Consumer Behavior and Travel Choices: A Focus on Cyclists and Pedestrians

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Submitted for presentation and publication to the 92nd Annual Meeting of the Transportation Research Board, January 2013, Washington, D.C.

Submitted August 1, 2012
Word Count: 6,014 words + [(10 tables & figures) x 250] = 8,514 words; Abstract: 191 words

ABSTRACT

This paper aims to examine the links between consumer behavior and the mode of transportation used to access local destinations with the greater goal of providing the empirical evidence needed to inform decision making and educate the public. The findings presented here are the result of the first study of this type and scale in the United States. We limit our scope to the examination of the relationships between consumer expenditures and their trip making behavior, including mode of travel and frequency of trips. This analysis is guided by the following objectives: 1) quantifying the various transportation mode shares of customers for a variety of business types, locations and transportation contexts; and 2) comparing levels of consumer spending & frequency of visits by travel modes. This analysis made use of intercept surveys of local business completed at 78 establishments in the Portland metropolitan area. The findings support the notion that customers that arrive by modes other than the automobile are competitive consumers, spending similar amounts or more, on average, than their counterparts using automobiles. They are also more frequent patrons on average, presenting perhaps a unique marketing opportunity for these businesses.

INTRODUCTION

Cities around the country are making significant investments in pedestrian, bicycling and transit infrastructure, a new and unfamiliar endeavor for many. As a result of these investments, communities have realized recent growth in the numbers taking transit, cycling and walking for transportation purposes. Many other cities, large and small, are eyeing these successes and are recognizing the potential of cycling as a viable mode of transportation for their communities but struggle to find information that guide decisions about these projects. The typical standards for transportation projects are held: travel-time savings, shifts away from automobile demand, and safety improvements pose challenges for non-automobile modes. Recently interest in the livability, environmental, public health and economic impacts of transportation have shifted the discussion to the broader benefits that might be attributed to these investments, including those impacts on local businesses.

Projects, such as those described above, are sometimes met with skepticism or resistance from the business community because of uncertainty about what the benefits and burdens of these projects are and how they might accrue to them. This skepticism is based largely upon the perceptions that investments and policies that encourage cycling, walking and transit may inhibit automobile use and thus, interfere with their business model that depends largely upon an automobile-oriented customer base. There is little evidence from rigorous, objective studies that exists to prove that these fears are unfounded.

Given the extent and maturity of Portland's existing bicycling, transit and pedestrian infrastructure and the ambitious level of anticipated future investments there and elsewhere in the United States, the timing is right to investigate the relative economic benefits of different modes in more depth. To fill this gap, this paper aims to examine the links between consumer behavior and the mode of transportation used to access local destinations with the greater goal of providing the empirical evidence needed to inform decision making and educate the public. The findings presented here are the result of the first study of this type and scale in the United States. Here, we limit our scope to the examination of the relationships between consumer expenditures and their trip making behavior, including mode of travel and frequency of trips in the context of the Portland, OR metropolitan area. This analysis is guided by the following objectives:

- Quantifying the various transportation mode shares of customers for a variety of business types, locations and transportation contexts; and
- Comparing levels of consumer spending & frequency of visits by travel modes

The remainder of this paper is organized as follows: a summary of the research on consumer behavior and travel choices; descriptions of the data used in this analysis; results of descriptive analysis and multivariate models of consumer spending, and; a discussion of the implications for planning and policy, the study limitations, and suggestions for future work.

BACKGROUND

The present study seeks to integrate insights from studies of travel and the built environment with consumer behavior - including the factors that influence the frequency of shopping trips and customer expenditure - to better understand the relationship between mode choice and consumer spending. This research builds off of the findings from a previous study on consumer expenditures and modes at grocery stores (1).

Mode Choice and Consumer Spending

There have been only a few studies to quantify the returns of bicycling investments for business owners. Within this small but growing research, there have been relatively greater efforts aimed at understanding the influence that the bicycle tourism and the cycling industries (e.g., bicycle manufacturers, retail and repair shops, and clothing merchandisers) have on local and regional economies. Fewer studies have focused exclusively on the relationship between mode choice and consumer spending at specific types of businesses. It is important to note that in general, existing research on mode choice and consumer spending is exploratory, not peer-reviewed, and does not employ statistical methods that enable controlling for relevant factors such as urban form or socio-demographics of the travelers. Nonetheless, the results of several studies provide a starting place for more rigorous examination of the effects of mode choice on spending.

Several studies have examined the benefits of recreational bicycling and bicycle tourism on the aggregate to help support the need for funding non-motorized infrastructure. These studies focused on expenditures including food, lodging and equipment. In Outer Banks, North Carolina, a study estimated that bicycling tourists generate approximately $60 million a year for the local economy, nine times greater than the one-time cost to construct the bicycle facilities in the area (2). Trail users on the Greenbrier River Trail in West Virginia make valuable contributions to the local economy, with over half of the visitors spending over $100 per visit and most coming from out-of-state (3). A recent study values the revenue generated by recreational cyclists and bicycle tourism in Wisconsin to nearly $1 billion annually in the state (4). Colorado estimates the impact of cycling by out-of-state tourists and active residents at $1 billion (5). On the contrary, older studies of pedestrian- and transit-oriented streets and malls with restricted or eliminated automobile traffic have shown smaller increases or event declined economic impacts (6; 7).

Some have argued that there is an aggregate benefit to investments in alternative modes of transport and the land use patterns that support these modes. The basis of this position is that the financial outlay expended by households to support car ownership and use can otherwise be spent in the local economy if patrons were to shift to alternative modes (8). An analysis of the benefits of bicycle parking on businesses in a commercial district in Carlton, Australia found that while drivers and auto passengers spent more per trip, converting auto parking spaces to bicycle parking areas increases the revenue potential for adjacent businesses because bicycles require a fraction of the space needed by automobiles (9). The findings of this study also suggest that the benefits of increasing walking, bicycling, and transit access to commercial areas may benefit restaurants, bars, and clothing/other comparison retailers more than grocery stores due to limited carrying capacity of the typical bicyclist.

