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Attitudes Toward Travel: The Relationships Among Perceived Mobility, Travel Liking, and Relative Desired Mobility

UCD-ITS-RR-00-06

Master's Thesis

June 2000

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Attitudes Toward Travel: The Relationships among Perceived Mobility, Travel Liking, and Relative Desired Mobility

UCD-ITS-RR-00-6

by

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EXECUTIVE SUMMARY

Three categories of questions were asked of 1,904 San Francisco Bay Area residents (in the three cities of Concord, Pleasant Hill, and north San Francisco) as part of a larger attitudinal travel survey. The categories asked how much people perceive they travel, how much they enjoy travel, and if they want to increase or decrease their travel. Each category probed for responses on a five-point ordinal scale for both short distance and long distance travel broken into overall, purpose, and mode related questions. The focus of this thesis was to determine the relationships among the attitudinal variables Perceived Mobility (PM), Travel Liking (TL), and Relative Desired Mobility (RDM). The relationships among these variables will help us better understand some of the attitudes that underlie the travel that is done and the motivation for increasing and decreasing that travel. Six different analysis methodologies were used: correlation analysis, three-way analysis (cross tabulation, graphical analysis, and regression analysis), vector sorting, and cluster analysis. The following sections discuss the key findings from the methodologies listed above.

General Findings

There appears to be three different types of relationships between RDM and Perceived Mobility depending on the activity being performed or mode being used.

1) The desired travel is inversely related to Perceived Mobility (e.g. Commuting to Work, BART). In graphical analysis, average Relative Desired Mobility decreases as Perceived Mobility increases (for each level of Travel Liking). In RDM regression equations for these cases, Perceived Mobility entered the equations as a negative term. This was the relationship we hypothesized and expected a priori.

2) The desired travel is inelastic or unaffected by Perceived Mobility (e.g. short distance Entertainment/Recreation/Social, long distance Personal Vehicle). In graphical analysis for these cases, average Relative Desired Mobility stays constant as Perceived Mobility increases (for each level of Travel Liking). In the RDM regression equations, Perceived Mobility did not enter the equations.
3) The desired travel is actually stimulated by Perceived Mobility (e.g. long distance Entertainment/Recreation/Social, Walking/Jogging/ Bicycling). In graphical analysis, average Relative Desired Mobility increases as Perceived Mobility increases (for each level of Travel Liking). In the RDM regression equations, Perceived Mobility entered as a positive term.

The Travel Liking concept was determined to be significant in its relationship to RDM.

1) The significant positive correlation between every Travel Liking category and the corresponding RDM category (ranging from 0.309 to 0.753) demonstrated how important liking travel is to wanting to increase or decrease the amount one travels. A key observation also was that overall short distance RDM was linked more closely to the liking of travel to specific activities performed than to the liking of travel by specific modes.
2) Travel Liking was significant and positive in 15 of 16 RDM regression equations, showing how essential it is for determining RDM.

Cross Tabulation Findings

The conclusion for short distance overall travel is that, on average, even those who liked travel and were doing little of it did not feel deprived of short distance travel. Those who liked short distance travel tended to feel balanced, those who disliked travel tended to feel surfeited, and those who were neutral tended to be split between balanced and surfeited.

Graphical Findings

In the three-point scale graphs, with each increase in Travel Liking, there is an increase in the RDM average for each level of Perceived Mobility. The long distance graphs had higher RDM averages than the short distance graphs, which demonstrates the greater demand people have for increasing long distance travel compared to short distance travel.

Regression Findings

Low to moderate R^2 values, for equations containing RDM measures as dependent variables and the corresponding Travel Liking, Perceived Mobility, and TL*PM interaction terms as the only explanatory variables, indicate that additional explanatory variables of attitudes, feelings, or demographics are needed to more precisely determine if people want to increase or decrease their travel. Nevertheless, the equations served to highlight the relationships among the three main variables of interest, as described above under General Findings.

Vector Sorting Findings

In the Travel Liking analysis, 46% of the sample has a liking for both short and long distance entertainment/recreation/social travel. The most frequent patterns indicate that work travel is the category that people strongly dislike.

The RDM results pointed towards people wanting more long and short distance social travel and less long and short distance work travel. One interesting outcome though is that the "[travel] about the same [amount]" or neutral group contained only 12% of the sample. Thus, few people are completely satisfied in their travel desires.

The top Perceived Mobility patterns supported the expectation that people perceive they do not travel much for long distance social activities. The majority of them also indicated that they

traveled relatively little for long distance work trips. The "don't travel much" sequence was the largest three-point scale group with 174 responses (9.1% of the sample).

Cluster Analysis (Travel Liking) Findings

Six clusters were identified from Travel Liking responses for short and long distance work travel, and short and long distance entertainment travel. The labels (or names) for each of the clusters refer to the liking for the work or entertainment *travel*, not to the liking for each actual *activity* (*i.e.*, Entertainment Lover/Work Hater refers to liking entertainment *travel* and hating work *travel*, instead of liking entertainment *activities* and hating work *activities*). Below are the cluster names and the corresponding levels (lowest to highest) of actual commute time, ideal commute time, and commute distance.

Table 1 - Cluster Commute Findings

	Actual Commute Time Rank (Ave. Minutes)	Ideal Commute Time Rank (Ave. Minutes)	Commute Distance Rank (Ave. Miles)
Short Distance Lovers (N=174)	1 (22.8)	5 (17.1)	1 (9.4)
Entertainment Lover/ Work Neutral (N=481)	2 (25.5)	6 (17.9)	2 (10.4)
Neutral (N=412)	3 (27.9)	4 (16.5)	3 (14.7)
Haters (N=170)	4 (31.7)	3 (16.3)	4 (16.2)
Entertainment Lover/Work Haters (N=314)	5 (33.7)	2 (15.2)	6 (19.7)
Short Distance Work Haters (N=353)	6 (37.2)	1 (14.7)	5 (17.8)

The clusters that dislike commute travel (the latter three rows of the table) tend to have high commute times and commute distances, while having low ideal commute times. Likewise, the clusters that like or are neutral towards commute travel (the upper three groups) tend to have low commute times and distances, while having higher ideal commute times than the dislike groups.

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The University of California Transportation Center and the DaimlerChrysler Corporation fund this research. Pat Mokhtarian served as an experienced and knowledgeable guide through the minefield of data analysis. She gave shape to abstract ideas and her insightful comments, support, and most importantly criticism enabled this thesis to exist in its present form. If it were not for Lothlorien (Lorien) Redmond there would not be any data to analyze. Her dedicated work on the early stages of the mobility project enabled the rest of us to enjoy the rich, clean database we use today. Lorien was also great for encouragement, comfort, and critique as we both followed the "yellow brick road" to the completion of our theses. And my thanks to the rest of the mobility crew, Naomi Otsuka and Sangho Choo, for their fresh outlook on my thesis and needed critique and support. Thanks also to Naomi for the use of the Census information contained in Appendix A. Lastly, and most importantly, my wife Jennifer Emiko Nakayama-Curry was a constant inspiration and is the sole reason I still have my sanity.

CHAPTER 1 - INTRODUCTION

When is more travel desired? When is less travel desired? What effect does the amount people travel have on their enjoyment of travel? Does traveling a lot necessarily result in wanting to travel less? Does enjoying travel automatically mean you want to travel more? Most transportation classes teach that travel is a derived demand and that therefore, people seek to minimize travel time between origin and destination. Let's stop for a moment and reconsider this common assumption. What if people have motivations for travel other than reaching a certain destination, and do not try to minimize their travel? The question then becomes "when do people want to travel more and when do they want to travel less? Is the desire to travel more or less an overall feeling or does it depend on the purpose of the trip? Or could the desire be based on the mode used to travel?"

It is easy to suggest that all people want to minimize travel time or reduce the number of trips they take. But what if you really enjoy feeling the power of a vehicle engine thrust you into motion on the open road. If you do not get to do it that often, do you think you will want to decrease your travel? What if you are a commuter who is stuck in congestion every morning and afternoon and you hate every minute of it. Do you think you would want to increase your travel? Scenarios can be created for every purpose and every type of mode. There are clearly some underlying feelings and attitudes that have to be accounted for in order to begin to understand the complex decision making process that humans go through when deciding to travel.

These questions are at the core of the analysis in this thesis. Three categories of questions were asked of San Francisco Bay Area residents as part of a larger attitudinal travel survey. The categories asked how much people perceive they travel, how much they enjoy travel, and if they

want to increase or decrease their travel. Each category probed for responses for both short distance and long distance travel broken into overall, purpose, and mode related questions. The relationships among these variables are analyzed in an attempt to answer some of the questions posed above. The relationships will also help us better understand some of the attitudes that underlie the travel that is done and the motivation for increasing and decreasing that travel.

1.1 SIGNIFICANCE OF THE STUDY

A question in the survey asks, "…what would be [your] ideal one-way commute time?" Everyone is taught that people travel to get to certain destinations, but that does not account for whether you want to increase or decrease your time getting to that destination, such as commuting to work. You might want to decrease the time if you feel that you travel a lot for commuting, or if you really dislike the commute because of congestion. You might want to increase your commute time if you feel you need more time to unwind after work or you really like the solitude to organize your thoughts. So it is difficult to say whether people would want to change their travel unless you knew their attitudes behind the travel. We collect a lot of data on volumes for freeways or traffic counts for intersections. We predict what path people will take using old origin-destination surveys and future volumes for our street network, assuming people want to minimize their travel time. But how much do we know about the attitudes and factors that determine whether you want to travel more often or longer for your commute to work? Not much. These attitudes underlie all the travel we do. If we can understand these attitudes better, we might be able to understand trends in travel. Although beyond the scope of this study, we could use the survey data to identify the type of person who lives in a traditional urban neighborhood, and the type who lives in suburbia. The different types of people would be characterized in part by their attitudes toward travel.

1.2 HYPOTHESES AND RESEARCH QUESTIONS

The focus of this thesis is analyzing the relationships among the attitudinal variables Perceived Mobility (PM), Travel Liking (TL), and Relative Desired Mobility (RDM). The analysis is mostly exploratory where the relationships between variables are unknown. However, there are some hypotheses about how the variables will interact with each other. Hypotheses related to the pairwise correlations include:

1. The greater the liking for travel, the more a person will want to increase travel.

   Correlation (TL, RDM) = Positive
2. The greater the perceived travel, the more a person will want to reduce travel.

   Correlation (PM, RDM) = Negative
3. A) The greater the perceived travel, the less a person will like to travel (having to do it too much makes it unappealing).

   Correlation (PM, TL) = Negative

   B) The more a person likes to travel, the greater his/her perceived travel (because she/he loves traveling, she/he tries to do it a lot).

   Correlation (PM, TL) = Positive

The two hypotheses listed under number 3 above represent two opposing but both plausible beliefs regarding potential relationships between Perceived Mobility and Travel Liking. The first belief is that if people perceive they travel a lot, they probably actually do a lot of traveling (in all sorts of conditions, including congested traffic) and therefore they will enjoy that travel less. Or if argued in the opposite direction of causality, the liking for travel influences the perception of how much I do. If I like travel, I would minimize the perceived amount (because I like travel so much it does not seem like I travel that much), and if I dislike travel, I would maximize the perceived amount (because I dislike travel so much it seems as though the travel takes a long time). The second belief, to the contrary, is that if people like to travel, they probably travel more

to satisfy their desires. If the observed correlation between PM and TL is not strong, then it could be because these two relationships are canceling each other out across the data set. The correlation analysis is the subject of Chapter 4.

The three-way relationship involves a more complex set of hypotheses. The expectation is that Perceived Mobility and Travel Liking will affect RDM jointly. If people like to travel and do not travel a lot, chances are they will want to travel more (a state referred to as "deprived"). If people travel a lot and dislike travel, chances are they will want to travel less (a state referred to as "surfeited"). The hypotheses are shown formally in Table 2 below. The table and full set of hypotheses are explained in Chapter 5 – Three-way Relationships.

Table 2 – Hypothesized Values of RDM as a Function of PM and TL

		TRAVEL LIKING		
		DISLIKE	*NEUTRAL*	*LIKE*
PERCEIVED MOBILITY	*LOW*	Balanced	Slightly Deprived	Deprived
	MEDIUM	Slightly Surfeited	Balanced	Slightly Deprived
	HIGH	Surfeited	Slightly Surfeited	Balanced

Regression analysis (Chapter 5), graphing (Chapter 5), vector sorting (Chapter 6), and cluster analysis (Chapter 7) techniques are used in this thesis to identify key relationships among these three variables. The exploratory cluster analysis examines two research questions:

1. How do patterns of travel perceptions cluster together in the sample (*i.e.*, what distinctive groups of people can be identified having similar attitude profiles)?
2. Once those attitude patterns are identified, what other variables are significantly associated with each pattern (*i.e.*, what types of people are apt to possess each kind of pattern of travel perceptions)?

1.3 SCOPE

Because of the sheer number of variables available to this study, it was necessary to restrict the scope of the analysis. The main focus of this study is to analyze the relationships between and within the categories of Perceived Mobility, Travel Liking, and Relative Desired Mobility. Objective Mobility questions are included in the correlation analysis and certain demographic questions are analyzed in conjunction with the cluster analysis; however, these and other variables were not introduced into the remaining sections. This survey was given to residents of three cities in the San Francisco Bay area. However, the study only looks at the attitudes for the entire sample and does not compare attitudes across the cities. The decision not to compare attitudes across the cities was made due to the length of the analysis. This thesis will use six analytical techniques to explore the data in varying degrees of depth. The comparison across cities would add another dimension of length and complexity.

Likewise, the vector sorting analysis utilizes four different combinations of responses within Perceived Mobility, Travel Liking, and RDM as well as across these variables. The four different combinations of responses are not exhaustive of all possible scenarios, and instead represent a first look at the data. The cluster analysis used one of the combinations identified as interesting from the vector sorting analysis. Many different combinations could have been chosen; however, the chosen scenario had the most benefit for the project given the amount of time left to devote towards data analysis. Other scenarios for research using the vector sorting analysis, cluster analysis, and other analytical techniques are discussed in the Recommendations for Further Research section of Chapter 8 - Conclusions. The strengths, weaknesses, and limitations of the results are discussed in Chapter 8 as well.

CHAPTER 2 - LITERATURE REVIEW

Two sets of literature were reviewed. The first set of literature constituted the papers that formed the backbone of this thesis effort. These include papers written during the project duration and papers that helped to form the hypotheses that the survey was designed to test. The second set of literature concentrated on articles related to travel affinity or liking and mobility perception. While there is a considerable literature on attitudes toward different specific aspects of travel (*e.g.* safety, convenience, reliability), there is relatively little literature on the empirical documentation of an affinity for travel for its own sake (the central Travel Liking concept of the current study), and to the author's knowledge, no literature aside from Ramon (1981) that specifically considers Perceived Mobility, Travel Liking, and Relative Desired Mobility even in pairs, let alone in the three-way combination.

2.1 PROJECT FOUNDATION

The foundation for this thesis was built from four papers: three papers written as part of the Mobility project itself and one dissertation from Jerusalem that predated and partly inspired the Mobility project. The Jerusalem dissertation explores the primary variables that are addressed in this thesis. The three papers explore, at varying depths, the fundamental concepts supporting the belief that travel can be valued for its own sake, not just as a means to get to a desired location.

2.1.1 Sociological Aspects in the Analysis of Travel Behavior in an Urban Area -- Jerusalem as a Model – *Haia Ramon* (Original in Hebrew, Discussion based on English translation of selected portions of the dissertation) (1981)

This thesis formed the basis of the current travel survey sections C and D. The study focused on "investigating various social and cultural aspects related to travel behavior" in Jerusalem. Ramon sampled the voting list in Jerusalem, which limited the sample to Jewish people age 21 years and

over. The survey was conducted in 1977 with 501 valid responses out of 550 sampled. The survey was performed as a questionnaire with a home interview.

Ramon refers to the time before travel occurs as "pre-behavioral" where the motivations and orientations occur. Ramon measured several variables such as "basic attitude towards travel" from "love" to "hate", "self-perception [or image] of mobility" from "a little" to "a lot", and the "satisfaction of the individual with his degree of mobility". These three variables are the predecessors to the current mobility project's "Travel Liking", "Perceived Mobility", and "Relative Desired Mobility", respectively. Ramon also defines the three levels of satisfaction as balance ("lack of desire to change the amount of travel involved"), deprivation ("desire to travel more than the person is travelling at present"), and surfeit ("person desires to travel less than he is doing at present"). Ramon used two supplemental ("Objective") measures to indicate the amount each person traveled: "kilometers covered per month" and "number of daily trips". Ramon found no correlation between actual mobility and feelings of deprivation or surfeit. A significant positive correlation was found between "attitude to travel" and "image of mobility" (consistent with hypothesis 3B) and a significant negative correlation between "image" and "satisfaction" (consistent with hypothesis 2). This leads to a combination of "attitude" and "image" yielding feelings of satisfaction (premise behind our three-way analysis of the variables). Perceived Mobility was also positively correlated with Objective Mobility.

2.1.2 What Happens When Mobility-Inclined Market Segments Face Accessibility-Enhancing Policies? – *Ilan Salomon, Patricia L. Mokhtarian* (1998)

This paper provided a conceptual foundation for the mobility project and for this thesis. Results from Ramon's dissertation are presented here in published form for the first time. Further, Salomon and Mokhtarian hypothesize about the relationships among Travel Attitude (termed Travel Liking in this thesis), Perceived Mobility, and Satisfaction (termed Relative Desired

Mobility in this thesis). The authors express the hypotheses in terms of Travel Attitude and Perceived Mobility taking on dichotomous extremes, as shown in Table 3 (with the original title). Those variables are analyzed at three levels and five levels for this thesis. The authors also discuss an important point about the relationship: the relationship varies by person based on the type of travel being conducted. A person could be deprived of travel in one category (*e.g.* shopping), yet be surfeited in another category (*e.g.* commuting). The implications of this proposed research were rather clear: if considerable numbers of people are deprived in the amount of travel they do, they are likely to "make certain policy efforts relatively ineffective".

Table 3 – Hypothesized relationships among travel attitude, perceived mobility, and satisfaction

		Travel Attitude	
		Hate	Love
Perceived Mobility	Low	Balanced	Deprived
	High	Surfeited	Balanced

Source: Salomon and Mokhtarian (1998).

2.1.3 How Derived is the Demand for Travel? Some Conceptual and Measurement Considerations – *Patricia L. Mokhtarian, Ilan Salomon* (forthcoming)

This is the first mobility project paper to start to discuss results from the survey. The results presented use the database of 1904 responses (out of 8000 sent out in May 1998) from the three project cities: North San Francisco, Pleasant Hill, and Concord. The paper focuses much of the discussion on undirected travel and why people engage in undirected travel, and explores the prospect of having a positive utility for travel. The paper does devote a section to looking at the empirical indications for Travel Affinity (termed Travel Liking in this thesis). Travel Affinity was examined for long and short distance travel, both overall and by mode and purpose. The expressed levels of affinity demonstrated that many people like trips, even those typically associated with chores (grocery shopping, taking others where they want to go). The rest of the empirical evidence demonstrates that there is a degree of positive utility for travel. The implication for this thesis is that if people have a positive utility for travel, even if they travel a lot

for a particular purpose they might still like the travel, and they might also want to increase that travel despite already doing it a lot. This increases the likelihood of having deprived groups of people within the sample.

