes special requests being un-accommodated and lack of empathy or flexibility of practices.
- Unsolicited employee conduct: involves negative behaviors of the employee, employee behavior contradicting the cultural norms of company or society, attention failure, and overall evaluation.

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<sup>1</sup> In all of these cases, aisle chair service was not timely and/or adequate.

Service quality is one of the most important factors affecting travelers' choice of airline (Gursoy, Chen, & Kim, 2005), and service quality is even more important to PWD. Burnett and Baker (2001) found PWD were extremely selective in their travel behavior, with service quality of increasing importance as the severity of disability increases. Current laws related to service for PWD do not consider disability severity. For example:

- Some wheelchair users may be able to walk short distances, and once they are transported to the jet bridge, they can get to their seat on the aircraft with minimal assistance.
- Some wheelchair users may not have use of their legs but may have full use of their arms; in this case, accommodations may require provision of an aisle chair to get to on and off the aircraft. These individuals may be able to transfer to the aisle chair with equipment, but without staff assistance.
- Some wheelchair users may require assistance that includes both the aisle chair and staff assistance (one or two people) to transfer to their seat in the aircraft.

In this case, the service requirements vary, as do the training requirements for personnel. The three scenarios above do not address the type of wheelchair used (powerchair versus manual), which could add to the complexity of the service requirements.

Chang and Chen (2012a) conducted research regarding the perceptions of air travel for people with reduced mobility in Taiwan and found the needs of PWD vary for each phase of travel. The needs in the pre-travel phase (booking/reservation), differ from the needs in pre-flight phase (terminal navigation), in-flight phase, and post-flight (Chang & Chen, 2012a). Additionally, the importance of different needs varies, depending on the

individual (Chang & Chen, 2011). These two important findings paired together suggest there are key service factors during each phase of air travel, and the importance of these key factors varies for different passengers (Chang & Chen, 2012b).

Another study examined the perspective of flight attendants when serving airline passengers with mobility impairments. This perspective is valuable because most literature reflects the customer view. Wang and Cole (2014) identified four in-flight requirements for people with mobility impairments:

- The need for assistance to use in-flight amenities.
- The need to be treated equal and the same as passengers without disabilities.
- The need for individualized services.
- The need for effective communication and accurate information.

The study findings suggest that airline management could improve service by providing adequate and thorough flight information for PwD. They also suggest additional training should be provided to airline and airport personnel who have direct interactions with passengers who have a disability (Wang & Cole, 2014). These findings are substantiated by other research from the tourism industry, as discussed below.

Other tourism sectors, such as hotels, have also identified the need to serve PwD differently than the general population. Bizjak, Kneževi, & Cvetrežnik (2011) suggest tourism schools need to incorporate disability studies to improve service. In the Bizjak et al. (2011) study, half of students surveyed had never interacted with a PwD, and 30% had limited interactions with this demographic. Study participants welcomed the information session administered in the study and admitted they would like more information so they can better accommodate PwD (Bizjak et al., 2011). This study

highlights the lack of awareness the tourism industry has regarding the unique needs of PWD and illustrates that offering educational workshops could improve the service and attitudes of front-line workers. Similar results were found in a study focusing on the hotel experience of PWD, which identified a need for proper handling of special request accommodations and additional staff sensitivity training (Kim, Stonesifer, & Han, 2012).

## 2.6 Summary

This chapter provided an overview of the regulations and policy that affect service for PxWD in the commercial aviation sector. This chapter also presented descriptive statistics that demonstrate the need for investigation into this service. Although there is limited literature on the topic of air service for PxWD, relevant literature related to the tourism industry is presented. The information presented in this chapter provides a foundation for this research.

## CHAPTER 3. METHODOLOGY

This section describes the methodology used in this research, including quantitative and qualitative procedures. Quantitative research provides a numerical analysis of air service for PxWD. Qualitative research provides a more robust explanation of the service characteristics.

### 3.1 Research Questions

The purpose of this study was to investigate commercial passenger service for PxWD, including documentation of the relevant regulations, examination of disability-related complaints, and user perceptions of the service provided. The research questions and a brief description of the research approach are as follows:

**Research Question 1 – Regulation.** What regulations and policies govern airport and airline service for passengers with disabilities in the United States?

***Research Approach.*** This research question is answered through a literature review of laws and regulations that apply to airports and airlines operating in the United States.

**Research Question 2 – Complaint Data.** Based on the number and rate of disability-related complaints and consumer-based complaints, is service for passengers with disabilities equivalent to service for all passengers?

***Research Approach.*** This research question is answered using complaint data provided by the DOT and passenger data from the BTS. The research examines

descriptive statistics about the trend over time and frequency of complaints for PxWD and passengers without disability.

**Research Question 3 – Service Equivalence.** Using the rate of disability-related complaints as an indication of service, do all airlines provide equivalent service for passengers with disabilities?

**Research Approach.** This research question is answered using the data from Research Question 2, in conjunction with an analysis of variance (ANOVA) with mixed effects to examine whether service to PxWD varies between air transportation service providers. Trends for select airlines (American, Delta, JetBlue, Southwest, and United) are also examined and reported.

**Research Question 4 – Survey Results.** How does the disabled community perceive the service provided by airlines and airports?

**Research Approach.** This research question is answered through analysis of data collected in a survey regarding passenger perception of service for the different phases of air travel (e.g., parking, travel within the terminal, boarding the aircraft, etc.). This analysis includes qualitative analysis of the descriptive responses from survey participants using In Vivo thematic coding.

### 3.2 Research Type and Framework

This research included quantitative and qualitative analysis to provide a better understanding of the service provided for PxWD by airlines and airports. The

combination of quantitative and qualitative methods in a single study is often referred to as mixed methods (Creswell, 2009). Quantitative and qualitative measures are used because “each method offers a unique capacity for explanation” (Ahram, 2009, p. 9). Quantitative and qualitative methods use different approaches to answer questions, mainly through different means of data collection. Quantitative methods typically use discrete and continuous data for estimating central tendencies for large populations, and qualitative methods typically use nominal or text data (narratives) to provide a better understanding of individual cases (Ahram, 2009).

### 3.3 Data Collection

Both qualitative and quantitative data are used in this research. Quantitative data include secondary data available through government archives, and primary data collected from a survey of PxWD. Primary qualitative data include results from a survey of PxWD, targeted to people who have traveled via commercial air (shown in Appendix F). A sample of selected survey questions is provided below:

- Please rate the level of service you typically experience for each stage of your air travel. Consider the average experience for all flights you have taken in the last 5 years.

	A Excellent	B Good	C Acceptable	D Less than Ideal	F Unacceptable
Parking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Getting through security	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Boarding the plane	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- Do you use an aisle chair provided by the airport or airline to access the plane?
  - ☐ Yes
  - ☐ No
  - ☐ Sometimes
  
- Is there anything you think should or could be improved for wheelchair passengers or service animals during the air travel experience?
  - ☐ Yes, service should be improved. Please explain below.  
\_\_\_\_\_
  - ☐ No, service is currently adequate
  
- Please feel free to share an airport experience (good or bad) you have had in the last 5 years. \_\_\_\_\_

### 3.3.1 Quantitative Data

The DOT provides complaint data through two separate reports, the *Air Travel Consumer Report* and the *Annual Report on Disability-Related Air Travel Complaints* (US Department of Transportation, 2017, 2018). These reports provide annual totals for each airline. Data for 2010 through 2016 were collected and analyzed. Descriptive statistics for the entire airline industry and for select major airlines were used to illustrate trends. An analysis of variance (ANOVA) with mixed effects was performed to examine whether service for PxWD varies among different commercial service providers. This quantitative data analysis provides an overview of complaints and the typical complaint categories; it cannot provide information about the specific issues for complaint categories.

Quantitative data obtained from the survey are also presented. Descriptive statistics of the survey findings and responses from Likert scale questions were analyzed

as interval data, a common practice in psychology and other social sciences (Allen & Seaman, 2007).

### 3.3.2 Qualitative Data

Qualitative data from an online survey tool, Qualtrics, were used to capture traveler perceptions and experiences and to explain facets of the complaint data documented by the DOT. To conduct research or handle data involving human subjects, it is necessary and ethical to obtain Institutional Review Board (IRB) approval. This research, specifically the use of the survey, has been reviewed by and approved by the Purdue IRB under the exempt category (see Appendix G). IRB exists to protect researchers, participants, and institutions against potential risks and liabilities involved with conducting research.

The purpose of the survey was to obtain feedback from the disabled community about their experiences and perceptions of service during air travel. The survey consists of open-ended, Likert scale, and multiple-choice style questions.

Participants were selected using convenient (Marshall, 1996), purposeful (Marshall, 1996), and snowball (Biernacki & Waldorf, 1981) sampling techniques. Personal contacts of the researcher were communicated with via e-mail and given a link to access the survey. Rehabilitation hospitals, national organizations that represent PWD, and disability advocates were also contacted and asked if they could assist with the dissemination of the survey link via their electronic mailing list or social media platforms. Handouts (Figure 16) containing the survey's URL link and a QR code were created and distributed at events persons in wheelchairs were known to attend; these events included the National Wheelchair Basketball Tournament at the Kentucky Expo

Center in Louisville, KY and the Abilities Expo in Chicago, IL. Additionally, the researcher carried these cards during travel and gave them to individuals in wheelchairs.

See Appendix F for complete survey information.



*Figure 16.* Survey card used to recruit participants

### 3.3.3 Threats to Validity

Accuracy and reliability are important considerations in research, and affect research credibility. Construct, internal, and external validity should always be considered. Researcher bias is another possible threat to the validity of research results.

Cronbach and Meehl (1955) stated construct validity occurs “whenever a test is to be interpreted as a measure of some attribute or quality which is not operationally defined” (p. 282). Construct validity relates to the test being an appropriate measure of intended inferences. In the case of the created survey, colleagues and professors

reviewed, critiqued and provided feedback for the survey questions to ensure the adequacy of question interpretation, syntax and grammar, and overall survey design. Internal validity refers to the study results (Pannucci & Wilkins, 2010). External validity refers to the study's findings, and whether results can be generalized (Pannucci & Wilkins, 2010). Internal validity is addressed through triangulation of results. The results use data from multiple sources to examine the air travel service for PxWD. To address the credibility and transferability of results, thick description is used to describe the setting of research and the participants. A key attribute of thick description is that it, "enables readers to make decisions about the applicability of the findings to other setting or similar contexts" (Creswell & Miller, 2000). Another threat to internal validity is researcher bias, which can result from selective recording of information and by allowing personal views to affect data interpretation (Johnson, 1997).

### 3.3.4 Analysis Threats

Research is subject to analysis threats. The survey sample may not reflect the true population of PWD, since convenience sampling techniques were used. This may be especially pronounced, since one venue for recruiting participants is a wheelchair sporting event, which represents a strong and fit sample of the disabled population. This group may be able to overcome obstacles others with disabilities cannot. The survey did not seek those with the most severe disabilities. As a result, the findings may understate the extent of the problem, both for the survey data and the disability complaint data.

The findings may also understate the extent of the problem, since previously-mentioned literature (section 2.3 Disability Laws) indicates that PWD choose not to travel by air because they face physical barriers, prejudice, hostility, and disability

stereotyping (National Council on Disability, 1999). This finding implies that there is a latent demand for air travel that is currently not being served since the system is viewed as unfriendly. If this latent demand were translated to actual demand, it is likely that the incidence of complaints may be higher. These threats do not invalidate research findings, but one potential result of these threats is that the findings may not capture the true extent of the problem. The problem may be even greater than this analysis captures.

### 3.4 Summary

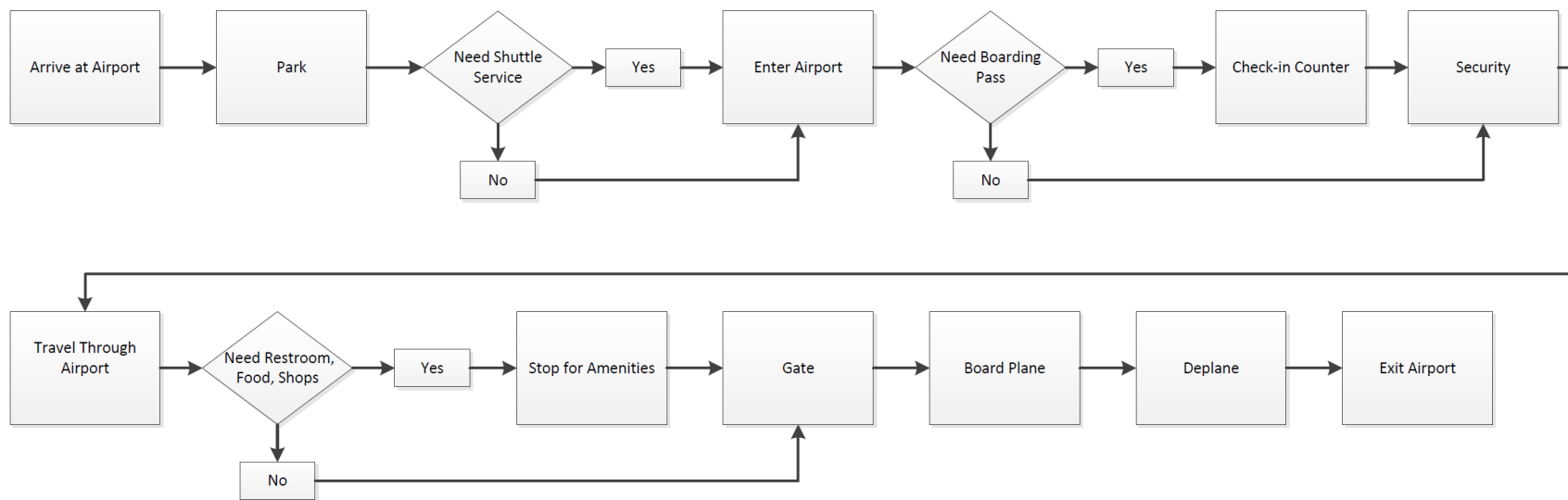
A mixed methods approach was utilized to fully capture the issues airlines and airports have while providing service to the PxWD. Insight from survey responses by a subset of the disabled community, wheelchair users, was used to gain understanding regarding the obstacles and challenges related to service faced by PWD.

## CHAPTER 4. RESULTS

### 4.1 Research Question 1 – Regulations

**RQ 1:** *What regulations and policies govern airport and airline service for passengers with disabilities in the United States?*

All passengers follow the same basic progression of activities during commercial air travel. Passengers arrive at the airport, pass through security, arrive at the gate, and board the aircraft. Figure 17 depicts a generalized progression of travel for all commercial airline passengers. Passenger travel experiences, however, can vary significantly, based on the characteristics and needs of individual passengers. PxWD are a passenger demographic group that may reflect a variety of characteristics and may have specific needs that result in a different travel experience, compared to passengers without a disability. Airports, airlines, and government policies acknowledge that the needs of PxWD and passengers without a disability differ and have established regulations to prevent discrimination and ensure adequate and reliable service throughout the entire air travel journey. This research question identifies the regulations and policies that airlines and airports must abide by during this travel experience. These regulations and policies have an important impact on the air travel experience for PxWD, and also have an impact on the agencies responsible for different segments of the air travel process. International guidelines for service for PxWD are provided by the International Civil Aviation Organization (ICAO), and US regulations for service for PxWD are codified in US law and defined by supporting policy.



*Figure 17.* Travel progression for commercial air passengers

#### 4.1.1 International Civil Aviation Organization

ICAO is a specialized agency of the United Nations, focused on coordinating and facilitating international air travel. Each day, there are more than 100,000 commercial flights in the world, and ICAO helps establish the operation and regulatory standards these flights follow. ICAO collaborates with 192 Member States to reach consensus on aviation-related matters and formulate Standards and Recommended Practices (SARPs). The purpose of SARPs are to promote “a safe, efficient, secure, economically sustainable, and environmentally responsible civil aviation sector” (International Civil Aviation Organization, n.d.).

ICAO promulgates SARPs within Annexes. Annexes cover a wide range of topics, and ICAO has issued 19 Annexes in total. Sample topics addressed by the Annexes include: rules of the air, meteorological services, operation of aircraft, aircraft accident investigation, and environmental protection (SKYbary, 2017). When circumstances warrant, ICAO updates Annexes as required. Revisions may be necessitated by a variety of circumstances, including accidents and incidents, changes in technologies and technical capabilities, and increased public awareness of important topics, sometimes illustrated by high-profile events portrayed in the media. Public awareness of the important topic of service for persons with disabilities was the catalyst for additions made to Annex 9, Facilitation, to reflect the needs of PxWD.

ICAO defines a person with a disability as “any person whose mobility is reduced due to a physical incapacity (sensory or locomotor), an intellectual deficiency, age, illness or any other cause of disability when using transport and whose situation needs special attention” (International Civil Aviation Organization, 2005, p. xiii). Persons with disabilities are covered in Chapter 8 of Annex 9 (International Civil Aviation

Organization, 2005). ICAO issued two Standards and 15 Recommended Practices regarding the “facilitation of the transport of passengers requiring special assistance” (International Civil Aviation Organization, 2005, p. 8-3). The two Standards are:

- **Standard 8.27** - “Contracting States shall take the necessary steps to ensure that airport facilities and services are adapted to the needs of persons with disabilities” (International Civil Aviation Organization, 2005, p. 8-3).
- **Standard 8.34** - “Contracting States shall take the necessary steps to ensure that persons with disabilities have adequate access to air services” (International Civil Aviation Organization, 2005, p. 8-3).

The areas covered in the Standards are broad; however, the Standards embrace both airport facilities and services performed by the airline. In addition to the Standards, there are 15 Recommended Practices (see Appendix H). The Recommended Practices provide additional specifics related to the Standards, and are described in three categories: general, access to airports, and access to air services.

1. **General.** The general category has five Recommended Practices (8.22 through 8.26), and states minimum uniform standards should be established by airport, airline, and ground operators. These minimum standards should occur throughout the entirety of a passenger’s journey, from beginning to end. ICAO recommends that any service available to the public should also be available to persons with disabilities, even if special assistance is required (e.g., information sharing for individuals with cognitive and sensory disabilities). Training programs are also covered under the general category and should be established

to properly inform employees how to assist disabled passengers when special accommodations are needed (International Civil Aviation Organization, 2005).

2. **Access to Airports.** The second category of ICAO's Recommended Practices for PxWD is access to airports. This category has six Recommended Practices (8.28 through 8.33). First, parking facilities should be available for individuals with mobility needs, and movement between the parking area and terminal should be barrier-free. Once inside the terminal, airports should ensure facilities are equipped with necessary equipment (e.g., lifts and wheelchairs) for moving elderly and PxWD freely from terminal and aircraft. When personnel assistance is needed to move passengers, reserved areas should be established to facilitate pick up and drop off procedures. These locations should be located as close as possible to main entrances to minimize travel distance. Importantly, all access routes should be clear of obstructions and accommodate all disability types (International Civil Aviation Organization, 2005).
3. **Access to Air Services.** The access to air services category has four Recommended Practices (8.35 through 8.38). ICAO states, PxWD should not be charged for transporting required medical equipment, nor should they be charged for service animals. Service animals should accompany passengers inside the cabin. To assist with service to PxWD, when a new aircraft enters the fleet or a major overhaul is performed on an existing aircraft, minimum equipment to support service and accessibility should be installed (e.g., moveable armrests, on-board wheelchairs, accessible lavatories, signage, etc.). A medical clearance is not required to fly a PxWD, unless the safety of the

PxWD or other passengers is a concern. An escort is not required for a PxWD unless it is clear the person is not self-reliant (International Civil Aviation Organization, 2005).

The SARPs issued by ICAO are generalized. ICAO does provide additional details regarding air travel for PxWD through the *Manual on Access to Air Transport by Persons with Disabilities* (Doc 9984). This report outlines specific considerations and emphasizes appropriate design, training, and equipment considerations needed to accommodate PxWD (International Civil Aviation Organization, 2013). The *Manual on Access to Air Transport by Persons with Disabilities* document has 13 chapters and topics covered include:

1. General issues,
2. Training,
3. Pre-journey,
4. Arrival and moving through an airport,
5. Airport facilities,
6. Security screening and boarder checks,
7. Boarding and disembarking an aircraft,
8. Aircraft operators' services on board,
9. Aircraft,
10. Connections and leaving an airport,
11. Ground transportation,
12. Complaints, and

### 13. Monitoring and enforcement of compliance (International Civil Aviation Organization, 2013).

ICAO issues international regulatory guidance; however, it is up to the individual Member States to enact the SARP into practice. The US implemented standards for passengers with disabilities through the Air Carrier Access Act (ACAA) and the Americans with Disability Act (ADA). Both of the US standards regarding PxWD were enacted prior to ICAO's guidance.

#### 4.1.2 Air Carrier Access Act

On October 2, 1986, President Ronald Reagan signed the ACAA (49 U.S.C. § 41705) into law, preventing the discrimination against persons with disabilities in air transportation. The ACAA applies to all commercial air service in the US, including flights to or from the US operated by foreign airlines.

Under the ACAA, it is the responsibility of the DOT to identify the unique needs of PxWD and develop the service requirements to ensure PxWD are treated without discrimination during air travel and receive special service provisions that are required. These special provisions are outlined in 14 CFR Part 382, Nondiscrimination on the Basis of Disability in Air Travel. The regulations define a person with a disability as “any individual who has a physical or mental impairment that, on a permanent or temporary basis, substantially limits one or more major life activities, has a record of such an impairment, or is regarded as having such an impairment” (14 CFR § 382.3). This is the same definition used by the US Census Bureau, which collects disability population data (referenced in section 2.1 Disability Statistics).

This legislation specifically affects airlines, and sets regulations for a variety of topics, including:

1. Access to service and information,
2. Information for passengers,
3. Accessibility of airport facilities,
4. Accessibility of aircraft,
5. Seating accommodations,
6. Boarding, deplaning, and connecting assistance,
7. Services on aircraft,
8. Stowage of wheelchairs, other mobility aids, and other assistive devices,
9. Training and administrative provisions, and
10. Complaints and enforcement procedures.

It is the airline's responsibility to ensure services provided directly by the airline (e.g., boarding pass acquisition counter, baggage check, gate information), as well as services contracted to vendors (e.g., assistance through the terminal, assistance boarding) meet federal regulations. The ACAA covers three main areas of operations and each area has specific regulations under 14 CFR Part 382; the three main areas are 1) the physical space an airline rents from the airport, 2) the aircraft, and 3) the services provided.

#### 4.1.2.1 Airport Accessibility Requirements

The physical space an airline owns, leases, or controls within each airport must comply with federal design and construction regulations regarding accessibility. It is the airline's responsibility to ensure facilities meet the public accommodation requirements under Title III of the DOJ's ADA (14 CFR § 382.51). Public accommodation

requirements are discussed in greater detail in the following section, 4.1.3 Americans with Disabilities Act. It is also the airline's responsibility to ensure that all intra- and inter-terminal transportation systems, such as shuttle vehicles, comply with applicable ADA requirements of the DOT (14 CFR § 382.51).

To improve access to information within airports, all televisions and other audio-visual displays must always have captioning enabled. As audio-visual equipment needs replacement, displays capable of high-contrast captioning must be incorporated into operation.

#### 4.1.2.2 Aircraft Accessibility Requirements

The aircraft does not have to comply with the same public accommodation standards as an airport terminal. An aircraft does, however, require accessibility features. Features consist of moveable armrests, accessible lavatories, and on-board wheelchairs. It is the airline's responsibility to ensure that all aircraft accessibility features are in proper working order.

Moveable armrests are required on aircraft with 30 or more passenger seats. Moveable armrests must be present on at least one-half of the total number of aisle seats with a proportionate distribution between all classes of service within the cabin (14 CFR § 382.61). Aisle seats with moveable armrests must be easily identifiable by passengers. Airlines are not required to retrofit aircraft with moveable armrests; however, if aisle seats are replaced in older aircraft, the new seats must include moveable armrests, until at least one-half of permissible aisle seats have this accessible feature.

Accessible lavatories are only required on aircraft with more than one aisle, commonly called wide-body aircraft; a minimum of one lavatory must be accessible on

these aircraft (14 CFR § 382.63). Single-aisle aircraft, commonly called narrow-body aircraft, are encouraged to have accessible lavatories, but are not required by law. Analogous to the requirements for moveable armrests, it is not mandatory to retrofit aircraft and add an accessible lavatory.

On-board wheelchairs are only required in certain situations. Aircraft with 60 or more seats and an accessible lavatory must be equipped with an on-board wheelchair in the cabin during flight. If a PxWD can use a lavatory without accessibility features, then an onboard wheelchair can be requested with advance notice. This request can be made directly to the airline and is only possible for aircraft that have more than 60 passenger seats. On-board wheelchairs must be maintained by the airline and must be structurally sound for maneuvering a PxWD in the cabin (14 CFR § 382.65).

#### 4.1.2.3 Accessibility Services and Accommodations

In addition to requirements for physical space in airports and in aircraft, the airline needs to provide services and accommodations for PxWD to assure compliance with 14 CFR Part 382. Services and accommodations consist of seating accommodations, assistance boarding and deplaning, proper storage and transport of mobility aids, and adequate training for personnel who assist PxWD.

As mentioned in section 4.1.2.2 Aircraft Accessibility Requirements, aircraft are required to have moveable armrests on aisle seats; moveable armrests make transferring in and out of seats easier for PxWD. Airlines must make appropriate seating accommodations for passengers that self-identify as a person with a disability and request aisle chair service. These individuals will be given priority on seats with moveable armrests, and such seats will be blocked off until 24 hours before the scheduled departure

of the flight (14 CFR 382.83). For PxWD traveling with a service animal, accommodations for a bulk head must be made (14 CFR 382.81). These regulations are especially important, since many airlines now charge an additional fee for bulkhead seats because they have more leg room and are closer to the front of the aircraft.

Airlines must also provide aid to PxWD boarding and deplaning an aircraft. Carriers must offer PxWD the option to preboard if they need additional time or assistance to be seated (14 CFR 382.93). If a passenger needs assistance boarding or deplaning, a carrier must “promptly provide the services of personnel and the use of ground wheelchairs, accessible motorized carts, boarding wheelchairs, and/or on-board wheelchairs” (14 CFR 382.95). Wheelchair users may need assistance boarding, since most wheelchairs do not fit in the aisle of the aircraft. Assistance transferring in and out of the seat may also be required, depending on the passenger’s disability.

Assistive devices must be transported and do not count towards the limit of carry-on baggage for PxWD (14 CFR 382.121). Assistive devices must be stowed in accordance with law and can be stowed in the cabin only if they fit in a designated area or overhead storage. When assistive devices do not fit in the designated storage compartments in the cabin, airlines must store them in the baggage compartment.

Assistive devices receive priority over other cargo and baggage, and should be among the first items retrieved from the baggage compartment to ensure a timely return to passengers. The law requires that airlines “timely return passengers' wheelchairs, other mobility aids, and other assistive devices as close as possible to the door of the aircraft, so that passengers may use their own equipment to the extent possible” (14 CFR 382.125). The traditional baggage liability for loss or damaged baggage does not apply to

assistive devices. If assistive equipment is damaged, compensation will be for the original purchase price of the device (14 CFR 382.131). The ACAA does not provide information about the method for a passenger to process a claim for damage to an assistive device.

It is an airline's responsibility to ensure that all personnel who interact with the traveling public be trained and capable to assist PxWD; training must be completed prior to interacting with the traveling public (14 CFR 382.143). Training for the proper use of equipment (e.g., wheelchairs or lifts) is also required. One important aspect of training is the awareness of appropriate responses to PxWD for the wide range of possible disabilities (e.g., emotional, mental, sensory, and physical). Training must result in "proficiency" and refresher training must be completed every three years (14 CFR 382.141).

The ACAA requires airlines to assist PxWD through three main operational areas, ensuring airport space meets public access standards, the aircraft has accessibility features, and appropriate services and accommodations are provided. The requirements for appropriate services and accommodations do not have associated metrics, and as a result, interpretation can be subjective. For example, assistive devices must be retuned "timely," boarding and deplaning assistance must be done "promptly," and training must assure "proficiency." Assigning metrics to these services may help the airlines better track and quantify service for PxWD. Identifying target metrics and measuring outcomes associated with these metrics has improved service in other areas of commercial air travel. Compensation for passengers who miss a connecting flight due to a delayed departure of more than three hours, and fines for airlines that have excessive tarmac

delays are two examples of clearly-defined metrics and accountability when the metric is missed (US Department of Transportation, 2016c).