In related efforts, several studies have focused on the perceptions of business owners about efforts to discourage driving or to improve non-auto access to commercial districts. In some cases, business owners have felt that restrictions to vehicular traffic to improve facilities for cyclists or pedestrians had a positive impact on their businesses. Business owners on a street in San Francisco felt that the installation of bike lanes increased the number of customers arriving by bike and improved or had no impact on sales (10). Businesses located near bicycle parking corrals in Portland estimated that a quarter or more of their customers arrived by bicycle (11). Merchants in Toronto, Canada tended to overestimate the number of customers that arrived in

automobiles, the majority also felt that the removal of on-street parking to allow for bicycle or pedestrian improvements would benefit or have no impact on their business (12).

Evaluating how patrons spend and frequent establishments through time provides valuable insight into how people tend to spend relative to their mode choice. There are few studies in the US that document mode, expenditures and frequency of trips. A survey conducted in a commercial corridor in San Luis Obispo revealed that consumers that arrive by bike spend similar amounts yet visit more frequently than those who arrive by car (13). Similar results were found in downtown San Francisco, where people traveling by foot or transit spent less per visit at shops and restaurants than people in automobiles, but visited about twice as often spending more per month (14). Internationally, studies from Utrecht (15) and Amsterdam (16) in The Netherlands have found that cyclists spend less per visit to businesses but visit the business more frequently, resulting in higher spending patterns over time. In Seattle, researchers studied the mode choice of customers for grocery store trips, and found that stores in higher density neighborhoods are more likely to attract customers that arrive at the store using a non-automobile mode (17).

The most recent and significant study focusing on the economic impact of non-motorized infrastructure investment took place in Vancouver, B.C. The City of Vancouver partnered with three local business organizations to commission a study of the economic impacts of two separated bicycle lane projects, Dunsmuir and Hornby Streets (18). Preliminary findings - based on surveys of businesses, property owners, retail customers, and Vancouver residents - indicate mild to moderate negative economic impacts of investments. Businesses estimated that net sales decreased by 4% on Dunsmuir and 10% on Hornby (or 5% on average) after the installation of the new bicycle facilities. Along both corridors, the impacts were perceived to be greater on the side of the street where the bike lane was installed. The same study asked property owners and managers to assess the financial impacts of changes to the streets, which they estimated at a loss of 6-9%, despite the fact that vacancy rates along Dunsmuir remained stable and vacancy rates along Hornby dropped. Surveys of customers and Vancouver residents found that 79% of shoppers and 80% residents did not change their shopping patterns as a result of the new bike lanes. Of those who reported adjusting their behavior, a net of 10% (percent who shopping more minus percent who shopping less) of shoppers and residents said they now shop on either street less often, most citing increased traffic congestion, lack of parking, and turning restrictions as primary reasons. Factors influencing people to shop on Hornby and Dunsmuir more often included increased bicycle safety, easier bicycle access, and a more pleasant environment for both bicyclists and pedestrians.

The authors of the study above note several limitations. First, because the consulting team was unable to collect detailed before-and-after financial data, the estimates of economic impacts are derived from non-representative survey responses of individual businesses, property owners/managers, customers, and residents. Second, since the downtown business community's concerns about potential negative impacts of the bike lanes was a driving factor in the decision to conduct the study, the potential for response bias in the findings is relatively high. Third, it takes time for people to adjust to major infrastructure changes. Since the surveys were conducted between six months and one year after the installation of the bike lanes over a two month window, the results are preliminary and only measure short-term impacts.

Dynamics of Consumer Spending Behavior

The direct costs or benefits of shifts in modal accessibility to retailers depend on a variety of factors. Within a given geographic area, the effects on retailers will be influenced by employment and residential densities, socioeconomic characteristics of residents and employees, the maximum distance customers are willing to travel to reach the establishment, current and potential attractiveness of use of alternative modes, demand for the type of product or service provided by the business, and the willingness of customers to purchase those goods or services from a neighborhood retailer (19).

An empirical investigation of trip generation and parking requirements of traditional shopping districts conducted by Steiner (20) found that while these districts are in fact associated with higher rates of non-automobile travel, many people still access them by car, especially if visiting grocery stores, where items need to be carried from the establishment.

A study of shoppers in Austin, Texas found that while proximity to the store is an important factor in grocery store choice, but it is not the only relevant factor (21). Even in cases where a full-service grocery store was within walking distance, most people traveled relatively long distances to access certain products or "experiences". The results suggest that people trade-off convenience with attributes such as price, quality, parking availability, and other intangibles. Even so, a model of store proximity found that each additional mile of travel to the store is associated with a reduction of nearly four trips per month.

Literature from marketing and retailing perspectives shed light on the complex and dynamic nature of consumer spending patterns. Kim and Park (22) found that 70% of shoppers visit grocery stores at random intervals, with the remaining 30% maintaining a fixed schedule. The so-called "routine" shoppers tended to visit stores less frequently and spend more per trip. In an effort to develop a model of household shopping behavior, Bawa and Ghosh (23) discovered that employment status, household size, age, the number of stores visited, and income all affect the frequency of shopping trips. Expenditure per trip was influenced by income, household size, and the presence of children. The authors conclude that for some consumers, shopping may have a recreational dimension, while for others it may compete directly with opportunities to generate income.

DATA

The aim of this paper is to examine the relationship between consumers' behavior and their travel choices, with a particularly emphasis on pedestrians and bicyclists. The basis of this analysis was an intercept survey of customers exiting various establishments, coupled with some information about the establishment site and surrounding built environment. Data were collected in 2011 from June through early October as part of a larger study in the Portland, Oregon metropolitan area (see Clifton et. al (24) for a complete accounting of the research design).

Site Selection

Given the resource limitations of this study, only a few business types are examined: (a) High-Turnover (Sit-Down) Restaurants (pizza and Mexican restaurants were used in this study), (b) Convenience Markets (Open 24-Hours) without gas stations, and (c) Drinking Places. These land use types were chosen because they are found throughout the region in all area types and have similar price points within each land use and have different implication for mode choices. The sites selected for inclusion in the study were taken from a variety of urban contexts, as

shown in Figure 1. Because of the relatively small sample size, we controlled for weather by only collecting data on days with favorable conditions. Data collection events occurred from 5PM to 7PM on Mondays through Thursdays.