2.1.4 Two Measures of Commute Preferences: Modeling Ideal Commute Time and Relative Desired Commute Amount – *Lothlorien S. Redmond, Patricia L. Mokhtarian* (Submitted to *Transportation*, 2000)

This is the third mobility project paper written, and the second paper that discusses the results of the survey itself. The results presented use only the respondents who commute to work (1302 out of the database of 1904 responses) from the three project cities: North San Francisco, Pleasant Hill, and Concord. The paper focuses on modeling and evaluating the Ideal Commute Time and Relative Desired Commute amount (the response to the RDM question regarding the commute purpose). This paper is important for understanding the two commute variables when using them in the cluster analysis section of this thesis. When modeling the two variables, several variables discussed in this thesis come into play. The Ideal Commute Time model includes the following explanatory commuting to work or school variables: Perceived Mobility (positively associated), Relative Desired Mobility (positively associated), and Travel Liking (positively associated). The Relative Desired Commute amount model included Perceived Mobility (negatively associated) and Travel Liking (positively associated) for commuting to work or school as explanatory variables. The directions of the Perceived Mobility and Travel Liking terms for the Relative Desired Commute are consistent with hypotheses 2 and 1, respectively. The reported Ideal Commute Time results showed that the mean Ideal Commute Time was near 16 minutes and 13.7% of the people wanted to travel 20 minutes or more. This is contrary to the traditional belief that most people would want a very small commute time between home and work. Also, since the Ideal Commute Time is greater than zero, this indicates that there is some positive utility to travel. The other potentially surprising result is that 7% of the commuters wanted an Ideal

Commute Time greater than their current commute time. This indicates that even for commute travel, some people appear to be deprived in the amount of travel they do.

2.2 PROJECT RELATED PAPERS

The second portion of the literature review concentrated on articles related to travel affinity or liking and mobility perception. Each paper discussed explores a different issue of the thesis analysis. These issues include incorporating attitudes into travel behavior models, the mobility behavior of the elderly who make up approximately 33% of our sample, the methodology of cluster analysis, the commute distance and time for employment centers in the Bay area, how socio-economics affect travel, and various attitudes regarding travel enjoyment.

2.2.1 Socio-Demographics, Activity Participation and Travel Behavior – *Xuedong Lu, Eric I. Pas* (1998)

This paper does not directly relate to the research being conducted in this thesis, however it does bring up an interesting question. The authors indicate that including activity participation ("amount of time spent on subsistence, maintenance, recreation and other activities") into structural equations together with socio-demographic variables helps explain travel behavior ("number of trips and chains, travel time, and vehicle mode share") better than just socio-demographics alone. The question is whether or not incorporating travel attitudes into those equations would also help to model travel behavior. Travel attitudes could be an additional dimension to the equations that might improve our predictions of travel behavior.

2.2.2 Mobility Behavior of the Elderly: Its Impact on the Future Road Traffic System – *Georg Rudinger, Viola Kahmann, Hardy Holte and Elke Jansen*

The study had a sample of 2032 subjects with data collected in a "survey-like investigation" in Germany. The research project started in 1996 and concluded in late 1999. While the paper targets the elderly, the implications of the results and the process used to examine the life styles is important to this thesis. The authors use a combination of factor and cluster analysis to identify five life styles among the elderly surveyed: Stimulus Seekers, Intellectuals, Indifferent Style, Calm Activities, and Rejective Attitudes. The results indicate that within elderly groups age 54 and above (as defined by Rudinger *et al*., though 54-64 were considered "young old"), several types of individuals could be identified. Analysis of the correlation of life styles to various demographics yielded the following significant relationships (as presented in the paper):

- Between Stimulus Seekers and being young old (54-64), male, still working, and having a medium level of education.
- Between Calm Activities and being middle old (65-74), female, no longer working, and living in small villages.
- Between Rejective Attitudes and being male, no longer working, living in medium size towns, and having a low educational level.
- Between Intellectuals and being young old (54-64), living in large cities, and having higher education (of course), however there was no relation between this life style and gender or occupational status.

A similar approach of identifying clusters and then analyzing the clusters by socio-demographic variables will be employed in this thesis.

2.2.3 Sub-centering and Commuting: Evidence from the San Francisco Bay Area, 1980-90 – *Robert Cervero, Kang-Li Wu* (1998)

This paper provides useful background on the San Francisco Bay Area and its regional sub-centers. The Consolidated Statistical Metropolitan Area (CMSA) of San Francisco-Oakland-San Jose was used as the area for the research. Data used for the analysis included the 1980 and 1990 census disaggregated at the census tract level. The main conclusion of the paper was that average commute time and distance increased from 27.7 minutes and 10.6 miles in 1980 to 29 minutes and 11.8 miles in 1990, despite job decentralization. This goes against the co-location theory that "jobs and housing co-locate so as to maintain fairly constant average commuting durations and distances, consistent with time-budget theory" (p. 1060). The commuting results are quite useful for this project because the authors compare commute distances and durations for 1980 and 1990. This gives a perspective on what commutes were like before our survey and provides a benchmark for our averages. The results for each employment center are displayed in Table 4. The average values for the commute distance and duration from the mobility project for each residential location are displayed in Table 5. The difference between the tables is that the project results are by residential location and the Cervero and Wu results are by employment center. However, the two tables show similarities in the range of distances and times even though there is an 8-year gap between the results. For example, many of those people who live in Concord and Pleasant Hill likely commute to Downtown San Francisco. The commute duration compares favorably for these locations, 31.67 and 30.77 minutes versus 34.3 minutes respectively. Likewise, people in North San Francisco could be commuting to East Bay or Silicon Valley, which would correspond quite closely for both commute distance and duration.

Table 4 – Commute Distance and Duration by Employment Center

		Downtown San Francisco	East Bay Core	Silicon Valley, San Jose	Suburban Centers
Commute Distance (miles)	1980	12.7	9.98	7.62	8.42
	1990	13.8	11.00	9.25	11.28
Commute Duration (minutes)	1980	34.00	26.55	22.75	20.10
	1990	34.30	27.30	26.35	25.15

Source: Cervero and Wu (1998)

Table 5 – Commute Distances and Durations by Residential Location (Mobility Project)

	Total Sample (N=1394)	North San Francisco (N=687)	Concord (N=330)	Pleasant Hill (N=377)
Commute Distances (miles)	14.48	11.12	18.05	17.48
Commute Duration (minutes)	29.66	28.09	31.67	30.77

2.2.4 Socioeconomics of Urban Travel: Evidence from the 1995 NPTS – *John Pucher, Tim Evans, and Jeff Wenger* (1998)

The evidence presented from the 1995 Nationwide Personal Transportation Survey (NPTS) examines the impact of income, race and ethnicity, gender, and age on travel behavior. The sample was restricted to metropolitan areas and trips under 75 miles in length. The evidence from the 1995 NPTS can be useful in understanding the impact of socio-demographics on travel behavior before analyzing Travel Liking clusters with the same variables. While Travel Liking is quite different from the number of trips made or distance traveled, an idea of how socio-economics affects travel could be useful. Income stratified the amount people traveled: "the poorest households traveled about half the mileage per person of the most affluent households" (page 16). Bus riders typically have a lower income (67% making less than $30,000), whereas commuter rail riders are somewhat more affluent (31% making less than $30,000). The difference in mileage traveled is quite staggering when looking at commuter rail; poor riders travel 8 miles on average whereas affluent riders travel 29 miles. The other modes have similar outcomes of affluent riders traveling more miles, however the differences are not as dramatic. Women are more likely to carpool and account for a larger share of transit riders (57%) than men.

Travel declines for older age groups, with people over 80 making half as many trips as those between 65 and 70. Also, "[b]oth walking and bicycling decrease sharply with increasing age" (page 30).

2.2.5 In the Driver's Seat – *Brad Edmondson* (1998)

While Edmondson devotes a good amount of the article towards billboards and outdoor advertising, he explores some attitude factors of drivers that might affect the effectiveness of billboards. Results presented in the article were derived from a survey conducted for American Demographics magazine by Maritz Marketing Research. Maritz Marketing Research does national consumer telephone opinion polls on many different topics. With respect to this thesis, the key section of the article deals with the agreement or disagreement with the statement "Driving is my time to think and enjoy being alone." Drivers aged 25 to 34 agreed 48 percent of the time, while 46 percent of drivers aged 35 to 54 agreed to the statement. Edmondson associated this with driving for pleasure due to the quiet relaxation time for people. These results are important in that they demonstrate that traveling to a particular destination is not the only utility derived from travel. Relaxation, freedom, time to think, etc. are all utilities gained from travel. The extent of this extra utility depends on the person and will likely affect the way she perceives her travel and whether she will want to increase or decrease her travel.

2.2.6 Travel Adjustments and Life Styles - A Behavioral Approach – *Shalom Reichman* (1976)

Reichman explores the conceptual basis behind travel adjustments regarding both mobility patterns and values. The values and needs portion of the article is important to the construct of this thesis. Reichman hypothesizes that approaching the study of travel patterns from the direction of values and needs may give insights to the utility of travel beyond that of being a derived demand: "Transportation, or travel patterns, may be considered as fulfilling a basic

human need, namely that of freedom, or the right to move. "…the notion that travel is essentially a disutility that should be minimized is no longer uniquely acceptable" (page 149). Simply stated, there are additional utilities of travel not specifically being addressed by current travel-demand models. These utilities may be addressed through the use of travel attitudes such as the liking of travel.

CHAPTER 3 - EMPIRICAL SETTING

The 14-page mobility survey was prepared to retrieve a broad base of travel attitudes and other relevant variables from residents in the San Francisco Bay Area. Three cash prizes were offered in denominations of $250, $150, and $100, to randomly selected individuals who returned the survey, in order to increase the response rate. The survey was limited to adults age 18 and older and the adult with the birthday closest to the date on the survey was asked to complete it. The survey was dated May 21, 1998 and asked to be returned by June 5, 1998.

3.1 CITY LOCATIONS

Three cities in the San Francisco Bay Area were chosen to receive the surveys. The cities were Concord, Pleasant Hill, and northern San Francisco, whose locations are displayed on the California County Map in Figure 1. These cities were selected from among the five neighborhoods surveyed in a previous ITS-Davis study by Kitamura *et al.* (1994), where land use information and other city characteristics were known.

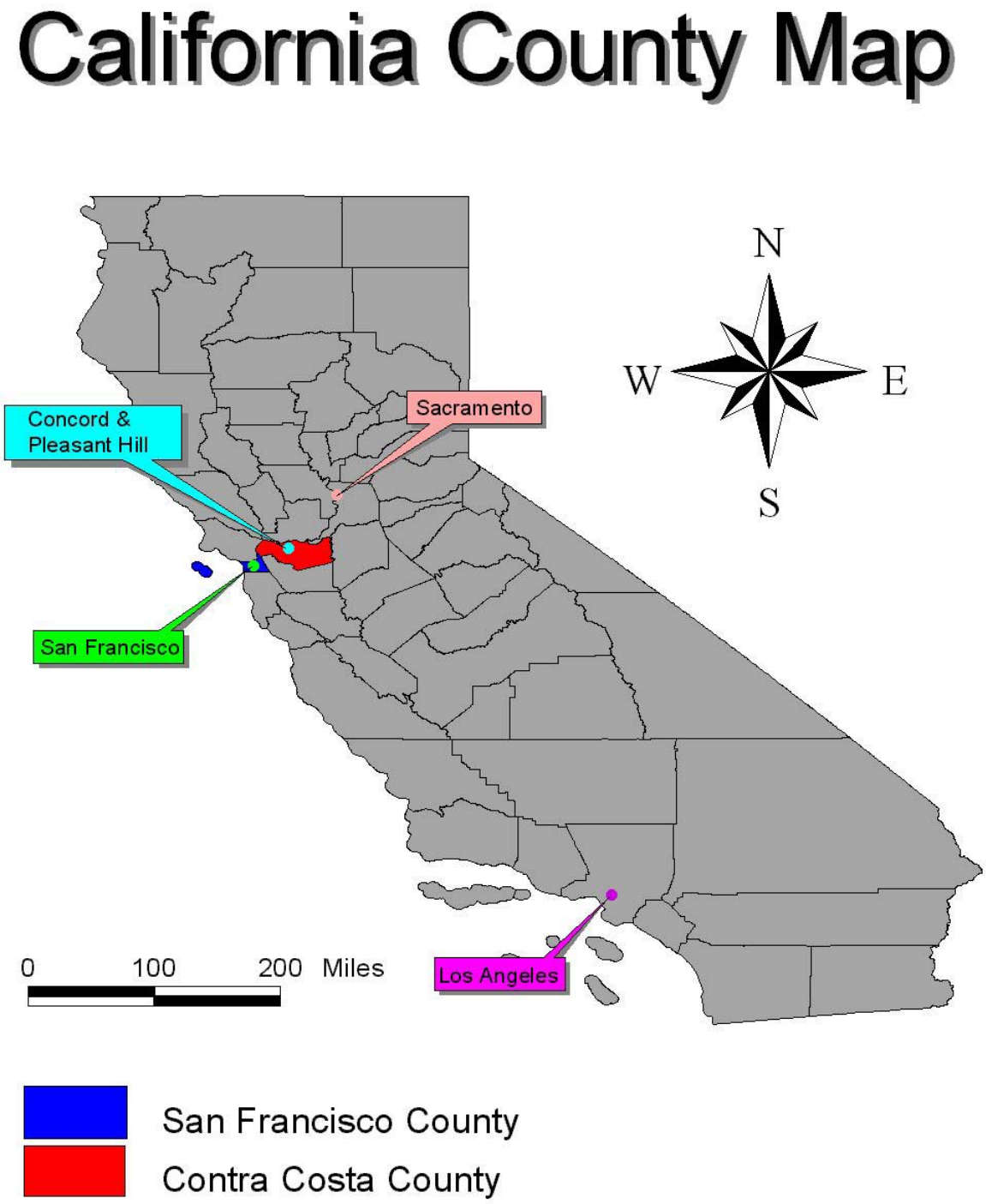

Figure 1 – California County Map

3.1.1 North San Francisco

The study area within North San Francisco was selected from distinct postal carrier routes. Figure 2 displays the streets (in black) from which surveys were collected. Also illustrated is the residents' access to major freeways such as the US 101, Interstate 80 and Interstate 280. The University of San Francisco is located within the heart of the study area and Golden Gate Park creates a boundary to the southwest corner. BART stations are located within approximately 1-3 miles of nearly all the residents, and the area has extensive and frequent bus service. The study area is located approximately 11.5 miles north of San Francisco International Airport. Housing is generally high density with a neo-traditional feel. The area has mixed land use with businesses located throughout (Kitamura, *et al*., 1994). The population total, from the 1990 census, is 105,299 for the census tracts comprising the North San Francisco study area.

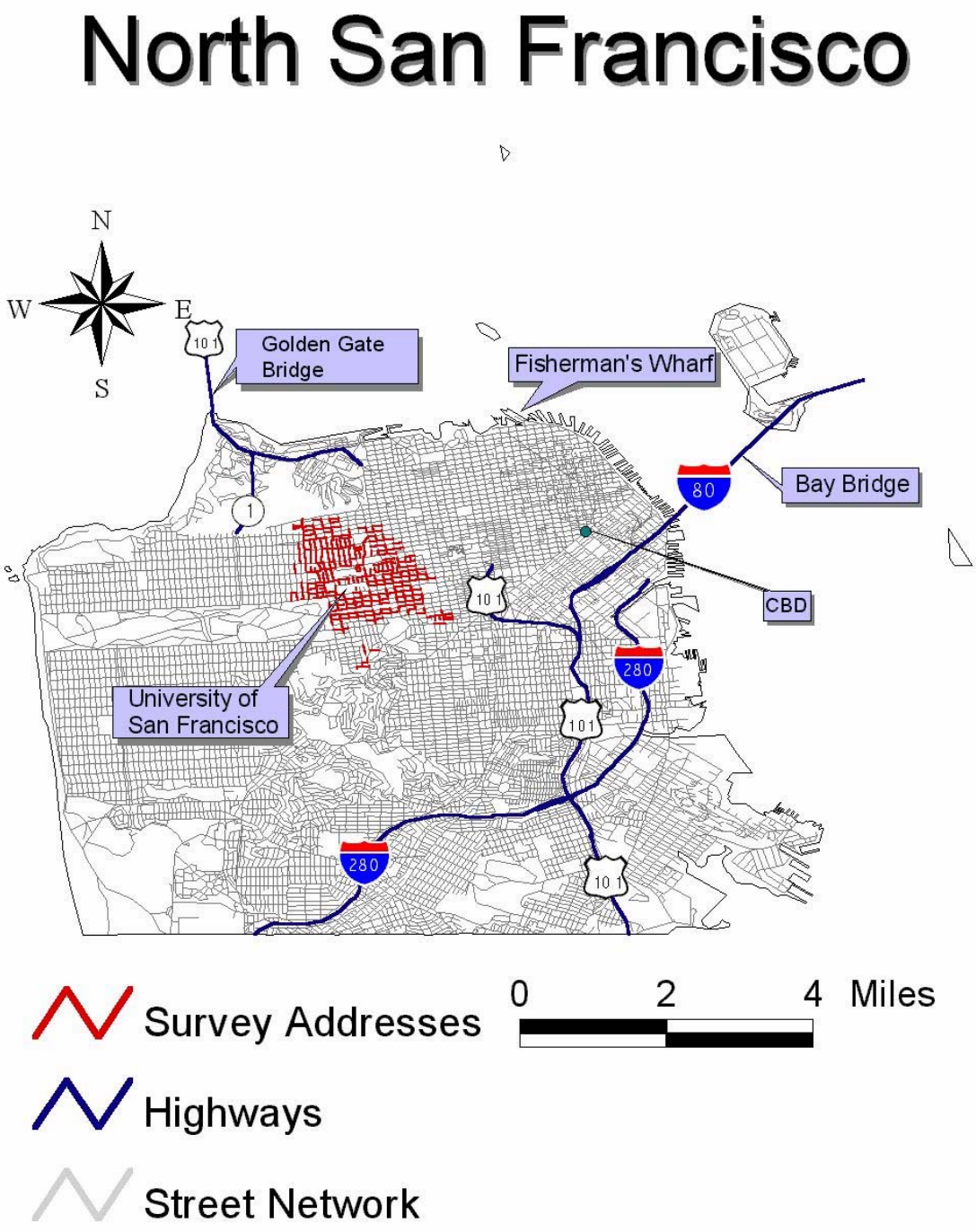

Figure 2 – North San Francisco

3.1.2 Concord & Pleasant Hill

Concord and Pleasant Hill are located next to each other on the east side of San Francisco Bay. Unlike North San Francisco, survey respondents were widely distributed throughout Concord and Pleasant Hill. The distribution of respondents is shown in Figure 3 where the street locations of respondents are indicated in black. Interstate 680 runs along the border between the two cities and State Routes 24 and 4 run through the northwest and north edge, respectively, of Concord. A BART station is located a quarter mile from the southeast corner of Pleasant Hill. Two BART stations are located in Concord: one in the center of the city and another located on the northern edge near State Route 4 (not shown on the map since the BART extension was completed after 1995, when the data for the map was created). Pleasant Hill has medium density, but fragmented street patterns might contribute to less public transit use (three bus routes in 1994 according to Kitamura, *et al*., 1994). Concord's low density likely contributes to only having three bus routes in 1994 (Kitamura, *et al*., 1994). The Pleasant Hill and Concord city centers are located approximately 26 and 29 miles, respectively, from the San Francisco central business district. The population totals from 1990 are 38,311 for Pleasant Hill and 115,083 for Concord.

