

## Intercity Travel in Northeastern Rural Regions of the U.S.

## **UVM Transportation Research Center**

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## **Table of Contents**

1. Introduction	1
2. Intercity Travel, Information, and Technology Survey Questionnaire	2
2.1. Survey Instrument	2
2.2. Survey Sample	4
3. Preliminary Analysis	8
3.1. Part 1: Recent Intercity Travel Trips and General Travel Preferences	8
3.1.1. Testing for Overall Differences	8
3.1.2. Testing by Gender	11
3.1.3. Testing by Education Level	13
3.1.4. Testing by Age Group	17
3.2. Part 2: Travel Preferences	20
3.2.1. Testing for Overall Differences	20
3.2.2. Testing by Gender	22
3.2.3. Testing by Education Level	23
3.2.4. Testing by Age Group	26
3.3. Part 3: An Imaginary Situation	29
3.3.1. Testing for Overall Differences	29
3.3.2. Testing by Gender	31
3.3.3. Testing by Education Level and Age Group	35
3.3.3.1. Testing by Education Level	35
3.3.3.2. Testing by Age Group	40
3.4. Part 4: Other Information about the Respondents and Their Household	45
3.4.1. Testing for Overall Differences	45
3.4.2. Testing by Gender	45
3.4.3. Testing by Education Level	46
3.4.4. Testing by Age Group	47
3.5. Changes in Mode Preference	48
4. Multimodal Network Dataset for Study Region	49
5. Future Research	51
Appendix A – Survey Questionnaire	53

TRC Report #15-007	Page iii
Appendix B – Survey Data Dictionary	66
Appendix C – Survey Data Summary	80
Appendix D – Network Data Dictionary	91

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#### Disclaimer

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the US DOT or the UVM Transportation Research Center. This report does not constitute a standard, specification, or regulation.

#### 1. Introduction

Much research exists on intercity travel behavior between large metropolitan centers. There is an opportunity for more research on travel from less populated areas to large metropolitan ones. When planning a trip from Northern New England to major cities in the Northeast, there are often several transportation options to consider. This work considers the relationship between information access and attitudes about transportation options for this type of travel, using automobile, intercity bus, and passenger rail. The report explores relationships between access to information and attitudes about traveling from Northern New England to major cities in the Northeast United States by automobile, intercity bus and passenger rail, taking into account gender, education level, and age group.

The primary research question is: What can we learn about the relationship between access to trip planning information, and people's attitudes about traveling from Northern New England to major cities in the Northeast by automobile, bus, and passenger rail?

*Study Objective:* The primary objective of this research is to examine the intersections between access to information, personal technology use, and intercity travel where public ground transportation is a viable option.

#### Study Goals:

- First, little is known about intercity travel behavior outside of travel between major metropolitan areas; this work considers travel originating from Northern New England (Vermont, New Hampshire, Main, and Massachusetts - excluding the Boston-Cambridge-Quincy Metropolitan Statistical Area) and going to Boston, New York, Philadelphia, and Washington, DC.
- Second, there has been limited research on the role that access to information, about travel options, could play in the trip-making decision process of intercity travelers. This study explores that role and provides a dataset that can be used to further examine the relationship between information, technology, and intercity travel behavior.
- Third, this research incorporates attitudinal and behavioral components, captured from the survey data. This can be used for future research considering the travel demand analysis process.
- Fourth, this work included developing a multimodal network dataset covering the study region. The dataset can be used for future research examining multimodal accessibility from throughout the study region, to large metropolitan areas.

Section 2 of this report will introduce and describe the survey instrument and survey sample from the Intercity Travel, Information, and Technology Survey Questionnaire, a primary component of the research described in this report. Section 3 of this report presents the preliminary analysis of the survey data, describing significant differences in responses identified between the control and test groups of the survey respondents. Differences are presented overall, and broken down by gender, education level, and age group, for each section of the survey. Changes in attitudes about mode choice, identified during the course of the survey, are also presented. Section 4 of this report describes a multimodal network dataset that was assembled for the study region as part of this project. Section 5 of this report discusses future research opportunities, based on the results of the work presented here.

## 2. Intercity Travel, Information, and Technology Survey Questionnaire

Resource Systems Group (RSG) conducted a travel survey on behalf of the University of Vermont's Transportation Research Center (UVM TRC) and the New England Transportation Institute (NETI) in 2014. This survey concerned trips from Northern New England to four major cities in the Northeast: Boston, New York City, Philadelphia, and Washington DC. Surveying took place from May 1 through May 16. Respondents were recruited via email by Research Now, an online research firm based in Plano, Texas, and directed to RSG's survey platform.

#### 2.1. Survey Instrument

The survey had questions on actual trips taken, a hypothetical trip to New York City, and attitudes about traveling by automobile, intercity bus, and passenger rail. There were a total of 98 questions plus a home zip code question that determined respondent eligibility for inclusion in the survey. At approximately halfway through the survey, the respondents were split into two groups. The test group had access to an intercity travel planning web tool, designed with this survey. The tool had scheduling options for traveling to New York City by intercity bus and rail. The control group did not have access to the planning tool. There were five questions, specific to the travel planning web tool, that only members of the test group, but not members of the control group, were asked. The survey instrument can be found in Appendix A.

The travel survey sampling protocol relied on respondent panels from Research Now to recruit residence from four New England states: Maine, New Hampshire, Vermont, and Massachusetts, outside of the Boston metropolitan area [Boston-Cambridge-Quincy Metropolitan Statistical Area (MSA)]. The survey was developed by the UVM TRC, NETI, and RSG. The intercity travel planning web tool was developed by RSG. A total of 2,560 valid survey responses were collected.

The survey was organized into four parts:

Part 1: Recent intercity travel trips and general travel preferences

Section 1-A: Questions about recent trips

Section 1-B: Questions about the survey respondent's most recent trip to Boston, New York City, Philadelphia, or Washington DC

Section 1-C: General travel and communication questions about the survey respondent and their household

Part 2: Travel preferences

Part 3: An imaginary situation

Part 4: Other information about the survey respondent and their household

Part 1 of the survey asked 13 questions about recent intercity travel trips and general travel preferences. For many questions, respondents were able to select all relevant answers from a list. For example, selecting which modes of transportation they have used for recent trips. Other questions allowed respondents to choose a relevant frequency or quantity (e.g., the number of trips to each city in the last twelve months, or the number of people and licensed drivers living in their household).

Part 2 included what is known in the Theory of Planned Behavior (TPB) as an elicitation. A list of 35 statements about intercity travel preferences was provided, many regarding a specific utility or disutility pertaining to a certain mode. Respondents were asked to select how much they agree or disagree with each statement on a Likert scale from 1 (completely agree) to 7 (completely disagree). Statements were randomized for each respondent, and shown ten at a time.

Part 3 presented a fictional scenario, in which someone has asked the respondent to travel from their home to Manhattan, in New York City (NYC), for an important appointment during the following month, and the respondent has decided to go. They would stay one night at a hotel and travel alone. The host would pay for the hotel costs, but not for travel. The respondent would be responsible for all costs of gas, parking, or any fares. The respondent was asked to assume that, for one reason or another, they had already decided that they would not take any part of the trip by plane. They would then need to choose between taking the entire trip by car (whether or not it was their own vehicle) and taking at least part of the trip by intercity bus or train.

All respondents were asked to select what mode(s) of transportation they thought were available to them for this trip to NYC, how likely they would choose to take a bus or train for a trip like this to NYC, and whether learning that no WiFi or electrical outlets were available on the bus or train would make them less likely to choose a bus or a train for this trip.

At this point, respondents were randomly selected to be in the control group or the test group. Random bias was checked to select an even split within each state of residence. The test group was then provided a link to review an intercity travel planning web tool related to their imaginary trip to NYC. The website showed respondents scheduling options from their home location to Times Square, New York City, by combinations of bus and rail. After having reviewed the web tool, respondents were asked to close the web tool and proceed with the remainder of the survey. The control group did not have access to the web planning tool. The test group was then provided with four statements about travel options and information availability, and asked to select how much they agree or disagree with each statement on a similar Likert scale as earlier. Next, both groups were asked to continue imagining the trip to NYC, and were given another series of 35 statements about attitudes related to intercity travel, to select their level of agreement on the same scale.

Respondents were then asked how likely they were, on the seven-point Likert scale, to choose a bus or train for a trip to NYC the next month, like the one described in the imaginary situation. For test group members who gave a different level of likeliness to take the train or bus to NYC, than they had earlier, they were asked to comment on the reasons why, and were provided an open-ended comment field. Respondents were then asked how seriously they would consider taking a bus or train to NYC, in real life.

Part 4 included five questions about what personal technology devices respondents own, and their demographics: age group, gender, level of education, and annual household income level.

A data dictionary showing all questions and response options for the survey questionnaire is available in Appendix B.

## 2.2. Survey Sample

The figure below (Figure 1) shows the study area, made up of zip code locations for survey respondents, and the four destination cities.

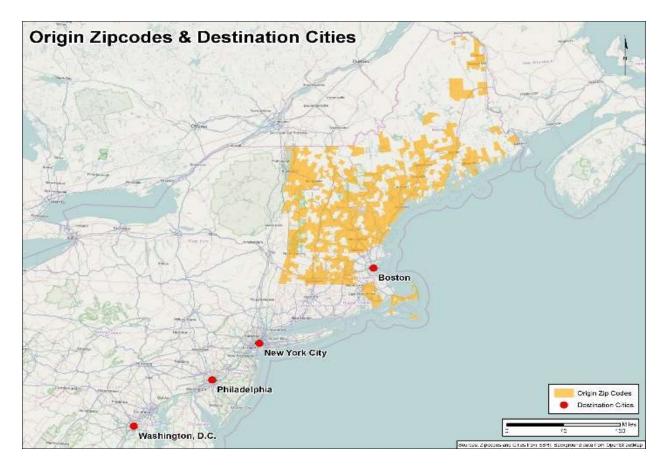


Figure 1. Survey Sample: Home (Origin) Zip Codes & Destination Cities

Table 1 and Figure 2 below show the number of respondents from each state, for both the control and test groups. Massachusetts had the highest number of respondents, followed by New Hampshire, Maine, and Vermont, respectively.

**Table 1 Responses by State and Control/Test Groups** 

Residence	Control	Test
ME	260	261
NH	363	364
VT	187	188
MA	468	469

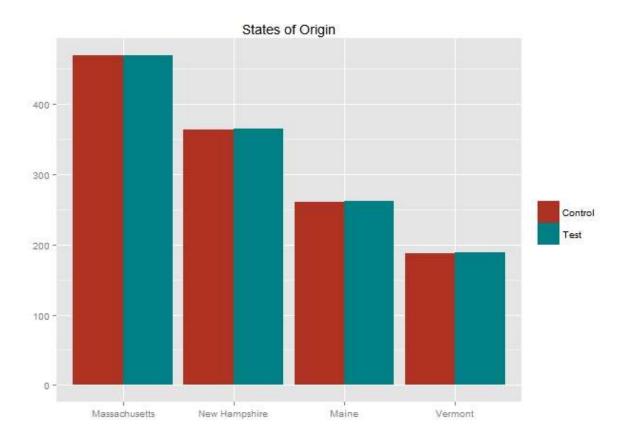


Figure 2. Responses by State and Control/Test Groups

Differences between control and test groups were examined by each age category except for ages 18-24, 75-84, and 85 or older, based on the respective sample sizes shown in

Table 2 and Figure 3 below. The distribution of ages between the control and test groups were not all the same, with marked differences for ages 45-54 and 65-74. The test group had more respondents in the 45-54 group, while the control group had more respondents in the 65-74 group.

Table 2 Responses by Age and Control/Test Groups

Age	Control	Test
18-24	30	35
25-34	176	183
35-44	178	198
45-54	263	300
55-64	353	342
65-74	236	195
75-84	36	28
85 or older	6	1

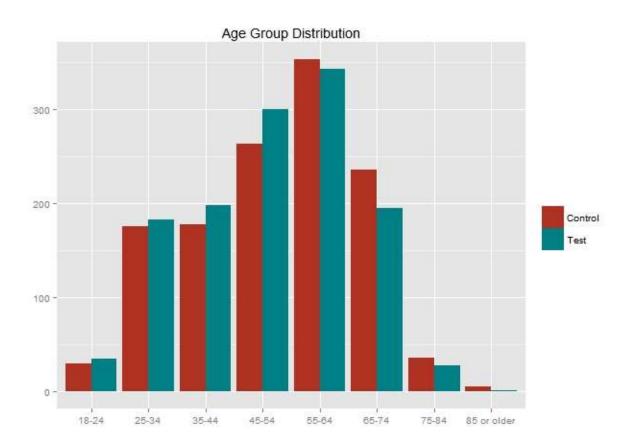


Figure 3. Responses by Age and Control/Test Groups

Differences between control and test groups were examined by each education category, grouping the first two into one, as "High school or less", based on the respective sample sizes shown in Table 3 and Figure 4 below. The distribution of education levels between the control and test groups were not all the same. There were more respondents with graduate or professional degrees in the test group, and more with associate degrees or some college, no degree, in the control group.

Table 3 Responses by Education and Control/Test Groups

	Education	Control	Test
1	Less than high school diploma	7	8
2	High school diploma or equivalen	124	126
3	Some college, no degree	240	215
4	Associate degree	137	104
5	Bachelor's degree	423	440
6	Graduate or professional degree	347	389

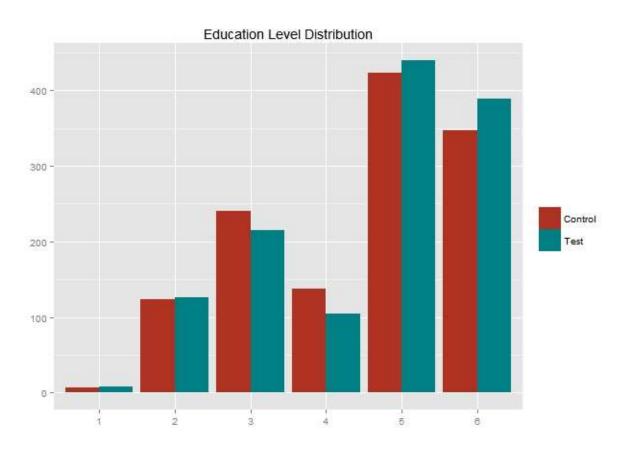


Figure 4. Responses by Education and Control/Test Groups

In addition to the information obtained from the survey data, several additional attributes were added, using available data and geographic information systems (GIS), for each zip code. These attributes included demographic information, land use, distances to destination cities, distances to the nearest urbanized areas within a metropolitan area, and distances to airports, rail stations, and bus stations of different sizes and types.

## 3. Preliminary Analysis

The survey data was first validated prior to analysis. Data validation included checking for the number of responses for each question, missing values, unique values, assessing the frequency distributions of the data set, and screening the amount of time taken to complete the survey, for each respondent. The survey data descriptive summary can be found in Appendix C.