Customer Surveys

The surveys were administered by intercepting customers as they left the establishments. First, a "long" five-minute survey was administered via handheld computer tablets and can be found in Figure 6 collecting information on: demographics of the respondent, travel mode(s), consumer spending behavior, frequency of trips to this establishment, attitudes towards transportation modes, the trip to and from the establishment, and map locations of home, work, trip origin and the following destination. If a potential respondent refused the longer survey, a "short" survey of four questions was offered as an alternative. This survey instrument collected information about: mode of travel, amount spent on that trip, frequency of visits to the establishment, and the respondent's home location. Gender was recorded by the survey administrator. Survey sample size and response rates are calculated and reported in Table 1.

Table 1. Survey Sample Size and Response Rates

Land Use	Establishments (N)	Long Surveys (N)	Short Surveys (N)	Response Rates		Total
				Long Survey	Short and Long Survey	
Drinking places	13	107	108	30%	50%	215
Convenience	26	281	710	14%	61%	991
Restaurants	39	309	369	24%	52%	678
Total	78	697	1187	19%	52%	1884

Demographic characteristics from this survey sample are compared to US Census data for the Portland Metropolitan Statistical Area. The survey sample appears to be representative of the area population based upon comparisons of household income, vehicle ownership, and household size.

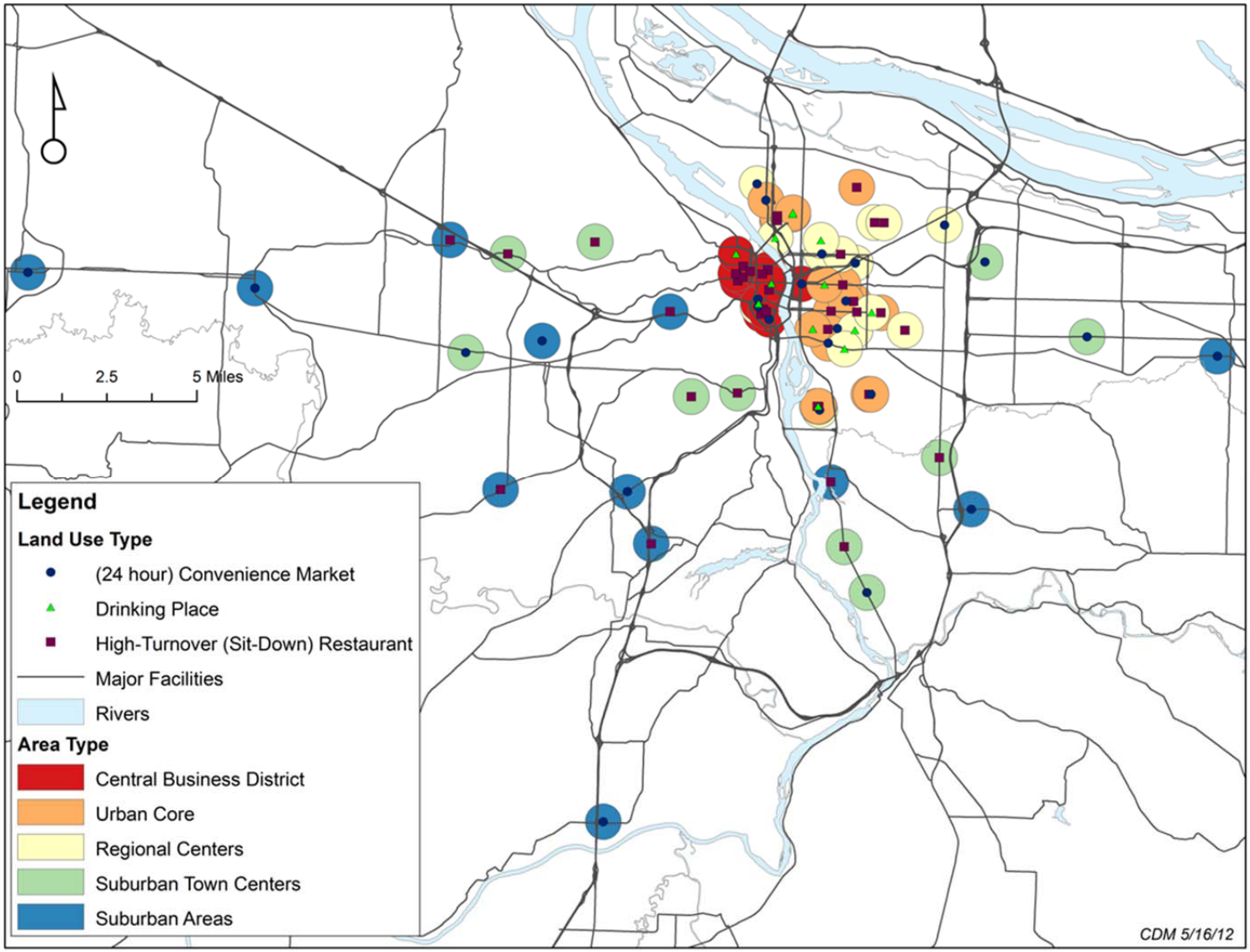

Figure 1. Locations of Survey Establishments

ANALYSIS

Mode Shares

Figure 2 shows the resulting mode shares by establishment type. The automobile is clearly the dominate mode for customers across all of the establishments, while transit is the least used mode. However, important differences exist in the use of these modes that point to the nature of the activities pursued at each business and the urban context where they are located.

Restaurants see the most use of the automobile, with 63% of trips made by private vehicle. Drinking places have the lowest automobile mode share of the four business types surveyed. Only 43% of patrons surveyed arrive by automobile, perhaps to comply with laws and programs discouraging drinking and driving.

Of the non-automobile modes, walking has the highest modes shares across all land uses. Walking rates are highest for convenience stores and drinking places, both with 27% mode share. Restaurants have a 22% walk mode share. Cycling is most popular at drinking establishments, where 22% of patrons arrive by bike. Restaurants and convenience stores have 8% and 7% bike mode share, respectively. Transit use is fairly consistent across convenience stores (6%), restaurants (6%) and drinking places (7%).