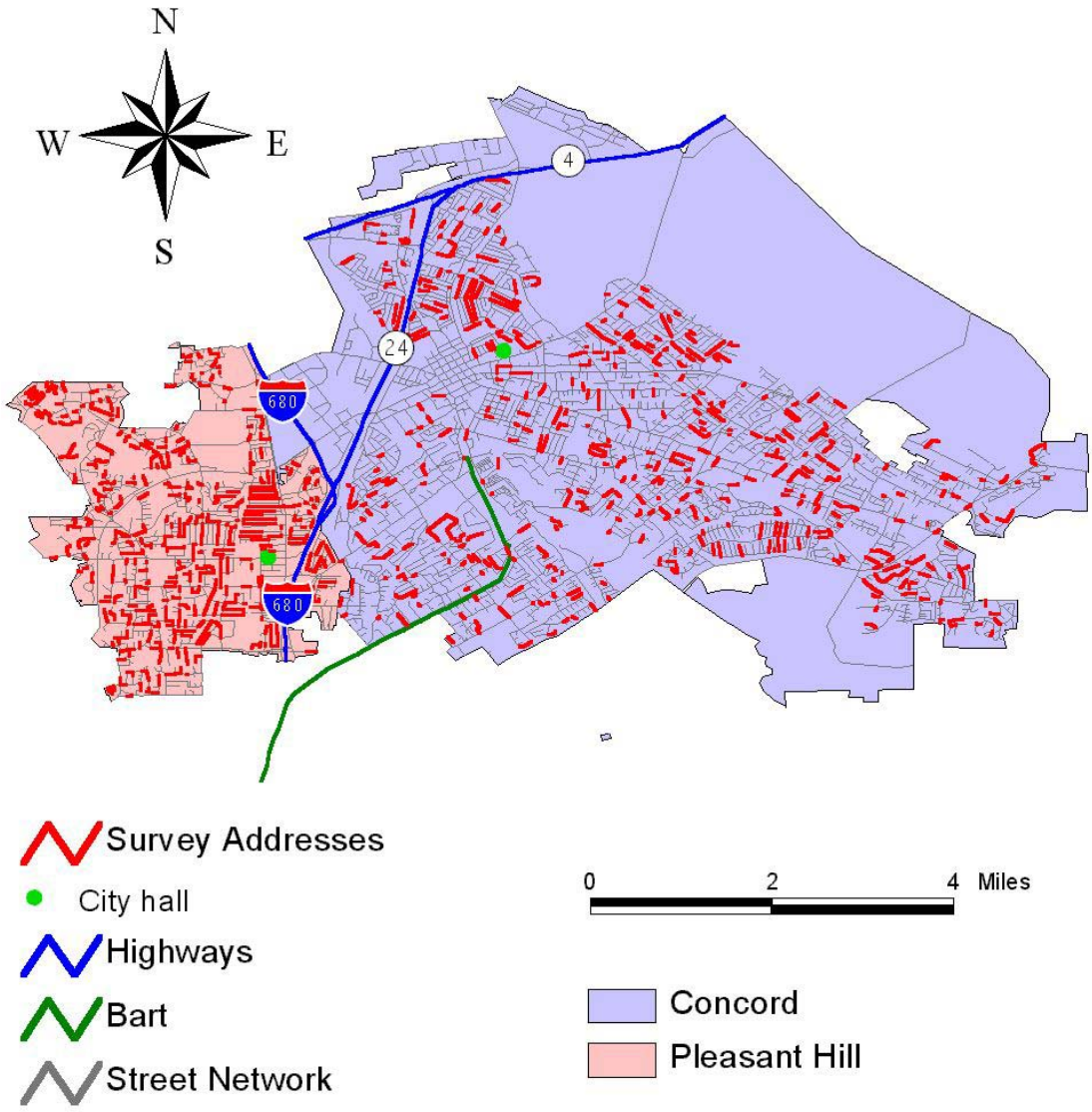

Figure 3 – Concord and Pleasant Hill

3.2 SAMPLE SIZE AND CHARACTERISTICS

About 8000 surveys were sent out to the three cities: 4000 to North San Francisco, 2000 to Concord, and 2000 to Pleasant Hill. The goal was to obtain an approximately equal number of responses from the traditional San Francisco neighborhood and from the suburban cities for comparison of attitudes (while allowing for diversity within suburban locations by splitting the suburban half of the sample between two adjacent but distinct cities). Attitudes that are similar between both land use types are more likely to be universal attitudes, whereas differences between the neighborhood types could indicate attitudes that differ by lifestyle. About 2000 surveys were returned. After discarding surveys with large amounts of missing data or other irreconcilable difficulties, 1904 responses were left. San Francisco accounted for 888 responses, Concord for 473 responses, and Pleasant Hill for 543 responses (Table 6). This leaves the sample with a slight suburban flavor.

Tables 6 and 7 display selected demographics for the sample. Nearly half of the sample (47.0%) is between the ages of 41 and 64 and 83.3% of the sample is between 24 and 64. A very high percentage of the sample (92.6%) has at least some college or technical school education, while a surprisingly high 66% have completed a 4-year college or technical school degree. Approximately 80% of the sample is employed, with about three-quarters of the remainder being retired. A high percentage (44.5%) of people classified their jobs as professional or technical, with another sizable portion (20.5%) as managers or administrators. The higher-level positions could increase the overall income of the sample. On average, there are 2.4 people, 1.6 workers, and 1.9 vehicles per household. Those workers travel, on average, 14.5 miles and 29.7 minutes to work, but ideally want to travel 16.3 minutes to work.

Table 6 – Sample Demographics (1)

CHARACTERISTIC		COUNT (PERCENT)			
		Total	North San Francisco	Pleasant Hill	Concord
% of Sample		1904 (100)	888 (46.6)	543 (28.5)	473 (24.8)
Have a Drivers License [T1, N1, C1*]		1857 (97.7)	854 (96.4)	541 (99.6)	462 (97.9)
Age of respondent [T1, N1, C1]					
	23 or younger	61 (3.2)	35 (4.0)	15 (2.8)	11 (2.3)
	24 – 40	691 (36.3)	439 (49.5)	130 (23.9)	122 (25.8)
	41 – 64	894 (47.0)	332 (37.5)	294 (54.1)	268 (56.8)
	65 – 74	155 (8.2)	48 (5.4)	59 (10.9)	48 (10.2)
	75 or older	100 (5.3)	32 (3.6)	45 (8.3)	23 (4.9)
Educational background of respondents [T2, N2, C1]					
	Some grade school or high school	15 (0.8)	8 (0.9)	4 (0.7)	3 (0.6)
	High school diploma	126 (6.6)	25 (2.8)	34 (6.3)	67 (14.2)
	Some college or technical school	506 (26.6)	152 (17.1)	188 (34.6)	166 (35.2)
	4-year college/technical school degree	603 (31.7)	328 (37.0)	158 (29.1)	117 (24.8)
	Some graduate school	211 (11.1)	110 (12.4)	49 (9.0)	52 (11.0)
	Completed graduate degree(s)	441 (23.2)	264 (29.8)	110 (20.3)	67 (14.2)
Current employment status of respondents [T3, P1]					
	Full-time	1249 (65.6)	640 (72.1)	325 (60.0)	284 (60.0)
	Part-time	267 (14.0)	128 (14.4)	79 (14.6)	60 (12.7)
	Homemaker	60 (3.2)	16 (1.8)	24 (4.4)	20 (4.2)
	Non-employed student	25 (1.3)	13 (1.5)	5 (0.9)	7 (1.5)
	Unemployed	37 (1.9)	19 (2.1)	7 (1.3)	11 (2.3)
	Retired	265 (13.9)	72 (8.1)	102 (18.8)	91 (19.2)
Occupation category of respondents [T4, N3, P1, C2]					
	Homemaker	88 (4.6)	23 (2.6)	42 (7.7)	23 (4.9)
	Service/repair	97 (5.1)	38 (4.3)	33 (6.1)	26 (5.5)
	Sales	165 (8.7)	72 (8.2)	45 (8.3)	48 (10.2)
	Production/construction/crafts	79 (4.2)	30 (3.4)	16 (2.0)	33 (7.0)
	Manager/administrator	388 (20.5)	179 (20.3)	120 (22.1)	89 (18.9)
	Clerical/administrative support	195 (10.3)	80 (9.1)	67 (12.4)	48 (10.2)
	Professional/technical	844 (44.5)	445 (50.4)	212 (39.1)	187 (39.7)
	Other	40 (2.1)	16 (1.8)	7 (1.3)	17 (3.6)

* T stands for Total N, N stands for the N for North San Francisco, C stands for the N for Concord, and P stands for the N for Pleasant Hill.

T1 = 1901	T2 = 1902	T3 = 1903	T4 = 1896	T5 = 1531	T6 = 1420
T7 = 1394	T8 = 1899	T9 = 1872	N1 = 886	N2 = 887	N3 = 883
N4 = 825	N5 = 700	N6 = 687	N7 = 885	N8 = 875	C1 = 472
C2 = 471	C3 = 417	C4 = 337	C5 = 330	C6 = 470	C7 = 466
P1 = 542	P2 = 489	P3 = 383	P4 = 377	P5 = 541	P6 = 531

Table 7 – Sample Demographics (2)

	MEAN (STANDARD DEVIATION)			
	Total	North San Francisco	Pleasant Hill	Concord
Ideal one-way commute time [T5, N4, P2, C3]	16.3 (8.8)	16.4 (8.4)	16.0 (8.9)	16.5 (9.2)
Actual one-way commute				
… time (minutes) [T6, N5, P3, C4]	29.7 (21.1)	28.1 (18.3)	30.8 (21.8)	31.7 (25.2)
… distance (miles) [T7, N6, P4, C5]	14.5 (20.2)	11.1 (17.7)	17.5 (14.6)	18.5 (27.8)
Number of Personal vehicles per HH [T8, N7, C2]	1.9 (1.8)	1.5 (1.0)	2.2 (1.2)	2.4 (3.0)
Percent of time vehicle is available [T4, N7, P5, C6]	90.8 (25.6)	83.6 (33.4)	98.5 (8.4)	95.6 (16.8)
Number of persons in HH	2.4 (1.2)	2.1 (1.2)	2.4 (1.2)	2.7 (1.3)
Number of workers in HH [T9, N8, P6, C7]	1.6 (0.9)	1.6 (0.9)	1.5 (0.9)	1.6 (1.0)

* T stands for Total N, N stands for the N for North San Francisco, C stands for the N for Concord, and P stands for the N for Pleasant Hill.

T1 = 1901	T2 = 1902	T3 = 1903	T4 = 1896	T5 = 1531	T6 = 1420
T7 = 1394	T8 = 1899	T9 = 1872	N1 = 886	N2 = 887	N3 = 883
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C2 = 471	C3 = 417	C4 = 337	C5 = 330	C6 = 470	C7 = 466
P1 = 542	P2 = 489	P3 = 383	P4 = 377	P5 = 541	P6 = 531

A comparison of the sample (year 1998) with 1990 census data, on key characteristics, is shown in Appendix A. The census data is shown for both the entire United States population and the three cities (census tracts that overlap with the study area boundaries). The comparison of the survey demographics with the entire population resulted in the following observations:

- The gender distribution was relatively similar.
- Households in the sample had fewer people age 24 and under, and more people age 25-64, than households in the population.
- The sample had proportionately more 2-person households and fewer households with 4 or more people than the population.
- Survey respondents tended to have higher household incomes than the population as a whole.
- Automobile ownership was slightly higher in the sample.
- Commute times were longer in the sample.

- The sample had proportionately more one worker households, and slightly fewer zero and 2 or more worker households.
- The sample was much more highly educated than the population (66% of our sample had at least a bachelor's degree, compared to 18.5% in the population as a whole).

The comparison with the census data for the three cities resulted in the following observations:

- The gender distribution was relatively similar.
- Households in the sample had fewer people age 19-24 and more people age 40-64 than households in the three-city population.
- The sample had proportionately fewer 1-person households, more 2-person households, and slightly fewer households with 5 or more people than in the three-city population.
- Survey respondents tended to have higher household incomes than in the three-city population.
- Automobile ownership was higher in the sample.
- The sample had slightly more commute times of 35 minutes or more than the three-city population.
- The sample had proportionately more 1-worker households, and fewer 2 or more worker households.
- The sample was much more highly educated than the population (66% of our sample had at least a bachelor's degree, compared to 34.4% in the three-city population).

The largest sources of potential bias are from the higher incomes and higher education levels, which likely affects the amount of travel being performed. This might not affect Travel Liking or wanting to increase or decrease travel, but probably elevates the Perceived Mobility and Objective Mobility variables. Another potentially important bias is the underrepresentation of single adults and large households in the sample. Single parent households also appear to be underrepresented although differences in definition of categories preclude a direct comparison.

Again, however, relationships among the variables are the main focus of this study, not the distribution of the values of the variables themselves.

3.3 SURVEY CONTENTS

The survey spans 14 pages of questions with six sections. The sections are "Your Opinions about Travel" (Section A), "Your Lifestyle as it Relates to Travel" (B), "The Amount You Travel" (C), "How You View Your Travel" (D), "Your Travel-Related Choices" (E), and "General Information" (F). Each section has approximately 2-3 pages of questions related to the title of the section. This thesis will focus primarily on sections C and D, the respondents' amount and views of their travel. The demographic information in section F will also be used during the analysis of sections C and D to compare selected groups of respondents.

3.3.1 Section C – Objective Mobility

Section C ("The Amount You Travel") consists of 4 questions, each with several parts. The first question asks about the frequency of short distance trips (100 miles or less one way) for several different types of trips by any mode of travel. The different types are commuting to work or school, work/school related activities, grocery shopping, eat a meal, entertainment/recreation/ social activities, taking other people where they need to go, and other purposes. The response choices are Never, Less Than Once a Month, 1-3 Times a Month, 1-2 Times a Month, 3-4 Times a Week, and 5 or More Times a Week. The second question asks the respondents to estimate the total distance they travel during a typical 7-day week. This question is broken into two parts: by means of travel, and by purpose. The means of travel include personal vehicle, bus, train/BART/light rail, walking/jogging/bicycling, and other means of travel. The categories related to the purpose of travel are the same as for the first question. There is also a part after means of travel that asks for number of miles of all short distance travel by any means.

The third question asks for the frequency of long distance trips (more than 100 miles one way) for work/school-related, entertainment/recreation/social, and other purposes. Under each purpose the trips are broken into personal vehicle, airplane, or other means, except for the other purpose category where the mode is listed as “Any means”. Response blanks are given for various regions of the United States and the world. The fourth and last question in the section explores how often people travel (Never/seldom, Sometimes, Often) for 13 reasons considered to represent "excess" or unnecessary travel. A few of the reasons include: “with no destination in mind”, “just for the fun of it”, “just to relax”, and “out of your way to see beautiful scenery”.

3.3.2 Section D – Perceived Mobility, Relative Desired Mobility and Travel Liking

Section D consists of three questions regarding how the respondents view their travel. Section D is the focus of the analysis in this thesis. Each question is a multipart question asking about several purposes and means of travel, as well as overall, for both short distance (100 miles or less one way) and long distance (more than 100 miles one way) travel. Each question uses the same list of purposes and means as used in Section C. For short distance travel the purposes are commuting to work or school, work/school related activities, grocery shopping, eat a meal, entertainment/recreation/social activities, and taking other people where they need to go. The means of travel are driver/passenger in any personal vehicle (car, van, small truck), bus, train/ BART/light rail, walking/jogging/bicycling, and other means of travel. For long distance travel the purposes are work/school-related activities and entertainment/recreation/ social activities and the means of travel are driver/passenger in any personal vehicle, in an airplane, and other means of travel. The first question will be referenced throughout this thesis by the term “Perceived Mobility”. The Perceived Mobility question is stated as “For short-distance trips (100 miles or less one way), I feel that I travel…”. The long distance Perceived Mobility question is stated in a similar fashion. The responses are on a five-point scale (1-5) with “None” equal to one and “A Lot” equal to five. The second question is termed “Relative Desired Mobility (RDM)” or

"Satisfaction". Both terms have been used in the project with RDM being a more recent description. There are bound to be some references to the term Satisfaction in figures or tables that were not changed due to the cumbersome effort of finding and changing every reference. The RDM question is stated as "For short-distance trips, I'd like to travel ___ compared to what I do now:". The long distance RDM question is stated in a similar fashion. The responses are on a five-point scale (1-5) with the choices of Much Less (= 1), Less, About the Same, More, and Much More (= 5). The third and last question will be referenced throughout this thesis by the term "Travel Liking". The Travel Liking question is stated as "How do you feel about traveling in each of the following categories?" with separate sections for short-distance and long-distance trips. The responses are on a five-point scale (1-5) with the choices Strongly Dislike (= 1), Dislike, Neutral, Like, and Strongly Like (= 5).

An important issue needs to be addressed regarding Section D. This issue is that some (perhaps many if not most) people might confound their enjoyment of travel itself with their enjoyment of the destination. This problem was anticipated, and the instructions in the survey explicitly say "*We are not asking how you feel about the activity at the destination, but about the travel required to get there.*" However, there are going to be cases where the individual was unable to distinguish between the two and recorded liking long distance travel although it was more because she was going to Hawaii than because she enjoyed travel by airplane. On the other hand, it is reasonable to expect that the attitude of the person toward travel does in fact change depending on what the trip purpose may be. A few cases may illustrate the point. For example, consider the trip to eat dinner out. Here a person is escaping the slavery of the kitchen to enjoy a tasteful meal beautifully presented in an engaging environment, or even just a local pizza joint. The person obtains pleasure from this venture and might confound that benefit with the pleasure of driving there. But at the same time, he is traveling on different roads than he does going to work 5 days a week. The work trip might become boring due to the routine of daily traveling the

exact same path (perhaps the shortest time path). However, on the other hand, he may take this dinner route only once every 2 or 3 weeks. His awareness is heightened due to the excitement of a meal out, and he takes in more of the surroundings. On the trip to the restaurant, one might notice more about how the vehicle handles, change the radio stations rather than listening to the usual commute-time talk show, notice there is a new building being built along the road. He enjoys the travel more because he doesn't do it as often, it seems new and fresh, and his attitude is different about hopping in the car.

