Southeast Florida FSUTMS Users Group
Aug 25th, 2023

Travel Behavior And Unfulfilled Travel Needs For Travel Limiting Population ---- using the 2017 NHTS Data

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PRESENTATION OUTLINE

INTRODUCTION

- Travel patterns of PWDs
- Transportation equity
- Travel barriers for PWDs
- Motivation

LITERATURE REVIEW

Literature review and study objectives

DATA ANALYSIS

- 2017 NHTS dataset
- Descriptive analysis
- Methodology
- Model results and interpretation

POLICY SUGGESTIONS

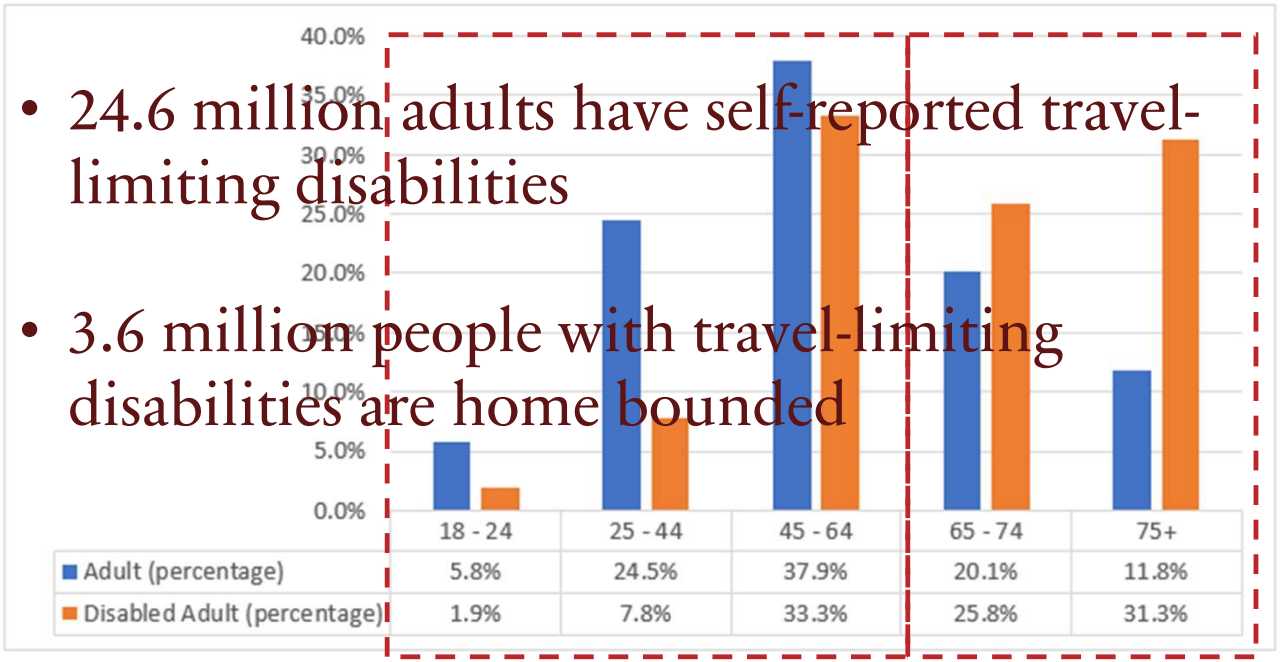
Policy implications for specific subgroups

CONCLUSION

Conclusions and limitations

PWD AND THE GENERAL POPULATION

- 24.6 million adults have self-reported travel-limiting disabilities
- 3.6 million people with travel-limiting disabilities are home bounded



	18 - 24	25 - 44	45 - 64	65 - 74	75+
Adult (percentage)	5.8%	24.5%	37.9%	20.1%	11.8%
Disabled Adult (percentage)	1.9%	7.8%	33.3%	25.8%	31.3%

Figure 1. Age distribution of adults versus disabled adults in the U.S.