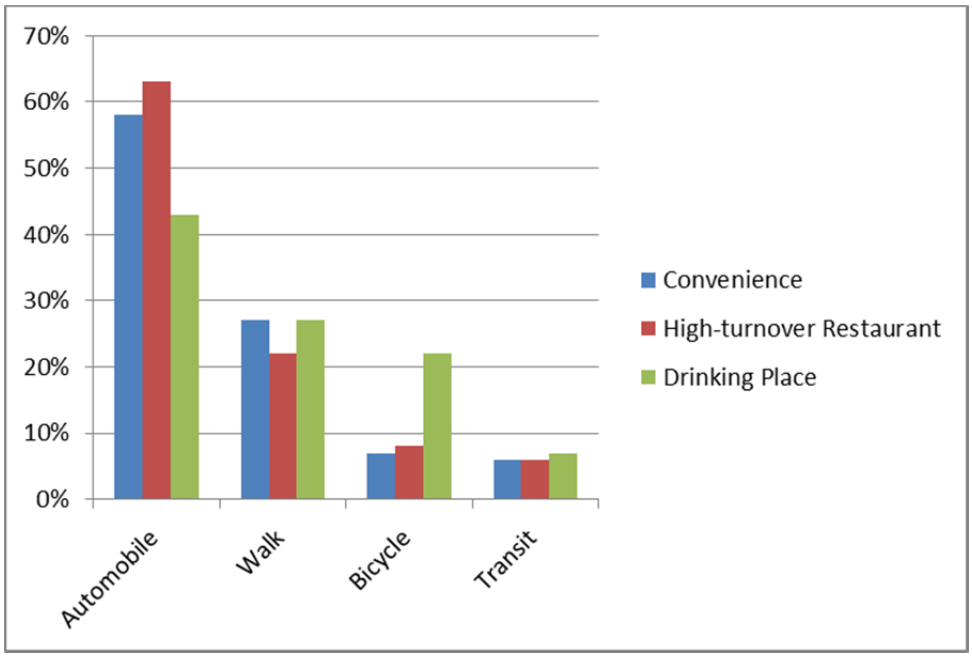

Figure 2. Mode Shares by Land Use

These results need to be interpreted with the context of data collection in mind. Table 2 shows mode shares in more detail. The use of private vehicle increases with increasing suburbanization. Higher proportions of walking and bicycling occur at establishments in the Central Business District, Urban Core, and Regional Center area-types than in suburban area-types. Transit mode shares are the highest at locations in the Central Business District, but there is not as consistent a trend in transit mode shares between urban to suburban area types as there are trends with other travel modes. Note that no drinking places were surveyed in suburban locations. This limitation

needs to be considered when interpreting these aggregate summary statistics as it has the effect of skewing the results. This is controlled for in the subsequent modeling analysis, which provides more detailed results.

There were also high proportions of people taking transit and walking, especially to convenience stores. Convenience stores and bars had the lowest vehicle mode share of 46% and 41% (respectively) and the highest pedestrian mode share of 37% and 29%. These reduced proportions of vehicle trips for these types of establishments may also be correlated to differences in urban context. However, even convenience stores in Suburban area-types had high walking mode shares, which indicates that even without a dense and highly pedestrian-oriented environment, residents may still choose to walk to a conveniently located corner store.

Table 2. Percent Mode Shares by Area Type and Land Use

Area Type & Land Use	Automobile Mode Share	Walk Mode Share	Bicycle Mode Share	Transit Mode Share
Convenience	58%	27%	7%	6%
Central Business District	34%	49%	10%	10%
Urban Core	52%	31%	9%	6%
Regional Centers	60%	26%	7%	5%
Suburban Town Centers	70%	18%	3%	7%
Suburban Areas	72%	14%	8%	3%
High-turnover Restaurant	63%	22%	8%	6%
Central Business District	35%	42%	7%	16%
Urban Core	65%	20%	13%	2%
Regional Centers	70%	24%	6%	1%
Suburban Town Centers	85%	6%	1%	6%
Suburban Areas	86%	5%	0%	8%
Drinking Place	43%	27%	22%	7%
Central Business District	26%	40%	19%	15%
Urban Core	46%	20%	25%	8%
Regional Centers	52%	30%	18%	1%
Suburban Town Centers*	N/A	N/A	N/A	N/A
Suburban Areas*	N/A	N/A	N/A	N/A
Overall	58%	25%	9%	7%
Central Business District	34%	43%	9%	14%
Urban Core	57%	23%	15%	5%
Regional Centers	61%	26%	10%	3%
Suburban Town Centers	79%	11%	2%	7%
Suburban Areas	78%	10%	5%	5%

*Drinking places were not surveyed in suburban area types

Trip Length Distribution

Figure 3 shows the average trip lengths by mode of travel. On average, transit riders travel the farthest, at 4.7 miles. Pedestrian trips are the shortest, which is not surprising. However, the average trip length for walk trips is 0.7 miles, much longer than conventional planning standards would lead one to believe.