#### 4.1.3 Americans with Disabilities Act

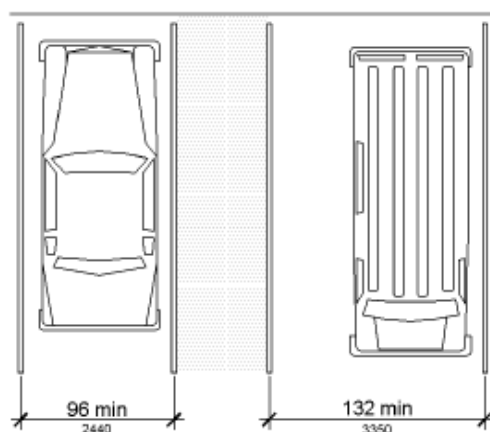
The ADA was enacted by President George H. W. Bush on July 26, 1990. The ADA is in US Code Title 42 (The Public Health and Welfare), Chapter 126, Equal Opportunities for Individuals with Disabilities (42 U.S.C. § 12101). This civil rights legislation prohibits discrimination on the basis of disability and ensures PWD receive equal opportunity in many aspects related to daily life. The ADA covers a wide range of topics, including employment, communication, education, transportation, and public access.

A major component of the ADA ensures the constructed environment is accessible by PWD. In 2010, the DOJ published an amendment to the regulatory standards of the original 1991 ADA standards. The updated standards are referred to as the 2010 ADA Standards for Accessible Design; these standards improved access by limiting architectural barriers and as a result, they increase accommodation in all public and commercial facilities.

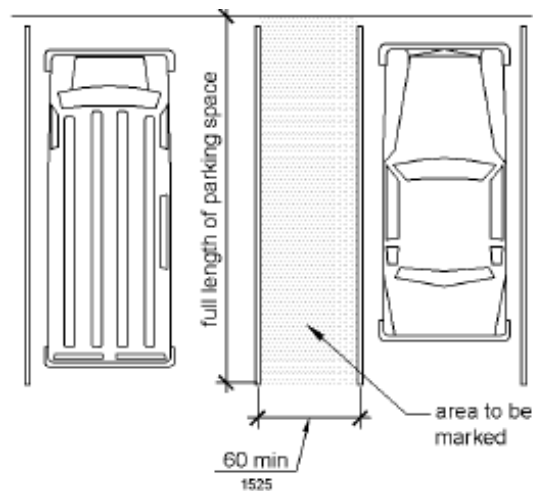
Design standards are crucial for individuals with disabilities; without these design standards, interacting with the constructed environment would be difficult or even impossible. Design standards establish minimum specifications for accessibility with the intent that they will meet the needs of as many individuals as possible. Accessible design standards facilitate social inclusion and independence. Accessible design standards exist for parking, access routes, public transit pick up and drop off locations, entrances of buildings, and building interiors. These standards are applicable during design and

construction, as well as during operation after the facility is completed. These standards must be reflected anytime buildings or facilities are altered (US Department of Justice, 2010).

All aspects of an airport must meet the 2010 Standards for Accessible Design, since airports are considered a public use space. To assist with the explanation of the regulatory requirements, the US Access Board and the DOJ created a guide, which provides visual representation of the ADA regulations (US Department of Justice, 2012). For example, accessible parking spaces require a minimum width of 96 inches for cars and 132 inches for vans, with a minimum of 60 inches for an access aisle. Figure 18, provided by the Access Board, demonstrates the proper measurement techniques. For comparison, a standard parking space is 108 inches wide with, no access aisle in between spaces (Temecula Municipal Code, n.d.).



18a. How to measure car and van accessible parking spaces



18b. How to measure the access aisle for accessible parking spaces

*Figure 18.* US Access Board guide for accessible parking spaces (US Department of Justice, 2012)

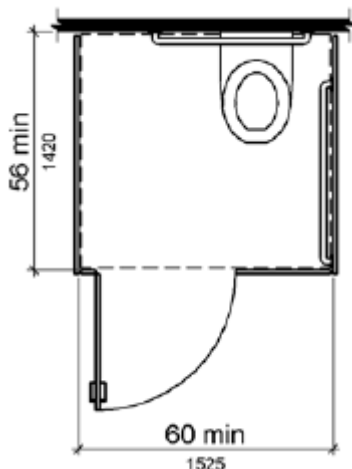
Other components of the airport's constructed environment, such as water fountains and restrooms, must also comply with design standards. Sinks and water fountains need to have 17 inches of clearance to ensure toes and knees do not hit from the seated position, as shown in Figure 19.



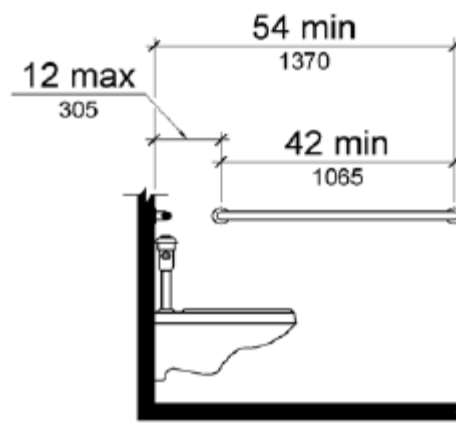
*Figure 19.* Example of toe and knee clearance

Restroom water closets must also be built to specifications that ensure accessibility for PxWD. Wheelchair accessible compartments must be a minimum of 60 inches wide and 56 inches deep (Figure 20a). There are also regulations for the side wall grab bar, which must be at least 42 inches long, and located 12 inches from the rear wall (Figure 20b). These dimensions were designed to serve the majority of people who would need to utilize an accessible stall.

The constructed environment must follow clearly-defined specifications and standards to ensure the constructed facility meets the needs of persons with disabilities. These standards are found in regulations and are illustrated in a visual guide published by the US Access Board; this visual guide facilitates interpretation and implementation of the standards. The DOT currently does not have a similar guide for the ACAA.



20a. Minimum length and depth of an accessible bathroom compartment



20b. Proper location of grab bar for an accessible bathroom compartment

Figure 20. Accessible water closet dimensions

#### 4.1.4 Transportation Security Administration

Security measures are the responsibility of the Transportation Security Administration (TSA) and are not covered in either the ACAA or ADA. The TSA was established in response to the September 11, 2001 terrorist attacks, through the Aviation and Transportation Security Act (Public Law 107-71) (*Aviation and Transportation Security Act*, 2001). One major requirement of the Aviation and Transportation Security Act is the requirement that every individual must be screened by a TSA agent before entering an airport concourse. TSA security screening must occur, regardless of age, race, gender, religion, culture, or disability (*Aviation and Transportation Security Act*, 2001).

TSA agents screen nearly two million travelers each day (Transportation Security Administration, 2016b). To expedite the screening process, advanced technologies are utilized. X-ray machines (and now sometimes CT scanners) are used to screen carry-on

baggage, and a walk-through metal detector or advanced imaging technology screens passengers.

Due to disability, some passengers cannot be screened by the technologies and methods that are commonly used. TSA acknowledges the need for special procedures in these circumstances, and as is true of all screening methods, the special procedures must not violate the civil rights nor discriminate against passengers with disabilities (Transportation Security Administration, n.d.-a). Security considerations as they relate to various disabilities are explained below.

#### 4.1.4.1 Ambulatory Disability

Depending on severity, some individuals with an ambulatory disability cannot perform the movements required for traditional screening methods (e.g., standing without assistance and/or holding hands above head). Others may rely on a mobility aid that renders metal detectors ineffective. To ensure compliance with the law, the individuals described above will receive a physical pat-down by a TSA agent (Transportation Security Administration, n.d.-b). In a physical pat-down, the passenger, along with any mobility aids, equipment, and/or other external medical devices, is inspected thoroughly; arms, legs, chest, waist line, and sensitive areas are examined. A PxWD is not required to remove their shoes if it is not practical due to balance and/or fine motor skills (Transportation Security Administration, n.d.-b). If shoes are not removed, they must undergo additional testing, such as detection for trace explosive materials. It is acceptable for a passenger to stand next to and utilize any mobility aid while a pat-down is in progress.

#### 4.1.4.2 Mobility Aids

Items such as crutches, canes and walkers are screened with the X-ray machine. If a passenger requires their mobility aid for stability and balance, they are asked to sit while a TSA officer screens their assistive device, which is typically returned immediately. Wheelchair and scooter users can stay seated while TSA performs the pat-down procedure and an examination of the wheelchair or scooter. Various locations on the wheelchair or scooter are tested for trace explosives, and any removable items are sent through the X-ray machine.

#### 4.1.4.3 Medication

TSA recognizes some medical conditions require passengers to bring substances into the sterile area of the airport that normally would not be allowed. For example, a diabetic may need to bring needles to inject insulin or an individual may require a gel/liquid/aerosol medication in a container that exceeds the standard 3.4 ounce limit. In these instances, necessary medications are permissible, but they are subject to visual inspection, X-ray, and/or tests for trace explosives. A physician note is not needed to accompany medication, but the medication should be clearly labeled (Transportation Security Administration, n.d.-b).

#### 4.1.4.4 Service Animals

Like humans, service animals must be screened. Service animals are screened using the metal detector and accompanied by the handler, if possible; if that method is not possible, a pat-down is required. TSA does not ever separate an individual from their service animal. This is important because the animal is working and providing a service to the handler. Collars, harnesses, leashes and any other accessories on a service animal

may be inspected, but do not have to be removed from the animal (Transportation Security Administration, n.d.-b). This practice is important, since service animals often associate the collar and/or harness with being “on duty.”

#### 4.1.4.5 Vision, Hearing, and Cognitive Disabilities

Vision, hearing, and cognitive disabilities are also considered by TSA. Generally, all assistive devices such as canes, walkers, and crutches must undergo X-ray screening, although hearing aids and cochlear implants do not. Travel companions will not be separated from passengers with vision, hearing, or cognitive disabilities (Transportation Security Administration, n.d.-b).

#### 4.1.4.6 TSA Initiatives

TSA interacts with a large and diverse group of individuals every day. Despite the many precautions, negative events do occur. In 2016, a teenager with mental illness was injured after being thrown to the floor by TSA agents because she did not comply with pat-down procedures (Golgowski, 2016). Another incident left a bladder cancer survivor feeling humiliated when their urostomy bag ripped open during a pat-down (Wall Street Journal, 2010).

TSA is proactive in their efforts to avoid these events and TSA aspires to reduce the anxiety passengers with disabilities may feel during security screening. One TSA initiative is TSA Cares, which provides a helpline for travelers who may require additional assistance or who would like additional information regarding security procedures (Transportation Security Administration, 2001). TSA Cares can also address disability specific questions and arrange a passenger support specialist for passengers. Support specialists are specially-trained individuals who can provide on-the-spot

assistance at airports (Transportation Security Administration, n.d.-c). In addition to the helpline, a notification card is available for travelers who may require assistance and are traveling alone (Figure 21).

Another service TSA provides to all members of the public is called AskTSA. AskTSA is a social media initiative to provide instant responses to security questions that travelers may have before their trip (Transportation Security Administration, 2016a). AskTSA can be accessed through Facebook and Twitter.

**TSA Notification Card: Individuals with Disabilities and Medical Conditions**

I have the following health condition, disability or medical device that may affect my screening:

I understand that alternate procedures providing an equivalent level of security screening are available and can be done in private. I also understand that presenting this card does not exempt me from screening.

---

Information • Assistance Requests • Compliments • Complaints

**TSA Cares**

1-855-787-2227 (Federal Relay 711)  
Weekdays: 8 a.m. to 11 p.m. ET

TSA-ContactCenter@tsa.dhs.gov  
Weekends/Holidays: 9 a.m. to 8 p.m. ET

Hablamos Español  
Automated information offered in 12 languages

Call 72 hours prior to traveling to request the assistance of a Passenger Support Specialist (PSS) at the checkpoint. If a PSS is not available, you may ask for a Supervisory TSA Officer at the checkpoint.

*Figure 21.* TSA notification card (Transportation Security Administration, n.d.-b)

Another example of TSA's proactive approach to service improvement for PxWD is an annual conference to address the needs of disabled and multicultural individuals. This conference has been an annual event for 14 years and facilitates connections between TSA and organizations representing various religious, cultural, and disability communities. This conference provides an opportunity to discuss issues related to the current screening process (Transportation Security Administration, 2016b). These initiatives demonstrate TSA's willingness to address concerns, accommodate the needs of PxWD and modify special procedures to incorporate new practices, as appropriate.

#### 4.1.5 Other Regulations and Related Policy

Earlier regulatory recognition of service for persons with disabilities includes the Rehabilitation Act of 1973, as amended; and the Architectural Barriers Act of 1968, as amended. These regulations affect the architectural or program accessibility of airports in the US transportation system and employment opportunities at these airports for individuals with disabilities.

Recently the FAA Reauthorization Act of 2018 was signed (*H.R.302 FAA Reauthorization Act of 2018*, 2018). This bill is over a thousand pages in length and seeks to gather additional information on a wide range of topics, including integration of Unmanned Aircraft Systems, disaster recovery, workforce recruitment, and air service improvements. A section under air service improvements specifically addresses PxWD. Studies, stronger definitions, and review of practices are requested to assess air travel services for PxWD. A list of topics includes:

- Sec. 431. Aviation consumers with disabilities study.
- Sec. 432. Study on in-cabin wheelchair restraint systems.

- Sec. 433. Improving wheelchair assistance for individuals with disabilities.
- Sec. 434. Airline Passengers with Disabilities Bill of Rights.
- Sec. 435. Sense of Congress regarding equal access for individuals with disabilities.
- Sec. 436. Civil penalties relating to harm to passengers with disabilities.
- Sec. 437. Harmonization of service animal standards.
- Sec. 438. Review of practices for ticketing, pre-flight seat assignments, and stowing of assistive devices for passengers with disabilities.
- Sec. 439. Advisory committee on the air travel needs of passengers with disabilities.
- Sec. 440. Regulations ensuring assistance for passengers with disabilities in air transportation.
- Sec. 441. Transparency for disabled passengers (*H.R.302 FAA Reauthorization Act of 2018*, 2018).

In addition to regulations, the FAA issues Orders and Advisory Circulars (AC) to provide information for FAA employees and the aviation community. A search of key words related to air travel for PxWD found two FAA Orders and one AC related to PxWD. Key words used in the search included wheelchair, access, accessibility, mobility aid, disabled, disability, and passengers with disabilities.

FAA Order 1400.12, published in 2004, is titled “Processing Accommodations Requests for People with Disabilities”; this order pertains to government employees making workplace requests and is not relevant to this research (US Department of Transportation, 2004). FAA Order 1400.9A, published in 2013, is titled “Standards and

Procedures Essential for Ensuring Access to Airport Facilities by Persons with Disabilities”; this order describes the regulations applicable to FAA personnel to ensure uniformity and standardization, and describes Title II of the ADA (as amended), Section 504 of the Rehabilitation Act of 1973 (as amended), and the ACAA (as amended) (US Department of Transportation, 2013b).

AC 150/5360-14A is titled “Access to Airports by Individuals with Disabilities” and addresses content similar to FAA Order 1400.0A. This AC is intended to assist airports in complying and understanding the regulations regarding PxWD. Basic regulatory requirements of the ACAA, ADA, and Section 504 of the Rehabilitation Act are identified and main features of each are presented, as they relate to airports. Sources of additional content and assistance are also presented in the form of websites to various disability and accessibility organizations. This AC was updated in December of 2017 to reflect the new laws regarding Service Animal Relief Areas (SARA) which are a component of 14 CFR Part 382, Nondiscrimination on the Basis of Disability in Air Travel. Prior to 2017, AC 150/5360-14A has not been updated since June 1999. There are no FAA Orders or ACs directed to the regulatory requirements for airlines.

#### 4.1.6 Discussion

PxWD follow the same travel process during commercial air travel as all other passengers. Throughout that travel process there are specific regulations in place to ensure adequate service for, and prevent discrimination against, PxWD. Throughout the commercial air travel process, PxWD predominantly interact with three operational environments: the airport facility, the aircraft (which is the responsibility of the airline), and security (which is the responsibility of TSA). Airport, airline, and security personnel all comply with a number of regulatory standards and are responsible for different segments of the travel process (Figure 22). Accessibility of airport facilities is primarily

under the jurisdiction of DOJ, pursuant to the ADA. The service provided by air carriers is primarily under the jurisdiction of the DOT, pursuant to the ACAA (Briggs, 2013). Security measures are controlled and administered by the TSA (

Table 2).

The airport environment is considered public space and as such is governed by the US Access Board. The US Access Board has created a visual guidebook to assist with interpretation and application of architectural design standards, which ensure that the constructed environment is compliant with the appropriate code; if standards are not met during inspection, alterations must occur to meet the minimum requirements. Airlines adhere to the ACAA.

The ACAA does not have any application outside the commercial aviation environment. The DOT provides the regulatory standards airlines must follow; however, unlike the ADA design standards, the ACAA does not provide a detailed guidebook for operators. Standards for service consist of terms such as “timely” and “prompt”, which do not provide clear metrics for interpretation.

Table 2

*Summary of Disability Related Legislation*

<b>Law</b>	<b>Year</b>	<b>Agency Responsible</b>	<b>Physical Space</b>
Air Carrier Access Act (ACAA)	1986	Department of Transportation (DOT)	<ul style="list-style-type: none"> <li>• Access to and from the aircraft</li> <li>• Assistance navigating the terminal</li> <li>• Storage of mobility aids</li> </ul>
Americans with Disabilities Act (ADA)	1990	Department of Justice (DOJ) (responsible for the Access Board)	<ul style="list-style-type: none"> <li>• Airport</li> </ul>
Transportation Security Agency (TSA)	2001	Transportation Security Administration (TSA)	<ul style="list-style-type: none"> <li>• Airport Security (Sterile Area)</li> </ul>
Service Animal Relief Areas (SARA)	2015	DOT	<ul style="list-style-type: none"> <li>• Airports</li> </ul>
International Civil Aviation Organization (ICAO)	2013	United Nations	<ul style="list-style-type: none"> <li>• Provide recommended standards and practices to be adopted by member states of ICAO</li> </ul>
Advisory Circular (AC) and Orders	2004 thru 2017	Federal Aviation Administration (FAA)	<ul style="list-style-type: none"> <li>• DOT Employees</li> <li>• Airports</li> </ul>

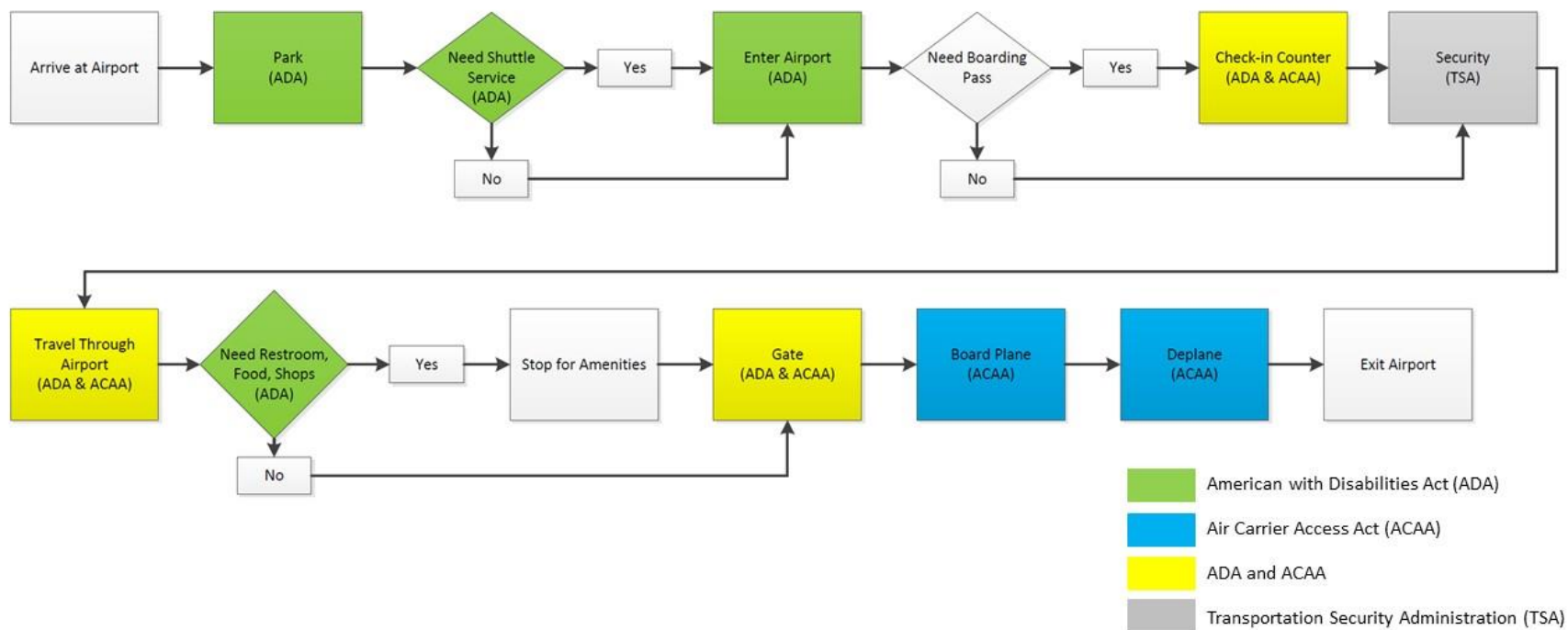


Figure 22. Travel process for PxWD and agencies responsible for accessibility standards

#### 4.1.7 Summary of Findings

This research question addressed the regulatory standards surrounding commercial air travel for PxWD. Throughout the travel process, it is the responsibility of various government agencies to prevent discrimination against PxWD. Those agencies, statutes, and responsibilities were reviewed in answering this research question.

#### 4.2 Research Question 2 – Complaint Data

**RQ 2:** *Based on the number and rate of disability-related complaints and consumer-based complaints, is service for passengers with disabilities equivalent to service for all passengers?*

This section uses complaints filed with the DOT to investigate Research Question 2. All commercial airline passengers have the ability to file a complaint regarding their flight experience through the DOT's website<sup>1</sup>. The DOT uses the narrative submitted by the passenger in the online form to classify each complaint into one of twelve complaint categories:

1. **Flight problems:** Cancellations, delays, or any other deviations from schedule, whether planned or unplanned.
2. **Oversales:** Involuntary denied boarding problems, whether or not the airline complied with DOT oversale regulations.
3. **Reservations, Ticketing, Boarding:** Airline or travel agent mistakes made in reservations and ticketing; problems in making reservations and obtaining tickets

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<sup>1</sup> <https://airconsumer.dot.gov/escomplaint/ConsumerForm.cfm>

due to busy telephone lines or waiting in line, or delays in mailing tickets; problems boarding the aircraft (except oversales).

4. **Fares:** Incorrect or incomplete information about fares, discount fare conditions and availability, overcharges, fare increases and level of fares in general.
5. **Refunds:** Problems in obtaining refunds for unused or lost tickets, fare adjustments, or bankruptcies.
6. **Baggage:** Claims for lost, damaged or delayed baggage, charges for excess baggage, carry-on problems, and difficulties with airline claims procedures.
7. **Customer Service:** Rude or unhelpful employees, inadequate meals or cabin service, treatment of delayed passengers.
8. **Disability:** Civil rights complaints by air travelers with disabilities.
9. **Advertising:** Advertising that is unfair, misleading or offensive to consumers.
10. **Discrimination:** Civil rights complaints by air travelers (other than disability); for example, complaints based on race, national origin, religion, etc.
11. **Animals:** Loss, injury or death of an animal during air transport provided by an air carrier.
12. **Other:** Frequent flyer, smoking, tours, credit, cargo problems, security, airport facilities, claims for bodily injury, and others not classified above.

Complaint data are compiled into monthly and yearly reports, which are available to the public through two reports, the *Air Travel Consumer Report* and the *Annual Report on Disability-Related Air Travel Complaints*.

#### 4.2.1 Air Travel Consumer Report

The *Air Travel Consumer Report* is a monthly report that is produced by the DOT's Office of Aviation Enforcement and Proceedings, and is available online<sup>1</sup>. The purpose of the *Air Travel Consumer Report* is to provide the public with information regarding the “quality of services provided by the airlines” (US Department of Transportation, 2018). The *Air Travel Consumer Report* includes summary statistics for airlines and airports, as well as passenger complaint data. The *Air Travel Consumer Report* is divided into six sections:

- Flight delays,
- Mishandled baggage,
- Oversales,
- Consumer complaints,
- Customer service reports to the Transportation Security Administration, and
- Airline reports of the loss, injury, or death of animals during air transportation.

In addition to monthly reports, the *Air Travel Consumer Report* also contains annual data each February (e.g., complaints for the 12 calendar months ending December 2017 are published in the February 2018 report). Analysis in this research utilized cumulative annual data from the consumer complaint section of the *Air Travel Consumer Report*.

Annual consumer complaint data for each year from 2004 to 2016<sup>2</sup> are provided in Table 3. A majority of the complaints filed are attributed to domestic carriers. The total

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<sup>1</sup> <https://www.transportation.gov/individuals/aviation-consumer-protection/air-travel-consumer-reports>

<sup>2</sup> At the time of analysis, annual consumer complaint data were available for 2017; however, disability-related complaint data were not available.

number of consumer complaints have fluctuated over the years; however, there has been an upward trend. The highest number of annual complaints was reported for 2015 (19,633 complaints), while the least number of complaints was reported for 2004 (7,127 complaints). Consumer complaints were nearly two-and-a-half times higher in 2016 than in 2004. This increase may be due to a variety of factors, including growth in aviation demand (as considered in the next section, 4.2.3 Passenger Data for Industry), increasing passenger access to the internet (passengers can now file a complaint while in the airport using airport Wi-Fi), and changes in airline service.

Table 3

*Air Travel Consumer Report Complaint Data*

<b>Year</b>	<b>Complaints Received by Domestic Carriers</b>	<b>Complaints Received by Foreign Carriers</b>	<b>Complaints Received by All Carriers</b>
2004	5,839	1,288	7,127
2005	6,900	1,485	8,385
2006	6,452	1,549	8,001
2007	11,091	1,817	12,908
2008	9,227	1,304	10,531
2009	7,120	1,449	8,569
2010	9,135	1,542	10,677
2011	9,414	1,708	11,122
2012	11,447	3,036	14,483
2013	9,690	2,844	12,534
2014	11,365	3,739	15,104
2015	15,268	4,365	19,633
2016	12,766	4,563	17,329

Note: All data obtained in the *Air Travel Consumer Report* Table 2 YTD (US Department of Transportation, 2018)

#### 4.2.2 Annual Report on Disability-Related Air Travel Complaints for Industry

In addition to disability-related complaints in the *Air Travel Consumer Report*, disability-related complaints are also documented in a separate DOT report, titled the *Annual Report on Disability-Related Air Travel Complaints*. Disability-related complaints documented in the *Annual Report on Disability-Related Air Travel Complaints* reflect complaints filed with an airline, as opposed to complaints filed with the DOT. As stated in section 4.1.2 Air Carrier Access Act, the ACAA requires airlines to report all passenger complaints related to discrimination of disability to the Secretary of Transportation for review (see Appendix I for reporting form). The *Annual Report on Disability-Related Air Travel Complaints* provides a summary report for the aviation industry as a whole, as well as a detailed account of complaints by carrier. The DOT provides this report on their website<sup>1</sup>, with data since 2004 (US Department of Transportation, 2017).

Annual disability-related complaint data are provided in Table 4. Similar to the *Air Travel Consumer Report*, the majority of disability-related complaints are filed with domestic carriers. Disability-related complaints have increased each year since the report began and are nearly three times higher in 2016 than in 2004. Disability-related complaints are consistently higher than consumer complaints (Figure 23).