PWD AND THE GENERAL POPULATION

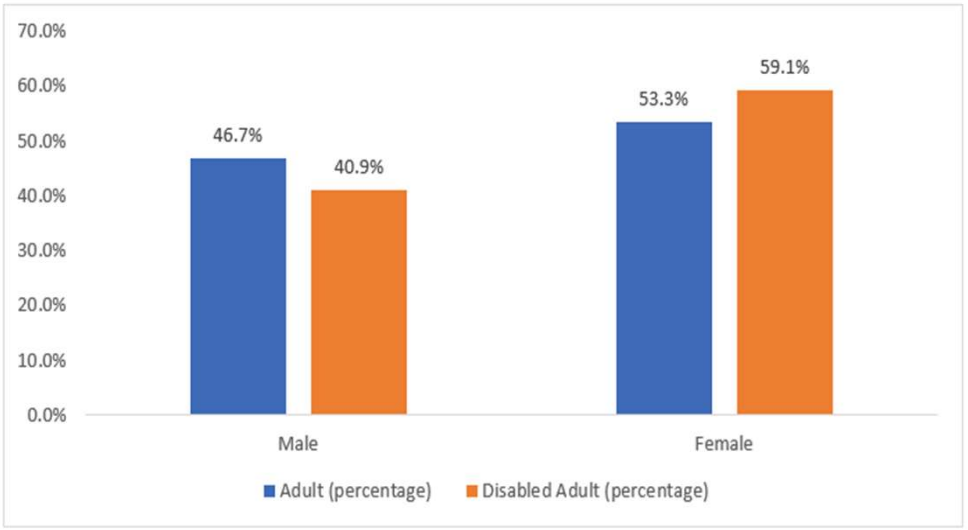


Figure 2. Gender distribution of adults versus disabled adults in the U.S.