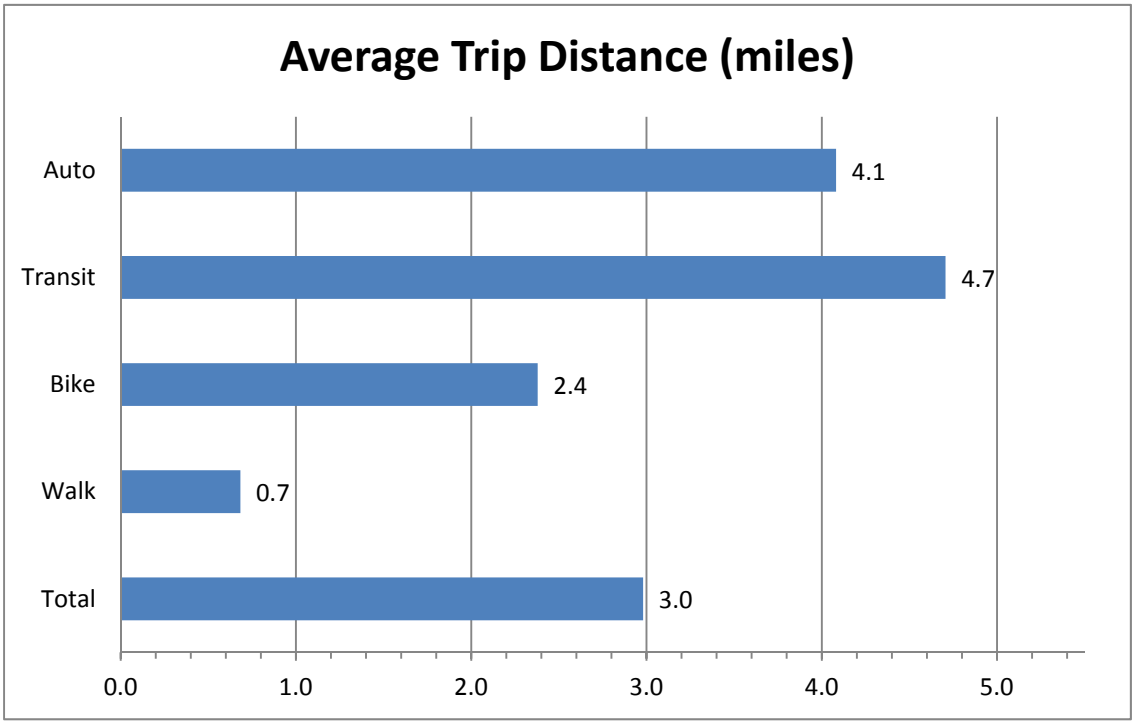

Figure 3. Average Trip Distances from Patron's Trip Origin to Establishment

Consumer Behaviors

Figure 4 shows the average expenditures that patrons made on the day surveyed by mode and establishment type. It is important to consider expenditures along with the frequency of visits, particularly for convenience stores where goods are purchased, which is shown in Figure 5.

Table 3 shows these statistics in more detail. Note that the average expenditures per month reported in this table are based upon the average of the disaggregate expenditures per trip multiplied by the reported frequency of visits for each person surveyed. They are not calculated based upon the average values in the table.

For convenience stores, where goods are purchased and carried off site, we see that cyclists spend the most per trip, averaging almost $8, and the most per month, averaging over $81. Pedestrians travel to the convenience store most frequently, with an average of 11 trips to the store per month, but tend to spend less per visit than customers arriving by other modes.

For drinking places, many of which also serve food, pedestrians spend the most per trip, with an average of over $22 per trip, perhaps suggesting that those that want to consume more alcohol opt not to drive. Again, cyclists spend the most per month, almost $82, despite spending the least

per trip, just under $17, the difference due largely to their greater frequency of visits – five times per month. Patrons who use transit have a similar frequency as cyclists but spend the least on average per month – just over $36.

Transit users frequent high-turnover restaurants more often than others, making almost 8 trips per month and expending an average amount of nearly $50 over that time. Patrons that use an automobile make the fewest number of trips, averaging only 2.5 visits per month, but spend the most per trip – over $19 per trip. Cyclists spend the least per trip but come almost as frequently as transit users, making them the second highest spending group per month.

These variations across modes and establishment types are due to a complex set of factors, including income, gender, group size and other social and demographic characteristics of consumers. Also, readers should exercise caution when interpreting averages. These factors and the relationships between modes and expenditures will explored in the disaggregate multivariate modeling analysis to follow.