The survey response data was analyzed, using the R statistical package, for overall differences in responses between the control and test groups. Differences in responses between the control and test groups were also examined by gender, age group, and education level. The responses were tested for differences using the Wilcoxan rank sum test, which does not assume a normal distribution, and compares the median between the two groups. Survey questions that showed a p-value of 0.1 or less, from the Wilcoxan rank sum tests, were flagged for review. The p-value threshold of 0.1 was chosen to be more inclusive, at this stage of analysis, than would have resulted from a more traditional p-value of 0.05.

# 3.1. Part 1: Recent Intercity Travel Trips and General Travel Preferences3.1.1. Testing for Overall Differences

Table 4 below shows significant differences overall in the responses provided by the control and test groups, based on the results of the Wilcoxan rank sum tests.

Table 4 Statistical Differences between the Control and Test Groups

Survey Question													
Sign	Significance:   **** 0.0001   *** 0.001   * 0.05   0								0.	1			
1	How many times have you visited one of the following cities in the past 12 months?												
	Visits to B	oston in	past year										
	Visits to N	ew York	in past ye	ar									
	Visits to P	hiladelp	hia in past	year									
	Visits to W	/ashingt	on DC in pa	ast year									
2	What mod	le(s) of t	ransportat	ion hav	e you use	d for you	ur trip(s)	to each	city in th	e past			
	twelve mo	nths?											
	Boston: Pe	ersonal A	Auto/Car	·	·	<u>-</u>	·	·	<u>'</u>			0	

Sur	vey Question	
		0.1
5181	Boston: Rental Car (including car share) or borrowed car	
	Boston: Intercity bus (e.g., Greyhound, Peter Pan, Megabus)	
	Boston: Intercity rail (e.g., Amtrak)	
	Boston: Airplane	
	Boston: Other	
	New York City: Personal Auto/Car	
	New York City: Rental Car (including car share) or borrowed car	
	New York City: Intercity Bus (e.g., Greyhound, Peter Pan, Megabus)	
	New York City: Intercity Rail (e.g., Amtrak)	
	New York City: Airplane	
	New York City: Other	
	Philadelphia: Personal Auto/Car	
	Philadelphia: Rental Car (including car share) or borrowed car	
	Philadelphia: Intercity bus (e.g., Greyhound, Peter Pan, Megabus)	
	Philadelphia: Intercity rail (e.g., Amtrak)	
	Philadelphia: Airplane	
	Philadelphia: Other	
	Washington DC: Personal Auto/Car	
	Washington DC: Rental Car (including car share) or borrowed car	
	Washington DC: Intercity bus (e.g., Greyhound, Peter Pan, Megabus)	
	Washington DC: Intercity rail (e.g., Amtrak)	
	Washington DC: Airplane	
	Washington DC: Other	
3	3. [If intercity bus or intercity rail selected for ANY city] How do you usually get information	
	about routes and schedules for bus or rail trips?	
	Use pamphlets or other printed material	
	Ask a friend or family member	0
	Visit the station	
	Call the bus or rail company	
	Search the internet	
	Use smart phone or tablet apps	
	Other, please specify	
4	[if # of cities visited > 1] Which city did you visit most recently?	
5	[Skip if frequency to # cities visited = 1] What mode(s) of transportation did you use for	
	your MOST RECENT trip to <recent city="">?</recent>	
	Personal auto/car	
	Rental car (including car share) or a borrowed car	
	Intercity bus (e.g., Greyhound, Peter Pan, Megabus)	
	Mode(s) used on most recent trip -Intercity rail (e.g., Amtrak)	
	Airplane	
	Other, please specify	
6	What was the purpose of your most recent trip to <recent city="">?</recent>	
	Leisure/vacation	
	Visit friends	
	Business	0
	Family event	

Sur	vey Questi	on									
Sigr	ificance:	****	0.0001	***	0.001	**	0.01	*	0.05	0	0.1
	Other, ple	ase spec	ify								
7	How many people travelled with you on your most recent trip to <recent city="">?</recent>										
	Other adults (18 and over) on most recent trip										
	Children (	under 1	8) on most	recent	trip						
8	[if bus, rai	l, or plan	ne trip] Hov	v did yo	u plan thi	is trip ar	nd book yo	our tick	ets?		
	Went to the	ne airline	e, bus, or tr	ain web	site						
	Went to a	travel w	ebsite (e.g	, Exped	ia.com, K	ayak.cor	n)				
	Called the	airline,	bus compa	ny, or tı	ain line						
	Through a	travel a	igency								
			member be	ooked it	for me						
	Other, ple	ase spec	rify								
9			did you sta				_				
10			red vehicle		orking or	der) are	available	to your	househol	ld?	0
11			zer's licens								
12			live in you		hold? Ho	w many	of you are	e licens	ed drivers	?	
			18 and ove								0
			Licensed d								
			H (under 18	,							**
			H: Licensed								
13			s the interr	et? <i>Plea</i>	ase select	all that	apply.				
	Internet s										*
	Internet s	ervice at	school								
	Internet s										
			rvice (e.g., a								*
			h a cellular	data pla	an (e.g., sı	mart ph	one, enabl	led tabl	et)		
	Other, ple	ase spec	rify								

There are three statements shown to have differences, between the control and test groups, with a p-value of 0.05 or less. One of these statements shows a difference between these two groups with a p-value of 0.01. This statement indicates that members of the test group were more likely to have indicated there being more than one child (under 18 years old) in the household. The other two statements show a difference in response between those in the control and test groups at the traditional level of significance, with a p-value of 0.05. Both of these statements are related to how respondents access the internet. The first of these statements indicates that more respondents from the control group, than from the test group, selected having internet access at home. The second of these statements indicates that more respondents from the test group selected accessing the internet from public internet service (e.g., at the library, community center).

## 3.1.2. Testing by Gender

Table 5 below shows significant differences, in response tendencies between control and test groups by gender, based on the results of the Wilcoxan rank sum tests.

Table 5 Statistical Differences by Gender between the Control and Test Groups

Sur	vey Question	Ger	der
Sign	ificance: **** 0.0001 *** 0.001 ** 0.05 0 0.1	F	M
1	How many times have you visited one of the following cities in the past 12 mo?		
	Visits to Boston in past year		
	Visits to New York in past year		
	Visits to Philadelphia in past year		
	Visits to Washington DC in past year		
2	What mode(s) of transportation have you used for your trip(s) to each city in the past		
	twelve months?		
	Boston: Personal Auto/Car		
	Boston: Rental Car (including car share) or borrowed car		
	Boston: Intercity bus (e.g., Greyhound, Peter Pan, Megabus)		
	Boston: Intercity rail (e.g., Amtrak)		
	Boston: Airplane		**
	Boston: Other		
	New York City: Personal Auto/Car		
	New York City: Rental Car (including car share) or borrowed car		
	New York City: Intercity Bus (e.g., Greyhound, Peter Pan, Megabus)		
	New York City: Intercity Rail (e.g., Amtrak)		
	New York City: Airplane		
	New York City: Other		
	Philadelphia: Personal Auto/Car		
	Philadelphia: Rental Car (including car share) or borrowed car		
	Philadelphia: Intercity bus (e.g., Greyhound, Peter Pan, Megabus)		
	Philadelphia: Intercity rail (e.g., Amtrak)		
	Philadelphia: Airplane		
	Philadelphia: Other	0	
	Washington DC: Personal Auto/Car		
	Washington DC: Rental Car (including car share) or borrowed car		
	Washington DC: Intercity bus (e.g., Greyhound, Peter Pan, Megabus)		
	Washington DC: Intercity rail (e.g., Amtrak)		
	Washington DC: Airplane		*
2	Washington DC: Other		7
3	3. [If intercity bus or intercity rail selected for ANY city] How do you usually get		
	information about routes and schedules for bus or rail trips?		*
	Use pamphlets or other printed material	0 *	
	Ask a friend or family member Visit the station	-1-	$\vdash$
	Visit the station  Call the bug or rail company		$\vdash$
	Call the bus or rail company		

Sur	vey Question	Ger	ıder								
	ificance: **** 0.0001 *** 0.001 ** 0.05 0 0.1	F	M								
	Search the internet										
	Use smart phone or tablet apps										
	Other, please specify										
4	[if # of cities visited > 1] Which city did you visit most recently?										
5	[Skip if frequency to # cities visited = 1] What mode(s) of transportation did you use										
	for your MOST RECENT trip to <recent city="">?</recent>										
	Personal auto/car										
	Rental car (including car share) or a borrowed car										
	Intercity bus (e.g., Greyhound, Peter Pan, Megabus)										
	Mode(s) used on most recent trip -Intercity rail (e.g., Amtrak)										
	Airplane	*									
	Other, please specify										
6	What was the purpose of your most recent trip to <recent city="">?</recent>										
	Leisure/vacation										
	Visit friends										
	Business										
	Family event										
	Other, please specify										
7	How many people travelled with you on your most recent trip to <recent city="">?</recent>										
	Other adults (18 and over) on most recent trip										
	Children (under 18) on most recent trip										
8	[if bus, rail, or plane trip] How did you plan this trip and book your tickets?	$\bot$									
	Went to the airline, bus, or train website	$\bot$									
	Went to a travel website (e.g., Expedia.com, Kayak.com)										
	Called the airline, bus company, or train line										
	Through a travel agency										
	A friend or family member booked it for me	4—	<u> </u>								
	Other, please specify	0	<u> </u>								
9	How many nights did you stay for your most recent trip to < recent city >?	<del> </del>									
10	How many registered vehicles (in working order) are available to your household?	+									
11	Do you have a driver's license?	+									
12	How many people live in your household? How many of you are licensed drivers?	+_									
	# of adults in HH (18 and over)	0									
	# of adults in HH: Licensed drivers	*									
	# of children in HH (under 18)		0								
10	# of children in HH: Licensed drivers	+-	T								
13	How do you access the internet? <i>Please select all that apply.</i>	+									
	Internet service at home	+-	0								
	Internet service at school										
1	Internet service at work	+									
	Public internet service (e.g., at the library, community center)  Mobile device with a callular data plan (e.g., smart phone, analysed tablet)	+-	0								
	Mobile device with a cellular data plan (e.g., smart phone, enabled tablet)  Other places energies	+-	*								
	Other, please specify	1	1								

Looking at differences in responses between female members of the control and test groups, there are differences shown between female respondents in control and test groups for three statements, with a p-value of 0.05, the traditional level of significance. The first of these statements indicates that more female respondents from the test group, than from the control group, usually ask a friend or family member to get information about routes or schedules for bus or rail trips. The second of these statements indicates that more female respondents from the control group, than from the test group, selected airplane as the mode of transportation used for their most recent trip to one of the study destination cities. The third of these statements indicates that more female respondents from the test group, than from the control group, were more likely to have indicated there being more than one child (under 18 years old) in the household.

Looking at differences in responses between male members of the control and test groups, there are differences shown between male respondents in control and test groups for six statements, with a p-value of 0.05 or less. The first of these statements shows a difference with a p-value of 0.01. This statement indicates that more males from the test group, than from the control group, selected taking an airplane to Boston in the past twelve months.

The remaining five statements show a difference between male respondents from the control and test groups, with a p-value of 0.05, the traditional level of significance. The first of these statements indicates that more males from the control group, than from the test group, selected 'other' as a transportation mode taken to Washington DC. The second of these statements indicates that more males from the test group, than from the control group, usually use pamphlets or other printed material to get information about routes and schedules for bus or rail trips. The third of these statements indicates that more males from the test group, than from the control group, were more likely to have indicated there being more than one licensed child in their household. The fourth and fifth of these statements indicates more males from the test group, than from the control group, selected 'other' as a way they access the internet.

### 3.1.3. Testing by Education Level

Table 6 below shows significant differences, in response tendencies between control and test groups by education level, based on the results of the Wilcoxan rank sum tests.

Table 6 Statistical Differences by Education Level between the Control and Test Groups

Survey Question									E	duca	tion	Leve	el			
Significance:		****	0.0001	***	0.001	**	0.01	*	0.05	0	0.1	H <sup>1</sup>	$C^1$	$A^1$	$\mathbf{B}^{1}$	G1
1	How many	y times	have you	visited	l one of t	he fo	llowing	citi	es in th	e pa	ast					

<sup>&</sup>lt;sup>1</sup> H = high school or less, C = some college, A = associate degree, B = bachelor's degree, G = grad./prof. degree

Survey Question	Е	duca	ition	Leve	el
Significance: **** 0.0001 *** 0.001 * 0.05 0 0.1	H <sup>1</sup>	C1	A <sup>1</sup>	B¹	G <sup>1</sup>
12 months?					
Visits to Boston in past year					
Visits to New York in past year					
Visits to Philadelphia in past year					
Visits to Washington DC in past year					*
2 What mode(s) of transportation have you used for your trip(s) to each					
city in the past twelve months?					
Boston: Personal Auto/Car				0	
Boston: Rental Car (including car share) or borrowed car					
Boston: Intercity bus (e.g., Greyhound, Peter Pan, Megabus)				**	
Boston: Intercity rail (e.g., Amtrak)					
Boston: Airplane					
Boston: Other					
New York City: Personal Auto/Car	*			0	
New York City: Rental Car (including car share) or borrowed car	*				
New York City: Intercity Bus (e.g., Greyhound, Peter Pan, Megabus)					
New York City: Intercity Rail (e.g., Amtrak)					
New York City: Airplane					
New York City: Other					
Philadelphia: Personal Auto/Car					
Philadelphia: Rental Car (including car share) or borrowed car					
Philadelphia: Intercity bus (e.g., Greyhound, Peter Pan, Megabus)					
Philadelphia: Intercity rail (e.g., Amtrak)					
Philadelphia: Airplane					
Philadelphia: Other					
Washington DC: Personal Auto/Car					
Washington DC: Rental Car (including car share) or borrowed car					0
Washington DC: Intercity bus (e.g., Greyhound, Peter Pan, Megabus)					
Washington DC: Intercity rail (e.g., Amtrak)					
Washington DC: Airplane					
Washington DC: Other					
3 3. [If intercity bus or intercity rail selected for ANY city] How do you					
usually get information about routes and schedules for bus or rail trips?					
Use pamphlets or other printed material			0		
Ask a friend or family member					
Visit the station					
Call the bus or rail company		*			*
Search the internet			*		
Use smart phone or tablet apps					
Other, please specify					
4 [if # of cities visited > 1] Which city did you visit most recently?					
5 [Skip if frequency to # cities visited = 1] What mode(s) of transportation					
did you use for your MOST RECENT trip to <recent city="">?</recent>					
Personal auto/car				*	
Rental car (including car share) or a borrowed car					
Intercity bus (e.g., Greyhound, Peter Pan, Megabus)	*			**	