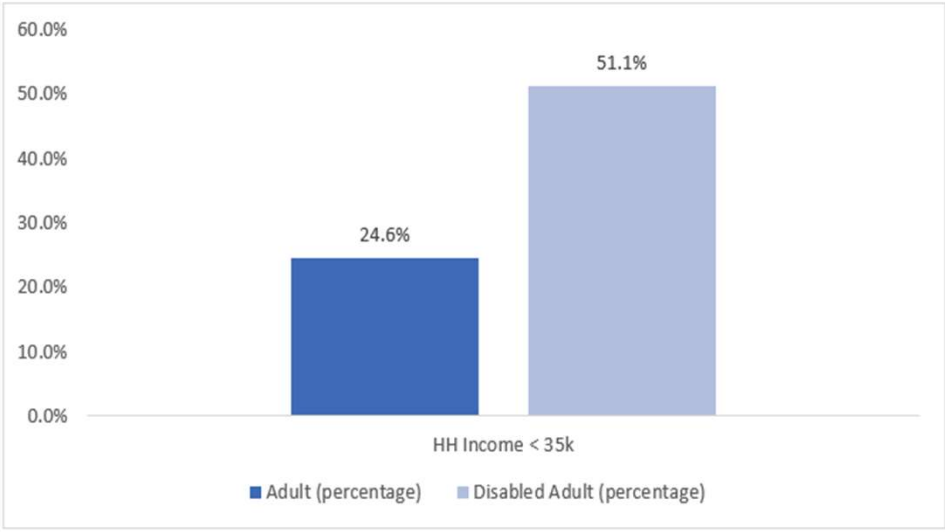


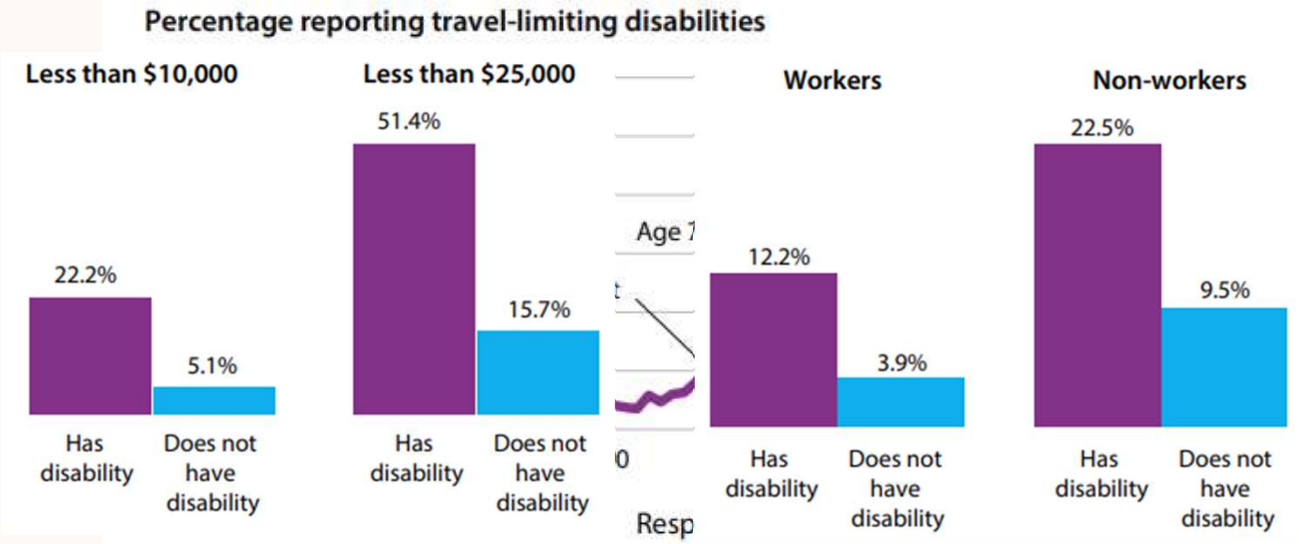
Figure 3. Poverty status of adults and disabled adults in the U.S.

TRAVEL PATTERNS OF PEOPLE WITH DISABILITIES (PWD)

Annual Household Income For Individuals by Disability Status (Age 18–64)

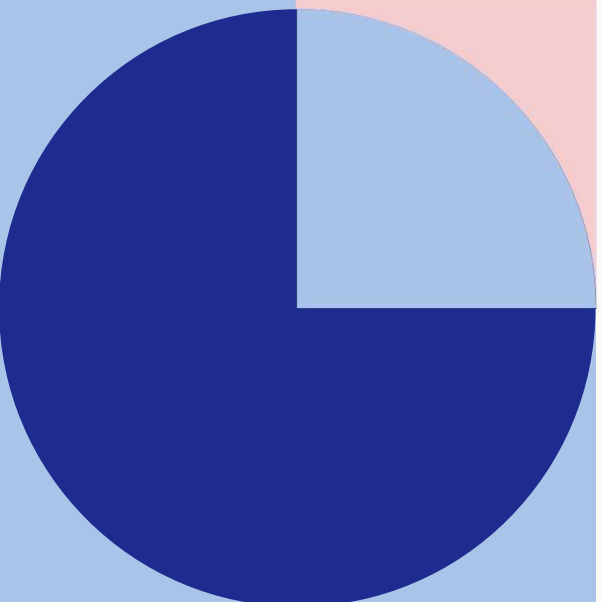
People Living In Zero-vehicle Households by Disability And Worker Status (Age 18–64)

Disability Reporting Rate by Age (all ages)