As another example, consider the flight to a tropical island versus a work flight. On a flight to Hawaii, everyone seems more upbeat; the hassles of travel don't quite seem like hassles. Problems are taken in stride and written off as minor inconveniences. People are wearing their Hawaiian shirts, listening to the relaxing rhythms of Hawaiian music, and sipping Mai Tai's. The entire mood of the plane is different, people are relaxed, happy, excited. The 5-hour flight from LA goes by faster than normal 5-hour flights. Did these people confound their travel destination with the joy of traveling? Somewhat. But at the same time, they enjoyed the travel more because of their attitude towards the travel. A work trip from Los Angeles to New York does not have the same feel. People are stressed about meetings and presentations. A delay of 30 minutes seems huge because of catching the taxi and getting to the hotel so you can press your clothes and review your figures one last time. Being stuck in that middle seat where you feel trapped seems like torture. But what is really happening is that the attitude is more negative due to the destination. This makes the trip seem more negative, even if you do really like flying and traveling, just due to your overall attitude. A businessman who flies 6 months out of the year still seems to enjoy the travel for a vacation trip. Why? All attitude. Therefore, the results may be partially skewed because of confounding the enjoyment of travel itself with the enjoyment of the destination. However, this problem may be smaller than it initially may have appeared, if the above examples are typical.

3.3.3 Section F – General Information/Demographics

Section F is titled "General Information" and is used to obtain the demographic information needed from the sample. Section F contains twenty questions referencing the individual taking the survey and his or her household. The standard demographic questions are present, such as gender, age, educational background, employment status, occupation, number of household members, household income, and personal income. Other standard transportation survey questions are present, such as commute time, commute distance, having a driver's license, make, model, year, and percent of time a personal vehicle is available. One question also asks about personal limitations of driving, taking public transportation, flying in an airplane, walking, and riding a bicycle. Some of the demographic information for the survey, compared to the 1990 census data, is reviewed earlier in this chapter.

3.4 DATA CLEANING

Cleaning the survey data took a considerable amount of time and effort. The majority of the cleaning was painstakingly and meticulously performed prior to the author joining the project. The next sections, however, recount some of the details of the cleaning performed. The data cleaning involves both identifying and discarding unusable surveys (which was done based on percent of usable/missing data for each section) and filling in critical missing data for otherwise usable surveys. The first step for all the data cleaning sections is to check original survey for data entry errors. The sections discussed are Sections C, D, and F.

3.4.1 Question C1: Trip Frequency Categories (Short Distance)

Question C1 examines the frequency people travel for different purposes. The following steps were used to clean and fill in missing data.

Step 1: If mileage per week (from question C2) was zero for the purpose and the Perceived Mobility (question D1) was a 1 (perceived to travel "none"), the missing value was changed to a

frequency category of "never". The assumption was made that the question was skipped because the respondent did not travel for the purpose.

Step 2: If commuting was not applicable for the respondent (questions F14 and F15 asked for the commute time and distance and included a box for not applicable), mileage for the purpose was missing (from question C2), and the person was not a student (question F13 asked for occupation and included a response category for student), then missing data for commute to work and work/school related activities was changed to a frequency of "never".

Step 3: If the mileage per week was non-zero for the purpose, then we checked the mean mileage and mileage quartiles across the sample for each frequency category for the given purpose. For example, in the case of commute to work, we found the mean and quartiles of the mileage per week for each frequency category with non-missing data. We then assigned the respondent with missing data to the frequency category most closely corresponding to the distance she/he reported. We replaced 25 values in this manner.

Step 4: We checked the work/school-related activities with the employment status. If they responded "homemaker" for instance, this would imply little or no work/school-related travel (taking children to school would be classified as "taking others where they need to go"), and therefore a missing frequency for this purpose was classified as "never". Some people worked full time and put down no miles for work/school related activities, but it is possible to work at home and do little work related travel, thus "never" is a legitimate answer.

Step 5: If the frequency for the category "just taking other people where they need to go" was missing, we checked whether the respondent had a driver's license and whether she/he lived alone which would indicate whether she/he had someone else she/he needed to take places. If the respondent did not have someone to take places or did not have a driver's license, the missing frequency was classified as "never". Since this constituted replacing missing data where respondents likely did not answer because they felt the question did not apply to them, this was deemed reasonable. Conceivably the person could take others by escorting them on bus or

BART, or they could take people around that they do not live with, but these were considered low-probability occurrences.

Step 6: If the category "grocery shopping" contained miles per week in question C2 then it was assumed the respondent went "1-2 times per week" and the missing data was converted. This is based on the assumption that most people do weekly grocery shopping.

3.4.2 Question C2: Weekly Distance Traveled (Short Distance)

Question C2 asks for the total distance traveled by mode and purpose in a typical 7-day week. The summation of the miles per week traveled by each mode was checked against the "total for all short-distance travel by any means". The total should have been equal to the sum of the modes as stated in the directions: "total for all short distance travel by any means (should be the sum of the above amounts)" (1732 cases matched, 92.5%). If the values were not equal, the differences were reconciled. The first step to reconciling the differences was to check the original survey for possible data entry errors. Secondly, the mode specific questions in Section D for Perceived Mobility and the frequencies in Question C1 were checked on a case-by-case basis. If the respondent reported that they traveled four times a week by bus but did not report any miles traveled, mileage was entered to help eliminate the difference. Thirdly, if none of the tests were conclusive then the total was changed to match the summation of miles, under the assumption that the respondent made a mathematical error.

If all of the purpose categories were blank the entire section was coded as missing, and similarly for mode. However, if any category was completed, then missing values for categories in that section were changed to zero if warranted by the frequency information. Also, the miles categories were checked for extreme outliers to determine if there was a data entry error or if the person was giving an unreasonable response. The outliers for both purpose and mode were checked for data entry errors from the original survey. If no conclusive evidence could be

gathered that would indicate an erroneous value (frequencies, Perceived Mobility, occupation, etc.), the value was left as a justifiable outlier. Nearly all outliers were kept the same.

The summation of miles traveled per week by purpose was checked to confirm that it was less than or equal to the total for all short-distance travel, as stated in the directions: "sum may be less than previous total since some purposes may not be included, but should not be greater than previous total" (446 cases were equal, 29.5%). Therefore if the total miles minus the summation of the miles traveled by purpose was relatively small and positive then nothing was changed. Otherwise, the number of miles traveled for each purpose was checked against the question C1 trip frequencies. Based on the frequency in question C1 and the commute distance in question F15, then the miles traveled for commuting could be verified. All of the discrepancies were handled on a case-by-case basis with changes made only if there was conclusive evidence from the rest of the survey to indicate that a change should be made.

The "other" category for the mode questions was cleaned by checking the miles traveled per week and whether the respondent had entered a mode on the specified line. The specification area was filled in with "blank" if nothing was listed and the respondent reported traveling zero miles per week in the "other" category. If the miles per week were greater than zero then the blank was changed to "unspecified" and the miles were left the same. If the entire section was left blank then the "other" category response was changed to "none" and miles per week were left as missing (coded as -9). If the other category contained a mode that should have been included among the given response categories then the miles were transferred to the correct category.

3.4.3 Question C3: Long Distance Trips by Purpose, Mode, and Location

Question C3 asked the respondents for the number of long distance trips they made the previous year, by purpose, mode, and region. Two alterations were made to the answers in this question.

First, blanks were changed to zeroes if there was at least one trip indicated in the section; otherwise the entire section was coded as missing. Since people do not travel to all the different continents it would have been cumbersome for respondents to fill in zeros for all the remaining sections. Second, where respondents used check marks rather than indicating the number of trips taken, the check marks were nearly always changed to one trip. Thirdly, the data was checked for extreme outliers. Extreme outliers were examined for data entry errors and by using evidence from the rest of the survey, such as the Perceived Mobility for long distance travel, income, occupation, etc. Where the number of trips could not be justified they were evaluated to determine if the person consistently entered the mileage instead of the number of trips (less than ten cases, or 0.5%, approximately). For example, one respondent reported 800 trips within California by personal vehicle, which logically could not be correct due to only having 365 days in the year. The 800 "trips" were judgmentally decided to be 4 trips, 100 miles in each direction (per the definition of long distance trips as being greater than or equal to 100 miles each way). If one trip value was large but other values seemed to correspond to the number of trips rather than miles then the outlier was assumed to be correct if at all reasonable.

3.4.4 Section D – Perceived Mobility, Relative Desired Mobility and Travel Liking

Missing values in Section D were analyzed by neighborhood and distance categories. For example, Perceived Mobility was analyzed for Concord and short distance travel, Concord and long distance travel, Pleasant Hill and short distance, etc. Within each neighborhood/distance category for each question the cleaning was done for purpose and mode combined. This was performed for Perceived Mobility (D1), Relative Desired Mobility (D2), and Travel Liking (D3). Lorien Redmond supplied the procedure outlined below for filling in missing data in Section D. The basic approach was to develop regression equations (on cases without missing data) expressing each variable as a function of the other variables in the section, and use those equations to predict missing data.

1. Run frequencies for missing values in each section.
2. Make new variables ("d1a_flag", "d1b_flag, etc.). The new variables were created as string variables with an "a" if the first question was missing, an "aa" if the second was missing, “ab” if the third question was missing, etc. (corresponding to the lettering in the survey). This created a list of the missing values for each case.
3. The “overall” questions were fixed first. Regression equations were estimated on those cases having no missing data, expressing each overall answer as a linear function of all the corresponding answers by mode and purpose (See Appendix G). For example, overall short distance Perceived Mobility was modeled as a linear function of short distance Perceived Mobility responses for each purpose and mode. Then for cases where the overall answer was missing, but *all* of the other variables were present, the overall answer was filled in using the estimated equation.
4. A stepwise regression was also performed for the overall questions in case *some* purpose or mode variables were also missing from the data (See Appendix G), which would eliminate using the equation from Step 3. Stepwise regression will only allow those variables that are significant to enter the equation. The program also will not use cases with missing values to determine the equation. Thus, in situations where the overall answers, as well as others, were missing but the case contained all of the variables in the stepwise regression, the missing overall answer was filled in using the stepwise equation.
5. For all the other variables, stepwise regression was used to create equations expressing each variable as a best-fit linear function of all the other variables in that section. For example, if the best-fit equation for variable “aa” is: aa = 3 + 5ac + 2ae, then any cases that are missing "aa" and not missing "ac" or "ae" can be filled in using this regression equation. The remaining missing values, those not filled in with the regression equations (if, for example, they were missing “ac” or “ae”) were filled in with the neighborhood-specific mean.

6. The final step was to go back through these cases and round all the new values to a whole number between 1 and 5, inclusive, so that their format would be consistent with the non-missing responses.

Other cleaning efforts that were conducted included fixing the "other" categories. Spelling consistency and standardization of "other" answers was performed. Also, if the "other" answers contained a mode that should have been marked in the pre-specified response categories then the appropriate responses were updated.

3.4.5 Section F - General Information/Demographics

Age - The age question (question F4 in Section F) was checked for consistency against how long the respondent had lived in the United States (question 10 in the "General Information" section - F) and with the number of years they had lived in the neighborhood (question 1 in Section A). No one was inconsistent in those two checks. Age was also checked with question F17 (number of household members in different age groups) to make sure there was a corresponding person marked in the same age category. This was also used to make sure people had included themselves in question 17 as the directions had indicated. If question 17 had no one in the respondent's age group listed, age was assumed to be correct and question 17 was changed (see Household Members in this section).

Vehicle Category – Standardization of the vehicle category included the creation of a variable called "Cartype". The question for the vehicle the respondent drives most often had spaces available for make, model, year, and contained a "not applicable" box to check. The first step was to correct the spelling errors from data entry and to capitalize every vehicle make. Unrecognizable makes or models were investigated to determine the correct names. In many cases, a model and vehicle trim line name was entered rather than the make and model. Using the model and year, the make of the vehicle could be found. The sources that were

used to determine correct makes and models were vehicle companies' web pages, vehicle fan club web pages, and most importantly, Consumer Reports magazine. Consumer Reports puts out an automobile guide every year that classifies the vehicle type and rates the automobiles on several items. This was the most complete listing of vehicles found, that also was readily available dating back to the 1950s. The makes and models were then classified based on the classification scheme presented in Consumer Reports. The magazine's one undesirable characteristic was the changing of classification schemes from year to year. A mid-size vehicle in 1970 is not the same size as a mid-size vehicle in 1990. However, it was decided that the classification scheme represented the perception of size from each year. Ten categories were selected into which vehicles would be classified: subcompact, small, compact, mid-size, large, luxury, sport, minivan/van, pickup, and sports utility vehicle (SUV). Vehicle size follows the order presented until the luxury category where the specialty vehicle types start. Where supplied vehicle makes or models could not be found or fit into a category they were termed "unspecified". If the respondent marked "not applicable" for the question (meaning that she did not drive or have access to a vehicle) then the make and model were marked "blank", and year was labeled "-8" (meaning that the missing data was consistent with the survey responses, as opposed to "-9" which means respondents did not complete).

Employment Status - Employment status was checked against the number of full-time and part-time workers in the household (question F9). If full time in question F9 was equal to one and there was only one person in the house, then the missing employment status was filled in as full-time. If the respondent marked full or part-time, then question F9 was checked to make sure at least one person was indicated in the appropriate space, otherwise it was changed. If "homemaker" was marked in the employment status, then "homemaker" should have been filled in for the occupation category as well. If "homemaker" was not marked in

occupation, it was changed. Also, if "homemaker" was marked then the number of full-time workers in question F9 should be equal to or less than the number of adults indicated in question F17 minus one. Question F9 was adjusted if the number of full-time workers was greater. For each of the above consistency checks, very few surveys were changed.

Occupation – The first step in standardizing and cleaning the occupation "other" category was to determine if the "other" answers belonged in the provided occupation categories. The Standard Occupation Codes defined by the United States Census were used to help classify specific occupations into one of the seven given occupations. Occupations that did not fit into the pre-specified categories or that were not comprehensible were left in the "other" category.

Commute Time – The commute time question (F14) was checked for outliers, such as commute times of several hours. The first step with any outliers is to check for data entry errors before proceeding into consistency checks. If the commute time was really long then the frequency was checked in question C1, and the commute distance was checked in questions F15 and C2. The respondent may commute a long distance a relatively infrequent amount. Each case examined needed overwhelming evidence to change the commute time, and very few were changed. We also recoded missing values from -9 to -8 if the respondent indicated that commuting was not applicable.

Commute Miles - The one-way commute miles question (F15) was checked against the miles "to/from" work or school in section C question 2 and with the commute frequency in section C question 1. If the frequency multiplied by twice the one-way commute miles was drastically different than the total commute miles in C2 then the survey was checked more thoroughly. The question was also checked for extreme outliers. Amount of travel for an

airplane (Perceived Mobility in Section D and long distance travel - question C3) was also checked since the commute mode should not be limited. Due to checking airplane travel, income was also checked to make sure it was a reasonable assumption. Only two mileages were adjusted using the checks above: 999 miles and 1512 miles. Missing values were also recoded from -9 to -8 if the respondent indicated that commuting was not applicable, similarly to the commute time question.

Household Members – The number of people in the household (F16) was checked against the summation of number of people in the various age group categories (F17). If the numbers were not equal, then the number of full-time and part-time workers were checked as well as the total number of drivers' licenses in the house. For example, if there was only one person in F16 but two boxes were marked for ages, then the number of people was adjusted to two. Seventy-three cases (3.8%) were investigated with 2.5% short 1 person – indicating that the respondents neglected to include themselves in the age group categories.

Household and Personal Income – Income categories were checked to make sure that household income was greater than or equal to personal income. Only 1.1% of the sample was affected by this check. If personal income was greater than household, the first check was to determine if there was another person in the household. If there was only one person in the house, then the incomes were made equal. Otherwise, two different fixes were made depending on the case. The first fix was that the personal income was added to household income to give a new household income. This was because the respondent might have mistaken household income to mean for the *rest* of the household instead of for the *entire* household including themselves. The second fix was to switch the incomes on the assumption that the respondent erroneously marked household in the personal income

question. The changes were made on a case-by-case basis with other pertinent demographic and survey responses as a guide for the judged correction.

3.5 DESCRIPTION OF ANALYSIS METHODOLOGIES

Numerous analytical techniques were used to describe the relationships among Perceived Mobility, Travel Liking, and Relative Desired Mobility (RDM). Each analytical technique is used to look at different levels of detail in the relationship and eventually to classify groups based on their answers to these questions. Each section of results first describes the application of each of these techniques. The description details the steps, the reasons for performing each step, and what the output of each step will give for the analysis. The analytical techniques used are correlation, cross tabulation, graphical, regression, vector sorting, and cluster analysis. All analysis was performed in SPSS unless otherwise noted.

The three main questions being analyzed are Perceived Mobility, Travel Liking, and RDM. Each question looks separately at short distance and long distance travel, both overall and by various purposes, and modes of travel. As indicated earlier, Perceived Mobility is a qualitative self-assessment of how much a person is traveling. Responses for Perceived Mobility are on a five-point scale from “None” to “A Lot”. RDM (also known as Satisfaction) is how much more, or less, a person wants to travel compared to present amounts. Responses range on a five-point scale from “Much Less” to “Much More”. Travel Liking is how much a person likes or dislikes travel for different purposes and modes. Responses range on a five-point scale from “Strongly Dislike” to “Strongly Like”.

In applying many of the analytical techniques it was convenient to condense the five-point scales for each question into a three-point scale. In each question the first two responses were

combined, third response left alone, and the last two responses were combined. Since it is typical for people to stay towards the center or neutral response, condensing the scale takes the strong answers (one and five) and combines them with the softer answers (two and four, respectively). For Perceived Mobility the first two responses were condensed to “A Little”, the third response was left as “Medium”, and the fourth and fifth responses were combined to give “A Lot”. RDM was condensed taking “Much Less” and “Less” to get “Less”, “Much More” and “More” to get “More, and “About the Same” was left as “Same”. Travel Liking was condensed by combining “Strongly Dislike” and “Dislike” to get “Dislike”, “Strongly Like” and “Like” to get “Like”, and leaving “Neutral” the same. The three-point scales were used in the cross tabulation, graphical, and vector sorting analysis.

The methodologies and results for correlation analysis, three-way relationships (cross tabulation, graphs, and regression analysis), vector sorting, and cluster analysis are the subjects of Chapters 4, 5, 6, and 7, respectively.