Sur	vey Questi	on										E	duca	tion	Leve	el
Sign	ificance:	****	0.0001	***	0.001	**	0.01	*	0.05	0	0.1	H <sup>1</sup>	C1	A <sup>1</sup>	B <sup>1</sup>	G <sup>1</sup>
	Mode(s) u	ised on	most rece	nt trip	-Interci	ty rai	l (e.g., <i>l</i>	mtr	ak)							
	Airplane			•									*			
	Other, ple	ase spe	cify													*
6			rpose of yo	our mo	st recen	t trip	to <red< td=""><td>cent</td><td>city&gt;?</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></red<>	cent	city>?							
	Leisure/v												0			
	Visit frien														*	
	Business															
	Family ev	ent														
	Other, ple	ase spe	cify													
7	How man	y peopl	e travelled	l with	you on y	our n	nost red	cent	trip to							
	<recent ci<="" td=""><td></td><td></td><td>•</td><td>-</td><td></td><td></td><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></recent>			•	-				-							
	Other adu	lts (18	and over)	on mo	st recen	t trip										
	Children (	under	18) on mo:	st rece	nt trip											
8	[if bus, rai	l, or pla	ne trip] Ho	ow did	you pla	n this	trip an	d bo	ok yoı	ır						
	tickets?	-					-		•							
	Went to th	ne airlir	ne, bus, or	train v	vebsite										0	
	Went to a	travel	website (e	.g., Exp	edia.cor	n, Ka	yak.con	n)								
	Called the	airline	, bus comp	any, o	r train li	ne										
	Through a	travel	agency													*
	A friend o	r family	y member	booke	d it for n	ne										
	Other, ple														0	
9	How man	y nights	s did you s	tay for	your m	ost re	cent tr	ip to	< rece	ent c	ity				*	
	>?															
10			ered vehic	les (in	workin	g ord	er) are	avail	lable t	o yo	ur					
4.4	household		. , 1.	2												
11			<u>iver's licer</u>		1 112	) TT		С.		1.						
12		y peopi	e live in yo	our noi	usenoia?	HOW	many	or yo	u are	ncer	ısea					
	drivers?	a in IIII	(10 and a	)											*	
			(18 and or Licensed													
					S											
			IH (under IH: License		70 MG											
13						logt o	II +ba+	zanlı.								
13			ss the inte	rnet: I	Piease se	iect a	n that c	ірріу	<u>'.                                    </u>							
	Internet s															0
	Internet s													*		
	Internet s			0+ +h -	librar-	00.700	m:t	0077	.o.n)					-1-		
			ervice (e.g.							.d						
	tablet)	vice wi	th a cellula	ıı uata	pian (e.	g., sir	iai t pii(	me, e	парте	u			0			
		222 27 -	oifr													
	Other, ple	ase spe	city											l		

Looking at differences in response between members of the control and test groups by education level, there are differences for multiple statements for each education level. There are two statements that were shown to have significant differences, with a p-value of

0.05 or less, for two education levels each. The first of these statements shows a difference, between members of the control and test groups, with a p-value of 0.05, for those with a Graduate or Professional Degree, and for those with Some College. The statement indicates that, of respondents with a Graduate or Professional Degree, more from the test group, than from the control group, usually call the bus or rail company to get information about routes and schedules for bus or rail trips. However, the statement indicates that, of respondents with Some College, more from the control group, than from the test group, usually call the bus or rail company to get information about routes and schedules for bus or rail trips. The second of these statements shows a difference, between members of the control and test groups, with a p-value of 0.01, for those with a Bachelor's Degree. It shows a difference, significant at the traditional level, with a p-value of 0.05, for those with an education level of High School or Less. This statement indicates that, of respondents with a Bachelor's Degree, more from the test group, than from the control group, used intercity bus (e.g., Greyhound, Peter Pan, Megabus) for their most recent trip to one of the destination cities. However, the statement indicated that, of respondents with an education level of High School or Less, more from the control group, than from the test group, chose intercity bus from their most recent trip to one of the destination cities.

There are two more statements indicating a significant difference, with a p-value of 0.05, the traditional level of significance, for those with an education level of High School or Less. The first of these statements indicates that, of those with this level of education, more from the test group, than from the control group, used a personal automobile for a trip to NYC in the past twelve months. The second of these statements indicates that, of those with this level of education, more from the control group, than from the test group, used a rental car (including car share) or a borrowed car, for a trip to NYC in the past twelve months.

There is one more statement indicating a significant difference, with a p-value of 0.05, for those with Some College. This statement indicates that, of those with this level of education, more from the control group, than from the test group, used an airplane on their most recent trip to one of the destination cities.

There are two statements, indicating a significant difference, with a p-value of 0.05, for respondents with an Associate Degree. The first of these statements indicates that, of those with this level of education, more from the test group, than from the control group, usually search the internet to get information about routes and schedules for bus or rail trips. The second of these statements indicates that, of those with this level of education, more from the test group, than from the control group, selected internet service at work as one way they access the internet.

There are five additional statements indicating a significant difference, with a p-value of 0.05 or less, for respondents with a Bachelor's Degree. One of these statements was shown to have a difference between those from the control and test groups, with a p-value of 0.01. This statement indicates that, of those with this level of education, more from the test group, than from the control group, used intercity bus for a trip to Boston within the past twelve months. Four more statements indicate a difference, with a p-value of 0.05, for respondents with a Bachelor's Degree, between those in the control and test groups. The

first of these statements indicates that, of those with this level of education, more from the control group, than from the test group, used a personal automobile on their most recent trip to one of the destination cities. The second of these statements indicates that, of those with this level of education, more from the control group, than from the test group, selected 'visiting friends' as the purpose of their most recent trip to one of the destination cities. The third of these statements indicates that, of those with this level of education, more from the control group, than from the test group, specified planning their most recent trip to one of the destination cities, using another method than those listed. The fourth of these statements indicated that, of those with this level of education, respondents from the test group indicated having more adults in their household, than those from the control group.

There are three additional statements indicating a significant difference, with a p-value of 0.05, for respondents with a Graduate or Professional Degree. The first of these statements indicates that, of those with this level of education, members from the control group, travelled to Washington DC more than members from the test group, in the past twelve months. The second of these statements indicates that, of those with this level of education, more from the test group, than from the control group, used a mode other than personal automobile, rental car, intercity bus, intercity rail, or airplane, for their most recent trip to one of the destination cities. The third of these statements indicates that, of those with this level of education, more from the control group, than from the test group, used a travel agency to plan their most recent trip to one of the destination cities.

## 3.1.4. Testing by Age Group

Table 7 below shows significant differences, in response tendencies between control and test groups by age group, based on the results of the Wilcoxan rank sum tests.

Table 7 Statistical Differences by Age Group between the Control and Test Groups

Sur	vey Questi	on											Age	e Gro	oup	
Sign	ificance:	****	0.0001	***	0.001	**	0.01	*	0.05	0	0.1	25-34	35-44	45-54	55-64	65-75
1	How many	y times	have you v	isited	one of t	he fol	llowing	cit	ies in th	ie p	ast					
	12 month	s?														
	Visits to B	oston i	n past year	•												
	Visits to N	lew Yor	k in past y	ear												
	Visits to P	hiladelj	phia in pas	t year												
	Visits to V	Vashing	ton DC in j	past ye	ear											
2	What mod	le(s) of	transporta	ation h	ave you	used	for you	ırtı	rip(s) to	o ea	ch					
	city in the	past tw	velve mont	hs?												
	Boston: Po	ersonal	Auto/Car													
	Boston: Re	ental Ca	ar (includii	ng car	share) o	r bor	rowed o	car								
	Boston: In	tercity	bus (e.g., 0	Greyho	ound, Pet	ter Pa	an, Mega	abu	ıs)						*	
	Boston: In	tercity	rail (e.g., A	mtrak	()		•			•		*				
	Boston: A	irplane							·							

Survey Question		Ag	e Gro	oup	
Significance: **** 0.0001 *** 0.001 ** 0.01 * 0.05 • 0.1	25-34	35-44			65-75
Boston: Other					0
New York City: Personal Auto/Car					
New York City: Rental Car (including car share) or borrowed car					
New York City: Intercity Bus (e.g., Greyhound, Peter Pan, Megabus)					
New York City: Intercity Rail (e.g., Amtrak)		0			
New York City: Airplane					
New York City: Other	0				
Philadelphia: Personal Auto/Car				*	
Philadelphia: Rental Car (including car share) or borrowed car					
Philadelphia: Intercity bus (e.g., Greyhound, Peter Pan, Megabus)	0				
Philadelphia: Intercity rail (e.g., Amtrak)	0				
Philadelphia: Airplane		*			
Philadelphia: Other					
Washington DC: Personal Auto/Car					
Washington DC: Rental Car (including car share) or borrowed car					
Washington DC: Intercity bus (e.g., Greyhound, Peter Pan, Megabus)					
Washington DC: Intercity rail (e.g., Amtrak)					
Washington DC: Airplane					
Washington DC: Other					
3. [If intercity bus or intercity rail selected for ANY city] How do you					
usually get information about routes and schedules for bus or rail trips?	,				
Use pamphlets or other printed material		*			
Ask a friend or family member					
Visit the station		0			
Call the bus or rail company			*		
Search the internet					
Use smart phone or tablet apps			0		
Other, please specify					
4 [if # of cities visited > 1] Which city did you visit most recently?					**
5 [Skip if frequency to # cities visited = 1] What mode(s) of transportation					
did you use for your MOST RECENT trip to <recent city="">?</recent>					
Personal auto/car		0		0	
Rental car (including car share) or a borrowed car					
Intercity bus (e.g., Greyhound, Peter Pan, Megabus)					
Mode(s) used on most recent trip -Intercity rail (e.g., Amtrak)					**
Airplane					
Other, please specify					
6 What was the purpose of your most recent trip to <recent city="">?</recent>					
Leisure/vacation					
Visit friends					
Business				0	0
Family event					*
Other, please specify					
7 How many people travelled with you on your most recent trip to					
<recent city="">?</recent>					
Other adults (18 and over) on most recent trip					

Sur	vey Questi	on											Age	e Gro	oup	
	ificance:	****	0.0001	***	0.001	**	0.01	*	0.05	0	0.1	25-34				65-75
		under	18) on mos	st rece	ent trip											
8	[if bus, rai	l, or pla	ine trip] Ho	w did	l you plai	ı this	trip an	d bo	ook yo	ur						
	tickets?	_					_		_							
	Went to th	ne airlir	ne, bus, or t	train v	website											
	Went to a	travel	website (e.	g., Exp	oedia.con	n, Kay	yak.con	1)								
	Called the	airline	, bus comp	any, c	or train li	ne										
	Through a	travel	agency												*	
	A friend of	r family	y member l	booke	d it for n	ıe										
	Other, plea	ase spe	ecify													
9	How many	y nights	s did you s	tay foi	r your mo	ost re	cent tri	p to	< rece	ent c	city					
	>?															
10			ered vehic	les (ir	n working	gord	er) are	avai	ilable t	o yc	ur					***
	household															
11	•		iver's licen													
12		y peopl	e live in yo	ur ho	usehold?	How	many o	of y	ou are	lice	nsed					
	drivers?															
			(18 and or													0
			: Licensed		rs .											0
			IH (under 1													*
			IH: License													0
13	How do yo			rnet?	Please se	ect a	ll that a	ppl	<i>y.</i>							
	Internet s													0		*
	Internet s															
	Internet s													0		
			ervice (e.g.,										0			
		vice wi	th a cellula	r data	a plan (e.	g., sm	art pho	ne,	enable	d						
	tablet)															
	Other, plea	ase spe	cify													

Looking at differences in response between members of the control and test groups by age group, there are differences for multiple statements for respondents ages 35-44, 55-64, and 65-74. There are no statements that were shown to have significant differences, with a p-value of 0.05 or less, the traditional level of significance, for multiple age groups.

There is only one statement indicating a difference, between control and test groups, for ages 25-34, with a p-value of 0.05. This statement indicates that, of those in this age group, more from the test group, than from the control group, took intercity rail to a recent trip to Boston.

There are two statements indicating a difference, between control and test groups, for ages 35-44, with a p-value of 0.05. The first of these statements indicates that, of those in this age group, more from the test group, than from the control group, took an airplane to Philadelphia, in the past twelve months. The second of these statements indicates that, of those in this age group, more from the control group, than from the test group, usually use

pamphlets or other printed material to get information about routes and schedules for bus or rail trips.

There is only one statement indicating a difference, between control and test groups, for ages 45-44, with a p-value of 0.05. This statement indicates that, of those in this age group, more from the control group, than from the test group, usually call the bus or rail company to get information about routes and schedules for bus or rail trips.

There are three statements indicating a difference, between control and test groups, for ages 54-65, with a p-value of 0.05. The first of these statements indicates that, of those in this age group, more from the test group, than from the control group, used intercity bus for a trip to Boston in the past twelve months. The second of these statements indicates that, of those in this age group, more from the test group, than from the control group, took a personal automobile for a trip to Philadelphia in the past twelve months. The last of these three statements indicates that, of those in this age group, more from the control group, than from the test group, used a travel agency to plan their most recent trip to one of the destination cities.

There are six statements indicating a difference, between control and test groups, for ages 65-74, with a p-value of 0.05 or less. One of these statements shows a difference with a pvalue of 0.001. This statement indicates that, of those in this age group, respondents from the control group have more registered vehicles available to their household, than do respondents from the test group. Two of these statements show a difference with a p-value of 0.01. The first of these statements indicates that, of those in this age group, respondents from the control group took more trips to Boston in the past year, than did those from the test group. The second of these statements indicates that, of those in this age group, more respondents from the control group, than from the test group, took intercity rail for their most recent trip to one of the destination cities. The remaining three statements show a difference with a p-value of 0.05, the traditional level of significance. The first of these statements indicates that, of those in this age group, more from the control group, than from the test group, made their most recent trip to one of the destination cities for the purpose of a family event. The second of these statements indicates that, of those in this age group, respondents from the test group have more children in their household, than do respondents from the control group. The third of these statements indicates that, of those in this age group, more from the control group, than from the test group, access the internet from home.

#### 3.2. Part 2: Travel Preferences

## 3.2.1. Testing for Overall Differences

Table 8 below shows significant differences overall, in response tendencies between control and test groups, based on the results of the Wilcoxan rank sum tests.