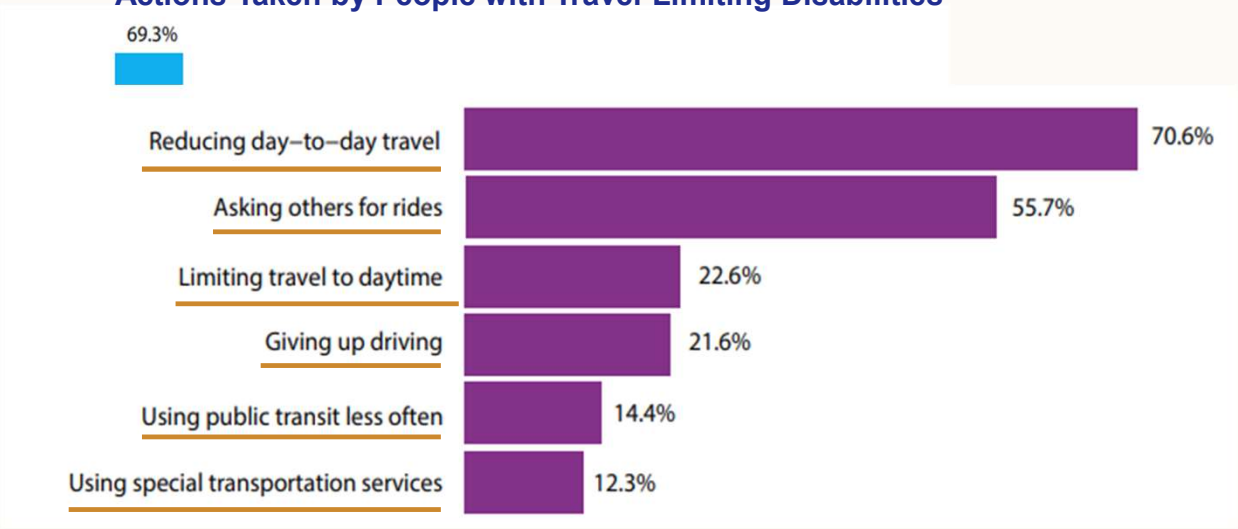


Source: Stephen Brumbaugh, Travel Patterns of American Adults with Disabilities, USDOT, 2018

TRAVEL PATTERNS OF PEOPLE WITH DISABILITIES (PWD) CONT.



Mode Share by Disability Status (age 65 and older)