CHAPTER 4 - CORRELATION

4.1 DESCRIPTION OF REQUIRED DATA DEVELOPMENT

The correlation analysis was performed in several different ways. The first was to correlate long and short distance overall answers for Perceived Mobility, RDM, and Travel Liking to the section C answers for overall frequency of trips and total miles traveled. The second, third, and fourth analyses were pairwise comparisons of each of the three main questions: Perceived Mobility versus RDM, Perceived Mobility versus Travel Liking, and RDM versus Travel Liking. The procedures for performing the correlation analysis are outlined below.

4.1.1 Overall Travel

The overall travel correlation required the most manipulation of data, in order to transform mode- and purpose-specific Part C variables into overall data. Five different measures of Objective Mobility were created for the correlation: short distance total trip frequency, long distance total trips, long distance total raw miles, long distance natural log of total miles, and long distance summation of the natural log of miles in each category.

Short Distance Total Trip Frequency – Part C question 1 asked for the frequency of short distance trips, with six ordinal response categories for each purpose. The frequency categories were converted into trip numbers to give an estimate of the number of trips per day. The conversion factors are shown in Table 8. For ranges of values the midpoint was used for the conversion; for example 1-3 times a month was converted to two times a month. In the case of five or more times a week the average value cannot be determined due to the absence of an upper bound. People could make more than one trip per day for any given purpose. A value of 5.5 times a week was judgmentally chosen to represent this category.

Values greater than 5.5 would have been too high, especially for commuting to work (the purpose comprising 55.4% of the total "five or more times a week" responses) where people typically only travel during weekdays. After each frequency category was converted to a number of trips per day for each respondent, the seven purposes were summed to get the total number of trips per day. The lowest value possible is zero and the highest (coincidentally, since there are seven purposes) is 5.5 trips a day.

Table 8 – Trip Frequency Conversion

Frequency Category	Conversion Value (trips per day)
Never	0
Less than Once a Month	0.5 / 30 = 0.01667
1-3 Times a Month	2.0 / 30 = 0.06667
1-2 Times a Week	1.5 / 7 = 0.21429
3-4 Times a Week	3.5 / 7 = 0.50000
5 or More Times a Week	5.5 / 7 = 0.78571

In a design compromise, the survey did not attempt to collect objective travel information of the level of detail of a travel diary: it was felt that to do so, in addition to obtaining the attitudinal information essential to the study, would impose too great a burden on the respondent and diminish the quantity and quality of the responses received. Hence, the Objective Mobility data should be viewed primarily as indicators of Objective Mobility rather than accurate measurements thereof. Nevertheless, it is worthwhile to make a reality check of our data against more reliable travel diary data.

Using the approximation described above, the mean value for the sample is 1.9 trips per day (Table 9) or 3.8 person trips (using the NPTS trip definition and the assumption that each of our trips are one-way, *i.e.* double the number of trips per day), which is lower than the mean daily rate of 4.3 person trips found in the Nationwide Personal Transportation Study (NPTS) data (Hu, 1999). Since we have only obtained data on a subset of seven out of all possible trip purposes, it is not at all surprising that trips appear to be under counted. Using the

category midpoint is of course another source of error. Also, the constraint we placed on the number of trips per day at 0.79, for a frequency of 5 or more times a week, did not represent the possibility of performing multiple trips within the same category on a given day. The mobility data also does not take into account trip chaining activities, which could only be obtained from a travel diary. Despite all of these differences, the number of trips per day are not dramatically different and do represent the respondents' level of travel, though not completely accurately. An encouraging fact was that the average for men (1.93) and women (1.96) was nearly identical, which was also found in the NPTS data (Hu, 1999). This suggests that the downward bias in our data is fairly uniform, and hence that qualitative relationships of this measure to other variables can be accurately captured.

Table 9 - Average Daily Person Trips

	Mobility Sample (# in Sample)	Mobility Sample using NPTS Trip Definition	NPTS*
Total	1.94 (1889)	3.88	4.3
Men	1.93 (903)	3.86	4.3
Women	1.96 (974)	3.92	4.3

* NPTS data source: Hu (1999).

Long Distance Total Trips – The total number of long distance trips was easy to obtain from the data. Part C Question 3 required the respondent to enter the number of trips for each purpose/mode combination to each region listed. The total number of trips was simply the summation of trips in Question 3.

Long Distance Total Miles – Three variations on total long distance miles were created: total miles, natural log of total miles, and summation of the natural log of miles for each purpose/ mode combination. To ease the burden on the respondent and obtain more reliable data, Part C Question 3 asked for the number of trips to each location (by purpose/mode combination) instead of the mileage to each location. However, since a trip from the San Francisco Bay

region to Las Vegas is entirely different than a trip to India, simply adding up the number of trips taken would not be extremely informative. Weighting each trip by its average distance would give an indication of the magnitude of the trip. An average distance from the Bay Area to each region is listed in Table 10. The average distance measurements were judgmentally computed and are therefore only approximate indicators rather than accurate measurements.

Table 10 – Conversion of Long Distance Trips to Miles

Destination Region	Judgmental Average Distance from San Francisco Bay
California or adjacent states (Oregon, Nevada, Arizona)	200
Other western states (Washington, Wyoming, Idaho, Utah, Montana, Colorado, New Mexico)	700
Elsewhere in US (except Alaska or Hawaii)	2000
Alaska, Canada, Mexico	3000
Central/South America, Caribbean	6000
Asia	7500
Australia, New Zealand, Pacific (including Hawaii)	5000
United Kingdom/Europe/Middle East	7300
Africa	9000

To obtain the long distance total miles, the number of trips to each region was multiplied by the average miles to each region from Table 10, to get the number of miles traveled to each region, and then the number of miles was summed across region. The second indicator of total long distance traveled was obtained by taking the natural log of the total miles. The third indicator of total long distance traveled was obtained by taking the natural log of the estimated number of miles traveled to each location by each purpose/mode combination. After taking the natural log, the values were then summed. The reason for performing a natural log transformation for both the second and third indicators was to reduce the weight of long trips, under the assumption that each additional mile traveled would have a diminishing marginal impact (*i.e.*, each additional mile does not add as much as the previous mile). Nine trips to Western States (6,300 miles total) would be fewer miles than one trip to Asia (7,500 miles). The question becomes, do nine trips to Western States represent a lower

level of long distance travel than one trip to Asia? Both may be quite grueling on the body and mind, but the Asia trip might only take one or two weeks whereas the trips to Western States could occupy nine weeks of the person's life. The natural log transformations can be used as different indicators of the level of travel. The natural log of the summation of miles (indicator two) would be roughly the same for the two cases in the example: 8.75 for the nine trips to Western States and 8.92 for the trip to Asia. Summing the natural log of each trip (indicator three) results in 58.96 for the Western States trips and 8.92 for the Asia trip. The third indicator would suggest that the nine Western States trips represent a higher level of travel than the Asia trip. Thus, the three indicators result in different rankings for this example. The first indicator (miles) favors the Asia trip, the second indicator (natural log of total miles) is roughly equal, and the third indicator (natural log of each trip) favors the Western States trips. While this example is contrived, it shows the distinction between the indicators. Each indicator was included in the correlation to determine which method of looking at total long distance traveled related most strongly to the other measures.

Correlation of Overall and Total Values – The first of the four correlation tables created was for the total values of short and long distance trips and miles along with the "overall" responses to Perceived Mobility, RDM, and Travel Liking. The correlation was run with two-tailed significance testing using the Pearson correlation coefficient. The correlation matrix was 12x12 with the following terms: short distance total frequency (SD_TOTFR), long distance total frequency (LD_TOTFR), total for all short distance travel (*i.e.*, miles/ week), long distance total miles (LD_TOTMI), long distance natural log of the total summed miles (LD_LNMIT), long distance summation of the natural log of miles for each category (LD_LNMIE), overall Travel Liking short distance, overall Travel Liking long distance, overall Perceived Mobility short distance, overall Perceived Mobility long distance, overall RDM (satisfaction) short distance, and overall RDM long distance.

4.1.2 PM, TL, RDM Correlation

The final three correlation matrices contain the three travel attitude questions compared to each other: Perceived Mobility versus RDM, Perceived Mobility versus Travel Liking, and RDM versus Travel Liking. Including the overall (2), short distance purpose (7), long distance purpose (2), short distance mode (5), and long distance mode (2) questions for each pair in the correlation resulted in 18x18 matrices for each of the three pairings.

4.2 RESULTS

The correlation matrices discussed in the following sections are those for overall travel, Perceived Mobility & RDM, Travel Liking & RDM, and Perceived Mobility & Travel Liking. The full correlation matrices for each section are located in Appendix B. Subsets of the full correlation matrices are supplied in each of the sections.

4.2.1 Overall Travel

The overall travel correlation matrix consisted of the overall answers for Travel Liking (TL), Perceived Mobility (PM), and RDM (satisfaction, S) as well the objective mobility questions. The objective mobility questions are short distance trip frequency (SD_TOTFR), long distance trip frequency (LD_TOTTR), total short distance miles traveled, long distance miles traveled (LD_TOTMI), and two variants of the long distance miles traveled. The two variants are the natural log of the total miles traveled (LD_LNMIT) and the summation of the natural log of miles for each trip taken (LD_LNMIE). A portion of the correlation matrix is displayed in Table 11.

Table 11 – "Overall" Correlation Results

	SD Total Freq	LD Total Freq	SD Total Miles	LD Total Miles	LD LN (∑Miles)	LD ∑LN (Miles)	TL SD	TL LD	PM SD	PM LD	RDM SD	RDM LD
SD Total Frequency	1.00											
LD Total Frequency		1.00										
SD Total Miles	0.19	0.11	1.00									
LD Total Miles		0.54	0.06	1.00								
LD LN (∑miles)	0.10	0.37	0.12	0.50	1.00							
LD ∑LN (miles)	0.10	0.44	0.14	0.70	0.69	1.00						
Travel Liking SD – Overall Liking for SD Trips (Strongly Dislike to Strongly Like)			-0.12			-0.06	1.00					
Travel Liking LD – Overall Liking for LD Trips					0.11	0.08	0.27	1.00				
Perceived Mobility SD – Overall I feel that I travel… (None to A Lot)	0.27	0.08	0.32			0.07		0.09	1.00			
Perceived Mobility LD – Overall I feel that I travel…	0.11	0.28	0.16	0.42	0.46	0.48		0.15	0.18	1.00		
Relative Desired Mobility SD – I'd like to travel… (Much Less to Much More)	-0.07		-0.24				0.33	0.16	-0.22		1.00	
Relative Desired Mobility LD – I'd like to travel…		-0.12	-0.07	-0.07			0.12	0.46		-0.07	0.13	1.00

Only correlations significant at the 0.01 level (two-tailed) displayed.
N ranges from 1873 to 1904 depending on the amount of missing data for the two variables being correlated.

One discovery is that Objective Mobility (represented by the variables in the first six rows and columns of the matrix) is significantly and positively correlated with Perceived Mobility. This is consistent with Ramon's Jerusalem findings from 1981. Short distance Perceived Mobility had a Pearson correlation coefficient of 0.274 with short distance total frequency and 0.318 with short distance total miles traveled per week. Long distance Perceived Mobility had a Pearson correlation coefficient of 0.278 for long distance total frequency, 0.415 for long distance miles traveled, 0.462 for LD_LNMIT, and 0.480 for LD_LNMIE. While these correlations are statistically strong and in the expected direction, they are far from perfect. Hence there is considerable variation in the amount of Objective Mobility resulting in the same level of Perceived Mobility being assigned by different people.

The responses for overall short distance and overall long distance were significantly and positively correlated for the four sets of variables: Travel Liking, Perceived Mobility, RDM, and Objective Mobility. Travel Liking had the strongest correlation, at 0.270. Perceived Mobility had a correlation of 0.179, Objective Mobility (Total short distance miles and LD_LNMIE) 0.140, and RDM 0.134. Having short and long distance significantly related for Travel Liking shows that people who enjoy traveling tend to like it for all distances. Likewise, people who dislike travel often dislike it for both short and long distances. This can be applied to each category such as Perceived Mobility where people who travel a lot for short distance tend to also travel a lot for long distance. Again, however, while these correlations are strongly significant, they are not large in absolute terms, meaning that the relationships have a lot of variability.

Perceived Mobility and RDM were negatively correlated with each other for both short and long distance overall travel. The expected direction of the negative relationship is stated, "The more you perceive you travel the more you want to reduce your travel." This is consistent with the hypothesis proposed in Chapter 1 and Ramon's findings from Jerusalem. Since Ramon's results

only look at overall questions and not purpose or mode specific, they only apply in this section of the discussion. The short distance correlation coefficient is –0.217, and the long distance coefficient is –0.069. The latter result, while statistically significant with 99.8% confidence and in the expected direction, is of little practical importance. This is of interest since, in contrast to the case for short distance travel, one's desire to change the amount of long distance travel is relatively independent of the amount currently done. The relationship for Objective Mobility and RDM is similar to that for Perceived Mobility and RDM since Objective Mobility and Perceived Mobility are positively correlated.

Travel liking and RDM had an overall positive relationship for both short and long distance. The expected direction of the positive relationship is stated as "The more you like to travel, the more you want to increase your travel." This is also consistent with the proposed hypothesis in Chapter 1. The short distance correlation coefficient is 0.329 and the long distance coefficient is 0.462. Perceived Mobility and Travel Liking were only correlated for long distance travel with a coefficient of 0.146. The expected direction of the positive relationship is stated as "The more you like to travel long distance, the more you perceive you travel long distance." The result for long distance travel is consistent with the second hypothesis for Perceived Mobility and Travel Liking proposed in Chapter 1 and with Ramon's Jerusalem study. The implication is that people are to some extent able to match the amounts they travel (long distance) with their liking for that travel. *E.g.*, people who dislike long distance travel may try to avoid traveling long distance by taking fewer vacations or not taking jobs that require such travel. Short distance travel cannot be avoided as easily. Therefore the two hypotheses stated in Chapter 1 might be canceling each other out for short distance travel, resulting in an insignificant correlation (this may also be a factor in the relatively small, although significant correlation for long distance as well). A more in depth analysis of the relationships between Perceived Mobility and RDM, Travel Liking and RDM, and Perceived Mobility and Travel Liking is presented later in the correlation results.

The significant overall relationships are displayed in Figure 4. The expected directions of causality are explained in the following paragraph. These directions may not be the correct directions, however, they are the most intuitive. Ascertaining the proper directions of causality is best done with a structural equations model, which will be the subject of future research on this data set. The short distance relationships show how Perceived Mobility and Travel Liking are used to explain whether people want to increase or decrease their overall short distance travel. Travel Liking explains more about increasing or decreasing overall travel than does Perceived Mobility. The long distance relationships are similar to the short distance relationships except that Perceived Mobility explains less about RDM and Travel Liking explains more. The long distance relationship also has Perceived Mobility and Travel Liking related to each other, as mentioned previously.

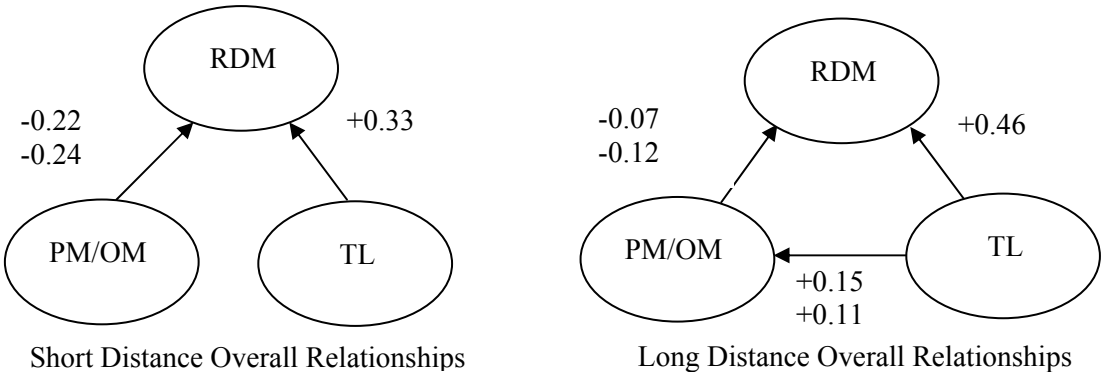

Figure 4 – Overall Correlation Relationships (with Hypothesized Directions of Causality)

4.2.2 Perceived Mobility & RDM

A correlation matrix was created to compare Perceived Mobility with RDM for every question. There are Perceived Mobility measures in 18 different categories, and RDM measures for the identical 18 categories. The correlation matrix allows us to look at, for example, the correlation between perceiving you travel a lot in a personal vehicle with wanting to travel more or less in a personal vehicle. The matrix also allows us to look at other combinations such as the RDM for

commuting to work correlated with the perceived travel in a personal vehicle. Some people might link their travel in a personal vehicle to commuting to work if that is the majority of their time spent in a vehicle.

The entire correlation matrix is contained in Appendix B, while specific results are displayed in tables below. Table 12 shows the correlation of a particular measure for Perceived Mobility with the corresponding measure for RDM. The table includes the correlation coefficient and the level at which the value is significant. The first thing to notice from the table is the sign of the coefficients. One might hypothesize that the more you perceive you travel the more you would want to decrease that travel. However, only 6 of the 18 total categories, 5 of 15 significant categories, and 5 of the 11 categories significant at the 0.01 level carry a negative sign. This implies that the hypothesis is not always true: in many categories, traveling a lot seems to increase the desire to travel more, and conversely, traveling even a little can be too much. The negative correlations are for overall short distance, commuting, grocery shopping, taking others where they want to go, personal vehicle, and overall long distance. This result is consistent with Redmond and Mokhtarian (2000), who found that Commute Perceived Mobility was a negative term in the Relative Desired Commute model. Most of the negative correlations seem reasonable: for example, most people would want to reduce their commute if they perceive they do it a lot. At least three of the six refer to trip purposes that would be considered chores by most people. However, the analysis elsewhere in this thesis makes it clear that these relationships are moderated by people's liking for travel. The only negative coefficient that does not make sense is the overall long distance correlation because all of the other long distance categories are positive. The overall category should be a combination of attitudes from the questions that make up the long distance section, however this one is opposite.