## Table 8 Statistical Differences between the Control and Test Groups

Sui v	vey Question	
		0.1
14	I feel I am less dependent on cars than my parents are/were.	
15	I need to drive my car to get where I need to go.	
16	I love the freedom and independence I get from owning one or more cars.	
17	It would be hard for me to reduce my driving mileage.	
18	For me to be able to leave the driving to someone else would be desirable.	
19	It would be desirable for my household to be able to have fewer cars.	*
20	Being able to freely perform tasks, including using a laptop, tablet, or smartphone is an	
20	important reason for me to choose bus or train travel.	
21	Having reliable WiFi internet access while I travel on a bus or train is important to me.	0
22	When taking a bus or train, being able to plan my trip and buy tickets online is important to me.	
23	It would be important to me to receive email or text message updates about my bus or train trip.	
24	I find tablet or smartphone apps for travel and trip planning to be helpful.	
25	When the government tries to improve things, it never works.	
26	If everyone works together, we could improve the environment and future for the earth.	
27	People like me take the bus or the train.	0
28	I would be willing to pay more when I travel if it would help the environment.	
29	I tend to use the fastest form of transportation, regardless of cost.	
30	For me, the whole idea of being on a bus or train with other people I do not know seems uncomfortable.	
31	I enjoy being out and about and observing people.	
32	I don't mind traveling with people I do not know.	
33	Having my privacy is important to me when I travel.	
34	When I choose a home, I value having adequate space for parking two or more cars.	
36	Living in a multiple family building (e.g., apartment, condo) wouldn't give me enough privacy.	
37	I like living in a neighborhood where there is a lot going on.	
38	I am confident that if I want to, I can do things that I have never done before.	
39	I worry about crime or other disturbing behavior on buses and trains, or while walking in and around the stops/stations.	
40	It is important to me to control the radio and the air conditioning in the car.	
41	I feel really stressed when driving for a long time in congestion in and around big cities.	
42	I prefer to use the most comfortable transportation mode regardless of cost or time.	
43	Having a low-stress trip is more important than reaching my destination quickly.	
44	I get very annoyed being stuck behind a slow driver.	
45	I am usually in a hurry when I make a trip.	
46	With my schedule, minimizing time spent traveling is very important to me.	
47	I would use the bus or train more often if it were cheaper to ride.	
48	Rather than owning a car, I would prefer to borrow, share, or rent a car just for when I need it.	

There is one statement showing a difference in response, between control and test groups overall, with a p-value of 0.05. This statement indicates that more people, from the control group, disagreed that it would be desirable for their household to have fewer cars.

## 3.2.2. Testing by Gender

Table 9 below shows significant differences, in response tendencies between control and test groups by gender, based on the results of the Wilcoxan rank sum tests.

Table 9 Statistical Differences by Gender between the Control and Test Groups

Surv	vey Question	Gen	der
Sigr	ificance: **** 0.0001 *** 0.001 * 0.05 0 0.1	F	M
14	I feel I am less dependent on cars than my parents are/were.		0
15	I need to drive my car to get where I need to go.		
16	I love the freedom and independence I get from owning one or more cars.		
17	It would be hard for me to reduce my driving mileage.		
18	For me to be able to leave the driving to someone else would be desirable.	*	
19	It would be desirable for my household to be able to have fewer cars.	0	
20	Being able to freely perform tasks, including using a laptop, tablet, or smartphone is		
	an important reason for me to choose bus or train travel.		
21	Having reliable WiFi internet access while I travel on a bus or train is important to	0	
	me.		
22	When taking a bus or train, being able to plan my trip and buy tickets online is		
	important to me.		
23	It would be important to me to receive email or text message updates about my bus or train trip.		
24	I find tablet or smartphone apps for travel and trip planning to be helpful.		
25	When the government tries to improve things, it never works.	0	
	If everyone works together, we could improve the environment and future for the		
26	earth.		
27	People like me take the bus or the train.	*	
28	I would be willing to pay more when I travel if it would help the environment.		0
29	I tend to use the fastest form of transportation, regardless of cost.		
30	For me, the whole idea of being on a bus or train with other people I do not know		
30	seems uncomfortable.		0
31	I enjoy being out and about and observing people.		
32	I don't mind traveling with people I do not know.		
33	Having my privacy is important to me when I travel.	*	
34	When I choose a home, I value having adequate space for parking two or more cars.		
36	Living in a multiple family building (e.g., apartment, condo) wouldn't give me enough		
	privacy.		
37	I like living in a neighborhood where there is a lot going on.	*	
38	I am confident that if I want to, I can do things that I have never done before.		
39	I worry about crime or other disturbing behavior on buses and trains, or while	0	

Surv	ey Questi	on										Gen	der
Sign	nificance:	****	0.0001	***	0.001	**	0.01	*	0.05	0	0.1	F	M
	walking i	n and ai	round the s	tops/s	tations.								
40	It is impo	rtant to	me to cont	rol the	e radio ar	nd the a	ir condit	ioning	in the ca	ır.			
41	I feel real	ly stres	sed when d	riving	for a lon	g time i	in conges	stion ir	and aro	und b	ig		
41	cities.												
42	I prefer to	o use th	e most com	fortab	le transp	ortatio	n mode i	egard	less of co	st or t	ime.	*	
43	Having a	low-str	ess trip is n	nore in	nportant	than re	eaching n	ny desi	tination (	quickl	y.		
44			ed being stu			w driv	er.						
45	I am usua	ally in a	hurry whe	n I mal	ke a trip.								
46	With my	schedul	e, minimizi	ng tim	e spent t	ravelin	g is very	impor	tant to m	ie.			
47	I would u	se the b	us or train	more	often if it	were o	heaper t	o ride.					
48	Rather th	an own	ing a car, I	would	prefer to	borro	w, share,	or ren	t a car ju	st for	when		
40	I need it.												

Looking at differences in responses between members of the control and test groups by gender, there are five statements indicating a difference in response, between females from the control and test groups, with a p-value of 0.05 or less. There are no statements indicating a difference in response, between males from the control and test groups, at this level of significance.

Of the five statements indicating a difference in response, between females from the control and test groups, at the traditional level of significance, the first statement indicates that females in the sample, from the test group, agree more that for them to be able to leave the driving to someone else (e.g., a bus driver), would be desirable. The second of these statements indicates that females in the sample, from the control group, disagree more that people like them take the bus or the train. The third of these statements indicates that females in the sample, from the control group, agree more that having privacy is important to them when they travel. The fourth of these statements indicates that females in the sample, from the test group, agree more that living in a multiple family unit wouldn't give them enough privacy. The fifth of these statements indicates that more females in the sample, from the test group, agree more that they feel really stressed when driving for a long time in congestion in and around big cities.

#### 3.2.3. Testing by Education Level

Table 10 below shows significant differences, in response tendencies between control and test groups by education level, based on the results of the Wilcoxan rank sum tests.

Table 10 Statistical Differences by Education Level between the Control and Test Groups

Surv	ey Questio	on										E	duca	tion	Leve	el
Signi	ficance:	****	0.0001	***	0.001	**	0.01	*	0.05	0	0.1	H <sup>2</sup>	C <sup>2</sup>	$A^2$	$\mathbf{B}^2$	$G^2$
14	I feel I am	less d	ependent o	on cars	than m	y par	ents are	e/w	ere.			*				
15			ny car to go													
16	I love the	freedo	om and ind	epend	ence I ge	et froi	n owni	ng o	ne or 1	nor	e					
	cars.															
17			d for me to													
18			le to leave		ving to s	ome	one else	e(e.g	g., a bus	S			*			
	_		e desirable													
19			rable for n										0			
20	_		eely perfor			_	_	-	-							
			n importai													
21	_		WiFi interi	net acc	ess whil	e I tra	avel on	a bu	is or tr	ain	is					
	importan			, .	11.					. ,		-1-		*		
22			ous or train	, being	g able to	plan	my trip	and	l buy ti	icke	ts	*		*		
22			ant to me.			11				1.1						
23		-	ortant to m		eceive er	naii c	or text n	ness	age up	oat	es					
24			train trip.		for trouv	land	l tuin nl	anni	ing to l	20			0			
24	helpful.	ecors	martphone	apps	ioi trave	ei anc	i ti ip pi	allill	ing to i	be						
25		gover	nment trie	c to im	nrovo th	ninge	it nove	or 1476	orke							*
26			ks togethe							and	l					
20	future for			i, wc c	ould iiii	J1 0 V C	tile ell	VIIO	iiiiiciic	and						
27			ake the bu	s or th	e train.											
28			ng to pay n			vel if	it wou	ld he	eln the							
	environm		6 to bay			., 01 11	10 11 0 01		p							
29			fastest for	m of t	ransport	ation	ı, regard	dless	s of cos	st.						
30			ole idea of b								I do	*				
			uncomfor	_					•	•						
31	I enjoy be	ing ou	t and abou	t and o	bservin	g peo	ple.									
32	I don't mi	nd tra	veling with	peopl	le I do no	ot kno	ow.					*				
33	Having m	y priva	acy is impo	rtant t	o me wh	ien I 1	travel.									
34	When I ch	100se a	a home, I va	alue ha	ving ade	equat	e space	e for	parkir	ıg tv	vo				0	
	or more c															
35			a neighborl		o live in,	I like	to be a	ıble 1	to wall	k to	a					
			illage cent													
36	_		iple family	buildi	ng (e.g., a	apart	ment, c	cond	o) woı	ıldn	't		*			
	give me e															
37			neighborh													
38		ident t	hat if I war	it to, I	can do tl	nings	that I h	iave	never	don	e					
20	before.	l		11 -	1.1.1	1.		1.	1							
39	_		rime or oth		_			buse	es and	traii	1S,					
	or while v	vaikin	g in and ar	ouna t	ne stops	/stat	ions.									

<sup>&</sup>lt;sup>2</sup> H = high school or less, C = some college, A = associate degree, B = bachelor's degree, G = grad./prof. degree

40	It is important to me to control the radio and the air conditioning in the					
	car.					
41	I feel really stressed when driving for a long time in congestion in and		*	*		
	around big cities.					
42	I prefer to use the most comfortable transportation mode regardless of					
	cost or time.					
43	Having a low-stress trip is more important than reaching my					
	destination quickly.					
44	I get very annoyed being stuck behind a slow driver.		**	*	0	
45	I am usually in a hurry when I make a trip.	*			0	
46	With my schedule, minimizing time spent traveling is very important to					
	me.					
47	I would use the bus or train more often if it were cheaper to ride.					
48	Rather than owning a car, I would prefer to borrow, share, or rent a car					
	just for when I need it.					

Looking at differences in response between members of the control and test groups by education level, there are differences for multiple statements for each education level, except for Bachelor's Degree, and Graduate or Professional Degree. There are three statements that were shown to have significant differences, with a p-value of 0.05 or less. the traditional level of significance, for multiple education levels. The first of these statements indicates that, more respondents with an education level of High School or Less, or with an Associate Degree, and from the control group, agree more that when taking a bus or train, being able to plan their trip and buy tickets online is important to them. The second of these statements indicates that, more respondents with Some College, from the test group, agree more that they feel really stressed when driving for a long time in congestion in and around big cities. On the other hand, this statement also indicates that more respondents with an Associate Degree, from the control group, agree more with this statement. The third of these statements indicates that, more respondents with Some College, from the test group, agree more that they get very annoyed being stuck behind a slow driver. This difference has a p-value of 0.01. However, this statement also indicates that respondents with an Associate Degree, from the control group, agree more with this statement. This difference has a p-value of 0.05.

There are four more statements showing a difference in response, between control and test groups, for respondents with an education level of High School or Less, with a p-value of 0.05. The first of these statements indicates that, of those with this level of education, more respondents from the control group, than from the test group, disagree that they feel that they are less dependent on cars than their parents are/were. The second of these statements indicates that, of those with this level of education, more respondents from the control group, disagree that for them, the whole idea of being on a bus or train with other people they do not know seems uncomfortable. The third of these statements indicates that, for those with this level of education, more respondents from the test group, disagree that they don't mind traveling with people they do not know. The third of these statements

indicates that, for those with this level of education, more respondents from the control group, disagree that they are usually in a hurry when they make a trip.

There are two more statements showing a difference in response, between control and test groups, for respondents with Some College, with a p-value of 0.05. The first of these statements indicates that, of those with this level of education, more respondents from the test group, agree that for them to be able to leave the driving to someone else would be desirable. The second of these statements indicates that, of those with this level of education, more respondents from the test group agree that living in a multiple family building wouldn't give them enough privacy.

There are no statements showing a difference in response, between control and test groups, for respondents with a Bachelor's Degree, with a p-value of 0.05 or less.

There is one statement showing a difference in response, between control and test groups, for respondents with a Graduate or Professional Degree, with a p-value of 0.05 or less. This statement indicates that, of those with this level of education, more respondents from the control group agree that when the government tries to improve things, it never works.

#### 3.2.4. Testing by Age Group

Table 11 below shows significant differences, in response tendencies between control and test groups by age group, based on the results of the Wilcoxan rank sum tests.

Table 11 Statistical Differences by Age Group between the Control and Test Groups

Surv	ey Questi	on										E	duca	ition	Leve	el
Signi	ificance:	****	0.0001	***	0.001	**	0.01	*	0.05	0	0.1	25-34	35-44	45-54	55-64	65-75
14	I feel I am	less de	ependent o	n cars	s than my	y par	ents are	e/we	ere.			0			0	
15	I need to	drive m	y car to ge	et whe	re I need	l to g	0.								*	
16	I love the	freedo	m and ind	epend	ence I ge	t froi	n ownii	ng oi	ne or n	nore	9					
	cars.															
17	It would l	oe hard	for me to	reduc	e my dri	ving 1	mileage.	•								
18	For me to	be able	e to leave t	he dri	iving to s	ome	one else	e(e.g	., a bus	;			**			
	driver) w	ould be	desirable													
19	It would l	oe desir	able for m	ıy hou	sehold to	be a	ible to h	ave	fewer	car	S.					*
20	Being abl	e to fre	ely perfori	n task	s, includ	ing u	sing a la	apto	p, tabl	et, o	r					
	smartpho	ne is ai	n importar	ıt reas	on for m	e to o	choose l	ous (	or traii	ı tra	ıvel.					
21	Having re	liable V	ViFi interr	iet acc	ess whil	e I tra	avel on a	a bu	s or tra	ain i	S			0		
	importan	t to me												O		
22	When tak	ing a bi	us or train	, being	g able to	plan	my trip	and	buy ti	cket	S					
	online is i	importa	ant to me.													
23	It would l	oe impo	ortant to m	e to re	eceive er	nail o	r text n	iess	age up	date	es					
	about my	bus or	train trip.													

24	I find tablet or smartphone apps for travel and trip planning to be					
27	helpful.					
25	When the government tries to improve things, it never works.				*	
26	If everyone works together, we could improve the environment and					
	future for the earth.					
27	People like me take the bus or the train.		0		*	
28	I would be willing to pay more when I travel if it would help the		*			
	environment.		*			
29	I tend to use the fastest form of transportation, regardless of cost.					
30	For me, the whole idea of being on a bus or train with other people I do					
	not know seems uncomfortable.					
31	I enjoy being out and about and observing people.			0		0
32	I don't mind traveling with people I do not know.					
33	Having my privacy is important to me when I travel.	0				
34	When I choose a home, I value having adequate space for parking two	0				
	or more cars.	O				
35	When I choose a neighborhood to live in, I like to be able to walk to a		0		0	*
	commercial or village center.		0		U	
36	Living in a multiple family building (e.g., apartment, condo) wouldn't					*
	give me enough privacy.					
37	I like living in a neighborhood where there is a lot going on.					*
38	I am confident that if I want to, I can do things that I have never done	*				
	before.					
39	I worry about crime or other disturbing behavior on buses and trains,					
	or while walking in and around the stops/stations.					
40	It is important to me to control the radio and the air conditioning in the		*			
	car.					
41	I feel really stressed when driving for a long time in congestion in and	0			0	
	around big cities.					
42	I prefer to use the most comfortable transportation mode regardless of					
40	cost or time.					
43	Having a low-stress trip is more important than reaching my					
4.4	destination quickly.					
44	I get very annoyed being stuck behind a slow driver.					
45	I am usually in a hurry when I make a trip.					
46	With my schedule, minimizing time spent traveling is very important to					*
47	me.					
47	I would use the bus or train more often if it were cheaper to ride.	0				
48	Rather than owning a car, I would prefer to borrow, share, or rent a car					
	just for when I need it.					