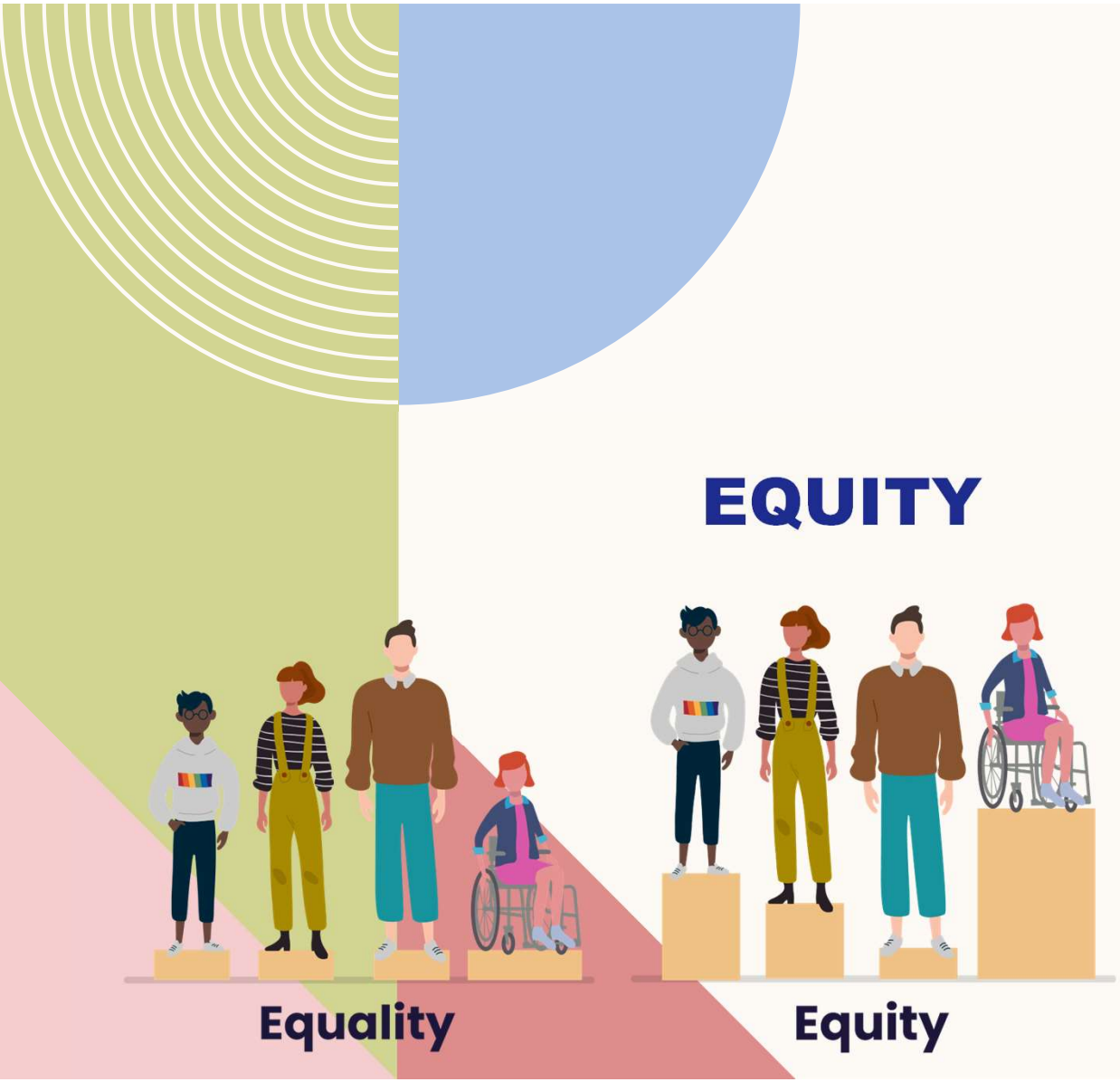


Source: Stephen Brumbaugh, Travel Patterns of American Adults with Disabilities, USDOT, 2018

Travel Barriers For People With Disabilities (PWD)

- Physical barriers
- Perceived barriers

DIFFERENT TRAVEL NEEDS AND SOLUTIONS

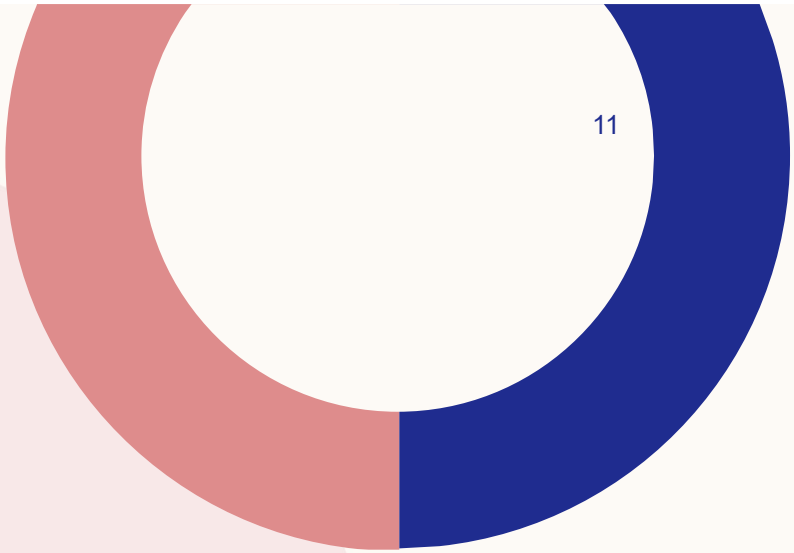


- **Equity** in transportation seeks fairness in mobility and accessibility to meet the needs of **all community members.** (USDOT)
- Equity accounts for **disparities.**
- Equity = Equal Access to Transportation

Picture source: www.bhcpublichealth.org/our-approach/health-equity

MOTIVATIONS

- Travel experiences of disabled individuals
- Focus within the disabled population
- The intersectionality of disability with other aspects of an individual's identity



PRIMARY GOAL

To investigate the disparities of the unmet travel needs within specific subgroups of the disabled population.

LITERATURE REVIEW

and the study objectives

Gender Disparities

*Generally, **women** tend to **travel less** frequently **trips may be shorter***

*Female tend to **spend more money** on transportation while their **trips may be shorter***

Assumption 1: Female PWDs are facing more barriers in day-to-day travel than male PWDs.