Table 12 – Correlation of Perceived Mobility & RDM

Category	Correlation Coefficient	Significance Level
Overall Short Distance	-0.217	**0.000**
SD Travel by Purpose		
Commuting	-0.138	**0.000**
Work/School Related	0.023	0.313
Grocery	-0.018	0.422
Eat a Meal	0.039	0.086
Entertainment/Recreation/Social	0.076	**0.001**
Taking Others	-0.067	**0.003**
SD Travel by Mode		
Personal Vehicle	-0.070	**0.002**
Bus	0.050	**0.030**
Train/BART/Light Rail	0.058	**0.012**
Walking/Jogging/Bicycling	0.298	**0.000**
Other Means of Travel	0.264	**0.000**
Overall Long Distance	-0.069	**0.002**
LD Travel by Purpose		
Work/School Related	0.046	**0.047**
Entertainment/Recreation/Social	0.192	**0.000**
LD Travel by Mode		
Personal Vehicle	0.121	**0.000**
Airplane	0.059	**0.010**
Other Means of Travel	0.234	**0.000**

The fact that most correlations in Table 12 were significant supports the expectation that the amount you travel will have an impact on whether you want to increase or decrease the amount you travel. However, it should be pointed out that although the large sample makes statistical significance relatively easy to achieve, the magnitudes of even the significant correlations are generally small (0.3 being the largest, for walking/jogging/bicycling). Further, just perceiving you travel a lot does not indicate why you would want to *increase* the amount of your travel as indicated by the positive signs. This is where the enjoyment of travel comes into play. If people want to increase their travel though they already travel a lot, it probably means they enjoy doing that type of travel. The moderating role of Travel Liking probably partly explains the small magnitude of even the significant correlations, with those who dislike travel tending to have a negative correlation between Perceived Mobility and RDM, which partially counteracts the positive correlation for those who like travel. When the net outcome of those two counteractive

tendencies is positive, it suggests that liking for that form of travel is the dominant feeling across the sample. These more complex three-way relationships among the variables will be further explored in Chapter 5.

An interesting occurrence in the full matrix (shown in the Appendix but not presented here) is that the RDM overall categories seem to be correlated with each of the individual Perceived Mobility categories. Short distance overall RDM is significantly correlated with 8 (four positive, four negative) of the11 individual short distance Perceived Mobility categories, and long distance overall RDM is correlated with 3 (two positive, one negative) of the 5 individual long distance Perceived Mobility categories. Only one of the long distance correlations is at the 0.05 significance level, all others are at the 0.01 significance level. This implies that the amount you travel for each category influences whether you want to increase or decrease your travel overall.

Another intriguing result is looking at RDM for commute and how much people perceive they travel in a car (-0.079) or by BART (-0.118). Correlations for both of the categories are significant and negative. This means that the more people perceive they travel by BART or by personal vehicle, the more likely they will want to decrease the amount they commute. Other results of interest include the positive correlation between RDM for personal vehicle and Perceived Mobility for bus (0.090). The more people travel by bus the more they want to increase their travel by personal vehicle.

4.2.3 Travel Liking & RDM

A correlation matrix was created to compare Travel Liking with RDM for every question. There are Travel Liking measures in 18 different categories, and RDM measures for the identical 18 categories. The correlation matrix allows us to look at the correlation between how much you enjoy your travel with wanting to increase or decrease travel.

Every single correlation between Travel Liking and RDM for individual categories shown in Table 13 was significant and relatively sizable (0.31-0.75). Thus, liking or disliking travel is extremely important in predicting whether people would want to increase or decrease their amount of travel. Each correlation was also positive, which implies that the more people like traveling for a certain activity or mode the more they want to increase their travel in that same category. Excluding the "other means of travel", the highest three correlation coefficients were for Walking/Jogging/Bicycling (0.599), Airplane (0.559), and long distance Entertainment/ Recreation/Social (0.523). The lowest correlation coefficient was 0.309 for both the grocery shopping and eat a meal categories. This positive correlation for Commuting to Work/School is consistent with the Redmond and Mokhtarian (2000) paper where Commute Travel Liking was a positive term in the Relative Desired Commute model.

As shown in Appendix B, overall short distance RDM was significantly correlated with 7 of the 11 short distance Travel Liking categories. All of the Travel Liking responses for short distance *activities* were significant, and only the liking for the personal vehicle *mode* was significant, in correlation with RDM overall short distance. This could imply that a desire to increase or decrease travel overall is seen more in terms of the activities performed than in terms of the modes used to conduct the travel. The highest correlation coefficient of the seven was for commuting to work or school at 0.239. Overall long distance RDM was significantly correlated with all five long distance Travel Liking questions. The strongest correlation was for Entertainment/Recreation/Social at 0.385, which might imply that most people relate long distance travel with pleasure travel. Another reason for the social activity having the highest correlation is that many people surveyed might travel long distance only for pleasure.

Table 13 – Correlation of Travel Liking & RDM

Category	Correlation Coefficient	Significance Level
Overall Short Distance	0.329	**0.000**
SD Travel by Purpose		
Commuting	0.460	**0.000**
Work/School Related	0.377	**0.000**
Grocery	0.309	**0.000**
Eat a Meal	0.309	**0.000**
Entertainment/Recreation/Social	0.388	**0.000**
Taking Others	0.405	**0.000**
SD Travel by Mode		
Personal Vehicle	0.423	**0.000**
Bus	0.401	**0.000**
Train/BART/Light Rail	0.493	**0.000**
Walking/Jogging/Bicycling	0.599	**0.000**
Other Means of Travel	0.639	**0.000**
Overall Long Distance	0.462	**0.000**
LD Travel by Purpose		
Work/School Related	0.467	**0.000**
Entertainment/Recreation/Social	0.523	**0.000**
LD Travel by Mode		
Personal Vehicle	0.473	**0.000**
Airplane	0.559	**0.000**
Other Means of Travel	0.753	**0.000**

4.2.4 Perceived Mobility & Travel Liking

A correlation matrix was created to compare Perceived Mobility with Travel Liking for every question. There are Perceived Mobility measures in 18 different categories, and RDM measures for the identical 18 categories. The correlation matrix allows us to look at the correlation between how much you perceive you travel and how much you like to travel.

Perceived Mobility and Travel Liking are significantly correlated for nearly every single activity and mode (Table 14). The only categories not significantly correlated are overall short distance and commuting to work or school. Every significant correlation is also positive. This means that, in general, the more you like to travel the more you perceive you travel or the less you like to travel the less you perceive you travel. Two hypotheses were formulated for this relationship: the first hypothesis suggested that the perceived travel would negatively affect the liking for travel

(*i.e.*, having to do it too much makes it unappealing), and the second hypothesis suggested that the liking for travel would positively affect the perceived mobility (*i.e.*, because she/he loves traveling, she/he tries to do it a lot). The results indicate that the second hypothesis governs for each purpose and mode that was significant. The results also suggest that people try to be balanced in the travel they do. If people dislike travel they limit the amount of travel they do. This leads to the hypothesis that will be analyzed in the three-way relationship, especially in cross tabulation and graphical analysis procedures. The hypothesis is that those people who dislike travel and do not travel that much, like travel and travel a lot, and have neutral liking and travel a medium amount are all balanced in their travel satisfaction (*i.e.*, desire to travel "about the same" as they are now). Those who do not fit into the balanced state are not satisfied and want to increase or decrease their travel to reach that balance in their life.

Table 14 – Correlation of Perceived Mobility & Travel Liking

Category	Correlation Coefficient	Significance Level
Overall Short Distance	-0.017	0.458
SD Travel by Purpose		
Commuting	0.023	0.310
Work/School Related	0.163	**0.000**
Grocery	0.132	**0.000**
Eat a Meal	0.164	**0.000**
Entertainment/Recreation/Social	0.179	**0.000**
Taking Others	0.166	**0.000**
SD Travel by Mode		
Personal Vehicle	0.191	**0.000**
Bus	0.253	**0.000**
Train/BART/Light Rail	0.242	**0.000**
Walking/Jogging/Bicycling	0.507	**0.000**
Other Means of Travel	0.318	**0.000**
Overall Long Distance	0.146	**0.000**
LD Travel by Purpose		
Work/School Related	0.222	**0.000**
Entertainment/Recreation/Social	0.258	**0.000**
LD Travel by Mode		
Personal Vehicle	0.264	**0.000**
Airplane	0.152	**0.000**
Other Means of Travel	0.299	**0.000**

The highest correlation in Table 14 is for Walking/Jogging/Bicycling, which has a coefficient of 0.507. The relationship for the Walking category is quite easy to comprehend. Those people who enjoy jogging or biking a lot probably make time in their life to jog or bike a lot. The same is true for the other mode categories. If someone is going to travel to another location, they will most likely choose the mode that they enjoy the most. These people are going to continue to select the mode they like best for most of their travel needs that can be covered by these modes. The same is true for purposes: if you enjoy taking your children to school or picking them up because you get to converse with them about their day, you probably are going to like that portion of your travel and choose to pick them up as often as you possibly can.

CHAPTER 5 - THREE-WAY RELATIONSHIPS

5.1 DESCRIPTION OF APPROACHES USED

The correlation analysis was important to see how one variable interacts with another. However, as we have already seen, only comparing the variables pairwise is incomplete. To predict whether a person wants to reduce her travel, it would be important to know not only how much she is traveling now, but also how much she likes traveling. Two people could be traveling similar amounts, with the one who likes travel wanting to keep it the same or even increase it. Thus, we hypothesize that the influence of Perceived Mobility on Relative Desired Mobility is moderated by Travel Liking. We explore this complex three-way relationship using three analysis methods: cross tabulation, graphs, and regression. Each of the three methods has strengths and weaknesses in displaying the relationships among Perceived Mobility, Travel Liking, and RDM, and will be discussed in separate sections below.

5.1.1 Cross Tabulation

The cross tabulation analysis allows examination of all three travel questions at the same time. This is a step up from the correlation analysis, where only two questions could be analyzed at a time. This analysis tabulates Travel Liking versus Perceived Mobility for each level of RDM. The program then determines the number of times a particular threesome occurs and places the count into the table. For example: Travel Liking = Strongly Dislike, Perceived Mobility = A Lot, and RDM = Less may occur 50 times in the database.

Both five-point and three-point scales are used in the analysis of the data, and each has its own advantages and disadvantages. The five-point scales give the complete picture displaying all possible combinations of responses in the 5x5x5 cube. The problem with the five-point scale is

that the extreme values in the corners of the 5x5x5 cube might not have enough occurrences to give statistical validity. The advantage of the three-point scales is that they simplify the interpretation of the cross tabulation tables. The difficulty is that the extreme values will have less weight when combined with less extreme values. Therefore the results will gravitate towards neutral and give a less accurate sense of the actual travel attitudes. A two-dimensional example of the result of collapsing the scales is displayed in Table 15 and Table 16. The tables show, through shading, which cells are combined when a five-point cross tabulation is condensed into a three-point cross tabulation. When Perceived Mobility is added to the tables the cross tabulation becomes three-dimensional, therefore a 5x5x5 cube would reduce to a 3x3x3 cube. The conversion of values is done on all three questions: Perceived Mobility, Travel Liking, and RDM.

Table 15 – Five-Point Example Combination

Travel Liking → RDM ↓	Strongly Dislike	Dislike	Neutral	Like	Strongly Like
Much Less					
Less					
Same					
More					
Much More					

Table 16 – Three-Point Example Combination Result

Travel Liking → RDM ↓	Dislike	Neutral	Like
Less			
Same			
More			

Once the conversion to three-point responses is complete, then the cross tabulations are produced for both three-point and five-point responses. Perceived Mobility was placed in rows, Travel Liking in columns, and RDM as the layers. This was performed for all purposes, modes, and overall questions. The output was then examined and compared to the hypotheses established in Tables 17 and 18. Each cell of the tables represents a single hypothesis. In general, when Travel Liking and Perceived Mobility take on a certain combination of values, the hypothesis is that the predominant RDM response is that indicated in the cell. For example, if Perceived Mobility is

high and Travel Liking is low (dislike), we would expect the dominant RDM response to be surfeited ("want to travel less"). Thus the nine cells of Table 17 represent nine hypotheses regarding the value of RDM given Perceived Mobility and Travel Liking.

Table 17 – Three-Point Cross Tabulation Hypotheses

		TRAVEL LIKING		
		DISLIKE	*NEUTRAL*	*LIKE*
PERCEIVED MOBILITY	*LOW*	Balanced	Slightly Deprived	Deprived
	MEDIUM	Slightly Surfeited	Balanced	Slightly Deprived
	HIGH	Surfeited	Slightly Surfeited	Balanced

Table 18 – Five-Point Cross Tabulation Hypotheses

		TRAVEL LIKING				
		STRONGLY DISLIKE	*DISLIKE*	*NEUTRAL*	*LIKE*	*STRONGLY LIKE*
PERCEIVED MOBILITY	*NONE*	Balanced	Balanced	Slightly Deprived	Deprived	Deprived
	2	Balanced	Balanced	Slightly Deprived	Slightly Deprived	Deprived
	3	Slightly Surfeited	Slightly Surfeited	Balanced	Slightly Deprived	Slightly Deprived
	4	Surfeited	Slightly Surfeited	Slightly Surfeited	Balanced	Balanced
	A LOT	Surfeited	Surfeited	Slightly Surfeited	Balanced	Balanced

The next step was to define what is meant by the "predominate" RDM response for each cell of the cross tabulation table. The mean RDM levels for each cell were taken and compared to a set scale. The three-point and five-point scales were each divided into five equal intervals. The interval cut points, for both three-point and five-point scales, are shown in Tables 19 and 20. For the five-point cross tabulation, suppose the average RDM response for individuals with Perceived Mobility equal to "A Lot" and Travel Liking equal to "Dislike" was 1.2. According to Table 20, this average would be classified as "Surfeited", which is consistent with the hypothesis shown in Table 18. Using equal intervals to define the cut points will make it more difficult for the average RDM in a given cell to attain the extreme categories, since averages by definition will tend to be

less extreme. However, other approaches to defining the cut points relied too heavily on arbitrary judgments.

Table 19 – Cut Points for Three-Point RDM Scale

RDM Average	Cell Label
1.00 – 1.4	Surfeited
1.41 – 1.8	Slightly Surfeited (SS)
1.81 – 2.2	Balanced
2.21 – 2.6	Slightly Deprived (SD)
2.61 – 3.0	Deprived

Table 20 – Cut Points for Five-Point RDM Scale

RDM Average	Cell Label
1.00 – 1.8	Surfeited
1.81 – 2.6	Slightly Surfeited (SS)
2.61 – 3.4	Balanced
3.41 – 4.2	Slightly Deprived (SD)
4.21 – 5.0	Deprived

The cross tabulation hypothesis tables (Tables 17 and 18) show the predicted predominate values for each of the cells. In reality, however, the observed data could depart somewhat from these hypotheses and still represent quite reasonable relationships. For example, it is plausible for individuals to dislike travel, perceive they are doing it a moderately heavy amount, but want to do it about the same amount (because they consider it a necessity, or the advantages outweigh their dislike) – thereby being classified as "balanced" rather than surfeited as we hypothesized. On the other hand, it is less reasonable to expect many people to dislike travel, perceive they are doing it a moderately heavy amount, and want to increase it. Thus, for each combination of Perceived Mobility and Travel Liking we can identify a range of RDM responses that could be considered reasonable: these are shown in Tables 21 and 22. Note that these ranges are constructed in terms of the main tendency in the data and that it is still plausible for individual responses occasionally to fall outside these ranges. Each cross tabulation table showing the empirical results will indicate, by gray shading, the cells that do not match the validation tables.

Table 21 - Three-Point Cross Tabulation Validation Table

		TRAVEL LIKING		
		DISLIKE	*NEUTRAL*	*LIKE*
PERCEIVED MOBILITY	*LOW*	Balanced, SS, Surfeited	Deprived, SD, Balanced	Deprived, SD, Balanced
	MEDIUM	Balanced, SS, Surfeited	SD, Balanced, SS	Deprived, SD, Balanced, SS
	HIGH	Balanced, SS, Surfeited	Balanced, SS, Surfeited	SD, Balanced, SS

Code - SS = Slightly Surfeited, SD = Slightly Deprived

Table 22 - Five-Point Cross Tabulation Validation Table

		TRAVEL LIKING				
		STRONGLY DISLIKE	*DISLIKE*	*NEUTRAL*	*LIKE*	*STRONGLY LIKE*
PERCEIVED MOBILITY	*NONE*	Balanced	Balanced	Deprived, SD, Balanced	Deprived, SD	Deprived, SD
	2	Balanced, SS, Surfeited	Balanced, SS, Surfeited	Deprived, SD, Balanced	Deprived, SD, Balanced	Deprived, SD, Balanced
	3	Balanced, SS, Surfeited	Balanced, SS, Surfeited	SD, Balanced, SS	Deprived, SD, Balanced, SS	Deprived, SD, Balanced, SS
	4	Balanced, SS, Surfeited	Balanced, SS, Surfeited	Balanced, SS, Surfeited	SD, Balanced, SS	SD, Balanced, SS
	A LOT	SS, Surfeited	SS, Surfeited	Balanced, SS, Surfeited	SD, Balanced, SS	SD, Balanced, SS

Code - SS = Slightly Surfeited, SD = Slightly Deprived

5.1.2 Graphs

A way to avoid the problem of labeling the mean RDM in cross tabulations or classifying the patterns in the cross tabulation data is to graphically represent the RDM average. The graphs will also be able to show trends along each dimension and will make it easier to identify areas of interest. The graphical method just displays the data contained in the cross tabulations, so no new manipulation of the data is required. Both three-point and five-point graphs are produced. The cross tabulation data is copied from SPSS to Excel where the data is graphed. RDM Average is along the y-axis, Perceived Mobility along the x-axis, and each line is a different Travel Liking

level. The graphing is accomplished for every question (overall, purpose, and mode) for three-point and five-point data. The result is 32 graphs, 16 for each point scale.

5.1.3 Regression

Regression equations were performed only on the five-point data. The regression models were estimated for each short and long distance question pertaining to purpose, mode, and overall attitudes, 16 in all. RDM was the dependent variable in each equation with Travel Liking, Perceived Mobility, and an interaction term of Travel Liking and Perceived Mobility as the only variables allowed to enter. This is equivalent to a two-way analysis of variance of the RDM responses, where Travel Liking and Perceived Mobility are the two factors. Stepwise regression was employed, with an F-to-enter of 0.05 and an F-to-remove of 0.10.

5.2 RESULTS

Three separate approaches were used to evaluate the relationships among all three variables (Perceived Mobility, Travel Liking and RDM): cross tabulation, graphical analysis, and regression analysis. The following sections describe the results of each approach individually.

5.2.1 Cross Tabulations

Cross tabulation is the first method of showing the interactions among Perceived Mobility, Travel Liking, and RDM. The general hypothesis being tested is that people want to be balanced in their travel. Balanced means that they are satisfied with the amount of travel they are doing and do not want to increase or decrease this amount. Therefore people who like to travel and perceive they travel a lot are more likely to be satisfied with their amount of travel and less likely to want to increase or (especially) decrease their amount. Likewise if someone dislikes travel and perceives they travel a little, they are probably also satisfied (or wanting to decrease their travel further, but not increase it). Those people who dislike travel and perceive they travel a lot are in flux.