Looking at differences in response between members of the control and test groups by age group, there are differences for multiple statements for ages 35-44, 55-64, and 65-74, with a p-value of 0.05 or less.

There is one statement showing a difference in response, between control and test groups, for respondents ages 25-34, with a p-value of 0.05. This statement indicates that, of those in this age group, more respondents from the test group agree more that they are confident that if they wanted to, they can do things that they have never done before.

There is one statement showing a difference in response, between control and test groups, for respondents ages 35-44, with a p-value of 0.01. This statement indicates that, of those in this age group, more respondents from the test group agree that for them to be able to leave the driving to someone else would be desirable.

There are two statements showing a difference in response, between control and test groups, for respondents ages 35-44, with a p-value of 0.05. The first of these statements indicates that, of those in this age group, more respondents from the control group disagree that they would be willing to pay more when they travel if it would help the environment. The second of these statements indicates that, of those in this age group, more respondents from the test group agree that it is important for them to control the radio and the air conditioning in the car.

There are no statements showing a difference in response, between control and test groups, for respondents ages 45-54, with a p-value of 0.05 or less.

There are three statements showing a difference in response, between control and test groups, for respondents ages 55-64, with a p-value of 0.05. The first of these statements indicates that, of those in this age group, more respondents from the control group agree more that they need to drive their car to get where they need to go. The second of these statements indicates that, of those in this age group, more respondents from the control group agree more that when the government tries to improve things, it never works. The third of these statements indicates that, of those in this age group, more respondents from the control group disagree that people like them take the bus or the train.

There are five statements showing a difference in response, between control and test groups, for respondents ages 65-74, with a p-value of 0.05. The first of these statements indicates that, of those in this age group, more respondents from the control group disagree more that it would be desirable for their household to be able to have fewer cars. The second of these statements indicates that, of those in this age group, more respondents from the control group agree that when they choose a neighborhood to live in, they like to be able to walk to a commercial or village center. The third of these statements indicates that, of those in this age group, more respondents from the test group agree more that living in a multiple family building wouldn't give them enough privacy. The fourth of these statements indicates that, of those in this age group, more respondents from the test group disagree that they like living in a neighborhood where there is a lot going on. Finally, the last of these statements indicates that, of those in this age group, more respondents from the control group agree more that with their schedule, minimizing the time spent traveling is very important to them.

## 3.3. Part 3: An Imaginary Situation

## 3.3.1. Testing for Overall Differences

Table 12 below shows significant differences overall, in response tendencies between control and test groups, based on the results of the Wilcoxan rank sum tests.

Table 12 Statistical Differences between the Control and Test Groups

Sur	vey Questi	on									
	ificance:	****	0.0001	***	0.001	**	0.01	*	0.05	0	0.1
	Knowing	what yo	u know rigl	nt now,	what mod	de(s) c	of transpor	tation	do you thi	nk are	
	AVAILABI	LE to you	ı for this tr	ip to N'	YC? Please	select	all that ap	oply.			
	Personal a										
49		_	ing car shai								
	_		Greyhound,	, Peter i	Pan, Mega	bus)					
	Intercity r	`									
	Other, pled		<i>ify</i>								
	Other, spe										
50			u to choose								
51			re would be							ain for this	
	•		ake to you		_						
52			ptions thar								
53			us and traii				to NYC, I ju	ıst don	t think th	ere's a	
			o get there					. 1 .	1		
54	_		n like this	-	-		-	_	nake it eas	sier for me	
			kinds of bu						_		
55			otential tra							. J	
56	stressed.	ive iong	distances (	(like iro	om my nor	ne are	ea to NYCJ,	i can g	et tired ai	10	
57	I worry ab	out the	difficulty in	n findin	g a parkin	ıg spac	ce at a reas	sonable	cost whe	n I get to	
	NYC.	1.1	1 1	1 1 6	1		1 1 .		1 6		
58			at the sche		the bus or	r train	only lets r	ne trav	el a few ti	mes per	****
			be flexible.		1 CC	11	l	. C 1			
59			he limited	scneau	ies offered	ı by a	bus or trai	n for ti	iis trip iro	m my	
60	home to N		Insight on	d . w		aanla	on a hua o	two:	to NVC		0
61			I might see a of riding							rain	
			rain to NYC								
62	unpleasan		i aiii to ivi C	ı, ı ııııgı	it liave to	be wit	ii peopie v	viiose i	Jenavioi i	IIIIu	
60			ner people	who sh	are my va	lues w	hen I take	a bus	or train or	a trip like	!
63	this.		· r··r		J					· · ·	
64		it taking	a BUS to N	YC wou	ıld take a	lot lon	ger than d	riving.			*
65			a TRAIN to								
((			about it mu							y BUS	
66			n the cost o		_					-	
67			about it mu							y TRAIN	

Sur	vey Questi	on									
	ificance:	**** 0.0001	*** 0	0.001	**	0.01	*	0.05	0	0.1	
	would be	less than the cost of	f the car tr	ip (inc	luding	gas, tolls,	and pa	rking.)			
68	It would be really important to me to minimize costs when I plan this trip to NYC next month.										
69	I really want to minimize the time I spend on the trip to NYC, even if that means more stress or higher costs.										
70	Being able to use my laptop, tablet, or smartphone when traveling makes me more interested in taking a bus or train to NYC.										
71	I am the kind of person who would take my own car to NYC.										
72	Most people whose opinions I value would approve of my taking this trip by bus or train.										
73	My family would think that I should take this kind of trip by car or plane.										
74	My colleagues would likely think that it is strange not to go by a car or plane to NYC.										
75	When my friends go to NYC, they always take a bus or train.										
76	When my family members go to NYC, they always take a bus or train.										
77	It might be unsafe to make this trip by bus or train.										
78	The experience at the NYC bus or train station would be so unpleasant that I would try to avoid it.										
79	It would be easy for me to get the schedules for a bus or train between here and NYC, and I would understand them.										
80	I like the idea of taking a bus or train instead of driving for this trip to NYC.										
81	I think tha	at the most RATION	IAL choice	would	be to t	ake a bus	or traii	n instead	of a car.		
82	I think that the most PLEASURABLE choice would be to take a bus or train instead of a car.										
83	I think tha	at the most STRESS	FUL choice	e would	d be to	take a bu	s or trai	in instead	of a car.		
84	All other things being equal, if a bus was cheaper, but less reliable than a train, I would choose to take a bus.										
85	I am confident that if I wanted to, I could take a bus or train for such a trip to NYC next month.										
86	I would m	ake an effort to ch	ose a bus	or trai	n for su	ıch a trip	to NYC	next mon	th.		
87	For me to take a bus or train for such a trip to NYC the next month would be impossible.									*	
88	In this imaginary situation, I would plan to take a bus or train for this trip to NYC next month.										
89	I would tr	ust the person who	invited m	e to N	YC to re	commen	d how I	should tr	avel.		
90	I don't know all the things I NEED to do to make this trip work by bus or train.										
91	Given what you know about bus and train services to NYC, how likely are you to choose a bus or train for a trip to NYC next month (like the one described in the imaginary situation)?										
92	We noticed that you are now <more less=""> likely to take the train or bus to NYC. Please tell us why you have changed your mind.</more>										
93	Thank yo	u for sharing your o ously would you co	pinions ab	out th				. In your r	eal life,		

There are two statements shown to have differences in answers, between the control and test groups overall, at the highest level of significance. The first of these statements indicates that there is some relationship between the planning tool and positive attitudes

about scheduling flexibility, with people who had access to the planning tool being less concerned about the frequency and flexibility of traveling by bus or train. The second of these statements indicates that more people, who did not have access to the planning tool, agreed that it would be easy to get and understand bus and train schedules from their home to NYC. That is, less people who did have access to the planning tool agreed that it would be easy to get and understand bus and train schedules from their home to NYC. There are also three statements with differences in answers, between the control and test groups overall, with p-values of 0.05, the traditional level of significance. The first of these statements indicates that more people, without access to the planning tool, agreed that taking a bus to NYC would take a lot longer than driving, than did those people with access to the planning tool. The second of these statements indicates that more people with access to the planning tool agreed that being able to use their personal technology devices when traveling makes them more interested in taking a bus or train to NYC. Finally, the third of these statements indicates that less people, who had access to the planning tool, disagreed that taking a bus or train to NYC the following month would be impossible. That is, there seems to be some relationship between having access to the planning tool, and agreeing that it would be impossible to take a bus or train for a trip to NYC in the next month.

The differences in responses discussed so far were observed between the control and test groups overall.

#### 3.3.2. Testing by Gender

Table 13 below shows significant differences, in response tendencies between control and test groups by gender, based on the results of the Wilcoxan rank sum tests.

Table 13 Statistical Differences by Gender between the Control and Test Groups

Survey Question								Gender					
Significance:		****	0.0001	***	0.001	**	0.01	*	0.05	0	0.1	F	M
49	Knowing what you know right now, what mode(s) of transportation do you think are												
	AVAILABLE to you for this trip to NYC? Please select all that apply.												
	Personal a	uto/car											
	Rental car (including car share) or a borrowed car												
	Intercity b	us (e.g.,	Greyhound	, Peter	Pan, Meg	gabus)							
	Intercity r	ail (e.g., .	Amtrack)										
	Other, plea	ase speci	fy										
	Other, spec	cified											
50	How likely	are you	ı to choose	to tak	e a bus o	r train	for a trip	like 1	this to NY	/C next	t		
	month?												
51			re would b										
	•		at make to	•							)		
52	There are more options than what I expected to travel to NYC by bus and train.												
53	After seein	ng the bu	us and trai	n optio	ons for tr	aveling	to NYC,	I just	don't thi	nk thei	re's a		

Surv	vey Question	Gen	der
	ificance: **** 0.0001 *** 0.001 ** 0.05 0 0.1	F	M
0.8	good way for me to get there by either bus or train.	1 -	
	Having information like this on my smartphone or computer might make it easier for		
54	me to understand the kinds of bus and train services available to me.		
55	Having so many potential travel options by bus and train is confusing.		
	When I drive long distances (like from my home area to NYC), I can get tired and		
56	stressed.		
	I worry about the difficulty in finding a parking space at a reasonable cost when I get		
57	to NYC.		
58	I am concerned that the schedule of the bus or train only lets me travel a few times	****	
58	per day, and I need to be flexible.		
59	I could deal with the limited schedules offered by a bus or train for this trip from my	*	
39	home to NYC.		
60	I like the idea that I might see and meet new people on a bus or train to NYC.		
61	I don't like the idea of riding with a lot of people that I don't know on a bus or train.		
62	If I took a bus or train to NYC, I might have to be with people whose behavior I find		
02	unpleasant.		
63	I could be with other people who share my values when I take a bus or train on a trip		
03	like this.		
64	I think that taking a BUS to NYC would take a lot longer than driving.	**	
65	I think that taking a TRAIN to NYC would take a lot longer than driving.	**	
66	Without thinking about it much, I would guess that the cost of taking the trip by BUS		
00	would be less than the cost of the car trip (including gas, tolls, and parking).		
67	Without thinking about it much, I would guess that the cost of taking the trip by		
_	TRAIN would be less than the cost of the car trip (including gas, tolls, and parking.)		
68	It would be really important to me to minimize costs when I plan this trip to NYC next		
	month.		-
69	I really want to minimize the time I spend on the trip to NYC, even if that means more		*
	stress or higher costs.		
70	Being able to use my laptop, tablet, or smartphone when traveling makes me more	*	
71	interested in taking a bus or train to NYC.  I am the kind of person who would take my own car to NYC.		
	Most people whose opinions I value would approve of my taking this trip by bus or		
72	train.		
73	My family would think that I should take this kind of trip by car or plane.		
74	My colleagues would likely think that it is strange not to go by a car or plane to NYC.		
75	When my friends go to NYC, they always take a bus or train.		
76	When my family members go to NYC, they always take a bus or train.		
77	It might be unsafe to make this trip by bus or train.		
	The experience at the NYC bus or train station would be so unpleasant that I would		
78	try to avoid it.		*
	It would be easy for me to get the schedules for a bus or train between here and NYC,		
79	and I would understand them.	*	***
80	I like the idea of taking a bus or train instead of driving for this trip to NYC.		
	I think that the most RATIONAL choice would be to take a bus or train instead of a		_
81	car.		0
82	I think that the most PLEASURABLE choice would be to take a bus or train instead of		

Sur	vey Questio	on										Gen	ıder
Sign	ificance:	****	0.0001	***	0.001	**	0.01	*	0.05	0	0.1	F	M
	a car.												
83	I think tha car.	t the mo	ost STRESS	FUL c	noice wo	ıld be t	o take a	bus o	r train in	stead o	of a		*
84	All other the would cho	_	O 1 .	if a bu	s was che	eaper, b	out less r	eliabl	e than a	train, I			
85	I am confid next mont		it if I wante	ed to, I	could tal	ke a bus	s or train	for s	uch a trip	to NY	C		
86													
87	For me to take a bug or train for such a trip to NVC the next month would be												**
88	In this imamonth.	ginary	situation, I	would	l plan to t	ake a b	us or tra	in for	this trip	to NY	C next		****
89	I would tri	ust the p	person who	invit	ed me to	NYC to	recomm	end h	ow I sho	uld tra	vel.		
90	I don't kno	w all th	e things I l	NEED 1	to do to n	nake th	is trip wo	ork by	bus or t	rain.			
	Given wha	t you kı	now about	bus ar	ıd train s	ervices	to NYC, l	now li	ikely are	you to	)		
91	choose a b	us or tr	ain for a tr	ip to N	YC next i	nonth (	like the	one d	escribed	in the			
	imaginary	situatio	on)?										
92	We noticed that you are now <more less=""> likely to take the train or bus to NYC.</more>												
72	Please tell us why you have changed your mind.												
93	Thank you for sharing your opinions about the imaginary trip to NYC. In your real life,												
75	how serior	usly wo	uld you coi	nsider	taking a	ous or 1	rain to N	IYC?					

Looking at differences in responses between members of the control and test groups by gender, there are differences for many statements for each gender, but only one statement that was shown to have significant differences in levels of agreement from both females and males. This difference was shown to be more significant for males than for females, but still significant for females at the traditional level of significance. That statement indicates that, more of both females and males in the control group, than in the test group, agree that it would be easy for them to get the bus or train schedules between their home and NYC, and they would understand them. While both females and males without access to the planning tool agreed with this at the same level, and less of both females and males with access to the planning tool agreed with this, less males that had access to the tool agreed with this, than did females with access to the tool. So, there appears to be a greater relationship, for males, between having access to the planning tool, and being in less agreement that it would be easy to get, and understand, the schedules for a bus or a train to NYC. Overall though, both females and males, from both the control and test groups, tend to agree with the statement.