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<sup>1</sup> <https://www.transportation.gov/airconsumer/annual-report-disability-related-air-travel-complaints>

Table 4

*Data from the Annual Report on Disability-Related Air Travel Complaints*

<b>Year</b>	<b>Disability Complaints Domestic Carriers</b>	<b>Disability Complaints Foreign Carriers</b>	<b>Disability Complaints All Carriers</b>
2004	10,193	1,326	11,519
2005	12,194	1,398	13,592
2006	12,075	1,691	13,766
2007	13,926	1,364	15,290
2008	12,557	1,449	14,006
2009	15,496	1,572	17,068
2010	19,347	1,654	21,001
2011	18,953	2,419	21,372
2012	20,584	2,859	23,443
2013	21,965	3,281	25,246
2014	24,044	3,512	27,556
2015	26,401	4,429	30,830
2016	27,842	4,603	32,445

Source: *Annual Report on Disability-Related Air Travel Complaints* (US Department of Transportation, 2017)

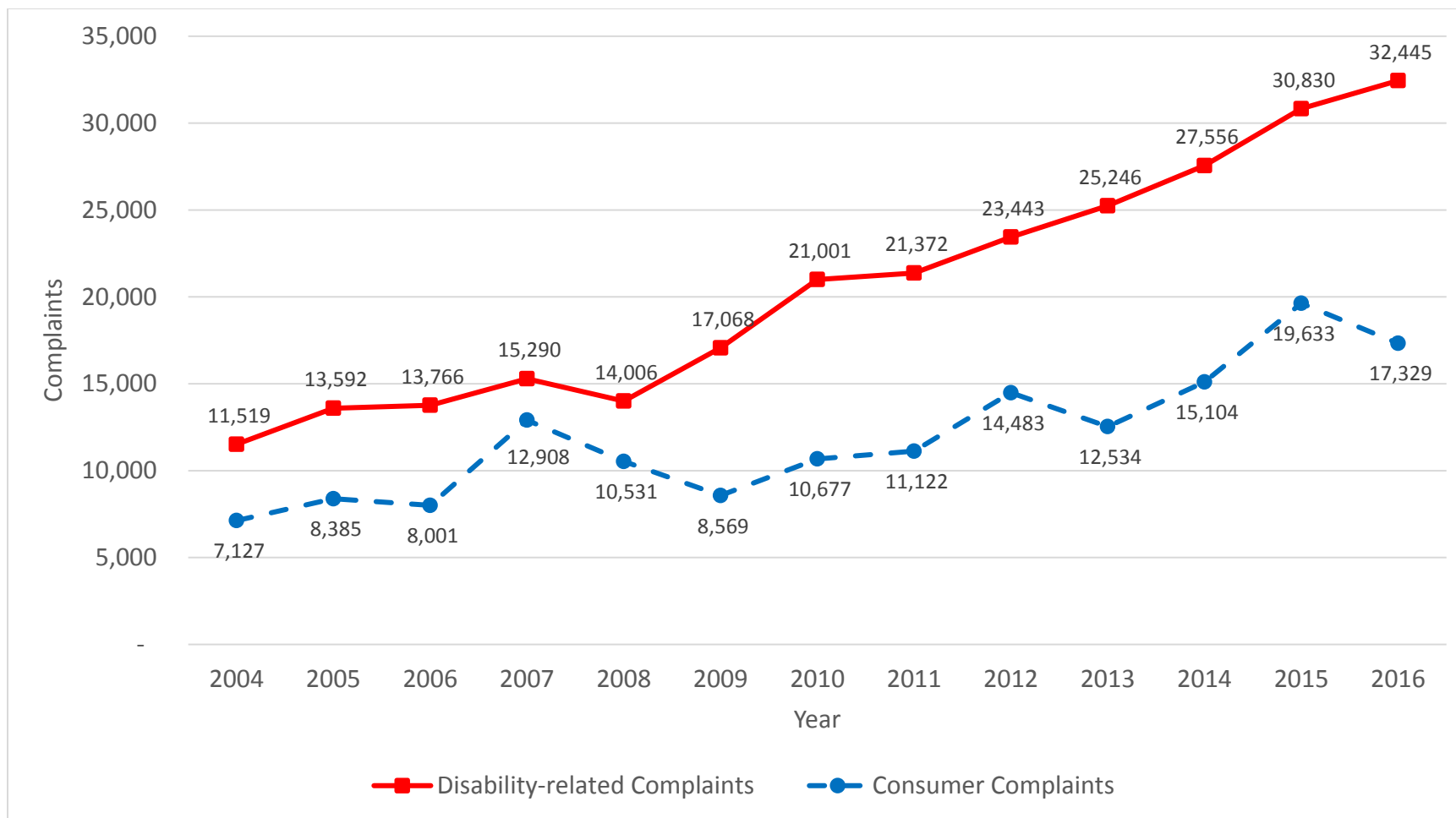


Figure 23. Consumer complaints and disability related complaints filed from 2004 to 2016

#### 4.2.3 Passenger Data for Industry

The increase in passenger complaints may be due to growth in the aviation sector. The impact of growth on passenger complaints can be determined by investigating the number of consumer and disability-related complaints normalized, based on the passenger volume each year. Passenger data are provided by the Bureau of Transportation Statistics (BTS) in the T-100 market data and are updated monthly. The BTS does not track data for PxWD, however the *Annual Report on Disability-Related Air Travel Complaints* estimates PxWD comprise approximately 2.5% of all airline passengers.

#### 4.2.4 Discussion

Examination of complaint data filed with the DOT was used to investigate Research Question 2. Results indicated that service for PxWD is not equivalent to service for all passengers. The complaint data suggest that commercial air service for PxWD is much worse than commercial airline service for all passengers.

The normalized complaint rate for all consumers and for PxWD are shown in Table 5 and Figure 24. Consumer complaints peaked in 2015, reaching a high in terms of complaints (19,633), as well as complaint rate (2.19 complaints per 100,000 passengers). Disability complaints have continued to increase each year, with the highest number of complaints and the highest complaint rate reported in 2016 (32,445 complaints, 144.30 complaints per 100,000 PxWD).

The number of disability complaints is 54% higher in 2016 than in 2010, and the disability complaint rate increased 37% during the same period. The number of consumer complaints is 62% higher in 2016 than in 2010, and the consumer complaint rate

increased 37% during the same period. Perhaps most striking is the fact that the disability complaint rate is two orders of magnitude higher, with 144 complaints per 100,000 PxWD, compared to 1.86 consumer complaints per 100,000 passengers. This discrepancy between the complaint rate for PxWD compared to the consumer complaint rates suggests that the intent of the ADA and ACAA has not yet been realized. Unfortunately, the 2.5% of airline passengers that are disabled generate approximately twice as many complaints as the 97.5% of travelers without a disability. Unlike consumer complaints, which peaked in 2015 despite increases in travel demand, there is no indication that either the number or the rate of complaints for PxWD is leveling off. The increasing rate of complaints for disabled passengers from 2010 to 2016 may be due to a variety of factors, including diminished service for PxWD, higher service expectations for PxWD, greater awareness of how to file a complaint, or increasing numbers of PxWD utilizing commercial air service. All of these factors are difficult to measure and, as a result the potential impact of these factors cannot be assessed in this analysis.

Table 5

*Consumer and Disability Complaint Data*

<b>Year</b>	<b>Consumer Complaints<sup>1</sup></b>	<b>Disability Complaints<sup>2</sup></b>	<b>PxWD<sup>2</sup></b>	<b>Total PAX<sup>3</sup></b>	<b>Percent of Passengers with Disabilities</b>	<b>Complaint Rate Per 100k PAX Consumer (All)</b>	<b>Complaint Rate Per 100k PAX Disabled</b>
2004	7,127	11,519	17,000,000	763,709,691	2.23	0.93	67.76
2005	8,385	13,592	17,000,000	800,849,909	2.12	1.05	79.95
2006	8,001	13,766	17,000,000	808,103,211	2.10	0.99	80.98
2007	12,908	15,290	17,000,000	835,510,422	2.03	1.54	89.94
2008	10,531	14,006	17,000,000	809,821,893	2.10	1.30	82.39
2009	8,569	17,068	19,000,000	767,816,588	2.47	1.12	89.83
2010	10,677	21,001	20,000,000	787,478,056	2.54	1.36	105.01
2011	11,122	21,372	20,000,000	802,134,793	2.49	1.39	106.86
2012	14,483	23,443	20,000,000	813,128,058	2.46	1.78	117.22
2013	12,534	25,246	20,000,000	824,967,603	2.42	1.52	126.23
2014	15,104	27,556	21,000,000	851,517,209	2.47	1.77	131.22
2015	19,633	30,830	22,000,000	896,602,288	2.45	2.19	140.14
2016	17,329	32,445	22,484,000	931,982,972	2.41	1.86	144.30

<sup>1</sup> Air Travel Consumer Report (US Department of Transportation, 2018)<sup>2</sup> Annual Report on Disability-Related Air Travel Complaints (US Department of Transportation, 2017)<sup>3</sup> Bureau of Transportation T-100 Market Data (Bureau of Transportation Statistics, 2018)

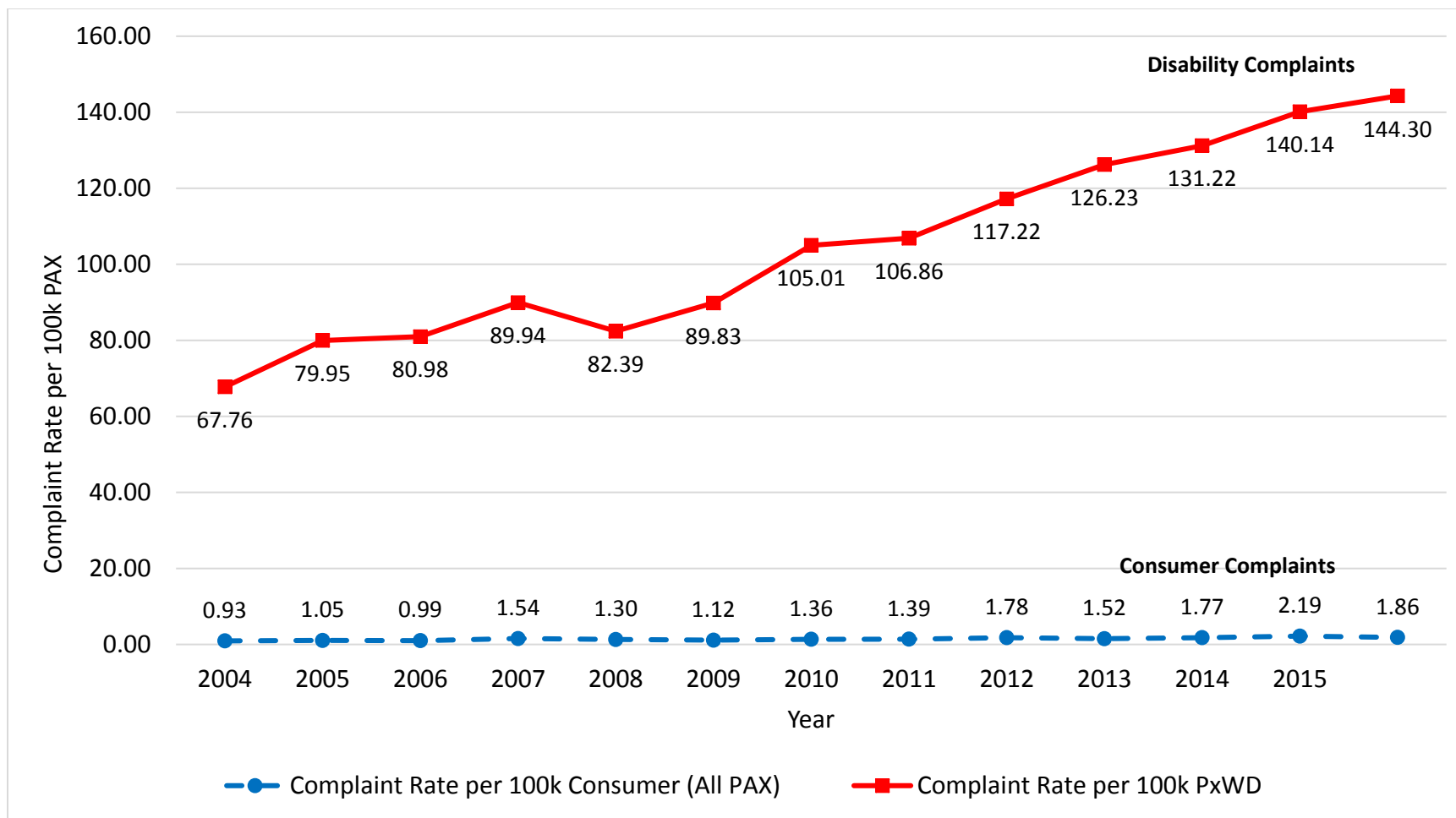


Figure 24. Complaint rate for PxWD and all passengers for 2004 through 2016

#### 4.2.5 Limitations

Data in this section are based on values provided by the DOT and the BTS. The DOT and BTS do not provide information regarding the exact number of PxWD, although the DOT does provide an estimate. In the future, it may be possible to increase the accuracy of the available data by documenting the number of passengers that self-identify as having a disability through the ticket purchasing and check-in process. Increased accuracy regarding the number of PxWD would allow greater confidence for the use of the complaint rate for PxWD as a performance metric. One challenge with this approach is that passengers may not wish to report their disability status for privacy reasons. Another challenge with this approach is that it has been suggested that some passengers may request wheelchair service for convenience, rather than due to a disability. An additional limitation may be that not all passengers are aware of their ability to file a complaint; this lack of awareness would result in fewer complaints, and as a result the total number of complaints would understate the problems associated with air service. It is not clear whether a lack of awareness regarding the complaint process would differ for PxWD as compared to all consumers.

#### 4.2.6 Summary of Findings

A review of annual passenger complaint data filed with the DOT, combined with passenger travel data published by the BTS, indicates that commercial airline service for PxWD is much worse than commercial airline service for all passengers. The number and rate of complaints for PxWD greatly exceeds the number and rate of consumer complaints every year from 2004 until 2017. Even though PxWD represent about 2.5% of all passengers, there are almost twice as many complaints for PxWD compared to the

consumer complaints for all passengers (32,445 vs. 17,329 in 2016). Furthermore, the complaint rate for PxWD is over 75 times the consumer complaint rate (144 vs. 1.86 in 2016). Research Question 4 presents the results of survey responses from PxWD, which illustrate and examine some of the challenges faced by PxWD during air travel.

### 4.3 Research Question 3 – Service Equivalence

**RQ3:** *Using the rate of disability-related complaints as an indication of service, do all airlines provide equivalent service for passengers with disabilities?*

This section documented the use of disability-related complaint data provided by the DOT, paired with passenger data provided by the BTS, to investigate the service for PxWD provided by five individual airlines. Data from 2010 through 2016 for American Airlines, Delta Air Lines, JetBlue Airways, Southwest Airlines, and United Airlines were used to investigate this research question. Descriptive statistics are presented for the airlines selected, as is an ANOVA statistical test.

#### 4.3.1 Annual Report on Disability-Related Air Travel Complaints for Selected Airlines

In addition to publishing disability-related complaint data for the aviation industry as a whole, the *Annual Report on Disability-Related Air Travel Complaints* also publishes data for individual airlines. As reported in Research Question 2, the aviation industry has experienced an increase in disability-related complaints each year since 2008. This upward trend is evident for the five airlines selected in this analysis (Figure 25), as well. The increase in complaints for the five largest airlines from 2010 to 2016

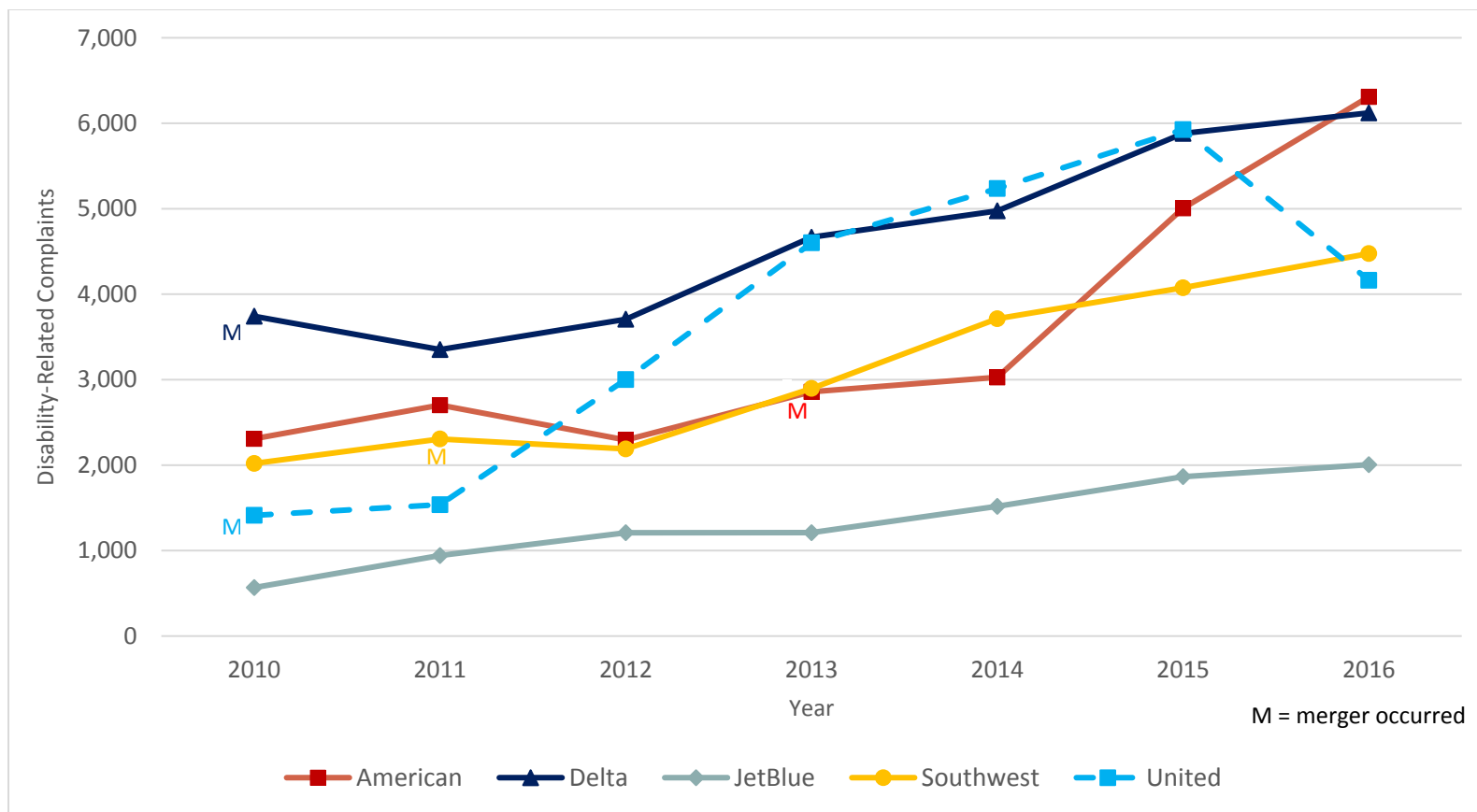
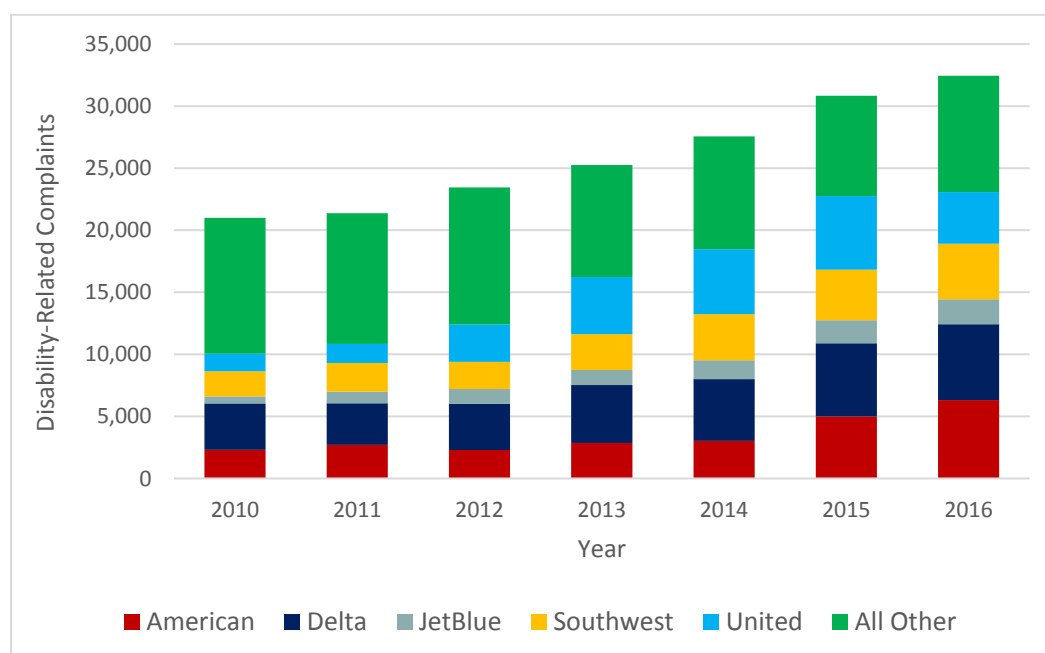


Figure 25. Disability-related complaints for selected airlines for 2010 through 2016 (US Department of Transportation, 2017)

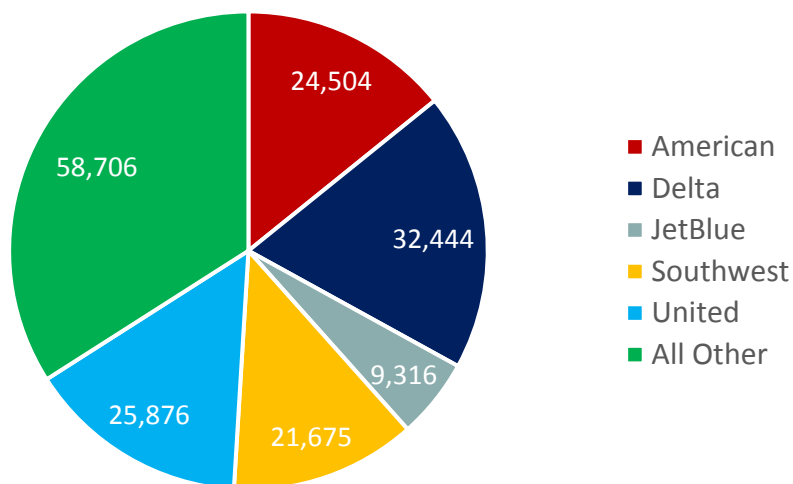
may be potentially attributable to mergers, since Delta and Northwest merged in 2010, United and Continental merged in 2010, Southwest and AirTran merged in 2011, and US Airways and American merged in 2013 (Airlines for America, 2016b). Merger dates are shown in Figure 25, although it is important to note that operational integration of the merged airlines may occur over a period of years after the merger occurs.”

A closer look at disability complaints reveals that the five largest US airlines, American Airlines, Delta Air Lines, JetBlue Airways, Southwest Airlines, and United Airlines, accounted for 48% of all disability complaints in 2010, and 71% of all disability complaints in 2016, as shown in Figure 26. The category “All Other” includes complaints for all other airlines combined. The five largest airlines currently reflect over two-thirds of the disability complaints, examination of the service provided by these largest five airlines offers a reasonable estimate of trends in the industry and represents the majority of passengers reporting disability complaints.



*Figure 26. Disability complaints by airline for 2010 through 2016*

Consider the cumulative number of disability complaints from 2010 to 2016 for American Airlines, Delta Air Lines, JetBlue Airways, Southwest Airlines, and United Airlines, as illustrated in Figure 27. Delta had the most disability complaints, with 32,444 over the seven-year period; JetBlue Airways had the fewest disability complaints, with 9,316, however, these values are affected by passenger volumes.



*Figure 27.* Cumulative annual total disability-related complaints of the five largest US airlines (2010 through 2016) (US Department of Transportation, 2017)

#### 4.3.2 Passenger Data for Selected Airlines

The FAA has projected a passenger growth rate of 2.1% per year for the next 20 years (Federal Aviation Administration, 2016). To track passenger growth, the BTS reports passenger data for the industry, as well as individual airlines (Table 6). Passenger data were paired with disability-related complaint data to calculate a normalized disability complaint rate for each airline, for the period 2010 through 2016.

Table 6

*Passenger Counts*

<b>Year</b>	<b>Industry Total</b>	<b>Percent Increase per Year</b>	<b>American</b>	<b>Delta</b>	<b>JetBlue</b>	<b>Southwest</b>	<b>United</b>
2010	787,478,056	----	86,086,130	109,329,792	24,198,698	106,227,521	53,032,240
2011	802,134,793	1.86	86,035,851	112,016,262	26,352,900	110,586,815	49,619,083
2012	813,128,058	1.37	86,330,792	114,958,112	28,934,369	112,234,074	91,493,988
2013	824,967,603	1.45	86,820,595	118,933,921	30,427,534	115,322,785	89,278,038
2014	851,517,209	3.21	87,828,395	128,018,335	32,056,119	127,194,550	89,871,585
2015	896,602,288	5.29	118,290,659	137,732,452	35,074,055	144,574,606	94,891,627
2016	931,982,972	3.95	144,189,749	142,286,020	38,241,080	151,740,277	99,769,952

Source: Bureau of Transportation T-100 Market Data (Bureau of Transportation Statistics, 2018)

### 4.3.3 Normalized Disability-Related Complaint Rate

The normalized disability-related complaint rates for American, Delta, JetBlue, Southwest and United, as well as the other airlines and industry (all airlines) are shown in Figure 28 (see Appendix J for data presented in table format). The data in this figure illustrate that the rate of disability complaints has increased for each of the five largest airlines; this reflects the overall industry trend shown in Figure 24 and discussed in Research Question 2 (section 4.2.4 Discussion). A closer look at Figure 28 and the disability complaint rate for each airline reveals a number of interesting facts and trends. Based on the disability complaint rate, Southwest has the lowest complaint rate for PxWD (among the five largest US airlines) and is the only airline that beats the industry average in both 2010 and 2016. Southwest's business model includes linked trips and the use of secondary airports. This may result in fewer complaints, because passengers may not need to change planes as often, and because secondary airports may accommodate disability service requests more easily, due to lower overall passenger volumes. Reducing the number of times a passenger needs to board or deplane would be expected to reduce the likelihood of a disability complaint related to wheelchair service, as well as the likelihood of damage to assistive devices by baggage handlers, due to a reduced number of wheelchair transfers in and out of the cargo hold. Additionally, Southwest has taken a proactive approach when serving PxWD. As of August 1, 2018, Southwest no longer serves peanuts onboard flight to protect passengers with food allergies (Southwest, 2018b). Furthermore, Southwest strives to provide a work environment which instills core values (e.g. warrior spirit, servant's heart, wow our customers) and empowers their employees, creating "the highest quality of customer service with a sense of warmth,

friendliness, individual pride, and Company Spirit” (Southwest, 2018a; 2018c). These factors may all contribute to better service for PxWD flying Southwest.

The data for United Airlines suggests there have been challenges with respect to service for PxWD, as evidenced by a complaint rate that more than doubled from 2.66 in 2010 to 6.25 in 2015. This increase represents a change from the industry average in 2010 to more than 1.8 times the industry average in 2015. This may reflect challenges associated with the merger of United and Continental (Airlines for America, 2016b). Complaints for United doubled in the calendar year 2012 and complaints subsequently increased. Then in January 2016 United was fined for the high number of disability-related complaints associated with the service they provided (US Department of Transportation, 2016d).