Typically people in this case will attempt to decrease their travel in order to return to a balanced state, meaning they are travel-surfeited. Conversely, those who like travel but do it little would attempt to increase their travel, meaning they are travel-deprived. These relationships of balance should be similar over different purposes and modes. A table of the hypotheses is displayed earlier in this chapter, and the breakdown for being surfeited, deprived, or balanced is also shown there. Surfeited implies that you are traveling more than you like, deprived means that you are traveling less than you would like to, and balanced means you are in a content state. The cross tabulation was performed for both three-point and five-point versions of each scale.

The complete set of cross tabulations is shown in Appendix C and discussed in the following paragraphs. The short distance overall results are shown below in Tables 23 and 24. The RDM mean for any cell that contained less than 3 values was shown as N/A for statistical reasons. The overall short distance results in Table 23 and 24 did not entirely reflect the hypothesized relationships. The balanced cells are shifted more towards the upper right corner of the cross tabulation than we expected. There were no Perceived Mobility/Travel Liking combinations for short distance overall questions resulting in a deprived or even slightly deprived state, on average. We hypothesized that people who liked travel and for whom Perceived Mobility was low would be travel-deprived. The results, however, indicate that these people are balanced on average. The tables show in light gray the cells that did not match the validity hypotheses. Five of the nine categories in Table 23 and eight of the twenty-five cells in Table 24 were different than our original hypotheses (Tables 17 and 18), though only two cells from Table 24 were different from the hypothesized valid responses (Table 22). One of those cells (the “surfeited” response to disliking short distance travel and doing none of it) actually represents a logical impossibility (if one is currently doing “none” of it, one cannot decrease it further) – a point to which we return to at the end of the cross tabulation results discussion. In any case, the results demonstrate that

people do not tend to feel deprived of short distance overall travel even if they like short distance travel and they travel little for short distance trips.

Table 23 – Average RDM by Perceived Mobility and Travel Liking: Overall Short Distance (Three-Point)

Cell-Specific Average Across All Levels of RDM (Less, Same, More)		**TRAVEL LIKING**		
		DISLIKE	*NEUTRAL*	*LIKE*
PERCEIVED MOBILITY	*LOW*	Slightly Surfeited	Balanced	Balanced
	MEDIUM	Slightly Surfeited	Slightly Surfeited	Balanced
	HIGH	Surfeited	Slightly Surfeited	Balanced

Table 24 – Average RDM by Perceived Mobility and Travel Liking: Overall Short Distance (Five-Point)

Cell-Specific Average Across All Levels of RDM (Much Less, Less, Same, More, Much More)		**TRAVEL LIKING**				
		STRONGLY DISLIKE	*DISLIKE*	*NEUTRAL*	*LIKE*	*STRONGLY LIKE*
PERCEIVED MOBILITY	*NONE*	N/A	Surfeited	Balanced	Balanced	N/A
	2	N/A	Balanced	Balanced	Balanced	Balanced
	3	N/A	Slightly Surfeited	Balanced	Balanced	Balanced
	4	Surfeited	Slightly Surfeited	Slightly Surfeited	Balanced	Balanced
	A LOT	Surfeited	Surfeited	Slightly Surfeited	Balanced	Balanced

Gray squares denote deviation from validity hypotheses (Table 22).

The majority of the short distance purpose cross tabulations show the same trend as the short distance overall travel. The cells are heavily balanced under the neutral, like, and strongly like categories. Under the work purpose (Table 25), the deprived condition never appears. On average, the respondents are balanced, slightly surfeited, or surfeited in their RDM. This clearly points to the fact that many people have commutes that are undesirable, possibly because they are mired in congestion, they drive in the early mornings and evenings when they are tired, or maybe because the location of their work puts them in downtown driving settings rather than green

meadows. Naturally people could also be confounding their dislike of work with the actual travel to get there, or it may be that the dislike of work alters their attitude and actually does affect the way they perceive their commute. The work, bus, and BART cross tabulations (Table 25, 28, and 29, respectively) are the only cases where the average RDM category does not monotonically increase from left to right or from top to bottom. The exceptions in these tables occur primarily in the strongly like column for the RDM averages in question, presumably because of the small sample sizes in the strongly like column. Table 25 also shows four cells that are logically impossible - Perceived Mobility equal to "None" and RDM average indicating people wanting to travel less. This issue will be addressed more thoroughly at the end of the cross tabulation results discussion.

Table 25 – Average RDM by Perceived Mobility and Travel Liking: Short Distance Commute to Work or School (Five-Point)

Cell-Specific Average Across All Levels of RDM (Much Less, Less, Same, More, Much More)		**TRAVEL LIKING**				
		STRONGLY DISLIKE	*DISLIKE*	*NEUTRAL*	*LIKE*	*STRONGLY LIKE*
PERCEIVED MOBILITY	*NONE*	Surfeited	Slightly Surfeited	Slightly Surfeited	Balanced	Slightly Surfeited
	2	Slightly Surfeited	Slightly Surfeited	Balanced	Balanced	Balanced
	3	Slightly Surfeited	Slightly Surfeited	Balanced	Balanced	Balanced
	4	Surfeited	Slightly Surfeited	Slightly Surfeited	Balanced	Slightly Surfeited
	A LOT	Surfeited	Surfeited	Slightly Surfeited	Balanced	Balanced

Gray squares denote deviation from validity hypotheses (Table 22).

The grocery shopping and eating out purposes show similarities to the work purpose in that there are hardly any slightly deprived cells. The difference is that most or all cells under the neutral, like, and strongly like columns are balanced. That means that the respondents want to travel the same as they currently do, even if they perceive they travel a lot. The only category differing from the short distance purpose trend is the entertainment/recreation/social activities category (Table 26). The strongly like column in this category contains respondents who are slightly deprived on average, meaning that they want to travel more. The responses in this column are

largely independent of Perceived Mobility in that there is little variation in RDM (3.5 to 3.74) as Perceived Mobility increases. The rest of the social activities columns exhibit the same trend of having little variation in RDM averages within a given Travel Liking column, displaying a relative independence from Perceived Mobility.

Table 26 – Average RDM by Perceived Mobility and Travel Liking: Short Distance Entertainment/Recreation/Social Activities (Five-Point)

Cell-Specific Average Across All Levels of RDM (Much Less, Less, Same, More, Much More)		**TRAVEL LIKING**				
		STRONGLY DISLIKE	*DISLIKE*	*NEUTRAL*	*LIKE*	*STRONGLY LIKE*
PERCEIVED MOBILITY	*NONE*	Surfeited	Slightly Surfeited	Balanced	Balanced	Slightly Deprived
	2	Surfeited	Slightly Surfeited	Balanced	Balanced	Slightly Deprived
	3	N/A	Slightly Surfeited	Balanced	Balanced	Slightly Deprived
	4	N/A	Slightly Surfeited	Balanced	Balanced	Slightly Deprived
	A LOT	N/A	Slightly Surfeited	Balanced	Balanced	Slightly Deprived

Gray squares denote deviation from validity hypotheses (Table 22).

The short distance mode cross tabulations show similarities between personal vehicle (Table 27), bus (Table 28), and BART (Table 29). The similarities exist for the Travel Liking categories strongly dislike to like. Strongly dislike tends to be a combination of slightly surfeited and surfeited for RDM, dislike is nearly all slightly surfeited, neutral is balanced for the lower Perceived Mobility levels and slightly surfeited for the higher Perceived Mobility levels, and like is nearly all balanced. The strongly like column varies between the three modes. The strongly like column for private vehicle is predominantly slightly deprived except for the highest Perceived Mobility which is balanced.

Table 27 – Average RDM by Perceived Mobility and Travel Liking: Short Distance Personal Vehicle (Five-Point)

Cell-Specific Average Across All Levels of RDM (Much Less, Less, Same, More, Much More)		**TRAVEL LIKING**				
		STRONGLY DISLIKE	*DISLIKE*	*NEUTRAL*	*LIKE*	*STRONGLY LIKE*
PERCEIVED MOBILITY	*NONE*	Slightly Surfeited	Slightly Surfeited	Balanced	Balanced	Slightly Deprived
	2	Slightly Surfeited	Slightly Surfeited	Balanced	Balanced	Slightly Deprived
	3	Surfeited	Slightly Surfeited	Balanced	Balanced	Slightly Deprived
	4	Surfeited	Slightly Surfeited	Balanced	Balanced	Slightly Deprived
	A LOT	Slightly Surfeited	Slightly Surfeited	Slightly Surfeited	Balanced	Balanced

Gray squares denote deviation from validity hypotheses (Table 22).

Table 28 – Average RDM by Perceived Mobility and Travel Liking: Short Distance Bus (Five-Point)

Cell-Specific Average Across All Levels of RDM (Much Less, Less, Same, More, Much More)		**TRAVEL LIKING**				
		STRONGLY DISLIKE	*DISLIKE*	*NEUTRAL*	*LIKE*	*STRONGLY LIKE*
PERCEIVED MOBILITY	*NONE*	Slightly Surfeited	Slightly Surfeited	Balanced	Balanced	Slightly Surfeited
	2	Slightly Surfeited	Balanced	Balanced	Balanced	Balanced
	3	Slightly Surfeited	Slightly Surfeited	Balanced	Slightly Deprived	N/A
	4	Slightly Surfeited	Slightly Surfeited	Slightly Surfeited	Balanced	N/A
	A LOT	Surfeited	Slightly Surfeited	Slightly Surfeited	Balanced	Slightly Deprived

Gray squares denote deviation from validity hypotheses (Table 22).

Table 29 – Average RDM by Perceived Mobility and Travel Liking: Short Distance BART (Five-Point)

Cell-Specific Average Across All Levels of RDM (Much Less, Less, Same, More, Much More)		TRAVEL LIKING				
		STRONGLY DISLIKE	*DISLIKE*	*NEUTRAL*	*LIKE*	*STRONGLY LIKE*
PERCEIVED MOBILITY	*NONE*	Surfeited	Slightly Surfeited	Balanced	Balanced	Balanced
	2	Slightly Surfeited	Slightly Surfeited	Balanced	Slightly Deprived	Slightly Deprived
	3	Slightly Surfeited	Slightly Surfeited	Balanced	Balanced	Slightly Deprived
	4	N/A	Slightly Surfeited	Balanced	Balanced	Deprived
	A LOT	Surfeited	Slightly Surfeited	Slightly Surfeited	Balanced	Balanced

Gray squares denote deviation from validity hypotheses (Table 22).

For the bus cross tabulation (Table 28) there are some unusual results. People who strongly like a mode and perceive they do not travel on the mode (*i.e.*, Perceived Mobility is equal to none) would typically want to increase the amount they travel. However, for this case respondents are slightly surfeited on average, which means they want to travel less on the mode (which is difficult since they do not travel on it currently). The problem is that only 14 people strongly like the bus mode and the three cells for which an RDM average can properly be computed only have 3 or 4 RDM values each, making the average unreliable. For example, the cell with Perceived Mobility equal to two had two people wanting to travel more and much more but a single respondent who wanted to travel much less decreased the RDM average. That single response had a large influence on the average creating a counterintuitive answer.

The walking/jogging/bicycling cross tabulation (Table 30) displayed a strong mix of opinions. The people who like or strongly like walking, biking, or jogging wanted to do more of it, on average, no matter how much they currently were doing. Likewise the people who dislike these modes wanted to do less of them even if they currently did not use the mode. People who were neutral in Travel Liking about the active modes wanted to travel the same amount they currently

were doing. This walking/jogging/bicycling cross tabulation had the fewest number of cells that were balanced compared to all other modes and purposes, which is not surprising since people may have stronger opinions regarding exercise modes. People who jog a lot find that they want to spend more time jogging and being active because they enjoy the benefits of the exercise. People who dislike it probably prefer other types of exercise or find any type of exercise (especially for travel) exhausting and too difficult.

Table 30 – Average RDM by Perceived Mobility and Travel Liking: Short Distance Walking/Jogging/Bicycling (Five-Point)

Cell-Specific Average Across All Levels of RDM (Much Less, Less, Same, More, Much More)		**TRAVEL LIKING**				
		STRONGLY DISLIKE	*DISLIKE*	*NEUTRAL*	*LIKE*	*STRONGLY LIKE*
PERCEIVED MOBILITY	*NONE*	Surfeited	Slightly Surfeited	Balanced	Slightly Deprived	Deprived
	2	Slightly Surfeited	Slightly Surfeited	Balanced	Slightly Deprived	Deprived
	3	Slightly Surfeited	Slightly Surfeited	Balanced	Slightly Deprived	Slightly Deprived
	4	N/A	Balanced	Balanced	Slightly Deprived	Slightly Deprived
	A LOT	N/A	N/A	Slightly Deprived	Balanced	Slightly Deprived

Gray squares denote deviation from validity hypotheses (Table 22).

Long distance overall travel cross tabulations displayed in Tables 31 and 32 demonstrate a different story than short distance travel. RDM for long distance travel appears to be independent of the respondents' Perceived Mobility unless they perceive they travel a lot. The cells in Table 31 and 32 are consistent for Perceived Mobility between none and 4 (moderately heavy). The only category for which the pattern changes is when Perceived Mobility is a lot which bumps the average RDM up one level. Therefore the amount people like long distance travel is an important determination of whether they want to increase or decrease their travel. Those people who strongly like long distance travel feel deprived in the amount they are traveling, meaning that they want to travel much more, even if they already perceive they travel moderately heavy amounts.

Likewise the people who dislike long distance travel still want to travel the same amount they currently do whether they travel none or moderately heavy amounts.

Table 31 – Average RDM by Perceived Mobility and Travel Liking: Overall Long Distance (Three-Point)

Cell-Specific Average Across All Levels of RDM (Less, Same, More)		**TRAVEL LIKING**		
		DISLIKE	*NEUTRAL*	*LIKE*
PERCEIVED MOBILITY	*LOW*	Balanced	Slightly Deprived	Deprived
	MEDIUM	Balanced	Slightly Deprived	Deprived
	HIGH	Slightly Surfeited	Balanced	Slightly Deprived

Gray squares denote deviation from validity hypotheses (Table 21).

Table 32 – Average RDM by Perceived Mobility and Travel Liking: Overall Long Distance (Five-Point)

Cell-Specific Average Across All Levels of RDM (Much Less, Less, Same, More, Much More)		**TRAVEL LIKING**				
		STRONGLY DISLIKE	*DISLIKE*	*NEUTRAL*	*LIKE*	*STRONGLY LIKE*
PERCEIVED MOBILITY	*NONE*	Slightly Surfeited	Balanced	Balanced	Slightly Deprived	Deprived
	2	Slightly Surfeited	Balanced	Balanced	Slightly Deprived	Deprived
	3	Slightly Surfeited	Balanced	Balanced	Slightly Deprived	Deprived
	4	N/A	Balanced	Balanced	Slightly Deprived	Deprived
	A LOT	Surfeited	Slightly Surfeited	Slightly Surfeited	Balanced	Slightly Deprived

Gray squares denote deviation from validity hypotheses (Table 22).

5.2.2 Logical Inconsistencies in the Relationship Between Perceived Mobility and RDM

The cross tabulation results reveled a glaring inconsistency in the relationship between Perceived Mobility and RDM. When Perceived Mobility is equal to "None", no matter what the level of liking for the travel category, RDM should never be equal to "Much Less" or "Less". Traveling less than "None" is not possible. This potential problem was anticipated in the survey design phase, and the instructions explicitly stated "Suppose you never travel for a certain purpose or by

a certain means (indicated by circling “1” or “none” for that category on Question D.1). If you don’t want to travel in that category, here check “about the same” (that is, still “none” for that purpose or means)”. While some respondents may have read and heeded the instructions, it is clear that their effect was limited. The extent of this problem is seen in every single overall, mode, and purpose cross tabulation. Tables 33 and 34 indicate the number of people who answered “Much Less” or “Less” when they answered “None” for Perceived Mobility. The largest number of inconsistencies (474 total) is found for the Bus category. The gray squares of Tables 33 and 34 denote which RDM averages in Tables 23 thru 32 were influenced the most, resulting in cells that indicated people were “Surfeited” or “Slightly Surfeited” for travel. Some inconsistencies could be due to people interpreting “None” as being nearly or approximately none. If this were the case, then traveling less would make some sense. More generally, however, the statement that people want to travel less even though they do not travel currently is probably an indicator of their strong attitude towards that particular mode or purpose. It is quite telling that the inconsistencies are most prevalent for the modes/purposes that are widely viewed as disagreeable: work, chauffeuring, transit, and to some extent walking/jogging/bicycling. The inconsistencies affect the rest of this chapter also; the inconsistency is shown in each one of the graphs and the regression analysis was performed on the raw data. Therefore the relationships determined through the regression equations may not be completely valid. Future analysis should use more sophisticated approaches in which the RDM responses for Perceive Mobility equal to “none” are properly censored.

Table 33 – RDM Count for Perceived Mobility Equal to "None" (Short Distance)

Short Distance Liking →	Strongly Dislike		Dislike		Neutral		Like		Strongly Like	
Travel Category ↓ RDM →	Much Less	Less	Much Less	Less	Much Less	Less	Much Less	Less	Much Less	Less
Overall	0	1	2	1	1	2	0	0	0	1
Commute to Work/School	79	12	26	9	43	11	3	1	3	1
Work/School Related Activities	79	2	26	9	60	16	3	3	4	2
Grocery Shopping	7	4	2	2	8	2	1	1	0	0
Eat	7	1	2	4	3	5	2	2	1	0
Entertainment/Recreation/ Social Activities	2	1	1	4	4	5	2	0	2	0
Taking Others	84	12	16	13	41	15	4	1	4	2
Personal Vehicle	4	1	1	2	1	4	1	2	1	0
Bus	240	25	102	37	49	7	9	2	2	1
BART	123	6	59	14	63	21	18	6	8	0
Walking/Jogging/Bicycling	50	2	14	8	21	3	4	0	0	0

Gray squares denote travel category/Travel Liking combinations for which the sample-wide RDM average was "Surfeited" or "Slightly Surfeited".

Table 34 – RDM Count for Perceived Mobility Equal to "None" (Long Distance)

Long Distance Liking →	Strongly Dislike		Dislike		Neutral		Like		Strongly Like	
Travel Category ↓ RDM →	Much Less	Less	Much Less	Less	Much Less	Less	Much Less	Less	Much Less	Less
Overall	6	3	2	0	4	3	0	1	0	0
Work/School Related Activities	139	18	37	45	57	15	13	3	7	2
Entertainment/Recreation/ Social Activities	10	1	3	3	11	9	3	4	1	0
Personal Vehicle	16	2	8	3	9	6	3	4	0	0
Airplane	31	4	1	6	15	5	7	3	2	0

Gray squares denote travel category/Travel Liking combinations for which the sample-wide RDM average was "Surfeited" or "Slightly Surfeited".