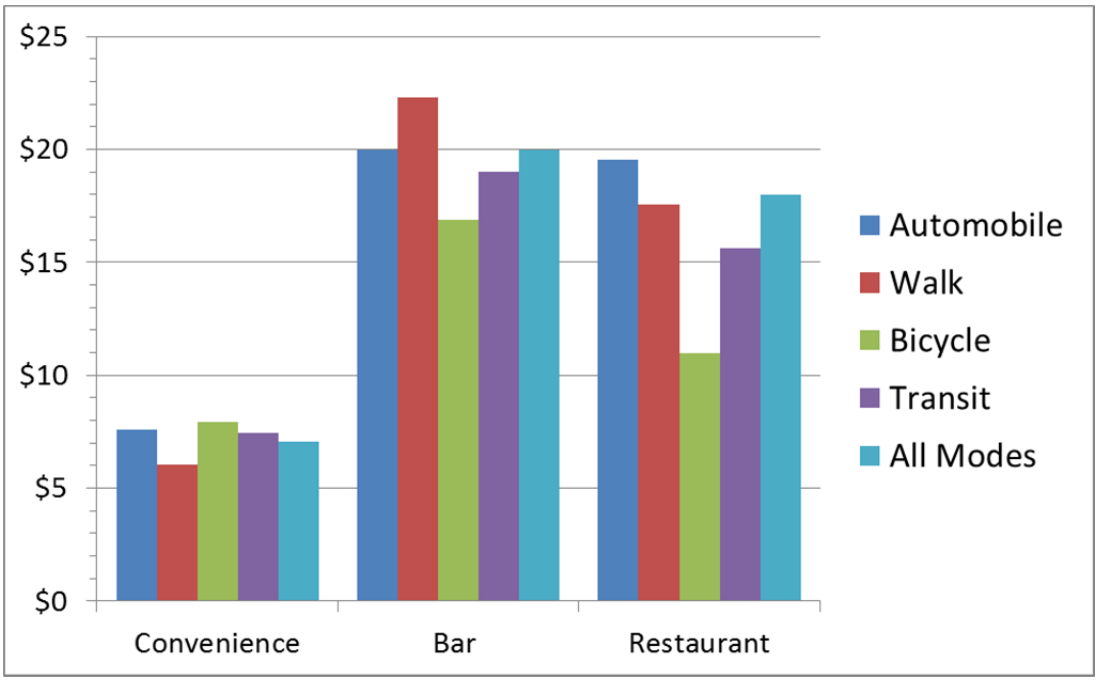

Figure 4. Average Consumer Expenditures per Trip

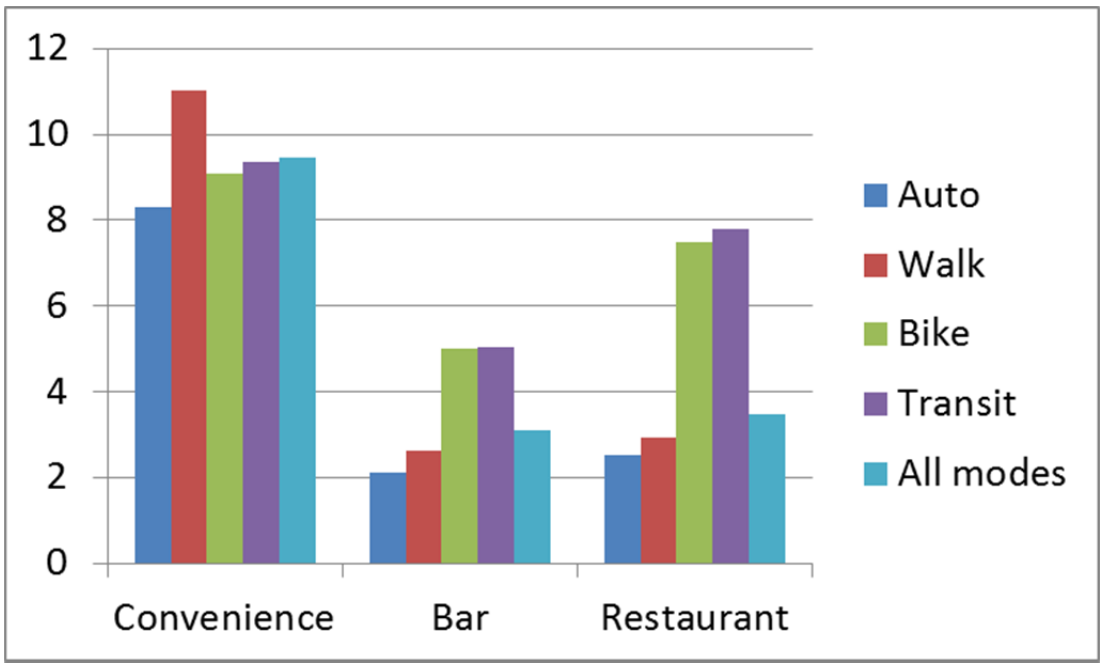

Figure 5. Average Consumer Frequency in Trips Per Month

Table 3. Descriptive Consumer Expenditures and Frequency of Trips

		Expenditure per trip	Trips per month	Expenditures per month	N
Convenience Store	Walk	$6.02	11.0	$64.81	96
	Bike	$7.95	9.1	$81.76	19
	Transit	$7.46	9.3	$60.37	26
	Auto	$7.61	8.3	$68.95	119
	Total	$7.03	9.5	$67.50	260
Bar	Walk	$22.30	2.6	$63.94	30
	Bike	$16.90	5.0	$81.90	20
	Transit	$19.00	5.0	$36.25	8
	Auto	$19.98	2.1	$40.78	41
	Total	$19.98	3.1	$55.74	99
Restaurant	Walk	$17.56	2.9	$32.01	64
	Bike	$10.97	7.5	$48.40	29
	Transit	$15.64	7.8	$49.39	14
	Auto	$19.52	2.5	$40.06	174
	Total	$18.00	3.5	$39.55	281

Models of Consumer Spending

As mentioned earlier, to understand the complexities surrounding mode choices and consumer behavior, additional analysis is needed. The following sections discuss the results of multivariate statistical analysis that considers the various the factors at play that contribute to the amounts customers spend and their mode choices. Because the business types considered here vary in terms of the nature of the consumer interaction, they are separated into logical groups for analysis– (a) Restaurants and Bars; and (b) Convenience Stores. The results from the specific models can be reviewed in the various tables in Table 4. Here, we interpret the findings of these descriptive models for policy and planning purposes.

Restaurants and Bars

We consider the consumer and travel behavior for restaurants and drinking establishments together. Many of the bars included in this study sell food and share similarities with restaurants. In both cases, the goods purchased are frequently consumed on site, with little or no carry out options. Thus non-automobile modes are not disadvantaged by the lack of carrying capacity.

A model of consumer spending per trip is estimated using ordinary least squares regression, based upon the long survey data presented in the previous chapter. The analysis considered several trip, demographic and establishment variables. The set of significant explanatory variables include: the group size, the time spent in the establishment, household income, the presence of children in the household, whether the establishment is a Mexican restaurant, the modes used to access the establishment, the number of times the patron visits the establishment per month, the number of adults in the household, and the distance the patron travels to access the restaurant. Table 4 shows the final model results.

Survey respondents reported spending amounts anywhere from $2 to $150 at restaurants and bars. Not surprisingly, the variable with the greatest impact on restaurant expenditures is group size. Each additional person in a group is associated with an additional $10.30 spent on average. The amount of time spent at the establishment is also important indicator of spending – each minute in a restaurant or bar translates into an additional $0.18 on the bill.

In terms of customer demographics, the presence of children in respondents' households also has a large impact on how much they spend: people with children spend an average of $3.69 less than those who do not have children. This suggests that, when all other factors are held constant (including group size), households without children are more inclined to spend more of their disposable income eating out or drinking out. Similarly, the number of adults in the household is associated with slightly lower spending, on average - $1.03 less per adult. Household income was also significant but had only a small impact – for every additional $10,000 in household income, respondents are expected to spend an average of $0.38 more. Respondent sex and age was also included in the analysis but was not significantly associated with spending and thus, was not included in the final model results.

Respondents spent an average of $3.55 more at Mexican restaurants. Customers may be more likely to visit a Mexican restaurant for a full meal in the early evening, while they may just stop by a bar or pizza place for a quick drink or snack, as many of the pizza establishments sold pizza by the slice.

In terms of the mode of access, only walking was significantly associated with spending. There was no significant difference between patrons who come by car, bicycle or transit. Customers who walk to the bar or restaurant are likely to spend $3.54 more than those who go by other modes. Given this, the impacts of trip distance are surprising. The trip distance from the origin to destination was significantly associated with slightly more spending, all else equal. Customers spent $0.29 more per mile traveled to access the restaurant, regardless of mode of access. The interaction between mode and trip distance was insignificant, meaning that trip distance did not have a separate effect for different mode users. The frequency of visits to the restaurant is associated with a decrease in spending. For those that visit a few times per week spend $5.47 less, on average than other patrons.

Convenience Stores

As with the restaurant and bars analysis above, a model of consumer spending per trip is estimated using ordinary least squares regression, based upon the same survey data. Several trip, demographic and establishment variables were considered in the modeling analysis. The set of significant explanatory variables include: the time spent in the establishment, household income, the modes used to access the establishment, the number of adults in the household, the number of times the patron visits the establishment per month, the distance the patron travels to access the restaurant and the customer age. Table 4 shows the final model results.

Survey respondents reported spending amounts anywhere from $1 to $50 on their trip to the convenience store. The results differed from the findings for restaurants, which is expected given the nature of the transactions at each of the establishment types. Because goods are purchased at convenience stores, albeit often in small quantities, there is a need to carry the items. Thus the spending per visit appears to be more sensitive to the mode of travel. Both transit and walking as modes of access were associated with spending less. On average, pedestrians spent $2.03 less and transit users spent $3.03 less than auto and bicycle users. The amount of time spent at the establishment is also important indicator of spending – each minute spent in the store yields an additional $0.37 on average.