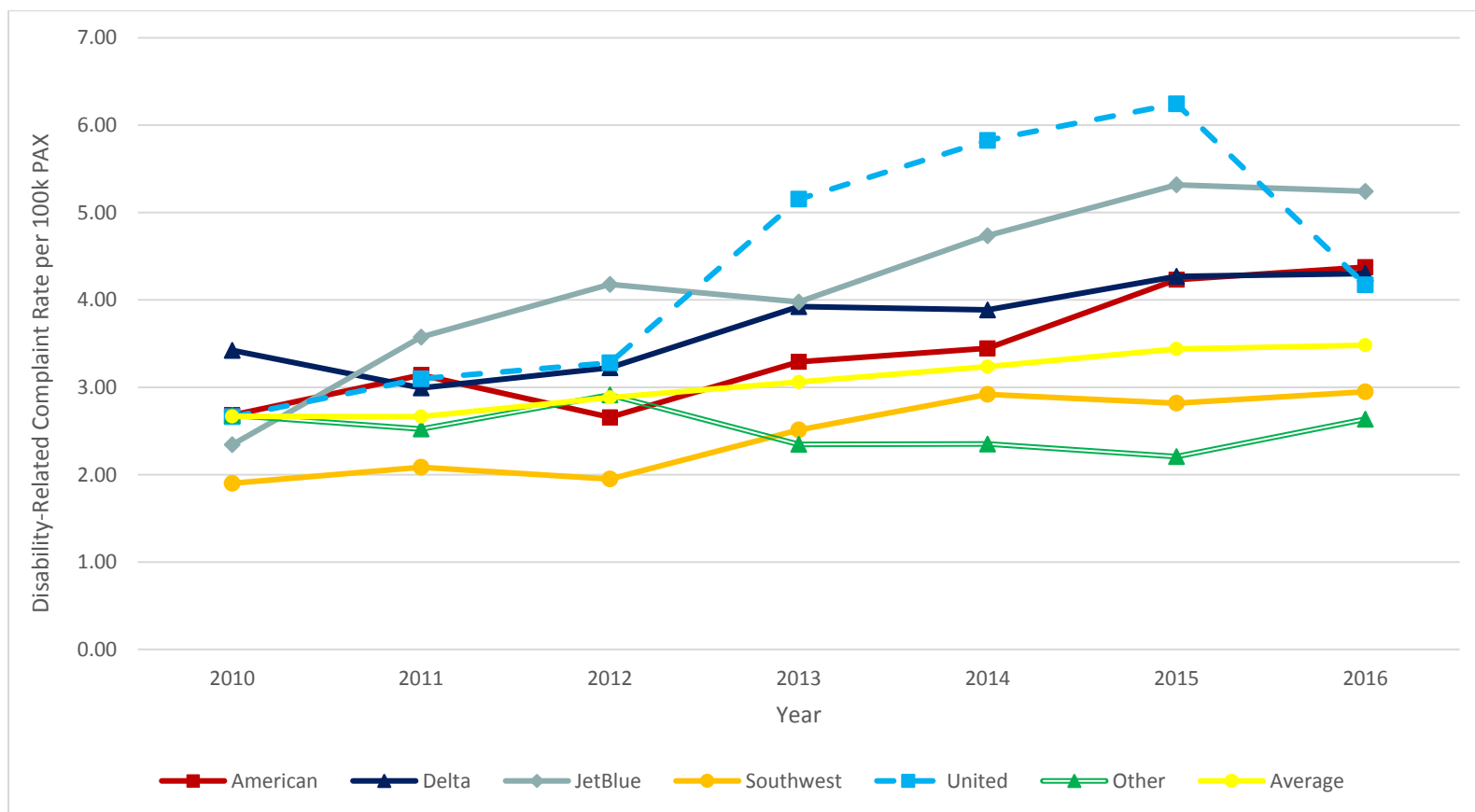
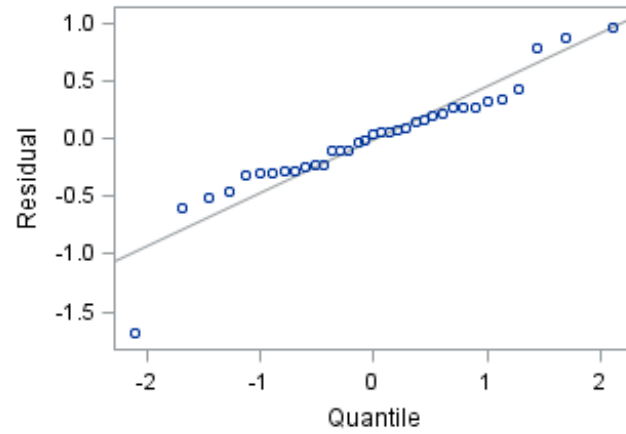


Figure 28. Disability complaint rate per 100,000 disabled passengers by airline

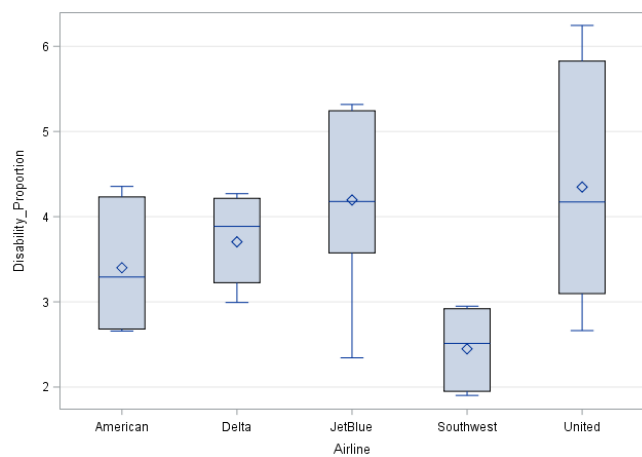
#### 4.3.4 Methodology

A two-way ANOVA test was performed to determine whether there are any statistically significant differences between the mean disability complaint rate for the airlines (Laerd Statistics Premium, 2018). The dependent variable in this case was the normalized complaint rate, and the independent variables were airline and year.

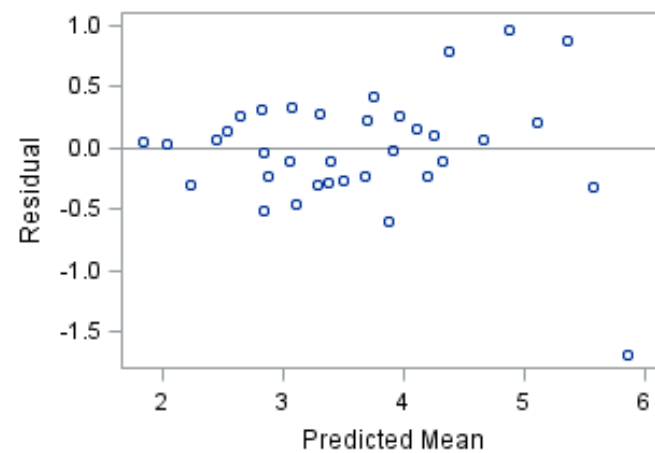
When using an ANOVA statistical test, four assumptions must be met: independence, normality, no outliers, and homogeneity of variances (Kleinbaum, Kupper, Nizam, & Rosengern, 2014). The first assumption, independence, means that each observation, or in this case complaint, does not influence the other. To file a complaint, a flight number, date and time, name, etc. is required; because of this required information, it is assumed passengers cannot submit multiple complaints, and it is assumed that each customer's complaint is independent of other customer complaints filed. The assumption of normality is demonstrated by performing a QQ-Plot of the residuals (Laerd Statistics, 2018b). In this case, the dependent variable, normalized complaint rate, was normally distributed (Figure 29a). The third assumption, determining if the data have outliers, can be assessed through a boxplot (Laerd Statistics, 2018a). There were no outliers in the data, based on an inspection of the boxplot (Figure 29b). The last assumption, homogeneity, can be tested by examining whether each observation has the same population variance; this is demonstrated using a plot of the residuals against the predicted mean (Kleinbaum et al., 2014).



a.) QQ-Plot of normalized disability complaint rate



b.) Boxplot of normalized disability complaint rate



c.) Residual plot against the predicted mean of normalized disability complaint rate

Figure 29. Assumptions for ANOVA statistical test

### 4.3.5 Results, Analysis and Discussion

ANOVA statistical analysis was used to determine whether the differences in disability complaints between airlines and differences for a given airline over time are statistically significant. The normalized disability complaint rate for each airline was analyzed using the linear model shown in Eqn 1. In this case,  $i = 1, 2, 3, 4, 5$  and represents each of the five largest airlines, and  $t = 2010, 2011, \dots, 2016$  and represents the year;  $y_{i,t}$  is the number of disability complaints per 100,000 passengers and  $\varepsilon_{i,t}$  represents the independent and identically-distributed normal random error. Autoregressive and Toeplitz covariance structures were both examined before deciding on ordinary least square.

$$y_{i,t} = \beta_0 + \beta_1 * year_t + \sum_{i=1}^5 (\beta_{0,i} + \beta_{1,i} * year_t) + \varepsilon_{i,t} \quad (1)$$

The two independent variables, airline and year, were found to be significant at the  $p < .01$  level. The interaction term, denoted by year\*airline, was significant at the  $p < .10$  level. The interaction term is the effect year has on the given airline. Year\*airline is simply a naming convention, and does not represent the equation year multiplied by airline. The results are shown in

Table 7 and suggest that the rate of disability complaints vary by airline, vary by year, and vary among airlines over the seven-year period examined. The point estimates provided represent the y-intercept for the disability complaint rate in the middle year of the data set. These results suggest that United has the highest rate of disability complaints per 100k passengers over the seven years examined. Even though JetBlue had the least number of disability complaints over the seven years examined (Figure 27), it has the

second highest disability complaint rate after United. Southwest has the lowest estimate, providing additional evidence that they provide better service for PxWD.

Investigating the interaction variable, denoted by  $\text{year} \times \text{airline}$ , reveals that the disability complaint rate for all airlines examined are increasing over time, as denoted by the positive estimate. Southwest's annual complaints have increased at the slowest rate over time, as denoted by the lowest estimate. Delta's estimate was also on the lower end of the spectrum. The complaint rates for United and JetBlue increased at the highest rates over the seven years analyzed for these five largest airlines.

To compare significance between airlines, a Tukey pairwise comparison was completed on the independent variable of airline. Means with the same letter are not significantly different from one another (Table 8). This test revealed that Southwest is significantly different from United and JetBlue, but Southwest is not significantly different from American and Delta. Overall, these results confirm that the service for disabled passengers, as measured by the normalized disability complaint rate, does vary depending on the airline.

Table 7

*Statistical Analysis Results Modeling Disability Complaint Rate*

Effect	Numerator DF	Denominator DF	F Value	Pr >F
Airline	4	9.2	24.16	<.0001
Year	1	19.2	78.13	<.0001
Year*Airline	4	19.2	2.78	0.0658

Airline	Point estimate represents average normalized complaint rate per 100,000 PAX for airline from 2010 to 2016 a lower point estimate is better ( <i>t</i> -statistic is in parentheses)	Rank based on disability complaint rate (1=best)
American	3.3975 (21.84)	2
Delta	3.7018 (23.80)	3
JetBlue	4.2063 (27.04)	4
Southwest	2.4486 (15.74)	1
United	4.3731 (28.11)	5

Year*American	0.286 (4.18)	3
Year*Delta	0.2053 (3.49)	2
Year*JetBlue	0.4527 (5.6)	4
Year*Southwest	0.2012 (3.46)	1
Year*United	0.4962 (5.97)	5

Table 8

*Tukey Pairwise Comparison for Normalized Disability Complaint Rate*

Tukey Grouping		Mean	N	Airline
	A	4.3731	7	United
	A	4.2063	7	JetBlue
B	A	3.7018	7	Delta
B	A	3.3975	7	American
B		2.4486	7	Southwest

## 4.3.6 Limitations

One potential limitation of this model is the assumption that the percent of PxWD was consistent across all airlines, which may not be the case. Another potential limitation of this model is that it may not fully consider the impact of airline mergers. When airline mergers occur, it can take multiple years to fully integrate fleet, operations, and service. This analysis was based on the data reported to the DOT by airlines, as required by law.

## 4.3.7 Summary of Findings

A normalized disability complaint rate was calculated for American Airlines, Delta Air Lines, JetBlue Airways, Southwest Airlines and United Airlines, based on disability-related complaints reported by the DOT and passenger count provided by the BTS for 2010 through 2016. An ANOVA statistical test was performed on the calculated complaint rate and the results indicate that Southwest Airlines has the lowest average complaint rate for PxWD. Southwest Airlines also has the lowest increase in complaint rate over the seven years studied. This analysis suggests that Southwest outperforms the competition when providing service to passengers with disabilities. JetBlue and United

had the highest normalized complaint rates, both on average and in terms of the increase over time.

#### 4.4 Research Question 4 – Survey Results

**RQ4:** *How does the disabled community perceive the service provided by airlines and airports?*

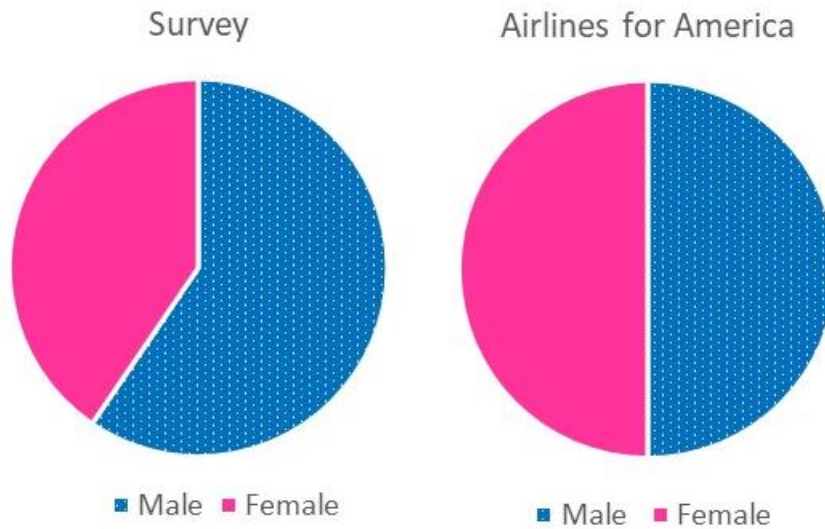
##### 4.4.1 Background

This section provides qualitative analysis of the results of a survey to investigate the perceptions of commercial air service for PxWD. The survey included multiple choice questions, Likert scale questions, and open-ended questions, and is shown in Appendix F. There were 102 responses; the survey was fully completed by 83. All questions were voluntary and any could be skipped; as a result, the response rate varied for different questions. Demographic questions were presented at the end of the survey and had the lowest response rate.

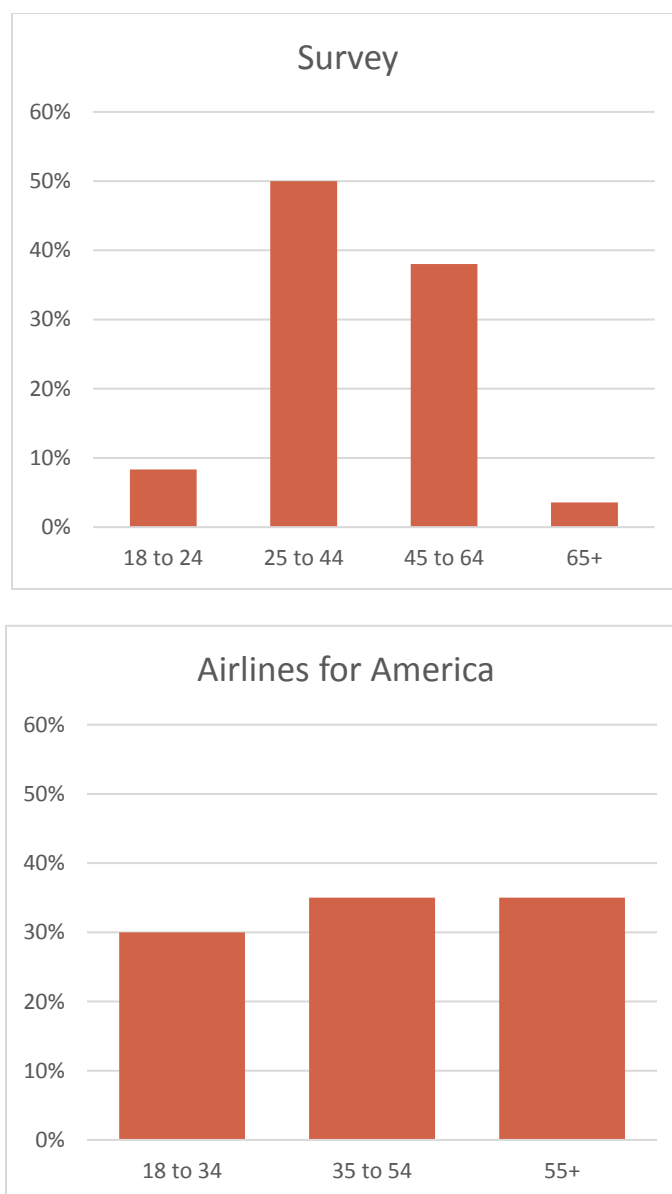
Survey respondents included 50 males (59.5%) and 34 females (40.5%). The age of participants varied, with the most responses from people 25 to 44 years old (50%), followed by people 45 to 64 years old (38%), people 18 to 24 years old (8.4%), and the fewest responses from people 65 years old or older (3.6%).

Convenience sampling techniques were used. In addition to personal contacts, participants were recruited from events wheelchair users were expected to attend; as a result, the sample may not be representative of the population of wheelchair users in the US. The demographics of survey respondents relative to US airline passenger demographics are shown in Figure 30 and Figure 31. US airline passenger demographics data are based on a report by Airlines for America (2016) and reflect American travelers

18 years old or older. Adult travelers in the US are evenly split between male and female passengers, and the most common ages are between 35 and 54 years old, and 55 years or older (35% in each of these groups) (Airlines for America, 2016a).



*Figure 30. Gender of survey respondents and US travelers*



*Figure 31. Age of survey respondents and US travelers*

The majority of survey participants (over 90%) reported using a wheelchair daily (93 respondents), while 7 individuals said they either sometimes use a wheelchair or only need a wheelchair for long periods of walking or standing. This is consistent with the survey results that indicate 92.4% of participants (85 respondents) use their own wheelchair while traveling and the remaining 7.6% (7 respondents) may use their own

wheelchair or one provided by the airport. A majority of survey participants use a manual wheelchair (63 respondents, 68.5%), a quarter of respondents use an electric wheelchair (23 respondents, 25%), and a few use both manual and electric wheelchairs (six respondents, 6.5%).

It is unknown how the demographics of survey respondents compare to the demographics of wheelchair users in the airport setting. However, the US Department of Health and Human Services estimates 2.2 million people in the US depend on a wheelchair for day-to-day activities (2016). There have been reports that some passengers may use wheelchairs at airports as a convenience, rather than a necessity (Nir, 2012). At least one source suggests airlines have different designations to reflect whether wheelchair assistance is needed in the terminal, to board and depart the plane, and/or for passengers unable to use stairs (Fleming, 2017); no data are available regarding the distribution of these designations for the services provided at airports. The reported wheelchair use characteristics of the survey respondents suggests that the survey results reflect the perceptions and experiences of individuals that rely on their own wheelchair as a mobility aid and in that regard the sample adequately reflects the intended audience of PxWD.

#### 4.4.2 Methodology

Qualitative analysis was conducted using the 139 unique survey responses from two open-ended questions (Q14 and Q15) and two text responses that were follow-up probes from multiple choice questions (Q7 and Q13). Analysis of the text responses utilized coding, a common framework for qualitative analysis. “Coding is a method that enables you to organize and group similar data into categories or ‘families’ because they

share common characteristics” (Salsana 2009). There are various frameworks of coding; descriptive and In Vivo coding were performed on this qualitative data set.

Descriptive coding, also referred to as topic coding, summarizes the basic topic of qualitative data into a word or short phrase (Salsana, 2009). An outcome of descriptive coding is a categorized inventory of the responses with an associated numerical account of the data. In Vivo coding, also referred to as literal coding and verbatim coding, uses a word, phrase, or complete excerpt from the language found in the qualitative data set (Strauss, 1987). The combination of these two coding methods allow researchers to identify themes and provide examples to substantiate ideas and findings.

Below is one of the survey responses, followed by a description of how this response was coded. This example demonstrates how a single open-ended response can contain multiple codes. Survey responses are provided “as is” and in some cases may include grammatical and spelling errors.

“People are very helpful but lack of knowledge with respect to wheelchair users or people with disability. Items on the wheelchair were typically found broken or damage when they bring it to me upon landing.”

The text, “people are very helpful,” was coded in the category *positive experience* and reflects that in many cases, airport and airline personnel want to provide assistance and have good intentions. The remainder of that sentence, “but lack knowledge with respect to wheelchair users or people with disability” was coded in the category *training needed for individual that interact with PxWD*. The final sentence, “items on the wheelchair were typically found broken or damage when they bring it to me upon landing,” was coded in

the category *lost or damage to wheelchair*. This example demonstrates how one response can hold multiple codes; in this case, there are three codes for a single response.

Keeping track of codes can be difficult. To aid qualitative researchers in the research process, computer-assisted qualitative data analysis software (CAQDAS) has been developed (Bazeley, 2006, 2007). CAQDAS provides a platform to record, store, index, and sort qualitative data (Morse & Richards, 2002). This research used NVivo11 software to track codes and organize data. Additional information regarding the step-by-step process for NVivo software and the formation and tracking of codes is available in a research guide developed by Leech and Onwuegbuzie (2011).

The NVivo software also can analyze text and produce a word count, which can provide a quick and unbiased overview of the words used in open-ended responses (Leech & Onwuegbuzie, 2011). Table 9 presents the top 75 words from the survey; words in bold were the basis for the qualitative codes used.

Table 9

*Top 75 Words in Mentioned Produced by NVivo Software*

Rank	Word	Times Mentioned	Similar Words Counted
1	chair	101	chair, chairs
2	wheelchair	82	wheelchair, wheelchairs
3	plane	62	plane, planes
4	seat	47	seat, seated, seating, seats
5	get	43	get, gets, getting
6	airline	43	airline, airlines
7	time	43	time, timely, times
8	use	39	use, used, using
9	airport	37	airport, airports
10	flight	36	flight, flights
11	need	31	need, needed, needing, needs
12	travel	29	travel, traveled, travelers, traveling, travelled, travelling
<b>13</b>	<b>aisle</b>	<b>23</b>	<b>aisle, aisles</b>
14	helps	21	help, helped, helpful, helping, helps
15	assistance	21	assist, assistance, assisted, assistive
<b>16</b>	<b>damaged</b>	<b>21</b>	<b>damage, damaged, damages, damaging</b>
17	people	21	people, peoples
<b>18</b>	<b>security</b>	<b>21</b>	<b>securement, security</b>
19	able	20	able
<b>20</b>	<b>boarding</b>	<b>20</b>	<b>board, boarded, boarding</b>
<b>21</b>	<b>waiting</b>	<b>20</b>	<b>wait, waited, waiting, waits</b>
22	experiences	18	experience, experiences
<b>23</b>	<b>isle</b>	<b>18</b>	<b>isle, isles</b>
24	check	17	check, checked, checking
25	first	17	first
26	lift	17	lift, lifted, lifting
27	take	17	take, takes
28	always	16	always
29	just	16	just
30	power	16	power
31	accessible	16	access, accessible
32	gate	16	gate, gates
33	disability	15	disabilities, disability, disabled
34	flying	15	fly, flying
35	luggage	15	luggage
36	service	15	service, services
37	better	14	better
38	even	14	even

Table 9 continued

39	<b>passenger</b>	<b>14</b>	<b>passenger, passengers</b>
40	transfer	14	transfer, transferred, transferring, transfers
<b>41</b>	<b>tsa</b>	<b>14</b>	<b>tsa</b>
42	make	13	make, makes, making
43	staff	13	staff
44	user	13	user, users
45	years	13	year, years
46	allow	12	allow, allowed, allowing, allows
47	attendant	12	attendant, attendants
<b>48</b>	<b>trains</b>	<b>12</b>	<b>train, trained, training, trains</b>
49	air	11	air
50	employees	11	employee, employees
51	front	11	front
52	going	11	going
53	good	11	good, goodness
54	got	11	got
<b>55</b>	<b>handling</b>	<b>11</b>	<b>handle, handles, handling</b>
56	usually	11	usually
57	without	11	without
<b>58</b>	<b>bathroom</b>	<b>10</b>	<b>bathroom, bathrooms</b>
<b>59</b>	<b>handlers</b>	<b>10</b>	<b>handler, handlers</b>
<b>60</b>	<b>baggage</b>	<b>10</b>	<b>baggage</b>
61	like	10	like
62	connection	9	connecting, connection
63	friend	9	friend, friendly, friends, friends'
64	issue	9	issue, issues
65	person	9	person, persons
66	put	9	put, putting
67	trying	9	tried, try, trying
68	back	9	back
<b>69</b>	<b>broken</b>	<b>9</b>	<b>broken</b>
70	easier	9	easier
71	equipment	9	equipment
72	never	9	never
73	someone	9	someone
74	took	9	took
75	arriving	8	arrival, arrive, arrived, arrives, arriving

#### 4.4.3 Results and Analysis

Based on the open-ended survey responses, the word counts, and a review of themes, a list of codes was developed. The top 10 descriptive codes found most frequently in the survey responses are shown in Table 10. Note that some of these descriptive code categories reflect negative service attributes (e.g., loss of or damage to wheelchairs), others reflect positive attributes (e.g., positive experiences during air travel) and others are neutral (e.g., TSA).

Table 10

*Top 10 Descriptive Codes Identified from the Survey*

<b>Rank</b>	<b>Code</b>	<b>References</b>
1	Loss of or Damage to Wheelchairs	35
2	Training Needed for Employees that Interact with PxWD	32
3	Wait Times During the Travel Process	20
4	Issues Related to the Aircraft	18
5	Positive Experiences during Air Travel	17
6	TSA	16
7	Boarding & Deplaning Aircraft	16
8	Request to Stay in Wheelchair on Aircraft	11
9	Aisle Chair Not Needed	11
10	Aisle Chair Service Not Available	9

The following sections provide additional information about the results for the top five descriptive code categories. Analysis includes the In Vivo coding and example excerpts of survey responses to supplement the information provided by the descriptive coding techniques. The In Vivo coding is based on the unedited survey responses. It is possible for a single response to appear in multiple categories. For example, a response may mention more training is needed for TSA agents.

#### 4.4.3.1 Loss of or Damage to Wheelchairs

Experiencing or concern regarding wheelchair loss or damage was the most frequently-referenced topic, and was mentioned 35 times in the 139 text responses. Although a source of considerable concern for PxWD, damage to assistive devices is a small percentage (less than 5%) of all disability-related complaints reported to the US DOT. One respondent stated, “as a wheelchair user, my greatest concern about flying is that my chair will get damaged.”

Another respondent said, “I have not flown commercially since my injury 10 years ago. I am nervous about traveling via airlines, because I've heard stories about an airline breaking or losing a person's wheelchair.” Fear of wheelchair loss or damage may prevent people from flying, resulting in latent demand for travel by PWD. Passenger complaints regarding wheelchair damage may underrepresent the problem, if PWD refuse to fly because the risk of wheelchair damage is too high; the impact of a lost wheelchair can be significant, since many PxWD rely on their wheelchairs and a substitute wheelchair is typically not an adequate replacement.

Apprehensions about damaged or lost wheelchairs are legitimate concerns. Some participants have experienced this first hand. One participant stated, “they lost my wheelchair when checked at the door and it took two days to find it, they gave me a "ratty" one to use until they found mine!” Another respondent said,

“I traveled abroad to Amman, Jordan three years ago. On the trip home I had a layover in Dubai. My wheelchair was not transferred to the second flight in Dubai, and it took the airline multiple days to locate it and return it to me. I was

never compensated for my wheelchair being misplaced and being without mobility for multiple days.”

A damaged wheelchair can be as problematic as a lost wheelchair. One survey participant stated, “my manual chair always comes up after a flight banged up, scratched, and always has to be readjusted after a flight. It's like they just throw it around.”

Another participant witnessed the improper handling of their wheelchair, “I've had 2 chairs broken on flights and watched baggage handlers drop my chair during loading.” Moreover, wheelchair damage is not necessarily a one-time occurrence; one individual said that damage to their wheelchair is a recurring issue.

“Over the past 5 years I have had my power wheelchair damaged numerous times (more than 5x) due to improper handling by baggage handlers. This is usually caused by them trying to pick it up to put it on the conveyor. The chair weighs 413 lbs. and cannot be picked up. Damage was the result of it being dropped.”

An online article from DisabilityGo News documents an instance where extensive damage occurred to a wheelchair during air travel (Figure 32) (Norris, 2016).