Earlier, there was an overall difference between control and test groups shown, for concern over frequency and flexibility, of bus or train schedules. When looking at this by gender, this difference in response tendency appears for females, at the highest level of significance, but no difference is shown for males. Females with access to the planning tool were close to neutral, while females without access to the planning tool agreed more, that

they were concerned about the flexibility of the bus or train schedule. There is a similar situation for thinking that a bus to NYC would take a lot longer than driving. More people overall, without access to the planning tool, agreed that taking a bus to NYC would take a lot longer than driving, than did those people with access to the planning tool. However, when breaking this down by gender, there is a difference shown in response to this statement for females, with a p-value of 0.01, but no difference is shown for males.

With a difference shown by a p-value of 0.01, it appears that more females, without access to the planning tool, are neutral about thinking that taking a train to NYC would take a lot longer than driving, while females with access to the tool disagreed more. No difference is seen for this statement by males in this sample, between those with and without access to the planning tool.

There are two additional survey statements showing differences in response for females, with and without access to the planning tool, having p-values of 0.05, the traditional level of significance. The first of these statements indicates that females in this sample, with access to the planning tool, agree more that they could deal with the limited schedules offered by a bus or train for the trip to NYC. The second of these statements indicates that females in this sample, with access to the planning tool, agree more, that being able to use their personal technology devices when traveling makes them more interested in taking a bus or train to NYC. This statement showed differences in response for those with and without access to the planning tool overall, but only by females, when breaking this down by gender.

There is one statement where a difference is shown, at the highest level of significance, for males in this sample, between the control and test groups. It indicates that males in the sample, without access to the planning tool, disagree more that in this imaginary situation, they would plan to take a bus or train for this trip to NYC next month. This statement showed differences in response for those with and without access to the planning tool overall, but only by males, when breaking this down by gender. Overall though, males in the sample tend to disagree with this statement.

There is one statement where a difference in response is shown for males with and without access to the planning tool, having a p-value of 0.01. It indicates that males in the sample, without access to the planning tool, disagree more that taking a bus or a train for the trip to NYC next month would be impossible.

There are four additional survey statements showing differences in response for males with and without access to the planning tool, having p-values of 0.05, the traditional level of significance. The first of these statements indicates that males in this sample, without access to the planning tool, disagree more that they really want to minimize the time spent on the trip to NYC, even if that means more stress or higher costs. The second of these statements indicates that males in this sample, without access to the planning tool, disagree more that the experience at the NYC bus or train station would be so unpleasant that they would try to avoid it. The third of these statements indicates that males in this sample, without access to the planning tool, agree more that the most stressful choice would be to

take a bus or train instead of a car. Finally, the fourth of these statements indicates that males in this sample, without access to the planning tool, agree more that they would make an effort to choose a bus or train for such a trip to NYC next month.

### 3.3.3. Testing by Education Level and Age Group

Next, significant differences are broken down between the control and test groups by education level and age group. Before considering the longer lists for each group, a few statements are selected that highlight some of the differences across education levels and age groups.

"I am concerned that the schedule of the bus or train only lets me travel a few times per day, and I need to be flexible."

The control group agreed more with this statement than the test group overall, for all age categories included, except for ages 65-75, and for any respondent with a post-secondary degree.

"I think that taking a BUS to NYC would take a lot longer than driving."

The control group agreed more with this statement than the test group overall, but only for those ages 25-44, with a bachelor's degree.

"It would be easy for me to get the schedules for a bus or train between here and NYC, and I would understand them."

The control group agreed more with this statement than the test group overall, but only for those ages 25-44, with a bachelor's, graduate or professional degree.

"When I drive long distances (like from my home area to NYC), I can get tired and stressed"

For respondents ages 55-64, the test group agreed with this statement more than the control group. For respondents ages 65-74, the control group agreed with this statement more than the test group.

### 3.3.3.1. Testing by Education Level

Table 14 below shows significant differences, in response tendencies between control and test groups by education level, based on the results of the Wilcoxan rank sum tests.

Table 14 Statistical Differences by Education Level between the Control and Test Groups

Sur	vey Questi	on										E	duca	ition	Leve	el
Sign	ificance:	****	0.0001	***	0.001	**	0.01	*	0.05	0	0.1	$H_3$	$\mathbb{C}_3$	<b>A</b> <sup>3</sup>	$\mathbf{B}_3$	$G_3$
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49	Personal a														*	
17			ding car sh													
			, Greyhoun		er Pan, M	legab	us)									
			, Amtrack)													**
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50	How likely NYC next	month?	)								.0					
	-		ere would													
51	bus or training bus or training		his trip, wo his trip?	ould th	at make	to yo	u less l	ikely	to cho	oose	a					
52	There are and train.	more	options tha	an wha	at I expe	cted t	o trave	l to N	VYC by	bus						
53		_	ous and tra	-			_		•		t					
54		formati sier fo	on like thi	s on m	y smartj	phone	e or con	nput	er mig	ht	es					
55	Having so	many <sub>I</sub>	potential ti	ravel o	ptions b	y bus	and tr	ain is	confu	ısing	Ţ.					
56		ive lon	g distances										0			
57	I worry ab		e difficulty o NYC.	in find	ling a pa	rking	space	at a ı	eason	able				*		
58		erned t	hat the sch				train or	nly le	ts me	trav	el a			***	****	*
59	I could dea			d sche	dules off	ered	by a bu	s or	train f	or th	is				*	
60	I like the i NYC.	dea tha	t I might s	ee and	l meet ne	ew pe	ople or	ı a bı	us or t	rain	to					*
61	I don't like bus or tra		ea of ridin	g with	a lot of p	oeopl	e that I	don	t knov	v on	a					
62	If I took a behavior I	find u	npleasant.				•					0				
63	I could be train on a			e who	share m	y valı	ies whe	en I t	ake a l	ous c	or					
64	I think tha	ıt takin	g a BUS to	NYC w	ould tak	ke a lo	t longe	r tha	ın driv	ing.					**	
65	I think tha										ıg.				*	
66			about it n													

<sup>&</sup>lt;sup>3</sup> H = high school or less, C = some college, A = associate degree, B = bachelor's degree, G = grad./prof. degree

Significance:   ***	Sur	vey Question	E	duca	tion	Leve	el
tolls, and parking).  Without thinking about it much, I would guess that the cost of taking the trip by TRAIN would be less than the cost of the car trip (including gas, tolls, and parking).  88 It would be really important to me to minimize costs when I plan this trip to NYC next month.  99 I really want to minimize the time I spend on the trip to NYC, even if that means more stress or higher costs.  70 Being able to use my laptop, tablet, or smartphone when traveling makes me more interested in taking a bus or train to NYC.  71 I am the kind of person who would take my own car to NYC.  72 Most people whose opinions I value would approve of my taking this trip by bus or train.  73 My family would think that I should take this kind of trip by car or plane.  74 My colleagues would likely think that it is strange not to go by a car or plane to NYC.  75 When my friends go to NYC, they always take a bus or train.  76 When my friends go to NYC, they always take a bus or train.  77 It might be unsafe to make this trip by bus or train.  78 The experience at the NYC bus or train station would be so unpleasant that I would try to avoid it.  79 It would be easy for me to get the schedules for a bus or train between here and NYC, and I would understand them.  80 I like the idea of taking a bus or train instead of driving for this trip to NYC.  81 I think that the most RATIONAL choice would be to take a bus or train instead of a car.  82 I think that the most PLEASURABLE choice would be to take a bus or train instead of a car.  83 I think that the most STRESSFUL choice would be to take a bus or train instead of a car.  84 All other things being equal, if a bus was cheaper, but less reliable than a train, I would choose to take a bus.  85 I am confident that if I wanted to, I could take a bus or train for such a trip to NYC next month.  86 I would make an effort to choose a bus or train for such a trip to NYC next month.  87 For me to take a bus or train for such a trip to NYC the next month would be impossible.  88 In this	Sign	ificance: **** 0.0001 *** 0.001 ** 0.01 * 0.05 0 0.1	$\mathbf{H}_3$	$\mathbb{C}_3$	$A^3$	$\mathbf{B}^3$	$G^3$
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Solidarian   Sol	79	•		0		*	*
NYC.  1 I think that the most RATIONAL choice would be to take a bus or train instead of a car.  1 I think that the most PLEASURABLE choice would be to take a bus or train instead of a car.  1 I think that the most STRESSFUL choice would be to take a bus or train instead of a car.  1 I think that the most STRESSFUL choice would be to take a bus or train instead of a car.  All other things being equal, if a bus was cheaper, but less reliable than a train, I would choose to take a bus.  I am confident that if I wanted to, I could take a bus or train for such a trip to NYC next month.  I would make an effort to choose a bus or train for such a trip to NYC next month.  For me to take a bus or train for such a trip to NYC the next month would be impossible.  In this imaginary situation, I would plan to take a bus or train for this trip to NYC next month.  I would trust the person who invited me to NYC to recommend how I should travel.	00						
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Instead of a car.  I think that the most PLEASURABLE choice would be to take a bus or train instead of a car.  I think that the most STRESSFUL choice would be to take a bus or train instead of a car.  All other things being equal, if a bus was cheaper, but less reliable than a train, I would choose to take a bus.  I am confident that if I wanted to, I could take a bus or train for such a trip to NYC next month.  I would make an effort to choose a bus or train for such a trip to NYC next month.  For me to take a bus or train for such a trip to NYC the next month would be impossible.  In this imaginary situation, I would plan to take a bus or train for this trip to NYC next month.  I would trust the person who invited me to NYC to recommend how I should travel.	01	I think that the most RATIONAL choice would be to take a bus or train	*				
train instead of a car.  I think that the most STRESSFUL choice would be to take a bus or train instead of a car.  All other things being equal, if a bus was cheaper, but less reliable than a train, I would choose to take a bus.  I am confident that if I wanted to, I could take a bus or train for such a trip to NYC next month.  I would make an effort to choose a bus or train for such a trip to NYC next month.  For me to take a bus or train for such a trip to NYC the next month would be impossible.  In this imaginary situation, I would plan to take a bus or train for this trip to NYC next month.  I would trust the person who invited me to NYC to recommend how I should travel.  I don't know all the things I NEED to do to make this trip work by bus or train.	01	instead of a car.	-				
I think that the most STRESSFUL choice would be to take a bus or train instead of a car.  84 All other things being equal, if a bus was cheaper, but less reliable than a train, I would choose to take a bus.  85 I am confident that if I wanted to, I could take a bus or train for such a trip to NYC next month.  86 I would make an effort to choose a bus or train for such a trip to NYC next month.  87 For me to take a bus or train for such a trip to NYC the next month would be impossible.  88 In this imaginary situation, I would plan to take a bus or train for this trip to NYC next month.  89 I would trust the person who invited me to NYC to recommend how I should travel.  90 I don't know all the things I NEED to do to make this trip work by bus or train.	82	I think that the most PLEASURABLE choice would be to take a bus or	*				*
instead of a car.  All other things being equal, if a bus was cheaper, but less reliable than a train, I would choose to take a bus.  I am confident that if I wanted to, I could take a bus or train for such a trip to NYC next month.  I would make an effort to choose a bus or train for such a trip to NYC next month.  For me to take a bus or train for such a trip to NYC the next month would be impossible.  In this imaginary situation, I would plan to take a bus or train for this trip to NYC next month.  I would trust the person who invited me to NYC to recommend how I should travel.  I don't know all the things I NEED to do to make this trip work by bus or train.	02						
All other things being equal, if a bus was cheaper, but less reliable than a train, I would choose to take a bus.  85 I am confident that if I wanted to, I could take a bus or train for such a trip to NYC next month.  86 I would make an effort to choose a bus or train for such a trip to NYC next month.  87 For me to take a bus or train for such a trip to NYC the next month would be impossible.  88 In this imaginary situation, I would plan to take a bus or train for this trip to NYC next month.  89 I would trust the person who invited me to NYC to recommend how I should travel.  90 I don't know all the things I NEED to do to make this trip work by bus or train.	83						*
train, I would choose to take a bus.  I am confident that if I wanted to, I could take a bus or train for such a trip to NYC next month.  I would make an effort to choose a bus or train for such a trip to NYC next month.  For me to take a bus or train for such a trip to NYC the next month would be impossible.  In this imaginary situation, I would plan to take a bus or train for this trip to NYC next month.  I would trust the person who invited me to NYC to recommend how I should travel.  I don't know all the things I NEED to do to make this trip work by bus or train.	05						
I am confident that if I wanted to, I could take a bus or train for such a trip to NYC next month.  I would make an effort to choose a bus or train for such a trip to NYC next month.  For me to take a bus or train for such a trip to NYC the next month would be impossible.  In this imaginary situation, I would plan to take a bus or train for this trip to NYC next month.  I would trust the person who invited me to NYC to recommend how I should travel.  I don't know all the things I NEED to do to make this trip work by bus or train.	84		*				
trip to NYC next month.  I would make an effort to choose a bus or train for such a trip to NYC next month.  For me to take a bus or train for such a trip to NYC the next month would be impossible.  In this imaginary situation, I would plan to take a bus or train for this trip to NYC next month.  I would trust the person who invited me to NYC to recommend how I should travel.  I don't know all the things I NEED to do to make this trip work by bus or train.							
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next month.  For me to take a bus or train for such a trip to NYC the next month would be impossible.  In this imaginary situation, I would plan to take a bus or train for this trip to NYC next month.  I would trust the person who invited me to NYC to recommend how I should travel.  I don't know all the things I NEED to do to make this trip work by bus or train.							
For me to take a bus or train for such a trip to NYC the next month would be impossible.  88 In this imaginary situation, I would plan to take a bus or train for this trip to NYC next month.  89 I would trust the person who invited me to NYC to recommend how I should travel.  90 I don't know all the things I NEED to do to make this trip work by bus or train.	86		0		0		
would be impossible.  In this imaginary situation, I would plan to take a bus or train for this trip to NYC next month.  I would trust the person who invited me to NYC to recommend how I should travel.  I don't know all the things I NEED to do to make this trip work by bus or train.							
In this imaginary situation, I would plan to take a bus or train for this trip to NYC next month.  89 I would trust the person who invited me to NYC to recommend how I should travel.  90 I don't know all the things I NEED to do to make this trip work by bus or train.	87		***				
trip to NYC next month.  89 I would trust the person who invited me to NYC to recommend how I should travel.  90 I don't know all the things I NEED to do to make this trip work by bus or train.							
I would trust the person who invited me to NYC to recommend how I should travel.  1 don't know all the things I NEED to do to make this trip work by bus or train.	88						0
should travel.  1 don't know all the things I NEED to do to make this trip work by bus or train.							
90 I don't know all the things I NEED to do to make this trip work by bus or train.	89		*				
train.							
	90				0		0
	91		*		0		

Sur	vey Questi	on										E	duca	tion	Leve	el
Sign	ificance:	****	0.0001	***	0.001	**	0.01	*	0.05	0	0.1	<b>H</b> <sup>3</sup>	$\mathbb{C}_3$	$\mathbf{A}^3$	$\mathbf{B}^3$	$\mathbf{G}^3$
	are you to choose a bus or train for a trip to NYC next month (like the															
	one descri	bed in	the imagin	ary si	tuation)?	?										
92	We notice	d that y	ou are nov	v <mc< td=""><td>re/less&gt;</td><td>likel</td><td>y to tak</td><td>e th</td><td>ie train</td><td>or l</td><td>bus</td><td></td><td></td><td></td><td></td><td></td></mc<>	re/less>	likel	y to tak	e th	ie train	or l	bus					
92	to NYC. Plo	ease tel	l us why y	ou hav	e chang	ed yo	ur mino	d.								
	Thank you	ı for sha	aring your	opinio	ons abou	it the	imagina	ary	trip to	NY(	C. In					
93	Thank you for sharing your opinions about the imaginary trip to NYC. In your real life, how seriously would you consider taking a bus or train to															
	NYC?															