*More likely to **chain their trips** or **make stops***

Age Disparities

*Travel preferences are different for **different age groups**.*

*Among older population, there is a transition period **between 65 and 74 years old.***

Assumption 2: Older PWDs are more likely to reduce day-to-day travel.

***Older women who live alone** are more likely to **give up driving** as they age.*

Race and Ethnic

“

Hispanic adults *have relatively* ***low leisure-time physical activity***

Assumption 3: Hispanic PWDs with poverty status or low education are more vulnerable in daily traveling.

Hispanic women *with disabilities have significantly* ***shorter commutes***

”

Disability Characteristics

*PWDs with **long-term disabilities** tend to develop effective transport strategies*

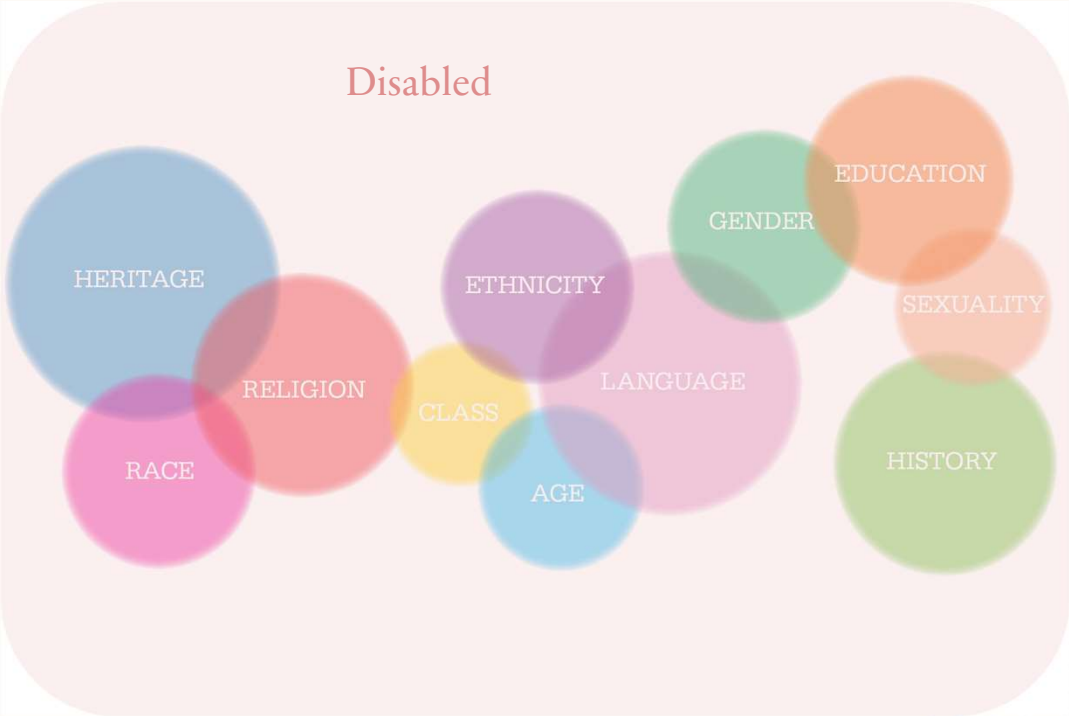
*PWDs are **newly or temporarily disabled** may lack confidence in using assistive devices*

*PWDs with **visual impairments or wheelchairs** may have difficulties **navigating** unfamiliar environments*

Assumption 4: The type and length of disability can affect the disabled population's travel needs and choices.