In terms of customer demographics, the number of adults in the household is associated with more spending, on average - $0.53 more per adult. Household income was also significant but had only a small impact – for every additional $10,000 in household income, respondents are expected to spend an average of $0.15 more. Customers between 25-34 years old spend $2.07 more than patrons of other ages. Respondent sex and the presence of children in the household were also included in the analysis but were not significantly associated with spending and thus, excluded in the final model results.

The trip distance from the origin to destination was not significant in the model. However, when interacted with taking a transit mode, the results were significant, suggesting that transit users' expenditures are more sensitive to trip distance than other modes. For every mile of distance traveled, transit users spend $0.50 more than those traveling by other modes, all else equal.

The frequency of trips made to the convenience store has a positive impact on spending on the particular visit surveyed. This may indicate a reliance on convenience store items on a regular basis, particularly if the store is located near a customer's home neighborhood. Patrons visiting a

few times a week spent $3.92 more than those visiting daily (a total of 47 customers) or once per month or less. Patrons visiting weekly and a few times per month spent more than those same daily or once per month or less shoppers, $2.88 more and $1.76 more, respectively.

Table 4. Regression Models for Expenditures per Trip

	Restaurants & Bars		Convenience Stores	
Independent Variables	**ß**	**Sig.**	**ß**	**Sig.**
(Constant)	-9.55	0.00	1.26	0.35
Group Size	**10.30**	**0.00**	0.70	0.12
Duration of Time in Establishment (min.)	**0.18**	**0.00**	**0.37**	**0.00**
Household Income ($10,000)	**0.38**	**0.00**	**0.15**	**0.05**
Age is 25-34	-	-	**2.07**	**0.01**
Mode: Walk	**3.54**	**0.01**	**-2.03**	**0.02**
Mode: Transit	2.27	0.36	**-3.03**	**0.10**
Mode: Bike	1.01	0.59	-0.89	0.55
Number of Adults in HH	**-1.03**	**0.08**	**0.53**	**0.10**
Presence of Children in the Household	**-3.69**	**0.00**		
Trip Distance (miles)	**0.29**	**0.07**	-0.12	0.18
Visits a few times per month	-	-	**1.76**	**0.07**
Visits weekly	-	-	**2.88**	**0.01**
Visits A Few Times per Week	**-5.47**	**0.01**	**3.92**	**0.00**
Mexican Restaurant (1=yes, 0=no)	**3.55**	**0.00**	**0.50**	**0.04**
Interaction Mode: Transit & Trip Distance	-	-	**0.50**	**0.04**
Model Summary				
N	350		255	
Adjusted R^2	0.56		0.23	
Standard Error of the Estimate	10.09		5.38	

CONCLUSIONS

This paper provides long-overdue evidence on the links between consumer spending and patronage and their travel modes. Portland provided a unique opportunity to observe the spending patterns across a variety of modes, given its relatively high non-automobile mode shares in many of the inner neighborhoods. The findings support the notion that customers that

arrive by modes other than the automobile are competitive consumers, spending similar amounts or more, on average, than their counterparts using automobiles. They are also more frequent patrons on average, presenting perhaps a unique marketing opportunity for these businesses.

Cities and other public agencies can use these findings to better understand how businesses might be impacted by changes to the built environment and to transportation infrastructure. In some cases, public agencies can use this information to help business owners understand the potential economic benefits of improvements to bicycling and pedestrian infrastructure. Public agencies can also use this information to understand what factors limit the potential benefits businesses might see from pedestrian and bicycle improvements.

While this study may be the first of its kind, it will clearly not be the last. This study is limited in the numbers and types of establishments included. More work is needed, particularly for retailing and supermarkets, where the requirement of hauling goods purchased can limit the purchases per visit by patrons using non-automobile modes but this may be offset by greater frequency of trips. This paper does not address the role of accommodation for these modes and how that influences the mode choices of patrons, which is the subject of future work. Much more extensive research is needed to fully understand how spending patterns translate into a return on investment, for both the business establishments and the agencies making public infrastructure investments.

ACKNOWLEDGEMENTS

The authors acknowledge the Portland Development Commission, Metro, the City of Portland, the Oregon Department of Transportation and Oregon Transportation Research and Education Consortium (OTREC) for funding this research.

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Figure 6. Customer Intercept Survey (Long Survey)

Question	Text To Read to Respondent	Answers
Q55. Age	What best describes your AGE?	[ ] under 18, [ ] 18-24, [ ] 25-34, [ ] 35-44, [ ] 45-54, [ ] 55-64, [ ] 65-74, [ ] 75 and over
Q52. HH	Please provide the following information for your household: Number of Adults	[ ] 0, [ ] 1, [ ] 2, [ ] 3, [ ] 4, [ ] 5 or more
	Number of Children	[ ] 0, [ ] 1, [ ] 2, [ ] 3, [ ] 4, [ ] 5 or more
	Number of Automobiles	[ ] 0, [ ] 1, [ ] 2, [ ] 3, [ ] 4, [ ] 5 or more
	Number of people with BICYCLES	[ ] 0, [ ] 1, [ ] 2, [ ] 3, [ ] 4, [ ] 5 or more
	Number of Transit Passes	[ ] 0, [ ] 1, [ ] 2, [ ] 3, [ ] 4, [ ] 5 or more
Q57. Decision	When did you decide that you would visit [LOCATION]?	[ ] passing by, [ ] after leaving home, [ ] today before leaving home, [ ] yesterday, [ ] before yesterday, [ ] do not know
Q2. Origin	We would like to ask you some questions about your travel here today, Can you tell me the nearest intersection or address from where you came from?	_____ _____ _____ _____ _____ _____
Q30. Beginning of Day	Is this the place where you began your day?	[ ] yes, [ ] no
Q3. Origin Type	The best description of this location is one of the following:	[ ] Home, [ ] Work, [ ] School, [ ]Restaurant, [ ] Coffee shop, [ ] Service errand, [ ] Other: _____
Q8. Origin Mode	How did you travel to [establishment]? Explain that we want travel modes in the order used. Remind respondent for walk trips if >1 block.	
	Segment 1: [ ] Walk, [ ] Bicycle, [ ] MAX/WES, [ ] Bus, [ ] Streetcar, [ ] Vehicle-driver, [ ]Vehicle-passenger, [ ] Other:_____	
	Segment 2: [ ] Walk, [ ] Bicycle, [ ] MAX/WES, [ ] Bus, [ ] Streetcar, [ ] Vehicle-driver, [ ]Vehicle-passenger, [ ] Other:_____	
	Segment 3: [ ] Walk, [ ] Bicycle, [ ] MAX/WES, [ ] Bus, [ ] Streetcar, [ ] Vehicle-driver, [ ]Vehicle-passenger, [ ] Other:_____	
	Segment 4: [ ] Walk, [ ] Bicycle, [ ] MAX/WES, [ ] Bus, [ ] Streetcar, [ ] Vehicle-driver, [ ]Vehicle-passenger, [ ] Other:_____	
	Segment 5: [ ] Walk, [ ] Bicycle, [ ] MAX/WES, [ ] Bus, [ ] Streetcar, [ ] Vehicle-driver, [ ]Vehicle-passenger, [ ] Other:_____	
	Segment 6: [ ] Walk, [ ] Bicycle, [ ] MAX/WES, [ ] Bus, [ ] Streetcar, [ ] Vehicle-driver, [ ]Vehicle-passenger, [ ] Other:_____	
Q9-Q14. Veh Occ	**IF VEHICLE CHOSEN:** For trip segment [#], how many people were in the vehicle?	[ ] 1, [ ] 2, [ ] 3, [ ] 4, [ ] 5 or more