*Figure 32. Photograph depicting a wheelchair damaged during air travel (Norris, 2016)*

When damage occurs, survey responses indicate that the process to fix a wheelchair can be challenging and time-consuming. “I’ve had the front wheel of my manual wheelchair broken off during a flight. Even with the DOJ’s<sup>1</sup> help, it still took 30 days for my wheelchair to be repaired.” Another respondent stated it took even longer and required assistance from their state representative.

“It took one year, three DOT Complaints and the support of my State Senator, NYS Sen. Tony Avella to be appropriately recompensed for the excessive damage and expense to my titanium Etac wheelchair by Southwest Air. There is no means of filing for “damages” like post secondary injury under the current version of the ACAA. Also, Airlines do not respect the procedures of your insurer, public or private, putting the wheelchair user in liability of future repair cost out of pocket.

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<sup>1</sup> DOJ refers to the Department of Justice. Airline passengers may submit a complaint to report a violation of civil rights or civil liberties through the Civil Rights Division of the Department of Justice (<https://www.justice.gov/actioncenter/submit-complaint>).

CMS [Centers for Medicare and Medicaid Services] has very strict guidelines as to who (DME [Durable Medical Equipment] Providers) may make repairs as well as qualification. Airlines look for anyone cheap with a toolkit, including Out-of-State, Out-of-County, non-RESNA certified DME sellers. The ACAA and ADA does not protect us there.”

The impact of a damaged or lost wheelchair can extend beyond inconvenience and the immediate inability to use the assistive device; loss or damage can negate the value of the entire trip or vacation. One participant said the airline, “broke my wheelchair ruining my first trip to Vegas.” Another said, “I had my wheelchair broken by an airline on my way to my honeymoon. Had to use a transport chair for 2 days while chair was temporarily repaired.”

In summary, lost and damaged wheelchairs are one of the top concerns for PxWD during the air travel process and some survey participants report that they have had their wheelchair damaged on multiple occasions. Unfortunately, lost or damaged assistive devices can severely impact daily mobility and overall enjoyment of a vacation or trip. Furthermore, the process to repair a damaged wheelchair can be lengthy and time-consuming.

Three recommendations are made based on the comments related to wheelchair damage. The first recommendation to improve service for PxWD is to increase training for baggage handlers and leverage existing technology to better track wheelchair location, to reduce anxiety for PxWD. A wheelchair is a vital piece of medical equipment that is often custom-made and tailored to the individual. An individual’s wheelchair not only provides mobility but also may be critical for good health, since it may be designed to

assure correct propulsion techniques, seating and positioning, and even change a person's orientation without moving hip, knee and ankle angles (Christopher and Dana Reeve Foundation, n.d.). Being placed in a "ratty" loaner wheelchair, as one participant experienced, is more than merely an inconvenience; a loaner wheelchair may result in adverse and serious health implications, such as poor pushing mechanics and a higher susceptibility to pressure sores.

Another recommendation is that since wheelchairs are a critical mobility aid, they ought to have a higher priority than other luggage beyond the 14 CFR 382.121 regulation of requiring to be transported and not counting towards the limit of carry-on baggage. Designated loading equipment and storage procedures should be used, especially for larger and heavier powered wheelchairs. Manually lifting wheelchairs onto the conveyer belt with suitcases may not be the best method to ensure safety of workers and mobility aids. This research did not examine the training requirements for ground crew of airlines; however, increased training may raise awareness of the importance of wheelchairs. It may also be appropriate to improve standard operating procedures to assure appropriate handling and stowage of wheelchairs in the cargo hold. European airlines have adopted a regulation to require a wheelchair manual to be present when traveling by air (Pearson-Jones, 2018). A wheelchair manual provides ground crew information regarding disassembly and where it can bear load.

Technologies may also be used to support best practices to track wheelchairs and reduce damage. Existing technology, such as radio frequency identification (RFID) tags can be temporary placed on wheelchairs to assist in tracking to prevent lost chairs. RFID technologies have been used to improve luggage tracking and passenger service (e.g.,

(Kang, 2016)). Technologies such as impact sensors or accelerometers that monitor the g-forces exerted on an object could be temporarily affixed to wheelchairs during transport. Combined with a time stamp and a geographic information system (GIS) enabled technology, an impact sensor or accelerometer could allow airlines to identify where/when damage occurs (e.g., loading the wheelchair, during aircraft takeoff or landing, en route, or during the removal of the wheelchair from the cargo hold, etc.). The use of advanced technologies would provide data that would identify when damage is occurring, so airlines can improve the associated operating procedures.

#### 4.4.3.2 Training Needed for Employees who Interact with PxWD

The need for additional or better training for employees who interact with PxWD was the second most-frequently cited code category for survey responses, with 32 occurrences. Participants specifically mentioned that TSA, third-party service vendors, and baggage handlers would benefit from training; there were also general comments about training.

TSA agents screen nearly two million travelers each day (Transportation Security Administration, 2016b). To expedite screening, advanced technologies are used, including X-ray machines to screen carry-on baggage, and walk-through metal detectors or advanced imaging technology (AIT) to screen passengers. Due to disability, some passengers cannot be screened by either the walk-through metal detector or the AIT; these passengers require a manual pat down.

A manual pat down consists of a same-gender TSA agent checking the passenger, as well as the wheelchair, by hand for discrepancies. In many cases, TSA uses wheelchair passengers as an opportunity to train new TSA personnel, who are often denoted by a

white shirt. One survey participant wrote, “security check was horrendous. The attendant was a trainee. She was not at all discreet or willing to listen to my answers. It took almost 45 minutes and it felt like a cavity search.”

Based on the survey responses, some TSA agents have not been fully trained or may require recurrent training on how to interact with PxWD. One survey participant describes their security experience below.

“In Philadelphia Airport when going through security they tried to make me get out of my manual wheelchair to walk through the body scanner, even though I repeatedly explained that I am not capable of walking without the assistance of my cane! They reasoned that if I could stand up I should at least be able to hold my hands out for a few seconds. I kept trying to explain paraplegia and how I have no balance to stand without assistance but was given such a hard time. Finally I got a pat down after much resistance and skepticism, and again embarrassment!”

Third-party vendors that provide wheelchair assistance were also specifically mentioned by survey participants. Similar to TSA, in some cases, these wheelchair escorts were apparently unfamiliar with how to provide assistance to passengers in wheelchairs. Two responses indicated a potential for bodily harm due to the poor assistance provided. “I have been dumped out of an aisle chair by an attendant who was in a rush.” Another stated, “my friend, who's in a power chair and needs an aisle chair to transport onto the plane, and needs assistance with transferring to an aisle chair, was dropped by the flight attendants who helped him transfer.”

Service assistance includes the use of appropriate equipment, and training to assure that the employees know how to use the equipment respectfully and safely. Figure 33 shows some of the assistive devices that may be used by wheelchair service providers in the airport setting. Challenges related to equipment and training are evidenced by the comment below.

“I needed to be lifted out of my seat. two small women were sent. they were bossy and told me they were going to use a sling but they never used it before and could not figure out how to set it up even. other times waiting on the isle chair has caused delays getting on and long waits to get off.”

Availability of the proper equipment and the need for appropriate training is crucial for adequate service. One recent media article reported that a wheelchair service attendant tied a woman with multiple sclerosis to a wheelchair with a blanket to keep her in place since the proper wheelchair was not originally brought (Miller, 2018).



33c. Aisle Chair (Logmire, 2018)



33b. Transport Chair (Schapiro, 2014)



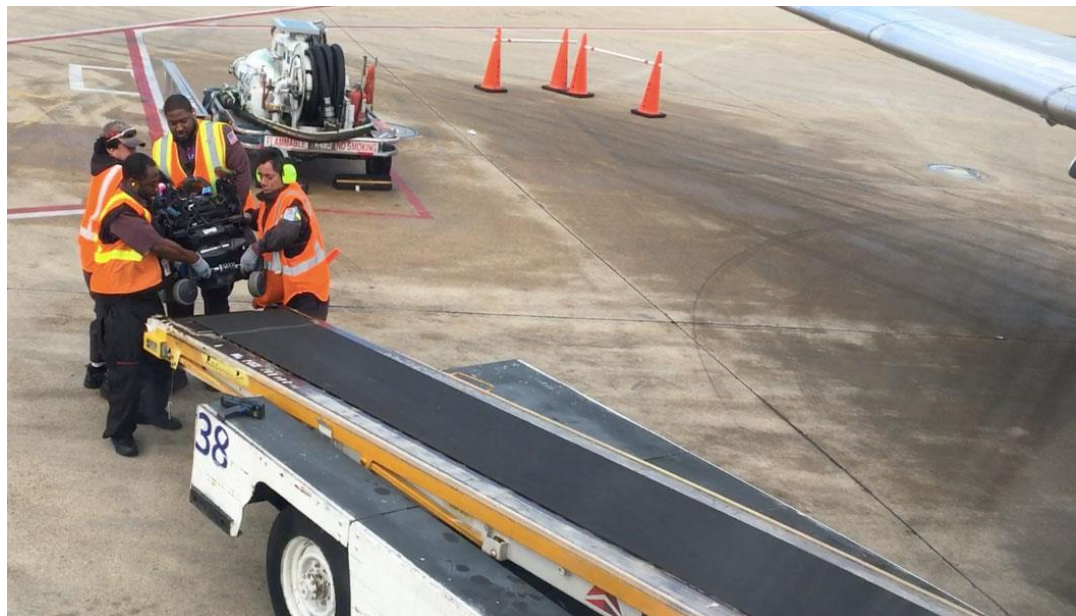
33c. Lift Slings (MidWest Medical Services, n.d.)

*Figure 33.* Types of assistive devices used by service providers

Another survey response stated, “I have had many nightmares with the aisle chairs [Figure 33a]. I am very small, 5'6" 145 pounds. I am strong and still have a hard time with these chairs. The issue is workers.” This comment illustrates that in many cases, when a PxWD transfers to an aisle chair, they are solely reliant on the capabilities of the service professional for safe and adequate assistance.

Reinforcing the concepts discussed in the previous section (4.4.3.1 Loss of or Damage to Wheelchairs), respondents suggested that baggage handlers should have better training and awareness of wheelchairs. “I would like the baggage handlers to be more careful and considerate when handling [*sic*] my chair. They can be rough and carless with it. It should not be treated like the rest of the suitcases.”

Another survey participant said, “staff needs better training about how to stow wheelchairs without damaging them.” The ground crew are responsible for transferring the wheelchair from the terminal to the ramp, loading it into the cargo hold, and properly securing the wheelchair and surrounding objects to assure that no damage occurs during flight. Figure 34 illustrates a power wheelchair being loaded onto the aircraft. In this case, four handlers were needed to safely lift the wheelchair; power wheelchairs can weigh hundreds of pounds. The adequate number of ground personnel may not always be used. Improved training for ground crew could combat the issues surrounding lost and damaged wheelchairs.



*Figure 34.* Photograph of ground crew loading a power wheelchair into an aircraft (Wheelchair Travel, n.d.)

One survey participant suggested training for all airport personnel may be appropriate, “universal training for airline employees on disability rights, regulations, etiquette.” This was echoed by another survey response. “The experience can be very unorganized and the people can be uneducated. More time needs to be spent on educating

employees on how to assist disabled people in the most efficient way.”

One challenge is that the appropriate kind of assistance varies for different PxWD. Since disabilities and the severity of disability can vary from person to person, it is difficult if not impossible to develop a single protocol. One respondent noted, “staff should be trained to ask if passengers need assistance and what type of assistance instead of automatically assuming that they need help.”

Another survey response reinforced this concept, “more awareness training for airport personnel who assist people with disabilities because they don't typically understand different types of disabilities and what to do to assist and they sometimes don't understand the English language.”

In summary, survey respondents suggested that additional training would improve service. Training should be provided for all airline and airport personal that interact with PxWD, as well as security, third-party wheelchair service providers, and baggage handlers.

Recommendations to improve service through training include providing workers with a better understating of disabilities, including an appreciation for the many types of disabilities, as well as techniques for appropriate interaction with PxWD. Training should emphasize the wide range of disabilities and recognize that in many cases each scenario may be unique. In every case, it is appropriate and helpful to talk with the passenger to identify the best plan, based on the abilities of that passenger.

Recommendations for TSA include additional training to make sure all agents are aware of the fact that disabilities vary and some disabilities may be invisible. TSA should not see wheelchair users as an opportunity to train new hires, and should conduct training

and practice “off-line” rather than with real passengers in the terminal who require screening. Properly and fully training new security agents to administer a manual pat down prior to agents being placed in an airport will ensure PxWD are not subjected to improper or discriminatory practices. A dedicated TSA agent on each shift that has the training, experience and capabilities to interact with and respectfully screen wheelchair passengers would reduce inconsistencies, promote safety and ensure that PxWD receive an appropriate manual screening each time they travel.

Recommendations for third-party wheelchair assistants include training that reflects the need for standard protocol, as well as recognition that flexibility may be required to match the service provided with a given passenger’s capabilities. Wheelchair assistants need to be trained in proper lifting techniques to prevent injury for both the passenger and the worker. It may be useful to consider best practices from other sectors, such as personnel that work in the medical field. For example, personnel who work in rehabilitation hospitals are typically well-trained and educated on the best practices for the safe and effective transfer of people into and out of wheelchairs.

Recommendations for baggage handlers should include awareness of the critical need for wheelchairs, how wheelchairs vary from other pieces of luggage, and the importance of loading and storing them securely on the aircraft.

#### 4.4.3.3 Wait Times during the Travel Process

The third most common theme that emerged from the qualitative survey data was long wait times throughout the travel process. All air travelers experience and are frustrated by waiting (Jansen, 2017a); however, survey data reveal that PxWD may experience wait times that exceed the wait times of passengers without a disability.

Survey participants identified security and wheelchair assistance as areas where abnormal wait times are likely to occur.

All passengers must go through TSA security to enter the sterile area of the terminal. As mentioned previously, PxWD may require a manual pat down by a TSA agent, and survey responses indicate that there may be a lengthy wait for an agent to be assigned to perform the manual pat down. “I always wait 10 min to find an extra person to pat me down, then it's always someone who has never done a wheelchair before. I usually average 20min at tsa with my longest time of 45min.” This sentiment was echoed by other respondents.

“My biggest gripe is getting through TSA you have to sit there while they find someone to pat you down there have been times that the agent see me sitting there waiting and atleast 20 mins before they even request a male assistance then another 15-20 mins before someone is available to do it.”

In some cases, wait times may be extended because multiple pat downs were necessary. “Mco Orlando tsa was understaffed but I got patted down 3 times and waited 30 minutes for supervisor to clear me.”

Another problem area with respect to wait time is waiting to get off the aircraft. “Upon returning back to Philadelphia, everyone left (including the crew) leaving my husband and I sitting there alone waiting for the person with the aisle wheelchair to arrive.”

In some cases, an aircraft arriving ahead or behind schedule can impact the provision of service when a PxWD needs to exit the aircraft. “Often the time waiting to deplane is too long; especially when a plane arrives early or late.”

An article that appeared in *The Guardian* highlights this situation. Elizabeth Wright (2017) documented that four passengers who required wheelchair assistance waited an hour and a half on the aircraft. In this case, service was delayed because attendants were busy assisting a delayed aircraft at a neighboring gate.

In some cases, wheelchair service may arrive on time, but a PxWD may be delayed because their wheelchair has not been brought up from the cargo hold. One survey response described this situation,

“I have sat on the plane for an hour after landing waiting for my wheelchair. I refuse to get off the plane without my chair in order to make sure my chair actually comes, lest I get stuck in a corner somewhere.”

Refusing to exit the aircraft until they are sure their wheelchair is available ensures that they are not confined to the aisle chair and “parked” somewhere until their wheelchair is brought up from the baggage hold.

In summary, PxWD are presented with opportunities to experience longer wait times than passengers without disabilities. Wait times often occur at security where PxWD wait for personnel to perform manual pat downs, on the aircraft where PxWD wait for wheelchair service providers to arrive and assist with the boarding and deplaning process, and after the flight where PxWD wait for ground crew to bring personal wheelchairs to the jet bridge.

Recommendations to reduce wait times for PxWD include the identification of reasonable wait times for security, deplaning and the provision of personal wheelchairs after the flight. Currently, the ACAA states service and mobility aids must be brought to PxWD in a timely manner, but does not define timely (as mentioned in section 4.1.2.3

Accessibility Services and Accommodations according to 14 CFR 382.95 and 14 CFR 382.125). Just as there are clearly-defined limits and fines for passenger delays when aircraft wait on the tarmac, there should be clearly defined limits and fines when delays for PxWD exceed the delays experienced for other passengers (US Department of Transportation, 2015). In some cases, recommendations overlap and may address multiple concerns. The provision of additional training for TSA agents dedicated to assist PxWD, as mentioned in the previous section (4.4.3.3 Wait Times during the Travel Process), may address concerns related to both wait times and improper manual pat down techniques.

#### 4.4.3.4 Issues Related to the Aircraft

The fourth most-cited concern was related to issues found surrounding the aircraft. The main aircraft issues for PxWD consisted of access to the aircraft lavatory and immovable armrests.

As mentioned in section 4.1.2.2 Aircraft Accessibility Requirements, all aircraft are not required to have accessible restrooms. One survey participant stated, “People who use wheelchairs should be able to get up and use the bathrooms on airplanes just like every other passenger.” The lack of restroom accessibility is exacerbated by current procedures which require that PxWD are the first on and last off the aircraft. “First on the place [*sic*] last off is terrible for those of us who have bladder control issues and can't use the plane bathrooms safely.” This may be further exacerbated by excessive wait times for the provision of an aisle chair or the return of the personal wheelchair as mentioned in the previous section (4.4.3.3 Wait Times during the Travel Process).

A recent story in the *Daily Mail* details an incident on an Emirates flight in which a paralyzed person crawled to the restroom (Kelly, 2018). While crawling to the restroom, the flight attendants told the PxWD to wait to use the restroom because their actions were making other flyers uncomfortable. The PxWD responded, “the only reason that should make the other passengers uncomfortable is because it would show them that the airline that they are travelling with doesn't have adequate provisions for disabled people” (Kelly, 2018).

Immovable armrests also present an access issue for PxWD. This again was a topic discussed in section 4.1.2.2 Aircraft Accessibility Requirements, with the ACAA mandating moveable armrests for new aircraft; older aircraft receive an exemption from this and only need to install moveable armrests when seats are replaced. Older aircraft are still in service, making this an issue for PxWD. “Too many planes no longer have armrests that go up, so I require a 2-man lift.” One survey response states some airlines are friendlier toward PxWD.

“American and Southwestern are great for putting us wheelchair people in the front. I literally can roll on an airplane without an aisle chair. However, delta is the opposite. All their commuter jets have armrests that do not come up. So I'm forced to have someone give me a 2man lift in after they take my to the appropriate aisle in a straight-back.”

This comment may provide insight into how Southwest accommodates PxWD and may reflect one reason why Southwest had the lowest overall disability-related complaints, as discussed in Research Question 3 (section 4.3).

Another survey participant mentioned that the front row works best for them, however, aircraft changes that impact seat assignments may result in assignments that are not appropriate for PxWD.

“Although I had booked our flight many weeks in advance to allow us to get the front row seating, when we had to change planes, no consideration was given to us. We were put in the very back of the plane. My son was lifted into a small aisle seat and then another passenger was supposed to climb over him to get to the window seat. When it was time to deplane, my husband had to stand on the seat behind my son to lift him out, as the seat arm did not move and we couldn't get my son transferred out into an aisle chair to leave the plane”

Recommendations to improve service on the aircraft for PxWD include aircraft design that accommodates an on-board aisle chair during flight, as is currently required on aircraft with two aisles. An on-board aisle chair with properly trained flight attendants would allow PxWD to access restrooms in flight, and may reduce wait times for PxWD once they have arrived at the gate after the flight is over.

Another recommendation is to install movable arm rests on selected seats in aircraft with immovable armrests, and give priority for these seats to PxWD. This will limit the need for two-man lifts, which are difficult in confined spaces and may be especially challenging when PxWD are larger or heavier. A third recommendation is to provide training for two-man lifts to ensure safety for PxWD and workers.

#### 4.4.3.5 Positive Experiences during Air Travel

Not all the comments made by survey participants were negative. The fifth most common code category reflected positive experiences for PxWD during air travel. This

category captured positive travel experiences such as, “most employees have a helpful attitude and are kind and courteous. I appreciate that.” As for all travelers, situations that are less than ideal may be more tolerable if they are accompanied by considerate employees.

In some cases, international travel experiences suggest that there may be best practices elsewhere that could be adopted to improve travel in the US.

“I have had very good experiences in Europe. In the United States my experience has varied from airport to airport. In Europe there is usually a complimentary attendant with a luggage cart that helps with the airport experience from the curb to the gate. I have not found this help in the United States. This kind of service would be welcomed.”

Another survey participant described how the proper assistance can improve the travel experience and reduce wait time.

“I’ve experienced both the best and worst treatment at airports. The best: For connection at deGalle Airport in Paris, I was met at the arrival gate by an Air France representative and accompanied through the various security lines to my next gate. What would’ve taken me more than an hour to do on my own, took less than half an hour with her assistance.”

The examples of positive experiences and the opportunities for exceptional service can vary dramatically, as illustrated by this comment from a PxWD returning from a trip abroad.

“When I first got to the US I had forgotten to resupply my bathroom supplies from my checked luggage when I got off the plane from Australia. While

boarding the flight to Chicago the airline went above and beyond to go through the luggage compartment to search for my bag. The pilot was even in the cargo hold searching. This was an exceptional thing to do and by no means expected by myself.”

Some of the positive experiences contradict experiences previously discussed. For example, even security can be a positive experience. “TSA usually pulls my family and I to the front for screening and often I've been seated in bulkhead or first class (drinks n snacks, yeah) with zero problem.” Reassignment to first class was mentioned by other survey participants as well, “I normally get an upgrade to first class, if there is an unoccupied seat.”

Two survey respondents mentioned that service has improved over the years. “I am a quadriplegic and use a power chair. Airline travel has become more disability friendly and overall much improved since the 1990's”. This positive trend is reinforced by a comment from another survey participant, “the people who bring the aisle chair onto the plane and take me on and off of the plane are being much better trained and have a good attitude than in the past.”

In summary, although survey respondents indicated there are areas in which service should be improved, survey responses also documented positive experiences, and in some cases suggest that service has gotten better over time. Recommendations from this category of positive experiences suggest that air travel need not be negative. The industry can learn from the best practices of domestic and international airlines and airports, and the identification and implementation of best practices can result in better service for PxWD.

#### 4.4.4 Discussion

A qualitative descriptive analysis was performed on 139 unique text responses from wheelchair users asking them to describe their air travel experiences. The top five themes were discussed in greater detail and include the following:

- Loss of or damage to wheelchairs,
- Training needed for employees who interact with PxWD,
- Wait times during the travel process,
- Issues related to the aircraft,
- Positive experiences.

The occurrence of these themes was validated through a word count (Table 9). Further validation of these qualitative findings was provided by a question (Q3) in which participants rated each segment of the air travel experience on a 5-point Likert scale (

Table 11) from A to F (A is best). A higher mean score indicates that service was better. Getting through security, boarding the aircraft, and deplaning the aircraft were identified as having the lowest service for PxWD (wheelchair users). This was consistent with the In Vivo coding comments.

Table 11

*Rate Your Travel Experience*

<b>Aspect of Air Travel</b>	<b>Mean</b>	<b>A (4)</b>	<b>B (3)</b>	<b>C (2)</b>	<b>D (1)</b>	<b>F (0)</b>	<b>Total</b>
Parking	2.48	15	28	31	15	0	89
Connection between parking and entering the airport	2.58	15	36	26	12	1	90
Boarding pass acquisition	2.82	23	38	20	8	1	90
Luggage check	2.60	17	37	22	14	1	91
Getting through security <sup>1</sup>	2.15	13	25	22	20	9	89
Traveling through the airport	2.72	20	36	26	5	3	90
Locating elevators and accessible routes	2.31	11	32	27	16	5	91
Boarding the plane	1.80	7	21	24	25	14	91
Service while on the plane	2.63	15	41	24	6	4	90
Getting off the plane	1.65	6	15	28	25	17	91

<sup>1</sup> Phases with the worst service score are shown in red.

Overall, the results of the qualitative analysis indicate that although there may be anecdotal comments that service has improved over the years, there are still many areas in which further improvement is needed. This is evident from both the survey responses discussed in this section, as well as the increasing number of disability-related complaints discussed in Research Question 2 and Research Question 3. The ADA and ACAA are intended to prevent discrimination during air travel and create a consistent level of service PxWD can expect from any airport and airline in the National Airspace System.

#### 4.4.5 Limitations

The survey was administered online and survey participants were recruited through personal contacts, at disability expos, and at wheelchair sporting events, which may introduce sample bias since respondents may represent a more active and physically agile group of individuals. The people who complete the survey may be able to manage situations that other PWD cannot manage, and the people surveyed may not be as vulnerable as the users who filed ADA and ACAA complaints identified in the DOT reports. As a result, results may not adequately represent the functional range and perceptions of all wheelchair users. Additionally, descriptive and In Vivo analysis techniques were used, however it is possible researcher sample bias could have been introduced.

#### 4.4.6 Summary of Findings

Qualitative analysis of open-ended responses highlights the challenges faced by PxWD and the wide range in service experienced by PxWD. The ACAA and ADA are in place to ensure a consistent service is provided that is equivalent to the service provided to all passengers, however; some comments suggest there are areas that need

improvement, including security screening practices, and support services provided when boarding the aircraft and deplaning the aircraft. Additional or more substantive employee training could potentially improve service for these activities. Training would be appropriate for employees who interact directly with PxWD or handle their mobility aids.

## **CHAPTER 5. CONCLUSION, DISCUSSION, AND RECOMMENDATIONS**

Chapter Four provided a detailed analysis of disability-related complaint data presented in DOT reports and qualitative responses by wheelchair users. This chapter presents a summary of the study, a discussion of findings, study limitations, and recommendations for future research.

### **5.1 Summary of Study and Discussion**

The objective of this research was to investigate the provision of air service for PxWD. This included investigation of the regulations that affect commercial air travel for airports and airlines, an examination of disability-related complaints, specifically the number and rate of these complaints compared to complaints for all travelers, and an assessment of passenger service for PxWD based on a survey.

All passengers follow the same basic progression (Figure 17) of activities during air travel; however, the experience for PxWD and passengers without disabilities can vary. To protect PxWD against discrimination, airports and airlines must follow regulations. During commercial air travel, PxWD interact in three operational environments: the airport facility, the aircraft (which is the responsibility of the airline), and security (which is the responsibility of TSA). Airport, airline, and security personnel each have to comply with regulatory standards and are responsible for different components of the travel process (Figure 22). Accessibility of airport facilities is primarily under the jurisdiction of DOJ pursuant to the ADA. The service provided by air carriers is primarily under the jurisdiction of the DOT pursuant to the ACAA (Briggs, 2013). Security measures are controlled and administered by the TSA (

Table 2).

Examination of complaint data filed with the DOT was used to investigate trends within the aviation industry. Results indicated that service for PxWD is not equivalent to service for all passengers and service does vary among airlines. Trends for the industry reveal that annual complaint totals and the normalized complaint rate for all consumers and for PxWD is increasing (shown in Table 5 and Figure 24). Consumer complaints peaked in 2015, reaching a high in terms of complaints (19,633) as well as complaint rate (2.19 complaints per 100,000 passengers). Disability-related complaints have continued to increase each year, with the highest number of complaints and the highest complaint rate reported in 2016 (32,445 complaints, 144.30 complaints per 100,000 PxWD). Most striking is the fact that the disability complaint rate is an order of magnitude higher than the complaint rate for all passengers. There are 144 complaints per 100,000 PxWD compared to 1.86 consumer complaints per 100,000 passengers.

Complaint trends for the largest airlines were examined and ANOVA statistical analysis was used to determine if the differences in disability complaints among airlines are statistically significant. The normalized disability complaint rate for each airline was analyzed (Figure 28). Statistical significance was calculated to determine the impact of changes over time (year) for the different airlines. Results suggested that United had the highest rate of disability complaints per 100k passengers over the seven years examined and Southwest had the lowest rate; the difference in complaint rates was statistically significant, providing evidence that service for PxWD varies by airline.