Looking at differences in response between members of the control and test groups by education level, there are differences for multiple statements for each education level, except for Some College, which only has a difference shown for one question. There are four statements that were shown to have significant differences, with a p-value of 0.05 or less, the traditional level of significance, for multiple education levels. One statement was shown to have significant differences in levels of agreement for three different education levels. This difference was shown to be significant at the highest level (p-value < 0.0001) for those with a Bachelor's Degree. It was shown to be significant at the second highest level (p-value < 0.001) for those with an Associate's Degree, and significant at the traditional level (p-value < 0.05) for those with a Graduate or Professional Degree. That statement indicates that, more people with Associates, Bachelor's, Graduate or Professional Degrees in the control group, than in the test group, agree that they are concerned that the schedule of the bus or the train only lets them travel a few times per day, and they need to be more flexible. While respondents in these three education levels without access to the planning tool agree more with the statement, respondents in these three education levels with access to the planning tool are more neutral about the statement.

It appears that more respondents, with Some College, and without access to the planning tool, agree less that when their family members go to NYC, they always take a bus or train. However, it appears that more respondents, with a Graduate or Professional Degree, and with access to the planning tool, agree less with this.

It appears that more respondents, with a Bachelor's Degree or a Graduate or Professional Degree, without access to the planning tool, agree more, that it would be easy to for them to get the schedules for a bus or train between their home and NYC, and they would understand them. Overall though, respondents from these education levels, from both the control and test groups, tend to agree with the statement.

It appears that more respondents, with an education level of High School or Less, or with a Graduate or Professional Degree, and without access to the planning tool, think that the most pleasurable choice would be to take a bus or train instead of a car. While this is true for both of these education levels, the mean of responses for respondents with a Graduate or Professional Degree, with access to the planning tool, is very close to the mean of responses for respondents with an education level of High School or less. Overall, respondents from both education levels tend to agree with this statement.

With a difference shown by a p-value of 0.001, it appears that more respondents with an education level of High School or Less, and without access to the planning tool, agree more that, for them to take a bus or train for such a trip to NYC the next month would be impossible.

There are five survey statements showing differences in response, for respondents with an education level of High School or Less, with and without access to the planning tool, having p-values of 0.05, the traditional level of significance. The first of these statements indicates that respondents with this education level, without access to the planning tool, disagree more that they want to minimize the time they spend on the trip to NYC, even if that means more stress or higher costs. The second of these statements indicates that respondents with this education level, without access to the planning tool, agree more that they think the most rational choice would be to take a bus or train instead of a car. The third of these statements indicates that respondents with this education level, without access to the planning tool, disagree more that, all other things being equal, if a bus was cheaper, but less reliable than a train, they would choose to take a bus. The fourth of these statements indicates that respondents with this education level, without access to the planning tool, agree more that, in this imaginary situation, they would plan to take a bus or train for this trip to NYC next month. Finally, the fifth of these statements indicates that respondents, with an education level of High School or Less, and without access to the planning tool, are more likely to choose a bus or train for a trip to NYC next month, like the one described in the imaginary situation, given what they know about bus and train services to NYC.

There is one statement where a difference in response is shown for people with Some College, with and without access to the planning tool, having a p-value within 0.05, the traditional level of significance. The statement indicates that respondents with an Associate Degree, without access to the planning tool, agree more that they worry about the difficulty in finding a parking space at a reasonable cost when they get to NYC. Overall though, respondents with an Associate Degree, with and without access to the planning tool, agree with this.

There are two statements, where a difference is shown in response for respondents, with a Bachelor's Degree, with and without access to the planning tool, having a p-value of 0.01. The first of these statements indicates that respondents with a Bachelor's Degree, without access to the planning tool, agree more that they think that taking a bus to NYC would take a lot longer than driving. The second of these statements indicates that respondents with a Bachelor's Degree, with access to the planning tool, agree more that being able to use their laptop, tablet, or smartphone when traveling makes them more interested in taking a bus or train to NYC.

There are three additional survey statements showing differences in responses for people with a Bachelor's Degree, with and without access to the planning tool, having p-values of 0.05, the traditional level of significance. The first of these statements indicates that more respondents with a Bachelor's Degree, and without access to the planning tool, selected personal automobile as a mode of transportation they think is available to them for the trip to NYC, knowing what they knew at the time of answering the question. This question was

asked just prior to dividing the sample into the control and test groups. Overall though, respondents with a Bachelor's Degree, with and without access to the planning tool, selected personal automobile for this question. The second of these statements indicates that respondents with a Bachelor's Degree, with access to the planning tool, agree that they could deal with the limited schedules offered by a bus or a train for this trip from their home to NYC. Finally, the third of these statements indicates that respondents with a Bachelor's Degree, with access to the planning tool, agree more that they think taking a train to NYC would take a lot longer than driving. Overall though, respondents with a Bachelor's Degree, with and without access to the planning tool, agree with this statement.

There is another statement where a difference in response is shown for respondents with a Graduate or Professional Degree, having a p-value of 0.01. It indicates that more respondents with a Graduate or Professional Degree, and with access to the planning tool, selected intercity rail (e.g., Amtrak) as a mode of transportation they think is available to them for the trip to NYC, knowing what they knew at the time of answering the question. This question was asked just prior to dividing the sample into the control and test groups. Overall though, respondents with a Graduate or Professional Degree, with and without access to the planning tool, selected intercity rail for this question.

There are two other statements where a difference in response is shown for respondents with a Graduate or Professional Degree, with a p-value of 0.05, the traditional level of significance. The first of these statements indicates that more respondents with a Graduate or Professional Degree, with access to the planning tool, disagree more that they like the idea that they might see and meet new people on a bus or train to NYC. The second of these statements indicates that more respondents without access to the planning tool, agree more that they think the most stressful choice would be to take a bus or train instead of a car.

#### 3.3.3.2. Testing by Age Group

Table 15 below shows significant differences, in response tendencies between control and test groups by age group, based on Wilcoxan rank sum tests.

Sur	vey Questi	on											Age	e Gro	oup	
Sign	ificance:	****	0.0001	***	0.001	**	0.01	*	0.05	0	0.1	25-34	35-44	45-54	55-64	65-75
	Knowing v	what yo	u know ri	ght no	w, what	mode	(s) of t	rans	sportat	ion	do					
49	you think are AVAILABLE to you for this trip to NYC? Please select all															
	that apply.															
	Personal a	Personal auto/car											***			
	Rental car	(includ	ling car sh	are) oi	a borro	wed c	ar									
	Intercity bus (e.g., Greyhound, Peter Pan, Megabus)											0				
	Intercity r	ntercity rail (e.g., Amtrack)													*	

Surv	vey Question		Ag	e Gro	oup	
		25-34				65-75
	Other, please specify					
	Other, specified					
50	How likely are you to choose to take a bus or train for a trip like this to					
50	NYC next month?					
	If you learned there would be no WiFi, and no electrical outlet on the					
51	bus or train for this trip, would that make to you less likely to choose a					*
	bus or train for this trip?					
52	There are more options than what I expected to travel to NYC by bus					
32	and train.					<u> </u>
53	After seeing the bus and train options for traveling to NYC, I just don't					
55	think there's a good way for me to get there by either bus or train.					
	Having information like this on my smartphone or computer might					
54	make it easier for me to understand the kinds of bus and train services					
	available to me.					<u> </u>
55	Having so many potential travel options by bus and train is confusing.					
56	When I drive long distances (like from my home area to NYC), I can get				*	*
	tired and stressed.					
57	I worry about the difficulty in finding a parking space at a reasonable					
	cost when I get to NYC.					
58	I am concerned that the schedule of the bus or train only lets me travel a	**	**	*	**	0
	few times per day, and I need to be flexible.  I could deal with the limited schedules offered by a bus or train for this					
59	trip from my home to NYC.		*		*	0
	I like the idea that I might see and meet new people on a bus or train to					
60	NYC.					
	I don't like the idea of riding with a lot of people that I don't know on a					
61	bus or train.				*	
60	If I took a bus or train to NYC, I might have to be with people whose					
62	behavior I find unpleasant.					
63	I could be with other people who share my values when I take a bus or					
03	train on a trip like this.					
64	I think that taking a BUS to NYC would take a lot longer than driving.	**	*			
65	I think that taking a TRAIN to NYC would take a lot longer than driving.	**				
	Without thinking about it much, I would guess that the cost of taking the					
66	trip by BUS would be less than the cost of the car trip (including gas,					
	tolls, and parking).					
	Without thinking about it much, I would guess that the cost of taking the					
67	trip by TRAIN would be less than the cost of the car trip (including gas,					
	tolls, and parking.)					
68	It would be really important to me to minimize costs when I plan this				0	
	trip to NYC next month.					
69	I really want to minimize the time I spend on the trip to NYC, even if that			*		
	means more stress or higher costs.					
70	Being able to use my laptop, tablet, or smartphone when traveling			0		
	makes me more interested in taking a bus or train to NYC.				a1-	
71	I am the kind of person who would take my own car to NYC.	-			*	
72	Most people whose opinions I value would approve of my taking this				1	1

Surv	vey Question		Ag	e Gro	oup	
	ificance: **** 0.0001 *** 0.001 ** 0.05   0.1	25-34				65-75
	trip by bus or train.					
73	My family would think that I should take this kind of trip by car or plane.				0	
74	My colleagues would likely think that it is strange not to go by a car or plane to NYC.					
75	When my friends go to NYC, they always take a bus or train.	0				*
76	When my family members go to NYC, they always take a bus or train.		*	0		0
77	It might be unsafe to make this trip by bus or train.					
78	The experience at the NYC bus or train station would be so unpleasant that I would try to avoid it.	0				
79	It would be easy for me to get the schedules for a bus or train between here and NYC, and I would understand them.	**	*			0
80	I like the idea of taking a bus or train instead of driving for this trip to NYC.	0			0	
81	I think that the most RATIONAL choice would be to take a bus or train instead of a car.				*	0
82	I think that the most PLEASURABLE choice would be to take a bus or train instead of a car.					0
83	I think that the most STRESSFUL choice would be to take a bus or train instead of a car.					
84	All other things being equal, if a bus was cheaper, but less reliable than a train, I would choose to take a bus.					0
85	I am confident that if I wanted to, I could take a bus or train for such a trip to NYC next month.					
86	I would make an effort to choose a bus or train for such a trip to NYC next month.					
87	For me to take a bus or train for such a trip to NYC the next month would be impossible.					**
88	In this imaginary situation, I would plan to take a bus or train for this trip to NYC next month.					***
89	I would trust the person who invited me to NYC to recommend how I should travel.				0	**
90	I don't know all the things I NEED to do to make this trip work by bus or train.					0
91	Given what you know about bus and train services to NYC, how likely are you to choose a bus or train for a trip to NYC next month (like the one described in the imaginary situation)?				0	
92	We noticed that you are now <more less=""> likely to take the train or bus to NYC. Please tell us why you have changed your mind.</more>					
93	Thank you for sharing your opinions about the imaginary trip to NYC. In your real life, how seriously would you consider taking a bus or train to NYC?					*

Looking at differences in response between members of the control and test groups by age group, there are differences for multiple statements for each age group. There are five statements that were shown to have significant differences, with a p-value of 0.05 or less,

the traditional level of significance, for multiple age levels. One statement was shown to have significant differences, with a p-value of 0.05 or less, in levels of agreement for four different education levels. This difference was shown to have a p-value of 0.01 for ages 25-34, 35-44, and 55-64, and a p-value of 0.05 for ages 45-54. This statement indicates that more people, from each age group except for ages 65-75, in the control group, are concerned that the schedule of the bus or train only lets them travel a few times per day, and they need to be flexible. While respondents in these four age groups without access to the planning tool agree more with the statement, respondents in these four age groups with access to the planning tool are more neutral about the statement.

It appears that more respondents, ages 55-64, with access to the planning tool, agree more that when they drive long distances (like from their home to NYC), they can get tired and stressed. However, it appears that more respondents, ages 65-74, without access to the planning tool, agree more with this.

It appears that, more respondents, ages 35-44, and 55-64, with access to the planning tool, agree more that they could deal with the limited schedules offered by bus or train for this trip from their home to NYC.

It appears that more respondents, ages 25-34 and 35-44, without access to the planning tool, agree more that they think that taking a bus to NYC would take a lot longer than driving.

It appears that more respondents, ages 25-34 and 35-44, without access to the planning tool, agree more that it would be easy for them to get the schedules for a bus or train between their home and NYC, and they would understand them.

There is one more statement showing differences in response, for respondents ages 25-34, with a p-value within 0.01. The statement indicates that more people, ages 25-34, without access to the planning tool, agree more that they think taking a train to NYC would take a lot longer than driving.

There is a statement showing a difference in response, for respondents ages 35-44, with and without access to the planning tool, with a p-value of 0.001, the second highest level of significance. The statement indicates that respondents, ages 35-44, without access to the planning tool, select the automobile more, as one of the modes of transportation they think are available to them, for this trip to NYC, knowing what they knew at the time of response.

With a p-value of 0.05, at the traditional level of significance, it appears that more respondents, ages 35-44, without access to the planning tool, agree less that, when their family members go to NYC, they always take a bus or train.

There is a statement showing difference in response, for ages 45-54, with and without access to the planning tool, at the traditional level of significance. It indicates that more respondents, ages 45-54, without access to the planning tool, agree less that they really want to minimize the time they spend on the trip to NYC, even if that means more stress or higher costs.

There are four more survey statements showing differences in response, for respondents ages 55-64, with and without access to the planning tool, having p-values of 0.05. The first of these statements indicates that respondents in this age group, with access to the planning tool, selected intercity rail more often, as one of the modes of transportation they think are available to them, for this trip to NYC, knowing what they knew at the time of response. The second of these statements indicates that, more respondents in this age group, with access to the planning tool, agree that they don't like the idea of riding with a lot of people they don't know on a bus or train. The third of these statements indicates that more people in this age group, with access to the planning tool, disagree that they are the kind of person who would take their own car to NYC. It appears that more respondents in this age group, without access to the planning tool, are more neutral about this statement. Finally, the last of these four statements indicates that more respondents in this age group, with access to the planning tool, agree more that they think the most rational choice would be to take the bus or train instead of a car. However, respondents in this age group, with and without access to the planning tool, agree with this statement.