Question	Text To Read to Respondent	Answers
Q58. Parking cost	**IF VEHICLE CHOSEN:** How much did you pay for PARKING in traveling to [LOCATION]? (Enter zero if you have a parking pass)	$_____
Q60. Transit Cost	**IF TRANSIT CHOSEN:** How did you pay for your public transportation in travelling to [LOCATION] today?	[ ] cash only, [ ] ticket at kiosk, [ ] transit pass, [ ] free zone
Q63. Mode Attitudes	Now, we will ask you about your attitudes towards different transportation options in traveling to [LOCATION]. Please evaluate the following on a scale from 1 (strongly disagree) to 5 (strongly agree), even if you do not use these modes:	
	Car parking here is easy and convenient	[ ] 1, [ ] 2, [ ] 3, [ ] 4, [ ] 5
	Bike parking here is easy and convenient	[ ] 1, [ ] 2, [ ] 3, [ ] 4, [ ] 5
	Biking here is safe and comfortable	[ ] 1, [ ] 2, [ ] 3, [ ] 4, [ ] 5
	Walking here is safe and comfortable	[ ] 1, [ ] 2, [ ] 3, [ ] 4, [ ] 5
	Taking transit here is convenient	[ ] 1, [ ] 2, [ ] 3, [ ] 4, [ ] 5
Q38. Shopping frequency	In order to understand more about why you came here, we will ask a few questions about your consumer habits. Can you tell me how frequently you come here?	[ ] rarely, [ ] once a month, [ ] a few times per month, [ ] once a week, [ ] a few times a week, [ ] daily
Q62. Time spent	Could you tell me the approximate amount of TIME you spent here at [LOCATION]	_____ Minutes
Q39. Money spent	Could you tell me the approximate amount of money you spent here at [LOCATION]?	$_____
Q53. Group size	How many people in your group did this purchase pay for?	[ ] 1, [ ] 2, [ ] 3, [ ] 4, [ ] 5 or more
Q31. Destination location	We are going to ask you a series of questions about where you will be going after [Location]. Can you tell me the nearest intersection or address you will be going NEXT?	_____ _____ _____ _____ _____ _____
Q32. Destination type	The best description of this location is one of the following:	[ ] Home, [ ] Work, [ ] School, [ ]Restaurant, [ ] Coffee shop, [ ] Service errand, [ ] Other: _____
Q8*. **Destination mode**	How will you travel to the next location from here? Explain that we want travel modes in the order used. Remind respondent for walk trips if >1 block.	
	Segment 1: [ ] Walk, [ ] Bicycle, [ ] MAX/WES, [ ] Bus, [ ] Streetcar, [ ] Vehicle-driver, [ ]Vehicle-passenger, [ ] Other:_____	
	Segment 2: [ ] Walk, [ ] Bicycle, [ ] MAX/WES, [ ] Bus, [ ] Streetcar, [ ] Vehicle-driver, [ ]Vehicle-passenger, [ ] Other:_____	
	Segment 3: [ ] Walk, [ ] Bicycle, [ ] MAX/WES, [ ] Bus, [ ] Streetcar, [ ] Vehicle-driver, [ ]Vehicle-passenger, [ ] Other:_____	
	Segment 4: [ ] Walk, [ ] Bicycle, [ ] MAX/WES, [ ] Bus, [ ] Streetcar, [ ] Vehicle-driver, [ ]Vehicle-passenger, [ ] Other:_____	

Question	Text To Read to Respondent	Answers
	Segment 5: [ ] Walk, [ ] Bicycle, [ ] MAX/WES, [ ] Bus, [ ] Streetcar, [ ] Vehicle-driver, [ ]Vehicle-passenger, [ ] Other:_____	
	Segment 6: [ ] Walk, [ ] Bicycle, [ ] MAX/WES, [ ] Bus, [ ] Streetcar, [ ] Vehicle-driver, [ ]Vehicle-passenger, [ ] Other:_____	
Q36. Home location	**IF HOME NOT ALREADY GIVEN IN ORIGIN/DESTINATION QUESTIONS:** Can you tell me the nearest intersection or address for your HOME?	_____ _____ _____ _____ _____ _____
Q37. Work location	**IF WORK NOT ALREADY GIVEN IN ORIGIN/DESTINATION QUESTIONS** Can you tell me the nearest intersection or address for your WORK?	_____ _____ _____ _____ _____ _____
Q54. Limitations	Do you have any medical limitations that prevent you from walking, bicycling or driving?	[ ] yes, [ ] no
Q56. HH Income	What best describes your total annual HOUSEHOLD INCOME?	[ ] less than $25,000, [ ]$25K - $49,999, [ ] $50K - $99,999, [ ] $100K - $149,999, [ ] $150K - $199,999, [ ] $200K or more
Q40. Gender	What gender do you most identify with?	[ ] male, [ ] female
Q71. Follow up	Finally, would you like to participate in follow-up research about travel & consumer choices?	Name:_____ _____ Phone/email: _____
END	We appreciate your time in completing this survey. Thank you, and have a great day!	