A qualitative descriptive analysis was performed using survey responses from PxWD who are wheelchair users. The survey included multiple choice questions, Likert scale questions, and open-ended questions, and asked participants to describe their air

travel experiences. The top five themes that emerged from respondents include the following:

- Loss of or damage to wheelchairs.
- The need for additional training for employees who interact with PxWD, including airline and airport personal, security, third-party wheelchair service providers, and baggage handlers.
- Excessive wait times throughout the travel journey, including wait time at security, wait time for wheelchair service on the aircraft, wait time for assistance during boarding, and wait time for ground crew to bring personal wheelchairs to the jet bridge.
- Aircraft issues such as a lack of access to the aircraft lavatory and immovable armrests.
- Positive experiences including comments that acknowledgement employees who are helpful, kind and courteous.

## 5.2 Conclusions

The results of this research suggest that PxWD do not receive equivalent service as passengers without a disability, and further suggest that the level of service provided by different airlines is statistically different, based on analysis of complaints. Southwest Airlines had the best service, based on complaints, and the service provided was better than the service provided by American Airlines, Delta Air Lines, JetBlue Airways, and United Airlines. JetBlue and United reported the highest complaint rates among the airlines analyzed, a finding which was statistically-significant. Major areas of concern for

wheelchair users include security, boarding and deplaning the aircraft, and the need for additional training for personnel who interact with PxWD.

The ACAA and ADA were enacted to ensure consistent and reliable service by all airlines and in all airports. Based on this analysis, the current service does not appear to meet the needs of PxWD. The FAA Reauthorization Act of 2018 does address service for PxWD, and as this regulation is addressed by future policies, perhaps the service inadequacies can be addressed and mitigated.

### 5.3 Limitations

The study had a number of limiting factors. First, the level of detail regarding complaint data is limited to the information provided by the DOT in the *Air Travel Consumer Report* and the *Annual Report on Disability-Related Air Travel Complaints*. It is unknown what the percentage of commercial airline passengers are aware of their ability to file a complaint.

The reason for the increasing number and rate of complaints for PxWD is unknown and may be due to factors such as diminished service which discourages PxWD from travelling, increased service expectations by PxWD, greater awareness of how to file a complaint, or an increasing number of PxWD utilizing commercial air service. The potential impact of these factors is difficult to measure and cannot be assessed in this analysis.

There were also limitations associated with the survey. Survey results are based on convenience sample techniques. Surveys were predominately distributed through personal contacts, at disability expos, and at wheelchair sporting events. Disability expos and wheelchair sporting events may introduce sample bias since respondents may

represent a more active and physically agile group of individuals. These individuals may be able to accommodate situations that other PxWD cannot manage. As a result, the people surveyed may not represent the entire population of PWD or PxWD. The sample of survey respondents may not represent the population of PxWD who filed ADA and ACAA complaints and may not represent the functional range and perceptions of all wheelchair users.

A structured approach and a qualitative management software were used to analyze survey responses, however, qualitative research pertaining to narratives and text responses lends itself to the potential of researcher bias. Researcher bias can result from selective recording of information and allowing personal views to affect data interpretation.

A final limitation is that PWD may choose not to travel by air due to real and perceived obstacles. This would result in latent demand, and as a result, a survey of actual PxWD would underrepresent the challenges PxWD face. As a result of these and other limitations, this research may not fully capture all of the issues PxWD face while traveling via commercial air.

#### 5.4 Recommendations for Practice

An examination of disability-related complaint data reveals that the majority of complaints are attributed to the wheelchair category (Figure 9 through Figure 12), and for selected airlines (e.g., Delta Air Lines and United Airlines), this category represents over 60% of total complaints. Strategic improvements to service for wheelchair users will not only help PxWD, but will also have a significant impact on all disability-related

complaints. Since Southwest Airlines has the fewest complaints and the lowest complaint rate, an examination of the service procedures and practices provided by Southwest Airlines may be valuable. Based on the information provided by Southwest's website, the work environment created by Southwest and importance of core values (Southwest, 2018a) may influence the customer service for PxWD. Identifying the best practices for PxWD would be beneficial for PxWD, as well as the airline industry.

Survey results identified the specific service components that can be addressed to improve service for PxWD. Airline and airport operators that target improved procedures in these areas (wheelchair damage, timely service, aircraft accessibility) are likely to see an overall improvement in service for PxWD and a correlating reducing in complaints.

### 5.5 Recommendations for Future Studies

This research successfully answered the research questions being investigated; however, the research identified additional research questions for future investigation. Recommendations for future research include the following:

- 1.) Specific problem areas for PxWD were identified. Research regarding the best practices and improvements to operational procedures and practices for security, traveling through the airport, assistance boarding the aircraft, and ground crew handling of wheelchairs will provide greater insight regarding where problems occur and how they can be potentially mitigated from the perspective of the airport, airline, and security.
- 2.) The disability-related complaint rate for selected airlines varied. Additional examination of the practices for individual airlines with a focus on policy and

procedures for compliance with the regulations in the ACAA and ADA could help identify best practices for the industry.

- 3.) This research focused on complaints for airlines. Additional research is recommended to investigate the complaints for airports, specifically if different airports have a different number and rate of complaints for PxWD. Airport characteristics, such as number of enplanements and passenger demographics served may, impact the number and rate of complaints. For example, Florida airports may have more complaints if the passenger demographics they serve include more passengers over age 65.
- 4.) This research utilized an online survey. Additional research is recommended to utilize interviews and focus groups that allow follow-up questions and exploration regarding specific comments. This would provide a stronger context and better understanding of the challenges PxWD face during air travel.
- 5.) This research focused on wheelchair users, one subset of the community of PWD. Similar studies focusing on other disability types would also be valuable, including research regarding the deaf, blind and visually-impaired, and people who may have invisible disabilities such as autism.
- 6.) This research focused on service in the US under US regulations and policy. Additional research is recommended to investigate service in other countries under other regulations. Best practices that are based on a variety of countries will identify the best of global practices, and advance the service provided to PxWD. Service in foreign airports, as well as service by foreign carriers should be examined to determine if there are more effective strategies that better serve

PxWD elsewhere in the world. An examination of practices in Europe under the regulations of the European Aviation Safety Agency may be a good place to start.

## REFERENCES

- ADA National Network. (n.d.). What is the definition of disability under the ADA?  
Retrieved from <https://adata.org/faq/what-definition-disability-under-ada>
- Ahram, A. (2009). The challenges of conceptual stretching in multi-method research. *Newsletter of the American Political Science Association Organized Section for Qualitative and Multi-Method Research*, 7(2).
- Airlines for America. (2016a). Status of air travel in the USA. Retrieved from <http://airlines.org/wp-content/uploads/2016/04/2016Survey.pdf>
- Airlines for America. (2016b). US airline mergers and acquisitions. Retrieved from <http://airlines.org/data/u-s-airline-mergers-and-acquisitions/>
- Allen, I. E., & Seaman, C. A. (2007). Likert scales and data analyses. *Quality Progress*, 40(7), 64–65.
- Aviation and Transportation Security Act (2001). 107d Congress.
- Biernacki, P., & Waldorf, D. (1981). Snowball sampling: Problems and techniques of chain referral sampling. *Sociological Methods and Research*, 10(2), 141–163.
- Bizjak, B., Knežević, M., & Cvetrežnik, S. (2011). Attitude change towards guests with disabilities: Reflections from tourism students. *Annals of Tourism Research*, 38(3), 842–857. <https://doi.org/10.1016/j.annals.2010.11.017>
- Brault, M. W. (2012). Americans with disabilities: 2010. *Current Population Reports*. Retrieved from <http://www.census.gov/prod/2012pubs/p70-131.pdf>
- Briggs, J. (2013). Accommodation of individuals with disabilities at commercial service airports. *TransLaw*. Retrieved from <http://assets.listpilot.net/acina/files/TransLawWinter2013.pdf>

- Bureau of Transportation Statistics. (2018). Passengers. Retrieved from [http://www.transtats.bts.gov/Data\\_Elements.aspx?Data=1](http://www.transtats.bts.gov/Data_Elements.aspx?Data=1)
- Burnett, J. J., & Baker, H. B. (2001). Assessing the travel-related behaviors of the mobility-disabled consumer. *Journal of Travel Research*, 40(1), 4–11. <https://doi.org/10.1177/004728750104000102>
- Centers for Disease Control and Prevention. (2015). Key findings: Prevalence of disability and disability type among adults in the US. Retrieved from <http://www.cdc.gov/ncbddd/disabilityandhealth/features/key-findings-community-prevalence.html>
- Central Bureau of Statistics. (n.d.). Uses of Census data. Retrieved from [http://www.cbs.gov.il/census/census/pnimi\\_sub\\_page\\_e.html?id\\_topic=1&id\\_subtopic=5](http://www.cbs.gov.il/census/census/pnimi_sub_page_e.html?id_topic=1&id_subtopic=5)
- Chan, H. (2010). *Hotel customer needs, satisfaction, and loyalty: Analysis of travels with disabilities in Taiwan*. Texas Tech University Libraries. Retrieved from [https://ttu-ir.tdl.org/ttu-ir/bitstream/handle/2346/45285/CHAN\\_HO-KAI\\_Diss.pdf?sequence=1&isAllowed=y](https://ttu-ir.tdl.org/ttu-ir/bitstream/handle/2346/45285/CHAN_HO-KAI_Diss.pdf?sequence=1&isAllowed=y)
- Chang, Y.-C., & Chen, C.-F. (2011). Identifying mobility service needs for disabled air passengers. *Tourism Management*, 32, 1214–1217. <https://doi.org/10.1016/j.tourman.2010.11.001>
- Chang, Y.-C., & Chen, C.-F. (2012a). Meeting the needs of disabled air passengers: Factors that facilitate help from airlines and airports. *Tourism Management*, 33, 529–536. <https://doi.org/10.1016/j.tourman.2011.06.002>

- Chang, Y.-C., & Chen, C.-F. (2012b). Overseas travel choice for persons with reduced mobility. *Journal of Air Transport Management*, 20, 43–45. <https://doi.org/10.1016/j.jairtraman.2011.11.005>
- Christopher and Dana Reeve Foundation. (n.d.). Picking the right wheelchair. Retrieved from <https://www.christopherreeve.org/living-with-paralysis/wheelchairs/how-to-pick-the-right-wheelchair-for-you>
- Colby, S. L., & Ortman, J. M. (2014). *The baby boom cohort in the United States: 2012 to 2060*. Retrieved from <https://www.census.gov/prod/2014pubs/p25-1141.pdf>
- Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory Into Practice*, 39(3). Retrieved from <http://www.jstor.org/stable/pdf/1477543.pdf>
- Cronbach, L., & Meehl, P. (1955). Construct validity in psychological tests. *Psychological Bulletin*, 129(1), 281–302. <https://doi.org/10.1037/h0040957>
- Cullen, E. (2016). Disabled man missed flight home after no one came to help him onto plane. Retrieved from <http://www.nottinghampost.com/disabled-man-missed-flight-home-after-no-one-came-to-help-him-onto-plane/story-29987117-detail/story.html>
- Darcy, S. (2012). (Dis)embodied air travel experiences: Disability, discrimination and the affect of a discontinuous air travel chain. *Journal of Hospitality and Tourism Management*, 19(1), 91–101. <https://doi.org/10.1017/jht.2012.9>
- Edinburgh Airport. (n.d.). Special assistance. Retrieved from <http://www.edinburghairport.com/prepare/special-assistance>
- Erickson, W. A., & Lee, C. G. (2005). *Disability statistics from the decennial census 2000*. Ithaca, NY. Retrieved from [www.disabilitystatistics.org](http://www.disabilitystatistics.org)

- Erickson, W., Lee, C., & von Schrader, S. (2017). *Disability statistics from the American Community Survey (ACS)*. Ithaca, NY. Retrieved from [www.disabilitystatistics.org](http://www.disabilitystatistics.org)
- Federal Aviation Administration. (2016). FAA aerospace forecast: Fiscal years 2016-2036. Retrieved from [https://www.faa.gov/data\\_research/aviation/aerospace\\_forecasts/media/FY2016-36\\_FAA\\_Aerospace\\_Forecast.pdf](https://www.faa.gov/data_research/aviation/aerospace_forecasts/media/FY2016-36_FAA_Aerospace_Forecast.pdf)
- Fleming, A. (2017). How to request a wheelchair or cart at the airport. Retrieved from <https://www.tripsavvy.com/how-to-request-wheelchair-at-airport-53205>
- Fox News. (2017). Disabled reporter blasts Easyjet after being stranded on plane without wheelchair assistance. *Fox News*. Retrieved from <http://www.foxnews.com/travel/2017/01/11/disabled-reporter-blasts-easyjet-after-being-stranded-on-plane-without-wheelchair-assistance.html>
- Golgowski, N. (2016). Video shows airport security tackling cancer patient with disability. Retrieved from [https://www.huffingtonpost.com/entry/cancer-patient-tackled-by-tsa\\_us\\_57acc5fde4b007c36e4d9e3b](https://www.huffingtonpost.com/entry/cancer-patient-tackled-by-tsa_us_57acc5fde4b007c36e4d9e3b)
- Government Publishing Office. (2018). Part 382: Nondiscrimination on the basis of disability in air travel. Retrieved from [https://www.ecfr.gov/cgi-bin/text-idx?SID=12016711a0de2b68744d644d46daf8a4&mc=true&node=pt14.4.382&rgn=div5#se14.4.382\\_145](https://www.ecfr.gov/cgi-bin/text-idx?SID=12016711a0de2b68744d644d46daf8a4&mc=true&node=pt14.4.382&rgn=div5#se14.4.382_145)
- Gray, M., & Roth, S. (2015). United apologizes after disabled man crawls off flight. Retrieved from <http://www.cnn.com/2015/10/25/us/united-airlines-disabled-man/>
- Gursoy, D., Chen, M.-H., & Kim, H. J. (2005). The US airlines relative positioning based on attributes of service quality. *Tourism Management*, 26, 57–67. <https://doi.org/10.1016/j.tourman.2003.08.019>

H.R.302 FAA Reauthorization Act of 2018 (2018). Retrieved from

<https://www.congress.gov/bill/115th-congress/house->

[bill/302/text?q=%7B%22search%22%3A%5B%22disaster+aid%22%5D%7D&r=7](https://www.congress.gov/bill/115th-congress/house-bill/302/text?q=%7B%22search%22%3A%5B%22disaster+aid%22%5D%7D&r=7)

Hung, K., Petrick, J. F., & O'leary, J. T. (2007). Do we change our travel behaviors as we get older? An investigation on the variations of travel behaviors across different age cohorts. Retrieved from <http://scholarworks.umass.edu/ttra>

International Civil Aviation Organization. (n.d.). About ICAO. Retrieved from

<https://www.icao.int/about-icao/Pages/default.aspx>

International Civil Aviation Organization. (2005). *Annex 9 to the convention on*

*international civil aviation: Facilitation*. Retrieved from [http://www.ifrc.org/docs/IDRL/Chicago Convention Annex 9.pdf](http://www.ifrc.org/docs/IDRL/Chicago%20Convention%20Annex%209.pdf)

International Civil Aviation Organization. (2013). *Manual on access to air transport by persons with disabilities (Doc 9984)*. Retrieved from [https://trid.trb.org/](https://trid.trb.org/view.aspx?id=1265504)

[view.aspx?id=1265504](https://trid.trb.org/view.aspx?id=1265504)

Jansen, B. (2017a). Air travelers frustrated with waiting in lines. Retrieved from

<https://www.usatoday.com/travel/>

Jansen, B. (2017b). Disabled travelers sue DOT for airline info about damaged

wheelchairs. Retrieved from <https://www.usatoday.com/story/news/2017/07/31/disabled-travelers-sue-dot-airline-info-damaged-wheelchairs/527248001/>

Johnson, R. B. (1997). Examining the validity structure of qualitative research. *Education*, 118(2), 282–292.

Kang, A. (2016). Delta introduces innovative baggage tracking process. Retrieved from

<https://news.delta.com/delta-introduces-innovative-baggage-tracking-process-0>

Kelly, C. (2018). Para-athlete told not for to crawl to toilet on Emirates flight. Retrieved from <http://www.dailymail.co.uk/news/article-5576187/Para-athlete-told-unacceptable-crawl-toilet-Emirates-flight.html>

Kim, S., & Lehto, X. Y. (2012). The voice of tourists with mobility disabilities: Insights from online customer complaint websites. *International Journal of Contemporary Hospitality Management*, 24(3), 451–476. Retrieved from <http://dx.doi.org/10.1108/09596111211217905>

Kim, W. G., Stonesifer, H. W., & Han, J. S. (2012). Accommodating the needs of disabled hotel guests: Implications for guests and management. *International Journal of Hospitality Management*, 31, 1311–1317. <https://doi.org/10.1016/j.ijhm.2012.03.014>

Kleinbaum, D., Kupper, L., Nizam, A., & Rosengern, E. (2014). *Applied regression analysis and other multivariable methods* (5th ed.). Boston: Cengage Learning.

Kraus, L. (2017). *2016 Disability statistics annual report*. Durham, NH. Retrieved from [https://disabilitycompendium.org/sites/default/files/user-uploads/2016\\_AnnualReport.pdf](https://disabilitycompendium.org/sites/default/files/user-uploads/2016_AnnualReport.pdf)

Laerd Statistics. (2018a). Two-way mixed ANOVA: Determining if your data has outliers. Retrieved from <https://statistics.laerd.com/premium/spss/twma/two-way-mixed-anova-in-spss-9.php>

Laerd Statistics. (2018b). Two-way mixed ANOVA: Normality checking based on residuals. Retrieved from <https://statistics.laerd.com/premium/spss/twma/two-way-mixed-anova-in-spss-16.php>

- Laerd Statistics Premium. (2018). Two-way ANOVA. Retrieved from <https://statistics.laerd.com/premium/spss/twa/two-way-anova-in-spss.php>
- Leech, N. L., & Onwuegbuzie, A. J. (2011). Beyond constant comparison qualitative data analysis: Using NVivo. *School Psychology Quarterly*, 26(1), 70–84.  
<https://doi.org/10.1037/a0022711>
- Legacy Now. (n.d.). *Accessible tourism market research summary*. Retrieved from [2010legaciesnow.com/accessible\\_tourism/](http://2010legaciesnow.com/accessible_tourism/)
- Logmire, S. (2018). Dear airlines: You're making wheelchair users terrified of flying. Retrieved from <http://spintheglobe.net/dir/2018/04/11/airlines-making-wheelchair-users-terrified-flying/>
- Marshall, M. (1996). Sampling for qualitative research. *Family Practice*, 13(3), 225–231.
- MidWest Medical Services. (n.d.). Patient lift. Retrieved from [https://midwest-medical.com/product\\_catalog/patient-lift-sling/](https://midwest-medical.com/product_catalog/patient-lift-sling/)
- Miller, J. (2018). Delta apologizes after woman with MS is tied to wheelchair. Retrieved from <https://nypost.com/2018/04/25/delta-apologizes-for-tying-woman-with-ms-to-wheelchair/>
- National Council on Disability. (1999). Enforcing the Civil Rights of air travelers with disabilities: Recommendations for the Department of Transportation and Congress. Retrieved from [http://www.ncd.gov/rawmedia\\_repository/3213b13f\\_6e73\\_47d5\\_a29c\\_65893fa2ee63.pdf](http://www.ncd.gov/rawmedia_repository/3213b13f_6e73_47d5_a29c_65893fa2ee63.pdf)
- Nir, S. (2012). A few passengers use wheelchairs to avoid airport lines. Retrieved from <https://www.nytimes.com/2012/10/04/nyregion/a-few-passengers-use-wheelchairs-to-avoid-airport-lines.html>

- Norris, R. (2016). Ex-marathon runner paralysed in freak accident has £20k wheelchair destroyed by careless baggage handlers. Retrieved from <https://www.disabledgo.com/blog/2016/01/ex-marathon-runner-paralysed-in-freak-accident-has-20k-wheelchair-destroyed-by-careless-baggage-handlers/#.Wui3T4jwbD5>
- Ortman, J. M., Velkoff, V. A., & Hogan, H. (2014). An aging nation: The older population in the United States current population reports.
- Pannucci, C. J., & Wilkins, E. G. (2010). Identifying and avoiding bias in research. *Plastic and Reconstructive Surgery*, 126(2), 619–25. <https://doi.org/10.1097/PRS.0b013e3181de24bc>
- Patterson, M. (2018). For some disabled travelers, getting around OKC's airport can be a problem. Retrieved from <http://www.aviationpros.com/news/12389425/for-some-disabled-travelers-getting-around-okcs-airport-can-be-a-problem>
- Pearson-Jones, B. (2018). Grandmother, 81, and son, 53, kicked off two Ryanair flights after staff can't fold wheelchair. Retrieved from <https://www.dailymail.co.uk/news/article-6123537/Grandmother-81-son-53-kicked-TWO-Ryanair-flights-staff-fold-wheelchair.html>
- Rutherford, F. (2017). Disabled people say they are being left stranded on trains, planes, and buses. Retrieved from [https://www.buzzfeed.com/fionarutherford/disabled-people-say-they-are-being-left-stranded-on-trains-p?utm\\_term=.fyGqv3g6k#.mcRQmXRze](https://www.buzzfeed.com/fionarutherford/disabled-people-say-they-are-being-left-stranded-on-trains-p?utm_term=.fyGqv3g6k#.mcRQmXRze)

- Schapiro, R. (2014). Airport wheelchair agents will get less than minimum wage, contractor tells workers. Retrieved from <http://beta.nydailynews.com/new-york/airport-wheelchair-agents-minimum-wage-article-1.1589656>
- SKYbary. (2017). ICAO annexes and doc series. Retrieved from [https://www.skybrary.aero/index.php/ICAO\\_Annexes\\_and\\_Doc\\_Series](https://www.skybrary.aero/index.php/ICAO_Annexes_and_Doc_Series)
- Southwest. (2018a). Culture. Retrieved from <https://careers.southwestair.com/culture>
- Southwest. (2018b). Customers with disabilities. Retrieved from <https://www.tsa.gov/news/releases/2011/12/22/tsa-announces-launch-tsa-cares-toll-free-helpline-travelers-disabilities>
- Southwest. (2018c). About Southwest. Retrieved from [https://www.southwest.com/html/about-southwest/index.html?clk=GFOOTER-ABOUT-CUSTOMER-COMMITMENTS#\\_tab\\_6](https://www.southwest.com/html/about-southwest/index.html?clk=GFOOTER-ABOUT-CUSTOMER-COMMITMENTS#_tab_6)
- Temecula Municipal Code. (n.d.). Parking facility layout and dimensions. Retrieved from [https://qcode.us/codes/temecula/view.php?topic=17-17\\_24-17\\_24\\_050](https://qcode.us/codes/temecula/view.php?topic=17-17_24-17_24_050)
- Transportation Security Administration. (n.d.-a). Civil Rights. Retrieved from <https://www.tsa.gov/travel/passenger-support/civil-rights>
- Transportation Security Administration. (n.d.-b). Disabilities and medical conditions. Retrieved from <https://www.tsa.gov/travel/special-procedures>
- Transportation Security Administration. (n.d.-c). Passenger support. Retrieved from <https://www.tsa.gov/travel/passenger-support>

Transportation Security Administration. (2001). TSA announces launch of TSA Cares

toll free helpline for travelers with disabilities and medical needs. Retrieved from

[https://www.tsa.gov/news/releases/2011/12/22/tsa-announces-launch-tsa-cares-toll-](https://www.tsa.gov/news/releases/2011/12/22/tsa-announces-launch-tsa-cares-toll-free-helpline-travelers-disabilities)

[free-helpline-travelers-disabilities](https://www.tsa.gov/news/releases/2011/12/22/tsa-announces-launch-tsa-cares-toll-free-helpline-travelers-disabilities)

Transportation Security Administration. (2016a). Have a question? Now you can Ask

TSA on Facebook. Retrieved from [https://www.tsa.gov/blog/2016/07/07/have-](https://www.tsa.gov/blog/2016/07/07/have-question-now-you-can-ask-tsa-facebook)

[question-now-you-can-ask-tsa-facebook](https://www.tsa.gov/blog/2016/07/07/have-question-now-you-can-ask-tsa-facebook)

Transportation Security Administration. (2016b). TSA hosts 14th annual disability and

multicultural coalition conference. Retrieved from <https://www.tsa.gov/news>

[/releases/2016/09/20/tsa-hosts-14th-annual-disability-and-multicultural-coalition-](https://www.tsa.gov/news/releases/2016/09/20/tsa-hosts-14th-annual-disability-and-multicultural-coalition-conference)

[conference](https://www.tsa.gov/news/releases/2016/09/20/tsa-hosts-14th-annual-disability-and-multicultural-coalition-conference)

United Spinal Association. (2017). Member has wheelchair heavily damaged by airlines:

Twice in one year! Retrieved from [https://www.unitedspinal.org/wheelchair-](https://www.unitedspinal.org/wheelchair-heavily-damaged-by-airlines/)

[heavily-damaged-by-airlines/](https://www.unitedspinal.org/wheelchair-heavily-damaged-by-airlines/)

US Access Board. (n.d.-a). About the US Access Board. Retrieved from

<https://www.access-board.gov/the-board>

US Access Board. (n.d.-b). About this guide. Retrieved from [https://www.access-](https://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-standards/guide-to-the-ada-standards/about-this-guide)

[board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-](https://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-standards/guide-to-the-ada-standards/about-this-guide)

[standards/guide-to-the-ada-standards/about-this-guide](https://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-standards/guide-to-the-ada-standards/about-this-guide)

US Census Bureau. (2016). SIPP introduction and history. Retrieved from

<https://www.census.gov/programs-surveys/sipp/about/sipp-introduction-history.html>

US Census Bureau. (2018). About the American Community Survey. Retrieved from

<https://www.census.gov/programs-surveys/acs/about.html>

US Department of Justice. (2009). Americans with Disabilities Act of 1990, as Amended.