There is a statement, with a p-value of 0.001, indicating that more respondents ages 65-74, without access to the planning tool disagree that in this imaginary situation, they would plan to take a bus or train for this trip to NYC in the next month.

There are two statements, where a difference is shown in response for ages 65-74, with and without access to the planning tool, having a p-value of 0.01. The first of these statements indicates that respondents in this age group, without access to the planning tool, agree more that for them to take a bus or train for such a trip to NYC the next month would be impossible. The second of these statements indicates that respondents in this age group without access to the planning tool, agree more that they would trust the person who invited them to NYC to recommend how they should travel.

There are three more statements, where a difference is shown in response for ages 65-74, with and without access to the planning tool, at the traditional level of significance. The first of these statements indicates that more respondents in this age group, without access to the tool, agree more that if they learned there would be no WiFi, and no electrical outlet on the bus or train for this trip, it would make them less likely to choose a bus or train for this trip. Overall all though, respondents in this age group, with and without access to the planning tool, agree with this statement. The second of these statements indicates that more respondents in this age group, with access to the planning tool, disagree more that, when their friends go to NYC, they always take a bus or train. Respondents in this age group, without access to the planning tool, are more neutral about this statement. The third of these statements indicates that respondents in this age group, without access to the planning tool, are more likely to consider taking a bus or a train to NYC.

# 3.4. Part 4: Other Information about the Respondents and Their Household 3.4.1. Testing for Overall Differences

Table 16 below shows significant differences overall, in response tendencies between control and test groups, based on the results of the Wilcoxan rank sum tests.

**Table 16 Statistical Differences between the Control and Test Groups** 

Sur	vey Questi	on										
Sign	ificance:	****	0.0001	***	0.001	**	0.01	*	0.05	0	0.	1
94	Which of t	he follow	ving do yo	u own?	Please sel	ect all tl	hat apply.					
	Owns desl	ktop com	iputer									0
	Owns lapt	ор										
	Owns sma	rtphone										
	Owns tabl	et										
	Owns stan	idalone (	GPS naviga	tion de	vice							
	Owns non	e of the l	isted devi	ces								
95	What is yo	our age?										**
96	What is yo	our gend	er?									
97	What is yo	our highe	est complet	ted leve	el of educa	tion?						*
98	What is yo	our annu	al househo	ld inco	me? If you	are un	sure of the	e answe	er, please §	give you	r	
98	best estim	ate.										

There are two statements shown to have significant differences in answers, between the control and test groups overall, with p-values of 0.05 or less. The first of these statements shows a difference in response, between control and test groups, with a p-value of 0.01. This statement indicates that, overall, respondents from the control group are older than respondents from the test group. The second of these statements shows a difference in response, between control and test groups, with a p-value of 0.05. This statement indicates that, overall, respondents from the test group have a higher education than those from the control group.

#### 3.4.2. Testing by Gender

Table 17 below shows significant differences, in response tendencies between control and test groups by gender, based on the results of the Wilcoxan rank sum tests.

Table 17 Statistical Differences by Gender between the Control and Test Groups

Survey Questi	on										Gen	der
Significance:	****	0.0001	***	0.001	**	0.01	*	0.05	0	0.1	F	M

Sur	vey Questi	on										Gen	der
Sign	ificance:	****	0.0001	***	0.001	**	0.01	*	0.05	0	0.1	F	M
94	Which of t	the follow	ving do yo	u own	? Please s	elect al	l that ap	ply.					
	Owns desl	ktop con	ıputer										
	Owns lapt	юр											
	Owns sma	ırtphone											
	Owns tabl	et											
	Owns stan	ndalone (	GPS naviga	tion d	evice								
	Owns non	e of the l	isted devi	ces									
95	What is yo	our age?										0	
96	What is yo	our gend	er?										
97	What is yo	our highe	est comple	ted lev	el of edu	cation?						*	
98	What is your best			old inc	ome? If y	ou are	unsure o	f the a	answer, p	olease g	give		

There is only one statement shown to have a significant difference in answers, between females from the control and test groups, with a p-value of 0.05. There are no statements shown to have a significant difference in answers, between males from the control and test groups. The statement showing a difference, between females from the control and test groups, indicates that females from the test group have a higher education than females from the control group. This difference is not seen between males from the control and test groups.

### 3.4.3. Testing by Education Level

Table 18 below shows significant differences, in response tendencies between control and test groups by education level, based on the results of the Wilcoxan rank sum tests.

Table 18 Statistical Differences by Education Level between the Control and Test Groups

Sur	vey Question	<b>Education Level</b>					
Sign	ificance:   **** 0.0001   *** 0.001   ** 0.01   * 0.05   0.1	H <sup>4</sup>	C <sup>4</sup>	A <sup>4</sup>	<b>B</b> <sup>4</sup>	G <sup>4</sup>	
94	Which of the following do you own? Please select all that apply.						
	Owns desktop computer						
	Owns laptop		*				
	Owns smartphone						
	Owns tablet			*			
	Owns standalone GPS navigation device				•	*	
	Owns none of the listed devices						

<sup>&</sup>lt;sup>4</sup> H = high school or less, C = some college, A = associate degree, B = bachelor's degree, G = grad./prof. degree

Survey Question											<b>Education Level</b>						
Sign	Significance: **** 0.0001 *** 0.001 * 0.05 0 0.1									0.1	H <sup>4</sup>	C <sup>4</sup>	A <sup>4</sup>	<b>B</b> <sup>4</sup>	G <sup>4</sup>		
95	What is your age?									**		**					
96	What is your gender?																
97	What is your highest completed level of education?																
98	What is your annual household income? If you are unsure of the answer,									wer,							
70	please give your best estimate.																

Looking at differences in response between members of the control and test groups by education level, there are differences for multiple statements for only one education level, those with an Associate Degree. There is one statement shown to have significant differences, with a p-value of 0.05 or less, the traditional level of significance, for multiple education levels. This statement indicates that, of those with an education level of High School or Less, or Associate Degree, respondents from the control group are older than respondents from the test group.

There is one statement showing a difference in response, between control and test groups, for respondents with Some College, with a p-value of 0.05 or less. This statement indicates that, of those with this level of education, more respondents from the test group own a laptop.

There is one more statement showing a difference in response, between the control and test groups, for respondents with an Associate Degree, with a p-value of 0.05 or less. This statement indicates that, of those with this level of education, more respondents from the control group own a tablet.

There are no statements showing a difference in response, between control and test groups, for respondents with a Bachelor's degree, with a p-value of 0.05 or less.

There is one statement showing a difference in response, between the control and test groups, for respondents with a Graduate or Professional Degree, with a p-value of 0.05 or less. This statement indicates that, of those with this level of education, more respondents from the control group own a standalone GPS navigation device.

## 3.4.4. Testing by Age Group

Table 19 below shows significant differences, in response tendencies between control and test groups by age group, based on the results of the Wilcoxan rank sum tests.

Table 19 Statistical Differences by Age Group between the Control and Test Groups

Survey Question											Age Group					
Significance:	****	0.0001	***	0.001	**	0.01	*	0.05	0	0.1	25-34	35-44	45-54	55-64	65-75	

Survey Question											Age Group						
Sign	gnificance:   **** 0.0001   *** 0.001   ** 0.01   * 0.05   0.1										0.1	25-34	35-44	45-54	55-64	65-75	
94	Which of t	he follo	wing do y	ou ow	n? <i>Pleas</i>	e seled	ct all th	at a	pply.								
	Owns desktop computer																
	Owns laptop																
	Owns smartphone																
	Owns tablet								0								
	Owns standalone GPS navigation device									0		*	*				
	Owns none of the listed devices																
95	What is your age?																
96	What is your gender?													*			
97	What is your highest completed level of education?											0					
98	What is your annual household income? If you are unsure of the answer,															0	
90	please give your best estimate.																

Looking at differences in response between members of the control and test groups by age group, there are differences for multiple statements for only one age group, 65-74, with a p-value of 0.05 or less. One of these statements was shown to have significant differences, for multiple age levels. This statement indicates that for those age 55-64, more respondents from the control group own a standalone GPS navigation device. However, this statement also indicates that for those age 65-74, more respondents from the test group own a standalone GPS navigation device.

The other statement showing a difference in response, for ages 65-74, between respondents from the control and test groups, indicates that the ratio of male to female respondents is larger in the test group than in the control group.

# 3.5. Changes in Mode Preference

Survey respondents were asked about their likelihood to choose a bus or a train for the imaginary trip to NYC, both at the beginning and end of Part 3, which covered this imaginary trip. Forty-three percent of respondents changed attitudes about choosing a bus or train for a trip to NYC. In Table 20 below, it is shown that more people, who did have access to the tool, were becoming more likely to choose a bus or a train, while more people, who did not have access to the tool, were becoming less likely to choose a bus or a train.

Table 20 Changes in Mode Preference by the Control and Test Groups

	Control	Test
1) More Likely	297	353
2) No Change	740	715
3) Less Likely	241	214

# 4. Multimodal Network Dataset for Study Region

In parallel to the work exploring and analyzing the survey data, a multimodal network dataset was created for the Northeast United States, which includes the survey data study area. Detailed information and metadata for the compilation of the network dataset is located in Appendix D. The dataset includes the road network, intercity rail network, and commercial service passenger airline network for New England states, plus New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and Washington, DC. Intercity bus is not represented in the current version of this multimodal dataset. The research team reached out to multiple intercity bus operators, but the data was not available. Creating and adding intercity bus network data to the network dataset is anticipated for future work. The network was compiled using the Caliper TransCAD 6.0 software system and finalized in TransCAD 7.0. Network data includes geometric nodes and links, in addition to route scheduling frequency, and travel times between nodes. This network dataset is more comprehensive than typical data from a Geographic Information System (GIS), which usually includes geometry and attributes in tabular form. The network dataset can be used for analysis related to travel time, passenger service frequency, and accessibility to geographic areas using multiple modes.

The road network portion came from the Environmental Systems Research Institute (Esri) road network dataset included with ArcGIS 10.1 desktop GIS software. The rail network data was compiled from General Transit Feed Specification (GTFS) data for each operator. GTFS evolved from the original Google Transit Feed Specification - a uniform formatting protocol developed to improve access to transit data - making transit data more readily accessible to the public by agencies and developers. Many transit agencies have adopted the formatting framework for their transportation networks, making the geographic and scheduling data available through exchanges or agency portals. GTFS data relevant to the region of study was acquired directly from the agencies when available. These agencies included passenger intercity rail (e.g. Amtrak), commuter rail (e.g. Metro-North), and lightrail transit (e.g. the "T" from MBTA). The data included rail stations, intercity passenger routes, route travel time, and frequency of service information. The commercial service passenger airline network was created using the Research and Innovative Technology Administration (RITA) Bureau of Transportation Statistics (BTS) Office of Airline Information T-100 Air Carrier Traffic and Capacity Data by Non-Stop Segment and On-Flight Market data and the Aviation Policy Domestic Airline Consumer Airfare Report, both from the US Department of Transportation (USDOT). Data used from these sources included airport pairs, airline information, air carrier group, travel time, service class, monthly departures scheduled, monthly departures performed, seats available, passengers per day, and average airfare.

The Esri Streets4 network dataset was imported into TransCAD. The GTFS files for each agency were imported into TransCAD following validation of the files with a transit feed validator and any necessary and identified data pre-processing. Data pre-processing included, when applicable, replacing delimiters with spaces, preserving quotations for headerlines, and adding line ends to headerlines with carriage returns. The data files generated from GTFS import include a route file (.rts), a geographic file (.dbd), and several

additional auxiliary files. The routes file contains all information about the line, node, route, physical stops, and transit stops. Caliper, the developers of TransCAD, provided technical support, as needed, for processing GTFS data. Airport node data points were created using latitude and longitude coordinates, obtained from the Federal Aviation Administration's (FAA) National Plan for Integrated Airport Systems (NPIAS) 2015-2019 report. The three letter airport identifier was used to join data to the airport node points, from the T-100 BTS and airfare data, referenced above. Only airports with Service Class F, and one or more scheduled flights per month were included. There are several ways this data can be filtered for use in future analysis.

The resulting dataset will be used for future research work, particularly to analyze the accessibility to large metropolitan areas by multiple modes from origins throughout the region. Future work, using this dataset, will include developing an accessibility index that provides a measurement for this type of multimodal accessibility, and exploring how this type of accessibility, to large metropolitan areas, originating from areas outside of large metropolitan areas, varies across the Northeast US. Part of the analysis will explore how multimodal accessibility might vary across the region in ways that aren't explained by distance alone.

#### 5. Future Research

For traveling to NYC by bus or train, the planning tool was related to positive attitudes about scheduling flexibility and travel time for certain age and education groups. It was also related to negative attitudes about the ability to get and understand schedules for a bus or train to NYC.

The research work, survey dataset, and multimodal network dataset, presented in this report, will be used for future related research. Further analysis will aim to better quantify the impacts of access to trip planning information, on attitudes about intercity travel by automobile, bus, and passenger rail. Creating GTFS data for intercity bus operators, and incorporating it into the multimodal network dataset developed, and presented in this report, is anticipated for future work related to this research. The intermodal network dataset will contribute to future research examining multimodal intercity accessibility. This type of accessibility describes the ability and ease of traveling from origins across the region, to large metropolitan areas, by multiple modes of travel.

The multimodal network dataset will be used to develop an accessibility index across the study region. The index will incorporate measures, representing the level of accessibility, to large metropolitan areas, from outside of large metropolitan areas, by multiple modes of travel. The measures will incorporate the availability of each mode of travel, including the existence and frequency of service, number of transfers, and network travel time, calculated using the network dataset, for origins from across the region, going to the four destination cities (Boston, New York City, Philadelphia, and Washington, DC). Whether or not differences in measured accessibility values can be explained by network distance alone will be examined. The relationship between network-based accessibility measures, to revealed preferences and stated preferences for mode choice, taken from the survey dataset, and how this might vary with gender and age level, will also be explored.

Possible research questions, pertaining to the survey and network datasets presented in this report, to be addressed in future research include:

How does locational and/or individual accessibility to large metropolitan areas vary over space and time?

If accessibility to large metropolitan areas, from Northern New England, can be measured and mapped, can areas then be identified, with greater accessibility, in truth, than areas with the same measured score? If so, what is it that increases their accessibility?

How do attitudes among study participants, about traveling by multiple modes, to large metropolitan areas, compare with accessibility levels that are calculated, for their origin zipcodes, using the multimodal network?

How does accessibility to large metropolitan areas, by multiple travel modes, relate to population density and urban form?

What is a healthy relationship between the level of accessibility, by multiple travel modes, to population density and urban form?

The research and datasets presented in this report will provide the foundation for future research that will explore multimodal accessibility across the Northeast US, its relationship to population density and urban form, and address some of the possible research questions included here.