Intersectionality

- **Unique** travel experiences and barriers for everyone
- Social categorizations interconnect
- Travel barriers may **overlap** when **disabled people** have **complex identities**



STUDY OBJECTIVES

- To explore the PWDs' disparities and unique needs
- Identifying heterogeneity among different segments of PWDs

DATA AND DATA ANALYSIS

2017 NHTS DATASET

- National Household Travel Survey (NHTS) conducted by FHWA
- Comprehensive information about American's personal, household and travel characteristics
- Self-reported travel-limiting disability

PWD Sample Characteristics

- Reported having travel-limiting disabilities were extracted
- Focused on persons age 18 and above with travel-limiting disabilities (PWD)
- Sample size used in this study is 23,644

Variable		Description	Frequency	Percentage
Demographic	Age Group	18 - 24	436	1.9%
		25 - 44	1839	7.8%
		45 - 64	7865	33.3%
		65 - 74	6117	25.9%
		75+	7387	31.2%
	Gender	Male	9673	40.9%
		Female	13971	59.1%
	Race	White	19582	82.8%
		Non-White	4062	17.2%
	Ethnic group	Non-Hispanic	22350	94.5%
		Hispanic	1294	5.5%
Socio-economic	Education level	Less than a high school graduate	9853	41.7%
	Poverty status (HH Income < 35k)	Poverty	11468	48.5%
	Household members	Only Adult in HH	6949	29.4%
	Has Young Children (0-4 years)	Yes	574	2.4%
	Home type	Owned	17189	72.7%
		Rented	6455	27.3%
	Employment status	Worker	2944	12.5%
		Non-worker	20700	87.5%
	HH Vehicle Ownership	Zero vehicle	2679	11.3%
Built-environmental	Built environment	Urban	17842	75.5%
		Rural	5802	24.5%
	Residential density in home location (Housing units per square mile in the census block group)	0-99	5380	22.8%
		100-499	4551	19.2%
		500-999	3191	13.5%
		1000-1999	4586	19.4%
		2000-3999	4057	17.2%
		4000-9999	1430	6%
		10000-24999	329	1.4%
		25000-999999	120	0.5%
Disability status	Disability type	Vision disabled	364	1.5%
		Wheelchair user	3172	13.4%
	Disability length	< 6 months	1866	7.9%
		> 6 months	19850	84%
		Lifetime	1897	8%

Measurement of Unfulfilled Travel Needs

All **disabled persons** were asked: **if their medical condition resulted in "Reduced Day-to-Day Travel"**

Binary outcomes of "Yes" or "No"

This variable serves as **an indicator of unfulfilled travel needs.**

PWDs **who chose "Yes"** considered as with **unmet travel needs** due to their disability.

Methodology

- Binomial logistic regression model with interaction effects:

$$\text{logit}(p_i) = \log\left(\frac{p_i}{1-p_i}\right) = \beta_0 + \Sigma(\beta_j X_{ij}) + \Sigma(\gamma_{jk} X_{ij} X_{ik})$$

- where, p_i is the probability of respondent i experiencing reduced travel,
- β_0 is the intercept term,
- X_{ij} is the vector of j^{th} predictor variable associated with reduced travel,
- β_j is the coefficient of corresponding parameter,
- X_{ik} is the vector of k^{th} independent variable,
- γ_{jk} is the coefficient associated with the interaction between the j^{th} and k^{th} predictor variables.

Demographic	✖	Demographic
Socio-economic		Socio-economic
Built-environmental		Built-environmental
Disability status		Disability status

Model Results

Logistic regression results of PWDs' unfulfilled travel needs

		B	p
Socio-demographic			
	Age 25-44 (ref: all other age groups)	0.234	**
	Hispanic (ref: non-Hispanic)	-0.801	***
Socio-economic			
	Unemployed (ref: employed)	0.737	***
	Single Adult (ref: adults live with others)	0.195	***
Disability status			
	Disabled Status < 6 months	1.565	***
	Disabled Status > 6 months (ref: lifetime disabled)	1.021	***
	Wheelchair user (ref: not wheelchair user)	0.263	***
Interaction effects			
Gender Interaction effect			
	(Disabled Status > 6 months) * Female	0.266	**
	(Disabled Status Lifetime) * Female	0.260	*
	Unemployed * Female	-0.196	**
	(Education Less than Highschool) * Female	-0.174	***
Age Interaction effect			
	(Disabled Status Lifetime) * (age 65-74)	0.474	***
	(Disabled Status Lifetime) * (age 75+)	0.478	***
	Poverty * (Age 45-64)	0.221	**
	Poverty * (age 65-74)	0.270	**
	Poverty * (age 75+)	0.236	**
	(Only Adult) * (age 65-74)	-0.315	***
	(Only Adult) * (age 75+)	-0.296	***
	(Wheelchair user) * (age 65-74)	0.336	***
Hispanic Interaction effect			
	(No car) * Hispanic	-0.438	**
	(Home Rented) * Hispanic	-0.801	***
	(Education Less than Highschool) * Hispanic	-0.801	***
Constant		-1.520	***