Retrieved from <https://www.ada.gov/pubs/adastatute08.htm>

US Department of Justice. (2010). Guidance on the 2010 ADA Standards for Accessible

Design. Retrieved from <https://www.ada.gov/regs2010/2010ADASTandards/>

Guidance\_2010ADASTandards.pdf

US Department of Justice. (2012). *2010 ADA Standards for Accessible Design*. Retrieved

from <https://www.ada.gov/regs2010/2010ADASTandards/2010ADAstandards.htm>

US Department of Transportation. (n.d.). Nondiscrimination on the basis of disability in

air travel. Retrieved from <http://airconsumer.dot.gov/rules/382short.pdf>

US Department of Transportation. (2004). *Processing accommodation requests for*

*people with disabilities*. Retrieved from [https://www.faa.gov/documentlibrary/](https://www.faa.gov/documentlibrary/media/order/1400.12.pdf)

media/order/1400.12.pdf

US Department of Transportation. (2011). Delta fined for violating rules protecting air

travelers with disabilities. Retrieved from [https://www.transportation.gov/briefing-](https://www.transportation.gov/briefing-room/delta-fined-violating-rules-protecting-air-travelers-disabilities)

room/delta-fined-violating-rules-protecting-air-travelers-disabilities

US Department of Transportation. (2013a). DOT fines US Airways for failure to provide

wheelchair assistance to passengers with disabilities. Retrieved from

[https://www.transportation.gov/briefing-room/dot-fines-us-airways-failure-provide-](https://www.transportation.gov/briefing-room/dot-fines-us-airways-failure-provide-wheelchair-assistance-passengers-disabilities)

wheelchair-assistance-passengers-disabilities

US Department of Transportation. (2013b). *Standards and procedures essential for*

*ensuring access to airport facilities by persons with disabilities*. Retrieved from

<https://www.faa.gov/documentLibrary/media/Order/1400.9A.pdf>

- US Department of Transportation. (2015). New DOT consumer rule limits airline tarmac delays, provides other passenger protections. Retrieved from <https://www.transportation.gov/briefing-room/new-dot-consumer-rule-limits-airline-tarmac-delays-provides-other-passenger>
- US Department of Transportation. (2016a). Air travel consumer reports. Retrieved from <https://www.transportation.gov/airconsumer/air-travel-consumer-reports>
- US Department of Transportation. (2016b). Aviation enforcement orders. Retrieved from [https://www.transportation.gov/airconsumer/enforcement-orders?term\\_node\\_tid\\_depth=3176&items\\_per\\_page=All](https://www.transportation.gov/airconsumer/enforcement-orders?term_node_tid_depth=3176&items_per_page=All)
- US Department of Transportation. (2016c). *Effects of the tarmac delay rule on flight cancellations and delays*. Retrieved from [https://www.oig.dot.gov/sites/default/files/DOT Tarmac Delay Rule Final Audit%5E10-26-16.pdf](https://www.oig.dot.gov/sites/default/files/DOT%20Tarmac%20Delay%20Rule%20Final%20Audit%5E10-26-16.pdf)
- US Department of Transportation. (2016d). United fined for violating airline disability, tarmac delay rules. Retrieved from <https://www.transportation.gov/briefing-room/united-fined-violating-airline-disability-tarmac-delay-rules>
- US Department of Transportation. (2017). Annual report on disability-related air travel complaints. Retrieved from <https://www.transportation.gov/airconsumer/annual-report-disability-related-air-travel-complaints>
- US Department of Transportation. (2018). Air travel consumer reports. Retrieved from <https://www.transportation.gov/airconsumer/air-travel-consumer-reports>
- Waldrop, J., & Stern, S. (2003). *Disability Status: 2000*. Retrieved from <https://www.census.gov/prod/2003pubs/c2kbr-17.pdf>

- Wall Street Journal. (2010). *TSA pat-down horror stories*. Retrieved from <http://www.wsj.com/video/tsa-pat-down-horror-stories/6362D283-8AC1-4891-9382-7FB871E6B4ED.html>
- Wang, W., & Cole, S. (2014). Perceived onboard service needs of passengers with mobility limitations: An investigation among flight attendants. *Asia Pacific Journal of Tourism Research*, 19(11), 1094–1665.  
<https://doi.org/10.1080/10941665.2013.852116>
- Wheelchair Travel. (n.d.). How to reduce the risk of an airline damaging your wheelchair. Retrieved from <https://wheelchairtravel.org/air-travel/reduce-risk-wheelchair-damage/>
- Wilson, J. (2017). Ryanair asks wheelchair user to walk up stairs, leaves her crying at the gate. Retrieved from <http://www.irishcentral.com/news/ryanair-asks-wheelchair-user-to-walk-up-stairs-leaves-her-crying-at-the-gate>
- Wright, E. (2017). Airports are failing disabled passengers, and we are tired of it. Retrieved from <https://www.theguardian.com/commentisfree/2017/aug/14/airports-failing-disabled-travellers-wheelchair-assistance-paralympic>

## **APPENDIX A – DISABILITY QUESTIONS ASKED IN THE US CENSUS**

- 1.) Does this person have any of the following long-lasting conditions:
  - a. Blindness, deafness, or a severe vision or hearing impairment?
  - b. A condition that substantially limits one or more basic physical activities such as walking, climbing stairs, reaching, lifting, or carrying?
  
- 2.) Because of a physical, mental, or emotional condition lasting 6 months or more, does this person have any difficulty in doing any of the following activities:
  - a. Learning, remembering, or concentrating?
  - b. Dressing, bathing, or getting around inside the home?
  - c. Going outside the home alone to shop or visit a doctor's office?
  - d. Working at a job or business?

## **APPENDIX B – DISABILITY QUESTIONS ASKED IN THE SURVEY OF INCOME AND PROGRAM PARTICIPATION**

### Sensory Disability Questions

1. Do you have any difficulties seeing the words and letters in ordinary newspaper print even when wearing glasses or contact lenses if you usually wear them? Note, includes blindness.
2. Are you able to see the words and letters in ordinary newspaper print at all?
3. Do you have difficulty hearing what is said in a normal conversation with another person even when wearing your hearing aid?
4. Are you able to hear what is said in a normal conversation at all?
5. Do you have any difficulty having your speech understood?
6. In general, are people able to understand your speech at all?

### Physical Disability Questions

1. Do you have any difficulty lifting and carrying something as heavy as 10 pounds - such as a bag of groceries?
2. Are you able to lift and carry a 10 pound bag of groceries at all?
3. Do you have any difficulty pushing or pulling large objects such as a living room chair?
4. Are you able to push or pull such large objects at all?
5. Do you have any difficulty...?
  - a. Standing or being on your feet for one hour?
  - b. Sitting for one hour?
  - c. Stooping, crouching, or kneeling?
  - d. Reaching over your head?
6. Do you have difficulty using your hands and fingers to do things such as picking up a glass or grasping a pencil?
7. Are you able to use your hands and fingers to grasp and handle at all?
8. Do you have any difficulty walking up a flight of 10 stairs?
9. Are you able to walk up a flight of 10 stairs at all?

10. Do you have any difficulty walking a quarter of a mile - about 3 city blocks?
11. Are you able to walk a quarter of a mile at all?
12. Do you have any difficulty using an ordinary telephone
13. Are you able to use an ordinary telephone at all?

#### Mental Disability Questions

1. Do you have...?
  - a. A learning disability such as dyslexia?
  - b. Mental retardation?
  - c. A developmental disability such as autism or cerebral palsy
  - d. Alzheimer's disease or any other serious problem with confusion or forgetfulness?
  - e. Attention Deficit Hyperactivity Disorder (ADHD)
  - f. Any other mental or emotional condition?
  - g. Any other developmental condition for which he/she has received therapy or diagnostic services?

#### Activity Limitation Questions

1. Do you need the help of another person with ...?
  - a. Getting around INSIDE the home?
  - c. Getting in and out of bed or a chair?
  - d. Taking a bath or shower?
  - e. Dressing?
  - f. Eating?
  - g. Using or getting to the toilet
  - h. Going OUTSIDE the home, for example, to shop or visit a doctor's office?
  - i. Keeping track of money or bills?
  - j. Doing light housework such as washing dishes or sweeping a floor?
  - k. Taking the right amount of prescribed medicine at the right time?

## **APPENDIX C – DISABILITY QUESTIONS ASKED IN THE AMERICAN COMMUNITY SURVEY**

1. Is this person deaf or does he/she have serious difficulty hearing?
2. Is this person blind or does he/she have serious difficulty seeing even when wearing glasses?
3. Because of a physical, mental, or emotional condition, does this person have serious difficulty concentrating, remembering, or making decisions?
4. Does this person have serious difficulty walking or climbing stairs?
5. Does this person have difficulty dressing or bathing?
6. Because of a physical, mental, or emotional condition, does this person have difficulty doing errands alone such as visiting a doctor's office or shopping?

## **APPENDIX D – 14 CFR PART 382, NONDISCRIMINATION ON BASIS OF DISABILITY IN AIR TRAVEL**

Selected excerpts from the electronic code of federal regulations provided by the Government Publishing Office (Government Publishing Office, 2018).

### Subpart A - General Provisions

#### **§382.1 What is the purpose of this part?**

The purpose of this part is to carry out the Air Carrier Access Act of 1986, as amended. This rule prohibits both U.S. and foreign carriers from discriminating against passengers on the basis of disability; requires carriers to make aircraft, other facilities, and services accessible; and requires carriers to take steps to accommodate passengers with a disability.

#### **§382.7 To whom do the provisions of this part apply?**

(a) If you are a U.S. carrier, this Part applies to you with respect to all your operations and aircraft, regardless of where your operations take place, except as otherwise provided in this part.

(b) If you are a foreign carrier, this part applies to you only with respect to flights you operate that begin or end at a U.S. airport and to aircraft used for these flights. For purposes of this part, a “flight” means a continuous journey in the same aircraft or with one flight number that begins or ends at a U.S. airport.

### Subpart B – Nondiscrimination and Access to Services and Information

#### **§382.11 What is the general nondiscrimination requirement of this part?**

(a) As a carrier, you must not do any of the following things, either directly or through a contractual, licensing, or other arrangement:

(1) You must not discriminate against any qualified individual with a disability, by reason of such disability, in the provision of air transportation;

(2) You must not require a qualified individual with a disability to accept special services (including, but not limited to, preboarding) that the individual does not

request. However, you may require preboarding as a condition of receiving certain seating or in-cabin stowage accommodations, as specified in §§382.83(c), 382.85(b), and 382.123(a) of this part.

(3) You must not exclude a qualified individual with a disability from or deny the person the benefit of any air transportation or related services that are available to other persons, except where specifically permitted by this Part. This is true even if there are separate or different services available for individuals with a disability, except when specifically permitted by another section of this Part; and

(4) You must not take any adverse action against an individual (e.g., refusing to provide transportation) because the individual asserts, on his or her own behalf or through or on behalf of others, rights protected by this part or the Air Carrier Access Act.

(b) As an indirect carrier, you must comply with §§382.17 through 382.157 of this part when providing facilities or services to passengers that would have otherwise been provided by a direct air carrier.

### **§382.13 Do carriers have to modify policies, practices, and facilities to ensure nondiscrimination?**

(a) As a carrier, you must modify your policies, practices, and facilities when needed to provide nondiscriminatory service to a particular individual with a disability, consistent with the standards of section 504 of the Rehabilitation Act, as amended.

(b) This requirement is part of your general nondiscrimination obligation, and is in addition to your duty to make the specific accommodations required by this part.

(c) However, you are not required to make modifications that would constitute an undue burden or would fundamentally alter your program.

### **382.15 Do carriers have to make sure that contractors comply with the requirements of this Part?**

(a) As a carrier, you must make sure that your contractors that provide services to the public (including airports where applicable) meet the requirements of this part that would apply to you if you provided the services yourself.

(b) As a carrier, you must include an assurance of compliance with this part in your contracts with any contractors that provide services to the public that are subject to the requirements of this part. Noncompliance with this assurance is a material breach of the contract on the contractor's part.

(1) This assurance must commit the contractor to compliance with all applicable provisions of this Part in activities performed on behalf of the carrier.

(2) The assurance must also commit the contractor to implementing directives issued by your CROs under §§382.151 through 382.153.

(c) As a U.S. carrier, you must also include such an assurance of compliance in your contracts or agreements of appointment with U.S. travel agents. You are not required to include such an assurance in contracts with foreign travel agents.

(d) You remain responsible for your contractors' compliance with this part and for enforcing the assurances in your contracts with them.

(e) It is not a defense against an enforcement action by the Department under this part that your noncompliance resulted from action or inaction by a contractor.

#### **§382.17 May carriers limit the number of passengers with a disability on a flight?**

As a carrier, you must not limit the number of passengers with a disability who travel on a flight.

#### Subpart D – Accessibility of Airport Facilities

#### **§382.51 What requirements must carriers meet concerning the accessibility of airport facilities?**

(a) As a carrier, you must comply with the following requirements with respect to all terminal facilities you own, lease, or control at a U.S. airport:

(1) You must ensure that terminal facilities providing access to air transportation are readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs. You are deemed to comply with this obligation if the facilities meet requirements applying to places of public accommodation under Department of Justice (DOJ) regulations implementing Title III of the Americans with Disabilities Act (ADA).

(2) With respect to any situation in which boarding and deplaning by level-entry loading bridges or accessible passenger lounges to and from an aircraft is not available, you must ensure that there is an accessible route between the gate and the area from which aircraft are boarded (e.g., the tarmac in a situation in which level-entry boarding is not available). An accessible route is one meeting the requirements of the Americans with Disabilities Act Accessibility Guidelines (ADAAG), sections 4.3.3 through 4.3.10.

(3) You must ensure that systems of intra- and inter-terminal transportation, including, but not limited to, moving sidewalks, shuttle vehicles and people movers, comply with applicable requirements of the Department of Transportation's ADA rules (49 CFR parts 37 and 38).

(4) Your contracts or leases with airport operators concerning the use of airport facilities must set forth your airport accessibility responsibility under this part and that of the airport operator under applicable section 504 and ADA rules of the Department of Transportation and Department of Justice.

(5) In cooperation with the airport operator and in consultation with local service animal training organization(s), you must provide animal relief areas for service animals that accompany passengers departing, connecting, or arriving at an airport on your flights.

(6) You must enable captioning at all times on all televisions and other audio-visual displays that are capable of displaying captions and that are located in any portion of the terminal to which any passengers have access on May 13, 2009. The captioning must be high-contrast insofar as is feasible.

(7) You must replace any televisions and other audio-visual displays providing passengers with safety briefings, information, or entertainment that do not have high-contrast captioning capability with equipment that does have such capability whenever such equipment is replaced in the normal course of operations and/or whenever areas of the terminal in which such equipment is located are undergoing substantial renovation or expansion.

(8) If you newly acquire televisions and other audio-visual displays for passenger safety briefings, information, or entertainment on or after May 13, 2009, such equipment must have high-contrast captioning capability.

(b) As a carrier, you must ensure that passengers with a disability can readily use all terminal facilities you own, lease, or control at a foreign airport. In the case of foreign carriers, this requirement applies only to terminal facilities that serve flights covered by §382.7 of this part.

(1) This means that passengers with a disability must be able to move readily through such terminal facilities to get to or from the gate and any other area from which passengers board the aircraft you use for such flights (e.g., the tarmac in the case of flights that do not use level-entry boarding). This obligation is in addition to your obligation to provide enplaning, deplaning, and connecting assistance to passengers.

(2) You may meet this obligation through any combination of facility accessibility, auxiliary aids, equipment, the assistance of personnel, or other appropriate means consistent with the safety and dignity of passengers with a disability.

(c) As a foreign carrier, you must meet the requirements of this section by May 13, 2010, except as otherwise indicated in paragraph (a). As a U.S. carrier, you must meet the requirements of paragraph (b) of this section by May 13, 2010.

#### Subpart E—Accessibility of Aircraft

##### **§382.61 What are the requirements for movable aisle armrests?**

(a) As a carrier, you must ensure that aircraft with 30 or more passenger seats on which passenger aisle seats have armrests are equipped with movable aisle armrests on at least one-half of the aisle seats in rows in which passengers with mobility impairments are permitted to sit under FAA or applicable foreign government safety rules.

(b) You are not required to provide movable armrests on aisle seats of rows which a passenger with a mobility impairment is precluded from using by an FAA safety rule.

(c) You must ensure that these movable aisle armrests are provided proportionately in all classes of service in the cabin. For example, if 80 percent of the aisle seats in which passengers with mobility impairments may sit are in coach, and 20

percent are in first class, then 80 percent of the movable aisle armrests must be in coach, with 20 percent in first class.

(d) For aircraft equipped with movable aisle armrests, you must configure cabins, or establish administrative systems, to ensure that passengers with mobility impairments or other passengers with a disability can readily identify and obtain seating in rows with movable aisle armrests. You must provide this information by specific seat and row number.

(e) You are not required to retrofit cabin interiors of existing aircraft to comply with the requirements of this section. However, if you replace any of an aircraft's aisle seats with newly manufactured seats, the new seats must include movable aisle armrests as required by this section. However, an aircraft is never required to have movable aisle armrests on more than one half of the aisle seats.

(f) As a foreign carrier, you must comply with the requirements of paragraphs (a) through (d) of this section with respect to new aircraft you operate that were initially ordered after May 13, 2009 or which are delivered after May 13, 2010. As a U.S. carrier, the requirements of paragraphs (a), (b), (d), and (e) of this section applies to you with respect to new aircraft you operate that were initially ordered after April 5, 1990, or which are delivered after April 5, 1992. As a U.S. carrier, paragraph (c) of this section applies to you with respect to new aircraft you operate that were initially ordered after May 13, 2009 or which were delivered after May 13, 2010.

(g) As a foreign carrier, you must comply with the requirements of paragraph (e) of this section with respect to seats ordered after May 13, 2009.

### **§382.63 What are the requirements for accessible lavatories?**

(a) As a carrier, you must ensure that aircraft with more than one aisle in which lavatories are provided shall include at least one accessible lavatory.

(1) The accessible lavatory must permit a qualified individual with a disability to enter, maneuver within as necessary to use all lavatory facilities, and leave, by means of the aircraft's on-board wheelchair.

(2) The accessible lavatory must afford privacy to persons using the on-board wheelchair equivalent to that afforded ambulatory users.

(3) The lavatory shall provide door locks, accessible call buttons, grab bars, faucets and other controls, and dispensers usable by qualified individuals with a disability, including wheelchair users and persons with manual impairments.

(b) With respect to aircraft with only one aisle in which lavatories are provided, you may, but are not required to, provide an accessible lavatory.

(c) You are not required to retrofit cabin interiors of existing aircraft to comply with the requirements of this section. However, if you replace a lavatory on an aircraft with more than one aisle, you must replace it with an accessible lavatory.

(d) As a foreign carrier, you must comply with the requirements of paragraph (a) of this section with respect to new aircraft you operate that were initially ordered after May 13, 2009 or which are delivered after May 13, 2010. As a U.S. carrier, this requirement applies to you with respect to new aircraft you operate that were initially ordered after April 5, 1990, or which were delivered after April 5, 1992.

(e) As a foreign carrier, you must comply with the requirements of paragraph (c) of this section beginning May 13, 2009. As a U.S. carrier, these requirements apply to you with respect to new aircraft you operate that were initially ordered after April 5, 1990, or which were delivered after April 5, 1992.

#### **§382.65 What are the requirements concerning on-board wheelchairs?**

(a) As a carrier, you must equip aircraft that have more than 60 passenger seats, and that have an accessible lavatory (whether or not having such a lavatory is required by §382.63 of this Part) with an on-board wheelchair. The Aerospatiale/Aeritalia ATR-72 and the British Aerospace Advanced Turboprop (ATP), in configurations having between 60 and 70 passenger seats, are exempt from this requirement.

(b) If a passenger asks you to provide an on-board wheelchair on a particular flight, you must provide it if the aircraft being used for the flight has more than 60 passenger seats, even if the aircraft does not have an accessible lavatory.

(1) The basis of the passenger's request must be that he or she can use an inaccessible lavatory but cannot reach it from a seat without using an on-board wheelchair.

(2) You may require the passenger to provide the advance notice specified in §382.27 to receive this service.

(c) You must ensure that on-board wheelchairs meet the following standards:

(1) On-board wheelchairs must include footrests, armrests which are movable or removable, adequate occupant restraint systems, a backrest height that permits assistance to passengers in transferring, structurally sound handles for maneuvering the occupied chair, and wheel locks or another adequate means to prevent chair movement during transfer or turbulence.

(2) The chair must be designed to be compatible with the maneuvering space, aisle width, and seat height of the aircraft on which it is to be used, and to be easily pushed, pulled, and turned in the cabin environment by carrier personnel.

(d) As a foreign carrier, you must meet this requirement as of May 13, 2010. As a U.S. carrier, you must meet this requirement by May 13, 2009.

#### Subpart G—Boarding, Deplaning, and Connecting Assistance

#### **§382.91 What assistance must carriers provide to passengers with a disability in moving within the terminal?**

(a) As a carrier, you must provide or ensure the provision of assistance requested by or on behalf of a passenger with a disability, or offered by carrier or airport operator personnel and accepted by a passenger with a disability, in transportation between gates to make a connection to another flight. If the arriving flight and the departing connecting flight are operated by different carriers, the carrier that operated the arriving flight (*i.e.*, the one that operates the first of the two flights that are connecting) is responsible for providing or ensuring the provision of this assistance, even if the passenger holds a separate ticket for the departing flight. It is permissible for the two carriers to mutually agree that the carrier operating the departing connecting flight (*i.e.*, the second flight of the two) will provide this assistance, but the carrier operating the arriving flight remains responsible under this section for ensuring that the assistance is provided.

(b) You must also provide or ensure the provision of assistance requested by or on behalf of a passenger with a disability, or offered by carrier or airport operator personnel and accepted by a passenger with a disability, in moving from the terminal entrance (or a

vehicle drop-off point adjacent to the entrance) through the airport to the gate for a departing flight, or from the gate to the terminal entrance (or a vehicle pick-up point adjacent to the entrance after an arriving flight).

(1) This requirement includes assistance in accessing key functional areas of the terminal, such as ticket counters and baggage claim.

(2) This requirement also includes a brief stop upon the passenger's request at the entrance to a rest room (including an accessible rest room when requested). As a carrier, you are required to make such a stop only if the rest room is available on the route to the destination of the enplaning, deplaning, or connecting assistance and you can make the stop without unreasonable delay. To receive such assistance, the passenger must self-identify as being an individual with a disability needing the assistance.

(c) As a carrier at a U.S. airport, you must, on request, in cooperation with the airport operator, provide for escorting a passenger with a service animal to an animal relief area provided under §382.51(a)(5) of this part.

(d) As part of your obligation to provide or ensure the provision of assistance to passengers with disabilities in moving through the terminal (e.g., between the terminal entrance and the gate, between gate and aircraft, from gate to a baggage claim area), you must assist passengers who are unable to carry their luggage because of a disability with transporting their gate-checked or carry-on luggage. You may request the credible verbal assurance that a passenger cannot carry the luggage in question. If a passenger is unable to provide credible assurance, you may require the passenger to provide documentation as a condition of providing this service.

### **§382.93 Must carriers offer preboarding to passengers with a disability?**

As a carrier, you must offer preboarding to passengers with a disability who self-identify at the gate as needing additional time or assistance to board, stow accessibility equipment, or be seated.

**§382.95 What are carriers' general obligations with respect to boarding and deplaning assistance?**

(a) As a carrier, you must promptly provide or ensure the provision of assistance requested by or on behalf of passengers with a disability or offered by carrier or airport operator personnel and accepted by passengers with a disability, in enplaning and deplaning. This assistance must include, as needed, the services of personnel and the use of ground wheelchairs, accessible motorized carts, boarding wheelchairs, and/or on-board wheelchairs where provided in accordance with this part, and ramps or mechanical lifts.

(b) As a carrier, you must, except as otherwise provided in this subpart, provide boarding and deplaning assistance through the use of lifts or ramps at any U.S. commercial service airport with 10,000 or more annual enplanements where boarding and deplaning by level-entry loading bridges or accessible passenger lounges is not available.

Subpart J – Training and Administrative Provisions

**§382.141 What training are carriers required to provide for their personnel?**

(a) As a carrier that operates aircraft with 19 or more passenger seats, you must provide training, meeting the requirements of this paragraph, for all personnel who deal with the traveling public, as appropriate to the duties of each employee.

(1) You must ensure training to proficiency concerning:

(i) The requirements of this part and other applicable Federal regulations affecting the provision of air travel to passengers with a disability;

(ii) Your procedures, consistent with this part, concerning the provision of air travel to passengers with a disability, including the proper and safe operation of any equipment used to accommodate passengers with a disability; and

(iii) For those personnel involved in providing boarding and deplaning assistance, the use of the boarding and deplaning assistance equipment used by the carrier and appropriate boarding and deplaning assistance procedures that safeguard the safety and dignity of passengers.

(2) You must also train such employees with respect to awareness and appropriate responses to passengers with a disability, including persons with physical, sensory,

mental, and emotional disabilities, including how to distinguish among the differing abilities of individuals with a disability.

(3) You must also train these employees to recognize requests for communication accommodation from individuals whose hearing or vision is impaired and to use the most common methods for communicating with these individuals that are readily available, such as writing notes or taking care to enunciate clearly, for example. Training in sign language is not required. You must also train these employees to recognize requests for communication accommodation from deaf-blind passengers and to use established means of communicating with these passengers when they are available, such as passing out Braille cards if you have them, reading an information sheet that a passenger provides, or communicating with a passenger through an interpreter, for example.

(4) You must consult with organizations representing persons with disabilities in your home country when developing your training program and your policies and procedures. If such organizations are not available in your home country, you must consult with individuals with disabilities and/or international organizations representing individuals with disabilities.

(5) You must ensure that all personnel who are required to receive training receive refresher training on the matters covered by this section, as appropriate to the duties of each employee, as needed to maintain proficiency. You must develop a program that will result in each such employee receiving refresher training at least once every three years. The program must describe how employee proficiency will be maintained.

(6) You must provide, or ensure that your contractors provide, training to the contractors' employees concerning travel by passengers with a disability. This training is required only for those contractor employees who deal directly with the traveling public, and it must be tailored to the employees' functions. Training for contractor employees must meet the requirements of paragraphs (a)(1) through (a)(5) of this section.

(7) The employees you designate as CROs, for purposes of §382.151 of this part, must receive training concerning the requirements of this part and the duties of a CRO.

(8) Personnel subject to training required under this part, who are already employed on May 13, 2009, must be trained one time in the changes resulting from the reissuance of this part.

(b) If you are a carrier that operates only aircraft with fewer than 19 passenger seats, you must provide training for flight crewmembers and appropriate personnel to ensure that they are familiar with the matters listed in paragraphs (a)(1) and (a)(2) of this section and that they comply with the requirements of this part.

## APPENDIX E – SAMPLE LETTER FROM DOT IN RESPONSE TO A DISABILITY-RELATED COMPLAINT



**U.S. Department of  
Transportation**

Office of the Secretary  
of Transportation

GENERAL COUNSEL

1200 New Jersey Ave., S.E.  
Washington, DC 20590

APR - 4 2016

VIA EMAIL: [REDACTED]

Dear [REDACTED]

This letter is in further reference to your disability complaint regarding United Airlines. We were sorry to hear of the incident and appreciate the opportunity to advise you of the outcome of our investigation. Enclosed you will find an Investigation Summary Sheet that details the results of our investigation, which was based on the Air Carrier Access Act (ACAA), 49 U.S.C. § 41705, and our implementing rule, 14 CFR Part 382.

In particular, the Investigation Summary Sheet identifies the applicable section of 14 CFR Part 382, provides a brief summary of that section and explains this office's view on whether the carrier has violated the ACAA and 14 CFR Part 382. If your complaint raises more than one disability issue, an additional Investigation Summary Sheet has been attached to address each issue.

If we believe the complained of incident involves a violation, the Investigation Summary Sheet indicates the action that we plan to take. We will either pursue formal enforcement action or by copy of this letter notify the airline specified in your complaint of our determination and warn it that any similar incidents could lead to formal enforcement action. Generally, we will pursue enforcement action on the basis of a number of complaints from which we may infer a pattern or practice of discrimination. However, where one or a few complaints describe particularly egregious conduct on the part of a carrier and those complaints are supported by adequate evidence, we will pursue enforcement action as our resources permit. If we decide to seek enforcement action against the airline, your complaint will be among those considered in the context of this action, which may lead to the issuance of a cease and desist order and to the assessment of civil penalties. In the event that this enforcement action leads to litigation, it is possible that we may need sworn statements or witnesses for a hearing. We will advise you if, in fact, we need your further help.

For your information, in an enforcement case, the U.S. Department of Transportation is limited to issuing cease and desist orders and assessing civil penalties not to exceed \$27,500 per violation. Such action can only be accomplished through settlements or formal hearings before administrative law judges. We cannot order compensation for aggrieved parties. To obtain a personal monetary award of damages, a complainant would have to file a private legal action that may be based on private contract rights or on civil rights statutes that provide for a private right of action.

If we have insufficient evidence or it appears that the airline specified in your complaint has not violated the ACAA, we will not pursue enforcement action. Notwithstanding our decision not to pursue enforcement action, however, private legal action may be pursued in the courts based on private contract rights or on civil rights statutes that provide for a private right of action and, in such a proceeding, monetary damages may be sought.

Regardless of whether the airline has been determined to have violated the ACAA, we have entered your

complaint in our computerized industry monitoring system, and the carrier's ACAA complaint totals in our monthly *Air Travel Consumer Report* reflect your complaint. Our monthly report is made available to the aviation industry, the news media and the general public so that both consumers and air travel companies can compare the overall complaint records of individual airlines, as well as the number of disability complaints filed against particular carriers. This system also serves as a basis for rulemaking, legislation and research.

Moreover, we also routinely monitor our complaint records to determine the extent to which carriers are in compliance with the ACAA and to track trends or spot areas of concern which we feel may warrant further action. This ongoing process also enables us to ensure prompt corrective action whenever we determine that an airline's policies or procedures are not in compliance with our ACAA regulations. Your complaint will be among those considered in the context of this overall process.

I hope this further information is useful. Thank you again for taking the time to contact us.

Sincerely,

Liv Vaughn Chapman, Jr.  
Chief, Aviation Civil Rights Compliance Branch  
Office of the Assistant General Counsel for  
Aviation Enforcement and Proceedings

By: Vinh Nguyen

Senior Trial Attorney

Enclosures  
cc: United Airlines

## APPENDIX F – SURVEY

Your participation is voluntary, anonymous, and confidential. If you choose to participate, you may discontinue participation at any time without penalty. Selecting "Enter Survey" certifies that you are at least 18 years of age, and that you understand and agree with the survey conditions outlined above.

- ☐ Enter Survey (1)
- ☐ Exit Survey (2)

If Exit Survey Is Selected, Then Skip To End of Survey

Q2 How often do you use a wheelchair?

- ☐ Daily (1)
- ☐ Sometimes (2)
- ☐ Only for long periods of standing/walking (3)
- ☐ Never (4)

If Never Is Selected, Then Skip To Do you typically travel with a service animal?

Q3 Please rate the level of service you typically experience for each stage of your air travel. Consider the average experience for all flights you have taken in the last 5 years.

	A Excellent	B Good	C Acceptable	D Less than Ideal	F Unacceptable
Parking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Connection between parking and entering the airport	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Boarding pass acquisition	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Luggage check	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Getting through security	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Traveling through the airport	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Locating elevators and accessible routes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Boarding the plane	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Service while on the plane	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Getting off the plane	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q4 What wheelchair do you use when you travel?

- ☐ I use my own wheelchair (1)  
☐ I use a wheelchair provided by the airport (2)  
☐ It varies, sometimes my own and sometimes one provided by the airport (3)

\_\_\_\_\_

Q5 What type of wheelchair do you use when traveling by air?

- ☐ A manual wheelchair (1)  
☐ An electric wheelchair (2)  
☐ It varies, sometimes manual and sometimes electric (3) \_\_\_\_\_

Q6 Do you typically request assistance from the airport and/or airline when traveling?

- ☐ Yes (1)
- ☐ No, I can manage without assistance (2)
- ☐ No, I travel with a companion who can provide the assistance I need (3)
- ☐ It varies depending on the situation (4) \_\_\_\_\_

Q7 Do you use an aisle chair provided by the airport or airline to access the plane?

- ☐ Yes (1)
- ☐ No (2)
- ☐ Sometimes (3) \_\_\_\_\_

Q8 Have you ever chosen NOT to travel by air because it would be too complicated or burdensome in a wheelchair?

- ☐ Yes (1)
- ☐ No (2)

Q9 Do you typically travel with a service animal?

- ☐ Yes (1)
- ☐ No (2)
- ☐ Sometimes (3)

Display This Question:

If Do you typically travel with a service animal? Yes Is Selected

Or Do you typically travel with a service animal? Sometimes Is Selected

Q10 Please rate the level of service you typically experience for each stage of your air travel when traveling with a service animal. Consider the average experience for all flights you have taken in the last 5 years.

	A Excellent	B Good	C Acceptable	D Less than Ideal	F Unacceptable
Parking with a service animal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Connection between parking and entering the building with a service animal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Boarding pass acquisition	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Luggage check with a service animal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Getting through security with a service animal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Traveling through the airport with a service animal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Locating elevators and accessible routes with a service animal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Locating and/or using a Service Animal Relief Area (SARA)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Boarding the plane with a service animal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Service while on the plane with a service animal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Getting off the plane with a service animal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q11 Have you ever filed a disability complaint with the Department of Transportation or an airline in regards to an air travel experience?

- ☐ Yes (1)
- ☐ No (2)

Display This Question:

If Have you ever filed a disability complaint with the Department of Transportation or an airline in... No Is Selected

Q12 Why?

- ☐ I have never had an experience that would require a complaint (1)
- ☐ I would have filed a complaint but I did not know I could (2)
- ☐ I was unable to file a complaint (3)

Q13 Is there anything you think should or could be improved for wheelchair passengers or service animals during the air travel experience?

- ☐ Yes, service should be improved. Please explain below. (1) \_\_\_\_\_
- ☐ No, service is currently adequate (2)

Q14 Please feel free to share an airport experience (good or bad) you have had in the last 5 years.

Q15 Please provide any additional comments you may have regarding this research topic.

Q16 How old are you?

- ☐ 18 to 24 (1)
- ☐ 25 to 44 (2)
- ☐ 45 to 64 (3)
- ☐ 65+ (4)

Q17 What is your gender?

- ☐ Male (1)
- ☐ Female (2)

Q18 How far do you live from the closest airport with commercial air service?

- ☐ Less than 30 miles (estimated a 30 minute drive) (1)
- ☐ 31 to 60 miles (estimated 31 minute to 1 hour drive) (2)
- ☐ 61 to 90 miles (estimated 1 to 1.5 hour drive) (3)
- ☐ 91 to 120 miles (estimated 1.5 to 2 hour drive) (4)
- ☐ More than 120 miles (more than 2 hour drive) (5)
- ☐ I don't know (6)

Q19 Only considering travel convenience and travel time, and travel distance, what is the maximum distance you would typically drive rather than fly? Assume cost is not a significant factor.

- ☐ Less than 250 miles (less than a 4 hour drive) (1)
- ☐ 251 to 360 miles (estimated 4 to 6 hour drive) (2)
- ☐ 361 to 480 miles (estimated 6 to 8 hour drive) (3)
- ☐ 481 to 600 miles (estimated 8 to 10 hour drive) (4)
- ☐ 601 to 720 miles (estimated 10 to 12 hour drive) (5)
- ☐ 721 to 840 miles (estimated 12 to 14 hour drive) (6)
- ☐ More than 840 miles (more than a 14 hour drive) (7)

Q20 If you would like to be a part of future research (short surveys) about this and/or related topic(s) please provide your e-mail address. Your information will not be shared with any one.

## APPENDIX G – IRB APPROVAL



HUMAN RESEARCH PROTECTION PROGRAM  
INSTITUTIONAL REVIEW BOARDS

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<b>To:</b>	SARAH HUBBARD NISW
<b>From:</b>	JEANNIE DICLEMENTI, Chair Social Science IRB
<b>Date:</b>	03/18/2016
<b>Committee Action:</b>	<b>Exemption Granted</b>
<b>IRB Action Date:</b>	03/22/2016
<b>IRB Protocol #:</b>	1602017142
<b>Study Title:</b>	Wheelchair Users Experiences and Perceptions of Commercial Air Travel

The Institutional Review Board (IRB) has reviewed the above-referenced study application and has determined that it meets the criteria for exemption under 45 CFR 46.101(b)(2) .

If you wish to make changes to this study, please refer to our guidance "**Minor Changes Not Requiring Review**" located on our website at <https://www.irb.purdue.edu/policies.php>. For changes requiring IRB review, please Create a New Amendment through the CoeusLite Online Submission System. Please contact our office if you have any questions.

Below is a list of best practices that we request you use when conducting your research. The list contains both general items as well as those specific to the different exemption categories.

### General

- To recruit from Purdue University classrooms, the instructor and all others associated with conduct of the course (e.g., teaching assistants) must not be present during announcement of the research opportunity or any recruitment activity. This may be accomplished by announcing, in advance, that class will either start later than usual or end earlier than usual so this activity may occur. It should be emphasized that attendance at the announcement and recruitment are voluntary and the student's attendance and enrollment decision will not be shared with those administering the course.
- If students earn extra credit towards their course grade through participation in a research project conducted by someone other than the course instructor(s), such as in the example above, the students participation should only be shared with the course instructor(s) at the end of the semester. Additionally, instructors who allow extra credit to be earned through participation in research must also provide an opportunity for students to earn comparable extra credit through a non-research activity requiring an amount of time and effort comparable to the research option.
- When conducting human subjects research at a non-Purdue college/university, investigators are urged to contact that institution's IRB to determine requirements for conducting research at that institution.
- When human subjects research will be conducted in schools or places of business, investigators must obtain written permission from an appropriate authority within the organization. If the written permission was not submitted with the study application at the time of IRB review (e.g., the school would not issue the letter without proof of IRB approval, etc.), the investigator must submit the written permission to the IRB prior to engaging in the research activities (e.g., recruitment, study procedures, etc.). This is an institutional requirement.

#### Categories 2 and 3

- Surveys and questionnaires should indicate
  - only participants 18 years of age and over are eligible to participate in the research; and
  - that participation is voluntary; and
  - that any questions may be skipped; and
  - include the investigator's name and contact information.
- Investigators should explain to participants the amount of time required to participate. Additionally, they should explain to participants how confidentiality will be maintained or if it will not be maintained.
- When conducting focus group research, investigators cannot guarantee that all participants in the focus group will maintain the confidentiality of other group participants. The investigator should make participants aware of this potential for breach of confidentiality.

#### Category 6

- Surveys and data collection instruments should note that participation is voluntary.
- Surveys and data collection instruments should note that participants may skip any questions.
- When taste testing foods which are highly allergenic (e.g., peanuts, milk, etc.) investigators should disclose the possibility of a reaction to potential subjects.

You are required to retain a copy of this letter for your records. We appreciate your commitment towards ensuring the ethical conduct of human subjects research and wish you luck with your study.

## **APPENDIX H – ICAO STANDARDS AND RECOMMENDED PRACTICES REGARDING PEOPLE WITH DISABILITIES**

### **I. General**

**8.22 Recommended Practice.** – When travelling, persons with disabilities should be provided with special assistance in order to ensure that they receive services customarily available to the general public. Such assistance includes the offering of information and directions in media that can be understood by travelers with cognitive or sensory disabilities.

**8.23 Recommended Practice.** – Contracting States should cooperate with a view to taking the necessary measures to make accessible to persons with disabilities all the elements of the chain of the person's journey, from beginning to end.

**8.24 Recommended Practice.** – Contracting States should take the necessary steps with aircraft operators, airports and ground handling operators to establish minimum uniform standard of accessibility with respect to transportation services for person with disabilities, from arrival at the airport of departure to leaving the airport of destination.

**8.25 Recommended Practice.** – Contracting States should take the necessary steps with aircraft operators, airports, ground handling operators and travel agencies to ensure that persons with disabilities are given information they need, and should take the necessary steps to ensure that airlines, airports, ground handling operators and travel agencies are in a position to give those passengers the assistance necessary for them, depending on their needs, to help them in their travel.

**8.26 Recommended Practice.** – Contracting States should take all necessary steps to secure the cooperation of aircraft operators, airports and ground handling operators in order to establish and coordinate training programmes to ensure that trained personnel are available to assist persons with disabilities.

## II. Access to Airports

**8.28 Recommended Practice.** – Contracting States should ensure that lifting system or any other appropriate device are made available in order to facilitate the movement of elderly and disabled passengers between the aircraft and the terminal on both arrival and departure as required where telescopic passageways are not used.

**8.29 Recommended Practice.** – Measures should be taken to ensure that hearing- and vision-impaired are able to obtain flight information.

**8.30 Recommended Practice.** – For elderly and disabled persons being set down or picked up at a terminal building, reserved points should be located as close as possible to main entrances. To facilitate movement to the various areas of the airport, access routes should be free of obstacles.

**8.31 Recommended Practice.** – Where access to public services is limited, every effort should be made to provide accessible and reasonably priced ground transportation services by adapting current and planned public transit systems or by providing special transport services for people with mobility needs.

**8.32 Recommended Practice.** – Adequate parking facilities should be provided for people with mobility needs and appropriate measures taken to facilitate their movement between parking areas and the terminal buildings.

**8.33 Recommended Practice.** –Direct transfer from one aircraft to another of passengers, particularly elderly and disabled passengers, should be authorized, where necessary and possible, whenever this is warranted by deadlines in making connecting flights or by other circumstances.

### III. Access to Air Services

**8.35 Recommended Practice.** – Contracting States should introduce provisions by which aircraft coming newly into service or after major refurbishment should conform to minimum uniform standards of accessibility with respect to equipment on board aircraft which would include moveable armrests, on-board wheelchairs, lavatories and suitable lighting and signs.

**8.36 Recommended Practice.** – Wheelchairs, special apparatus and equipment required by persons with disabilities should be carried free of charge in the cabin where, in the view of the aircraft operator, space and safety requirements permit or should be designated as priority baggage. Service animals accompanying passengers with disabilities should also be carried free of charge in the cabin, subject to the application of any relevant national or aircraft operator regulations.

**8.37 Recommended Practice.** – In principle, persons with disabilities should be permitted to determine where or not they need an escort and to travel without the requirement for medical clearance. However, advance notice should be mandatory where assistance or lifting is required. Aircraft operators should only be permitted to require passengers with disabilities to obtain a medical clearance in cases of medical conditions where it is clear that their safety or well-being or that of other passengers cannot be guaranteed. Furthermore, aircraft operators should only be permitted to require an escort when it is clear that a person with disabilities is not self-reliant and, as such, the safety or well-being of that person or that of another passenger cannot be guaranteed.

**8.38 Recommended Practice.** – If the presence of an escort is required, Contracting States should encourage aircraft operators to offer discounts for the carriage of that accompanying person.

## APPENDIX I – DISABILITY-RELATED COMPLAINT FORM SUBMITTED TO THE DEPARTMENT OF TRANSPORTATION BY AIRLINES

### APPENDIX A TO PART 382 – REPORT OF DISABILITY-RELATED COMPLAINT DATA

Name of Carrier: \_\_\_\_\_ Submission Date: \_\_\_\_\_

Contact Person: \_\_\_\_\_ Period of Data Collection: \_\_\_\_\_

Name: \_\_\_\_\_  
 Telephone # (include country code if outside the U.S.): \_\_\_\_\_  
 Email address: \_\_\_\_\_  
 Mailing address: \_\_\_\_\_

Total number of complaints (i.e., incidents): \_\_\_\_\_

#### REPORT OF DISABILITY-RELATED COMPLAINT DATA

	Vision Impaired	Hearing Impaired	Vision & Hearing Impaired	Paraplegic	Quadriplegic	Other wheelchair	Oxygen	Stretcher	Other Disability	Other Assistive Device	Mentally Impaired	Communicable Disease	Allergies
Refusal To Board Passenger													
Refusal to Board w/o Attendant													
Security Issues Regarding Disability													
Aircraft Not Accessible													
Airport Not Accessible													
Advance Notice Dispute													
Seating Accommodation													
Failure to Provide Assistance													

	Vision Impaired	Hearing Impaired	Vision & Hearing Impaired	Paraplegic	Quadriplegic	Other wheelchair	Oxygen	Stretcher	Other Disability	Other Assistive Device	Mentally Impaired	Communicable Disease	Allergies
Damage to Assistive Device													
Storage and Delay of Assistive Device													
Service Animal Problem													
Unsatisfactory Info													
Other													

**Certification Statement:** I, the undersigned, do certify that this report has been prepared under my direction in accordance with the regulations in 14 CFR Part 382. I affirm that, to the best of my knowledge and belief, this is a true, correct, and complete report

Signature: \_\_\_\_\_

The valid OMB control number for this information collection is 2105-0551. The time required to complete this information is estimated to average 30 minutes per response.

## APPENDIX J – DISABILITY-RELATED COMPLAINT DATA AND PASSENGER DATA FOR SELECTED AIRLINES

<b>Year</b>	<b>Airline</b>	<b>Disability Complaints<sup>1</sup></b>	<b>Passenger Count<sup>2</sup></b>	<b>Disability Complaint Rate per 100,000 PAX</b>
2010	American	2,308	86,086,130	2.68
2011	American	2,702	86,035,851	3.14
2012	American	2,294	86,330,792	2.66
2013	American	2,858	86,820,595	3.29
2014	American	3,027	87,828,395	3.45
2015	American	5,006	118,290,659	4.23
2010	Delta	3,742	109,329,792	3.42
2011	Delta	3,352	112,016,262	2.99
2012	Delta	3,707	114,958,112	3.22
2013	Delta	4,666	118,933,921	3.92
2014	Delta	4,975	128,018,335	3.89
2015	Delta	5,881	137,732,452	4.27
2016	Delta	6,121	142,286,020	4.30
2010	JetBlue	567	24,198,698	2.34
2011	JetBlue	942	26,352,900	3.57
2012	JetBlue	1,209	28,934,369	4.18
2013	JetBlue	1,210	30,427,534	3.98
2014	JetBlue	1,518	32,056,119	4.74
2015	JetBlue	1,865	35,074,055	5.32
2016	JetBlue	2,005	38,241,080	5.24
2010	Southwest	2,020	106,227,521	1.90
2011	Southwest	2,306	110,586,815	2.09
2012	Southwest	2,189	112,234,074	1.95
2013	Southwest	2,897	115,322,785	2.51

2014	Southwest	3,713	127,194,550	2.92
2015	Southwest	4,075	144,574,606	2.82
2016	Southwest	4,475	151,740,277	2.95
2010	United	1,412	53,032,240	2.66
2011	United	1,537	49,619,083	3.10
2012	United	3,001	91,493,988	3.28
2013	United	4,601	89,278,038	5.15
2014	United	5,236	89,871,585	5.83
2015	United	5,926	94,891,627	6.25
2016	United	4,163	99,769,952	4.17
2016	American	6,309	144,189,749	4.38

<sup>1</sup> Annual Report on Disability-Related Air Travel Complaints (US Department of Transportation, 2017)

<sup>32</sup>Bureau of Transportation T-100 Market Data (Bureau of Transportation Statistics, 2018)

## VITA

### Wesley L. Major

School of Aviation Technology and Transportation  
Polytechnic Institute  
Purdue University  
West Lafayette, Indiana 47906

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#### PROFESSIONAL PREPARATION

Doctor of Philosophy Degree in Technology

*Purdue University, West Lafayette, Indiana*  
Expected December 2018

Master of Science Degree in Aviation & Aerospace Management

*Purdue University, West Lafayette, Indiana*  
May 2015

Bachelor of Science Degree in Organizational & Community Leadership

*University of Delaware, Newark, Delaware*  
May 2012

Associate of Arts Degree in University Studies

*University of Delaware, Newark, Delaware*  
May 2006

#### PROFESSIONAL EXPERIENCE

**Federal Aviation Administration (FAA) Fellow - Center of Excellence Summer Experience Program**

Atlantic City, New Jersey  
May-August 2018

- Summer fellowship with the FAA at the William J. Hughes Technical Center
- Deep understanding of the data acquisition, processing, and presentation of the national Wildlife Strike Database
- Exposure to various airport safety topic areas including, Airport Rescue and Fire Fighting (ARFF), environmental impact of foam flow rates for airport fire suppression, LED runway and taxiway lighting, Engineered Material Arresting Systems (EMAS), Foreign Object Debris (FOD) detection equipment, and pavement paint

## **PROFESSIONAL EXPERIENCE (Continued)**

### **Partnership to Enhance General Aviation Safety, Accessibility and Sustainability (PEGASAS)**

Purdue University, School of Aviation Technology & Transportation  
January 2014-2016

- Conducted research into the *Evaluation of Aviation Rumble Strips*. Team member on a government funded, multi-university collaborative research project pertaining to general aviation safety
- Team member of *Weather Technology in the Cockpit: Project B VFR into IMC*. A government funded research project identifying gaps in training and education of general aviation pilots. Examined methods to improve aviation safety and education.
- Assist with project management, research design, data collection, analysis and project documentation.
- Submit proposals to the Institutional Review Board (for human subject research) and follow guidelines for conducting experimental research using human subjects

### **Teaching Assistant**

Purdue University, School of Aviation Technology & Transportation  
August 2013 – May 2018

- Co-teach undergraduate courses
- Create and execute syllabi according to accreditation standards
- Distribute grades while following FERPA regulations
- Assist with department functions

## **ADDITIONAL EXPERIENCE**

### **Transportation Research Board (TRB) Committee Member**

Washington, DC, May 2017 – Present

- Committee member for ABE60 Accessible Transportation and Mobility
- Attend the Annual TRB meeting to collaborate with other committee members on research agenda and issues surrounding accessible transportation for the nation

### **Airport Cooperative Research Program (ACRP)**

Washington, DC, December 2016 – Present

- Panel member of Project 04-21, Emergency Communication Models for Persons with Disabilities and Non-English Speakers
- Collaborate with other panel members to review research plans and select contract recipient
- Ensure timely and adequate progress is being made by researching agency

## **ADDITIONAL EXPERIENCE (Continued)**

### **Peer Mentor**

Purdue University, Disability Resource Center, August 2014-May 2015

- Facilitate the transition to college life for individuals functioning with a disability
- Acclimate and advise new students to campus resources

### **Able Flight Assistant Program Coordinator**

Purdue University, West Lafayette, Indiana, May 2013-May 2017

- Prepare facilities, materials and schedule for summer flight training program
- Coordinate and execute operations
- Communicate status updates to executive director throughout program progression

## **PUBLICATIONS**

### **Peer reviewed journal articles:**

Major, W. L., Matthews, J., Hubbard, S., Darcy, B. (2018). Evaluation of Opportunities for Connected Aircraft Data to Identify Pavement Roughness at Airports. *Collegiate Aviation Review – International (CARi)*, Vol. 36, Issue (2).

Major, W. L., Carney, T. Q., Keller, J, Xie, A., Price, M., Duncan, J., Brown, L., Whitehurst, G. R., William G., Nicolai, D., & Beaudin-Seiler, B. M. (2017). VFR-into-IMC Accident Trends: Perceptions of Deficiencies in Training. *Journal of Aviation Technology and Engineering*: Vol. 7: Iss. 1, Article 4.

Keller, J. C., Carney, T. Q., Xie, A., Major, W. L., & Price, M. (2017). VFR-into-IMC: An Analysis of Two Training Protocols on Weather-Related Posttest Scores. *Journal of Aviation Technology and Engineering*: Vol. 7: Iss. 1, Article 1.

Mathew, J. K., Major, W. L., Hubbard, S. M., & Bullock, D. M. (2017). Statistical modelling of runway incursion occurrences in the United States. *Journal of Air Transport Management*, 65, 54-62.

### **Peer reviewed practice journal articles:**

Major, W. L., Tinio, R., & Hubbard S. M. (2017). Able Flight at Purdue University: Case Studies of Flight Training Strategies to Accommodate Student Pilots with Disabilities. *Collegiate Aviation Review – International (CARi)*, Vol. 36, Issue (2).

## **PUBLICATIONS (Continued)**

### **Reviewed conference or symposium proceedings:**

Major, W. L., Tinio, R., & Hubbard S. M. (2017). Able Flight at Purdue. *Proceedings of the 19th International Symposium on Aviation Psychology, Dayton, OH.*

Major, W. L. & Hubbard S. M. (2017). Innovative Airport Visual Aids to Enhance Situational Awareness and Flight Training. *Proceedings of the 19th International Symposium on Aviation Psychology, Dayton, OH.*

Mathew, J. K., Major, W. L., Hubbard, S. M., & Bullock, D. M. (2016). Statistical modelling of runway incursions. *Transportation Research Board 95<sup>th</sup> Annual Meeting, Washington D.C.*

Kirschner, J., Avery, B., Major, W., Bowen, E., & Wulle, B. (2013). Able Flight: Increasing aviation opportunities for people with disabilities. *Proceedings of the 17th International Symposium on Aviation Psychology, Dayton, OH.* 6 pps.

### **Conference presentations:**

Major, W. L., Matthews, J., Hubbard, S., Darcy, B. (2018). Evaluation of Opportunities for Connected Aircraft Data to Identify Pavement Roughness at Airports. University Aviation Association's 71<sup>st</sup> Annual Conference. Dallas, Texas.

Major, W. L., Tinio, R., & Hubbard S. M. (2017). Able Flight at Purdue University: Case Studies of Flight Training Strategies to Accommodate Student Pilots with Disabilities. University Aviation Association's 71<sup>st</sup> Annual Conference. Dallas, Texas.

Major, W. L., Tinio, R., & Hubbard S. M. (2018). Able Flight at Purdue. School of Aviation and Transportation Technology 2018 Industry Advisory Board.

Major, W. L., Tinio, R., & Hubbard S. M. (2018). Able Flight at Purdue. *Proceedings of the 19th International Symposium on Aviation Psychology, Dayton, OH.*

Major, W. L. & Hubbard, S. M. (2018). A Process Map for Able Flight at Purdue: Adaptive strategies to support flight training for individuals with disabilities. Poster presentation at American Society of Engineering Education (ASEE). West Lafayette, IN.

Major, W. L. & Hubbard, S. M. (2018). An Examination of Disability-Related Complaints in Commercial Aviation. Presentation to Subcommittee of Accessible Transportation at Transportation Research Board 97<sup>th</sup> Annual Meeting. Washington, DC.

Major, W. L. & Hubbard, S. M. (2017). An Examination of Disability-Related Complaints in Commercial Aviation. Poster presentation at the Institute of Transportation Engineers (ITE) Annual Student Dinner. West Lafayette, IN.

## **PUBLICATIONS (Conference presentations, Continued)**

- Major, W. & Mathew, J. (2017). Evaluation of Opportunities for Connected Aircraft Data to Identify Pavement Roughness at Airports. Presentation at Transportation Research Board 96<sup>th</sup> Annual Meeting. Washington, DC.
- Major, W. & Mathew, J. (2016). Evaluation of Opportunities for Connected Aircraft Data to Identify Pavement Roughness at Airports. Poster presentation at the Institute of Transportation Engineers (ITE) Annual Student Dinner. West Lafayette, IN.
- Huang, C., Johnson, M. E., Mendonca, F., Ropp T. D., & Major, W. (2016). Explore the centralized safety management to mitigate the threats and risks of aircraft maintenance. Presentation at International Conference on Technology Management, Chicago, IL.
- Major, W. & Hubbard, S. M. (2016). A pilot study to assess the impact of surface type on wheelchair level of service. Presentation at Transportation Research Board 95<sup>th</sup> Annual Meeting. Washington, DC.
- Major, W. (2015). General aviation pilots and the use of weather technology in correlation with age. Poster presentation at Aviation Association Indiana (AAI), Columbus, IN.
- Major, W. & Mathew, J. (2015). An evaluation of aviation rumble strips. Poster presentation at the Institute of Transportation Engineers (ITE) Annual Student Dinner. West Lafayette, IN.
- Major, W. & Mathew, J. (2015). An evaluation of aviation rumble strips. Poster presentation to the Indiana Department of Transportation (INDOT) Executive Staff. West Lafayette, IN.
- Major, W. & Mathew, J. (2015). An evaluation of aviation rumble strips. Presentation at the Partnership to Enhance General Aviation Safety, Accessibility, and Sustainability (PEGASAS) Annual Meeting. West Lafayette, IN.
- Major, W., Mathew, J., & Furr, C. (2015). General aviation pilots and the use of weather technology in correlation with age. Presentation at Aviation Association Indiana (AAI), Peru, IN.

## **Workshops Presentations:**

- Keller, J., Major, W., & Carney, C. (2015). Cleared to Climb: Collaboration research between collegiate aviation and the Federal Aviation Administration. University Aviation Association's 68<sup>th</sup> Annual Conference. Salt Lake City, Utah.

## ACADEMIC TEACHING EXPERIENCE

### Teaching Assistant:

#### Purdue University

School of Aviation and Transportation Technology

- AT102 Aviation Business (3 credit hours)
- AT254 Commercial Pilot Fundamentals (3 credit hours)

School of Languages and Cultures

- ASL280 American Deaf Community: Language, Culture, And Society (3 credit hours)

## HONORS, AWARDS & PROFESSIONAL INVOLVEMENT

- School of Aviation and Transportation Technology Industry Advisory Board, Best Graduate Poster (2018)
- American Society of Engineering Education (ASEE) IL-IN Section Conference, Third Place Graduate Poster Contest (2018)
- Julie Swengel Graduate Scholarship (2017)
- Eisenhower Fellowship Recipient (2015)
- Young Members Council Aviation (YMC-A), Transportation Research Board (2015-Present)
- University Aviation Association Member (2015-Present)
- University Aviation Association First Place Graduate Student Virtual Poster Contest (2015)
- PEGASAS Outstanding Student Researcher Award, Purdue University (2014)
- Able Flight Volunteer of the Year (2013)
- Able Flight Full Flight Training Scholarship (2012)

## COMMUNITY & VOLUNTEER ACTIVITIES

- Able Flight Volunteer Assistant Program Coordinator May 2013 – July 2017
- Flight1, Purdue University, West Lafayette, Indiana April 2015
- Córdoba Recreational Sports Center Patron of the Month, Purdue University October 2014
- GoldSplash Community Day, Indianapolis, Indiana April 2014
- Flight1, Purdue University, West Lafayette, Indiana April 2014
- Peer Mentor, McGee Physical Rehabilitation Center, Philadelphia, PA November 2013
- Upward Bound Counselor, Newark, DE May-July 2011
- Ronald McDonald House, Wilmington, DE June 2008