Level of significance:
*p<0.1; **p<0.05; ***p<0.01.
McFadden R-Square: 0.02699.

Model Results

Interpretation of the interaction impacts

Indicator 1	Indicator 2	calculation	log-odds ratio
Gender Interaction effect			
Disabled Status > 6 months	Female		1.287
Disabled Status Lifetime	Female		0.26
Unemployed	Female		0.541
Education Less than Highschool	Female		-0.174
Age Interaction effect			
Disabled Status Lifetime	age 65-74		0.474
Disabled Status Lifetime	age 75+		0.478
Poverty	Age 45-64		0.221
Poverty	age 65-74		0.27
Poverty	age 75+		0.236
Single Adult	age 65-74		-0.12
Single Adult	age 75+		-0.101
Wheelchair user	age 65-74		0.599
Hispanic Interaction effect			
No car	Hispanic		-1.239
Home Rented	Hispanic		-0.37
Education Less than Highschool	Hispanic		-0.422

DISCUSSION

- Respondents would **NOT** consider their day-to-day travel as reduced when:
  - they have high travel demand, and **all of their travel needs are met**.
  - they have a **low desire to travel** outside and only take essential trips
- An indication of having reduced travel does not necessarily indicate that individuals encountered fewer barriers. It may reflect the **suppression of their travel needs** due to systemic inequities.

MAJOR FINDINGS

Female PWDs are facing more barriers. Especially **with young children** in the family, when they **live alone**, or **without personal vehicles**.	**Older** PWDs are more likely to reduce travel. Especially when they **live alone** or **in poverty status**.	**Hispanic** PWDs are less likely to feel daily travel reduced. Those **with poverty status** or **low education** are even more less likely to perceive the reduced travel.	**Different lengths of disability** may differentiate the likelihood of travel reduction.
1 confirmed	**2** confirmed	**3** contradict	**4** confirmed

POLICY IMPLICATIONS

• Targeted transportation services • Social support	• Financial assistance or subsidies • Improving accessibility in low-income areas	• Increasing job opportunities and economic support	• Recognizing the suppressed travel desires • Understanding the specific challenges
Female subgroup	**Poverty subgroup**	**Poverty subgroup**	**Hispanic subgroup**
• Targeted outreach programs • Culturally sensitive transportation services	• Educational initiatives to raise awareness about opportunities and rights	• Improving transit system • Creating barrier-free environments	• Raising awareness and educating the general public
Hispanic subgroup	**Hispanic subgroup**	**Systemic equities**	**General equity**

CONCLUSION

- Investigated the disparities of the unmet travel needs within specific subgroups of the disabled population.
- Shed light on the specific challenges faced by different subgroups of the disabled population.
- Highlights the potential suppression of travel desires, and the overlooked travel needs among Hispanic individuals with disabilities.
- Other data sources of built environment could be explored.
- Further study about other compensating strategies that could be taken by PWDs.

ACKNOWLEDGEMENTS

This work was sponsored by the United States Department of Transportation Office of the Assistant Secretary for Research and Technology (OST-R) through the Southeastern Transportation Research, Innovation, Development, and Education Center (Project A6).

The primary data utilized for this study was obtained from the 2017 National Household Travel Survey (NHTS), which is conducted by the U.S. Department of Transportation, Federal Highway Administration (FHWA).

THANK YOU!

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