5.2.3 Graphs

The graphical analysis pictorially represents the quantitative information contained in the cross tabulations. The graphs simply plot the RDM average against Perceived Mobility for varying levels of Travel Liking. The graphs were produced for both the three-point and the five-point scales. Though the three-point scales have not been used for most of the analysis because the five-point scale results are more rigorous, they provide cleaner graphs than the more cluttered five-point scale graphs. The three-point and five-point graphs are included in Appendix D but only the three-point graphs are discussed below. The titles for each graph also display which effects were found to be significant in ANOVA testing. When a Perceived Mobility or Travel Liking main effect is significant, it means that the average RDM rating significantly differs by level of Perceived Mobility or Travel Liking, respectively. When the interaction effect is significant, the lines tend to converge, diverge, or cross. In these cases, the Travel Liking effect on RDM depends on the Perceived Mobility value. When the interaction term is absent, the lines tend to be parallel to one another. This means that the Travel Liking effect on RDM does not depend on the Perceived Mobility value, and similarly that the effect of Perceived Mobility on RDM is independent of Travel Liking. The number of cases in each Travel Liking level is located in parentheses in each graph's legend.

The first notable result is that the RDM average increases for each increase in Travel Liking within each Perceived Mobility level (*i.e.*, when Perceived Mobility is equal to 1, the RDM average for Travel Liking equal to 2 is greater than the RDM average for Travel Liking equal to 1). This means that the separation of lines is consistent for all graphs, whether they are long or short distance, mode or purpose specific. The results also show that Travel Liking, in general, affects the placement of the RDM average: the higher the Travel Liking the higher the RDM average. For short distance travel, all the RDM averages are at or below neutral for 7 of the 11 graphs. This means that, on average, people want to travel the same or less for most short

distance travel, regardless of their Perceived Mobility or Travel Liking for that type of travel, which is consistent with the cross tabulation results. The graphs that break this trend are entertainment/recreation/social activities, bus, train/BART/light rail, and walking/jogging/ bicycling. The entertainment category has three parallel horizontal lines; the one for neutral Travel Liking falls directly at the RDM midpoint of wanting to travel the same amount. The dislike and like categories fall below and above this midpoint, respectively. For bus travel, the group who likes such travel is above the RDM midpoint of traveling the same (2) for every Perceived Mobility response. The neutral category starts exactly at the RDM midpoint of 2.00 (same) for Perceived Mobility of 1 (a little), and then declines to a RDM average of 1.56 for Perceived Mobility of 3 (a lot). The BART graph shows a similar trend as the bus graph, where the like category exceeds the RDM midpoint of 2, but the neutral category starts at 2.01 (Perceived Mobility of 1) and then declines to 1.54 (Perceived Mobility of 3). The final category that breaks the trend of wanting to travel the same or less for short distance travel is the walking/ jogging/bicycling category. In this case, for both those who like such travel and those who are neutral about it, average RDMs are above the midpoint of two. Even for those who dislike walking and think they do it a lot, their RDM average is at 2.00 (wanting to do it about the same amount).

The walking graph displays another interesting quality; the RDM average lines increase with increasing Perceived Mobility (for the dislike and neutral categories). The walking graph shares this quality with the long distance entertainment/recreation/social activities graph. These are the only two graphs that suggest that traveling more results in wanting to increase the amount you travel. This concept is discussed further in the regression analysis portion of the results. All the other graphs display a decreasing or flat line for each Travel Liking category. The categories with flat lines are going out to eat, short distance entertainment/recreation/social activities, and long distance personal vehicle travel. In these cases, the amounts that people perceive they travel

make no difference in whether they want to increase or decrease their travel for that mode or purpose.

Table 35 displays the highest and lowest RDM averages for short distance categories. The top three categories, with the highest RDM averages, are all modes whereas the bottom three categories, with the lowest RDM averages, comprise one mode category and two purpose categories. The bottom three categories are commonly associated with undesirable travel (public transportation, commuting, and chauffeuring), which justifies the low RDM average. Interestingly, BART placed in both the top and the bottom rankings, which demonstrates the diverse nature of travel attitudes and the important roles of Perceived Mobility and Travel Liking in determining RDM. The Perceived Mobility for the top three averages was either low or medium, while the Travel Liking was "like" across the board. The Perceived Mobility for the bottom three averages was either medium or high, while the Travel Liking was "dislike" across the board.

Table 35 - Short Distance RDM Averages (3 Point)

	Category	RDM Average	Perceived Mobility	Travel Liking
Top 3	Walk	2.66 - 2.68 - 2.66	1 - 2 - 3	Like
	Bus	2.42	2	Like
	BART	2.41 (2)	1 - 2	Like
Bottom 3	BART	1.07	3	Dislike
	Commute	1.13	3	Dislike
	Taking Others	1.16 (2)	2 - 3	Dislike

The long distance three point graphs are balanced more around the “travel the same” line than their short distance counterparts, with the neutral Travel Liking category typically falling near the RDM midpoint of 2. Table 36 displays the highest and lowest RDM averages for long distance categories. The RDM averages for the top three are higher than the highest for the short distance category (Table 35). Also, the lowest three are higher than the bottom three for the short distance graph. This shows the affinity most people have towards long distance travel. The categories

that the top and bottom come from are also quite interesting. The top categories include the social or recreation trip and traveling by airplane. Traveling for recreation could be confounding the destination with the actual travel, however the travelers may also be more relaxed and in a positive spirit or attitude due to the destination they are going to, and hence legitimately enjoying the travel itself more. Therefore it is difficult to determine how much of the average is due to confounding the trip with the destination and how much is the true joy of traveling. The bottom categories include traveling for work or school related activities and traveling by personal vehicle. The same reasoning applies to the work trip as to the social trip. The long distance work trip usually means you are going to meetings or trying to obtain more business, which can be quite stressful. The travel itself then becomes a lot less enjoyable due to the focus of preparing for the work that is at the destination. Having the personal vehicle in the bottom versus the airplane at the top may reflect the perception that driving has more stress because you must pay attention to the road, determine the route to be taken, and plan stops for gas and food. Airplane differs in that once you board the plane the pilot takes over the driving and flight attendants serve you drinks and possibly food. Many flights also include music and movies to make the trip even more enjoyable.

Table 36 - Long Distance RDM Average (3 Point)

	Category	RDM Average	Perceived Mobility	Travel Liking
Top 3	Social	2.76	3	Like
	Overall	2.73	1	Like
	Airplane	2.71 (2)	1 - 2	Like
Bottom 3	Work	1.53 - 1.35 - 1.21	1 - 2 - 3	Dislike
	Overall	1.57	3	Dislike
	Personal Vehicle	1.60 (2)	2 - 3	Dislike

5.2.4 Regression Analysis

Regression analysis was the third way of analyzing the three-way relationships among Perceived Mobility, RDM, and Travel Liking. We modeled RDM as the dependent variable in the equations with Perceived Mobility, Travel Liking, and a Perceived Mobility-Travel Liking

interaction term as the independent variables. The interaction term is calculated by multiplying the Perceived Mobility and Travel Liking responses. If the interaction term enters the equation it signifies that the Travel Liking term's effect on RDM does depend on the Perceived Mobility value. If there is no significant interaction term then the Travel Liking effect on RDM does not depend on the Perceived Mobility value (and vice versa). The regression analysis was performed on both the three-point and the five-point versions of each scale. The three-point results returned smaller adjusted R^2 values than the five-point results. Condensing the scale could make it more difficult to explain the difference between an RDM of less (1) or the same (2). Therefore, only the five-point results and tables are discussed below.

The regression results for short distance travel (Table 37) have low to moderate adjusted R^2 values for most modes and purposes, ranging between 0.095 for eat a meal and 0.374 for walking/ jogging/bicycling. This means that just knowing how much people like travel and perceive they travel does not mean one can predict with great accuracy if they want to increase or decrease their travel. With more explanatory variables included, such as many of the travel attitudes collected in the survey, these equations could achieve better fits to the observed data. Travel Liking was an important term in the regression equations, entering into every equation except overall short distance travel (where at least the interaction with Perceived Mobility is significant). This shows how important liking travel is to wanting to travel more or less. The positive direction for Commuting to Work/School is consistent with the Redmond and Mokhtarian (2000) paper where Commute Travel liking was a positive term in the Relative Desired Commute model.

Table 37 – Short Distance Regression

Short Distance	Adjusted R^2	Constant	TL	PM	Interaction
Overall	0.161	3.171		-0.423	0.0866
Commute to Work/School	0.239	1.868	0.267	-0.185	0.0412
Work/School Related Activities	0.142	1.621	0.338		
Grocery Shopping	0.100	2.461	0.139	-0.133	0.0312
Eat	0.095	2.165	0.234		
Entertainment/Recreation/ Social Activities	0.150	1.877	0.358		
Taking Others	0.182	1.780	0.363	-0.097	
Personal Vehicle	0.201	1.812	0.394	-0.101	
Bus	0.163	1.616	0.440	-0.049	
BART	0.246	1.427	0.515	-0.068	
Walking/Jogging/Bicycling	0.374	0.477	0.808	0.423	-0.1080

Perceived Mobility was a negative term in every equation it entered except for the walking/ jogging/bicycling category, where it was positive and sizable. Thus, in general (7 cases out of 11), the more people perceive they travel, the more they want to decrease their travel. This negative direction for Commuting to Work/School is consistent with the Redmond and Mokhtarian (2000) paper where Commute Perceived Mobility was a negative term in the Relative Desired Commute model. In the single case of walking/jogging/bicycling, however, traveling a lot by that mode seems to generate a desire to do it even more. One explanation is that the more people do active things for recreation or travel the better they feel about themselves. This leads to wanting to travel more or exercise more to maintain a positive self-image and stay physically fit. As noted with respect to the graphs, even those who disliked walking the most and perceived they did it a lot, still wanted to do it about the same amount. Thus, walking/jogging/bicycling may be unique among travel modes in that people do it to some extent because it is good for them, whether they like it or not.

Perceived Mobility was not significant in three of the 11 models: for the work/school related activities, eating out, and entertainment/recreation/social activities categories. In these cases, the amounts people were currently traveling seemingly had no impact on the amounts they wanted to travel. The only thing that matters for these equations is how much you like to do that travel. If you like it a lot, chances are you want to increase your travel. And if you dislike the travel, chances are you want to decrease your travel.

The highest R^2 value (0.374) is for the walking/jogging/bicycling category and in general the modes had stronger R^2 values than the purposes. The modes had three R^2 values above 0.200 whereas only one purpose category was above that mark. This also could be due to confounding the destination with the travel itself. The two variables that would be affected by confounding the destination with the travel itself are Travel Liking and RDM. Travel Liking is naturally affected since those people no longer perceive the question as asking if they like the *travel* to the destination, but rather if they like the activity at the *destination*. RDM, however, is less affected since those people must consider if they want to increase, decrease, or keep the engagement in those activities the same. Even if the activity replaces travel in the statement it does not mean people will want to increase their engagement in that activity. People might not want to increase engagement in an activity due to cost, or even the additional travel to get there. Therefore, RDM might not be affected as much as Travel Liking. The activity is more obvious when talking about different trip purposes than different travel modes. Though people could use a mode only for a certain purpose, the occurrence is less likely and requires an extra associative thought regarding the mode. Therefore, the travel modes might capture the true relationships between RDM and Travel Liking better, and thus lead to higher R^2 values.

The long distance regression results (Table 38) generally had higher adjusted R^2 values than the short distance results, with the lowest value at 0.223 for both personal vehicle and work/school

related activities. The highest R^2 value (0.312) was for airplane travel and the second highest was for entertainment/recreation/social activities. The airplane travel equation is significant because the only term in the equation is Travel Liking. So therefore, the amount you enjoy traveling by airplane is directly and strongly related to whether you want to travel more or less by airplane - independently of how much you are currently flying. Travel Liking entered into each equation as positive, reconfirming the contention that it is important to know whether people like a certain mode or purpose to understand whether they want to increase or decrease their travel.

Table 38 – Long Distance Regression

Long Distance	**Adjusted R^2**	**Constant**	**TL**	**PM**	**Interaction**
Overall	0.232	2.145	0.485	-0.124	
Work/School Related Activities	0.223	1.742	0.366	-0.160	0.0405
Entertainment/Recreation/ Social Activities	0.279	1.131	0.624	0.240	-0.0490
Personal Vehicle	0.223	1.742	0.401		
Airplane	0.312	1.617	0.525		

Perceived Mobility was a negative term for overall and work/school related activities, positive term for entertainment/recreation/social activities, and did not enter for private vehicle or airplane. The negative term implies that the more you travel long distance overall or for work the less you want to increase that travel - the expected result. The positive term for entertainment activities is unexpected, but understandable since many people are more relaxed and upbeat regarding their trip. Therefore traveling more for this purpose may not seem burdensome and may even induce the desire to increase the travel. The private vehicle and airplane modes not having a Perceived Mobility term simply suggests that the only thing that matters for wanting to travel more or less by these modes is whether you enjoy them. If you love to take long vehicle roadtrips, you probably will want to increase the amount you do whether you do a lot of them over the year or whether you do not get the chance. As seen in the cross tabulations and graphs,

this means that, for these two long distance travel modes, the RDM average is approximately constant for all levels of Perceived Mobility within a given Travel Liking category.

CHAPTER 6 - VECTOR SORTING

6.1 DESCRIPTION OF APPROACH

Vector sorting entails the creation of vectors based on the responses to the questions of interest. The vectors are created by first determining what type and therefore what dimension vector is being created. For this thesis, four different cases were identified. Case 1 looks at the short and long distance "overall" responses for each of the variables Travel Liking, Perceived Mobility, RDM. Case 2 looks at Travel Liking using the categories short distance commute to work or school, long distance work/school-related activities, and short and long distance entertainment/ recreation/social activities. Case 3 uses the same categories as Case 2 for the RDM variable. Case 4 uses the same categories as Cases 2 & 3 for the Perceived Mobility variable. Case 1 therefore involves six-dimensional vectors while Cases 2, 3, and 4 involve four-dimensional vectors.

The next step in vector sorting is to create the vectors. For ease of manipulation, a single number is created where each digit is the response of an individual on the corresponding dimension of the vector. If the vector is six dimensional then the first category's response is multiplied by 10^5, the next category's response by 10^4, and so on until the last number is multiplied by 10^0. Each number is then added together to create the final "vector". Table 39 shows an example of the process. Once the vectors are created for each respondent and case then the frequencies of occurrence of each vector are tabulated. The frequencies are then exported to Excel where they can be sorted by size. The most frequently occurring vectors for each case represent common response patterns that exist within the sample.

Table 39 – Vector Creation Example for Case 2 (Four-Dimensional TL Vector)

Category	Response (five-point)	Multiply by	Result
SD TL Work	1	10^3	1000
LD TL Work	2	10^2	200
SD TL ERS	4	10^1	40
LD TL ERS	5	10^0	5
Summation			1245

6.2 RESULTS

Vector sorting was a first stage of grouping together similar sets of responses to see what patterns naturally occur in the data. Vector sorting precedes cluster analysis where the groups are clustered into 5-10 groups. Four different vectors were created for both three-point and five-point data. The four vectors are: overall attitudes, Travel Liking, RDM, and Perceived Mobility. The discussion of each vector refers to a table featuring the 25 most frequently occurring patterns for both three-point and five-point data covering the entire sample. More vector sorting data is supplied in Appendix E and contains the top 25 vectors for each city as well as the vectors for the entire sample.

6.2.1 Overall Attitudes

The six-dimensional overall attitude vectors contain the overall responses for short and long distance questions on Travel Liking, RDM, and Perceived Mobility. The vector sequence is as follows: SD Travel Liking - LD TL - SD RDM (Satisfaction) - LD RDM (S) - SD Perceived Mobility - LD PM. This vector is abbreviated TLSPM Summary in Appendix E, where the "S" stands for satisfaction (former name for RDM - Relative Desired Mobility). The overall attitude vector results are discussed below and displayed in Table 40.

For the three-point scale, a total of 365 different sequences (out of $3^6 = 729$ total possible sequences) were found in the data, with the top 25 capturing 38% of the sample. If the responses were independent of each other, you would expect to see a larger percentage of possible

sequences represented in the data, due to the sample size of 1904 respondents. Since only 50% of the possible vectors are present, the variables seem to be related making certain combinations of variables highly unlikely to occur. The top 25 vectors showed an interesting trend regarding long distance Travel Liking equal to like and long distance RDM equal to more (the second and fourth elements in the sequence both being equal to 3). Eleven of the top twelve and 17 of the top 25 vectors contained these answers. This demonstrates a common theme or attitude prevailing throughout the population that people enjoy long distance travel and they want to do more long distance traveling. Recent evidence from the FAA supports this statement. San Francisco International Airport has increased its annual enplaned passenger totals 15.3% over 5 years (1994-1998) to 19,079,664[1] (FAA, 1998). Metropolitan Oakland International Airport also has increased enplaned passenger totals 10.3% over 5 years (1994-1998) to 4,497,481[1] (FAA, 1998). These two study area airports are not unusual; the US has seen a jump of 14.9% over 5 years (1994-1998) to 655,245,232[1] enplaned passengers (FAA, 1998). These numbers only look at airplane travel, not personal vehicle or train long distance traveling. The enplaned passenger totals show, however, that people are traveling more long distance as airports can accommodate more passengers and fares are reaching lower levels that enable more income groups to also experience long distance travel. The main point is that the attitudes depicting enjoying long distance travel and wanting to travel more are also supported by actual increases in passenger numbers from area airports and the entire United States.

No top 25 sequence (three-point) has a short distance RDM equal to more (3). The statistics shown earlier in the cross tabulations analysis confirmed that no cell had an RDM average that indicated that it was deprived. This is also supported by the five-point sequence results where there is no sizable group indicating that they want to travel more (4) or much more (5). However,

[1] The FAA does not distinguish between long distance and short distance flights. This number is assumed to comprise mostly trips over 100 miles in length, thereby designating the number of enplaned passengers

there is also no one in the top 25 sequences who wants to travel much less (1). In fact, people in the top 13 sequences all indicate that they want to travel the same (3) and only those in 3 of the top 25 sequences want to travel less (2). The top sequences also indicate that people with those sequences are all either neutral (3) about short distance travel or they actually like (4) the travel. The top 25 vectors for the five-point scales only account for 21.85% of the sample; 864 unique vectors are present in the data, out of $5^6 = 15{,}625$ total possible patterns. However, the results do show a theme of being neutral or liking short distance and wanting to travel the same for short distance. Likewise there is no one in the top 25 patterns who dislikes long distance travel or who wants to travel less in the long distance category.

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for long distance trips.

Table 40 - Overall Attitude Vectors

	3 Point Scales (N=1904)			5 Point Scales (N=1904)		
Rank	Vector*	Frequency	Percent	Vector*	Frequency	Percent
1	232322	59	3.10	343433	48	2.52
2	222221	43	2.26	333332	37	1.94
3	232321	43	2.26	343432	31	1.63
4	332321	41	2.15	443333	24	1.26
5	332332	38	2.00	343333	21	1.10
6	232331	37	1.94	443432	21	1.10
7	231332	32	1.68	333322	18	0.95
8	332331	31	1.63	343422	17	0.89
9	231331	30	1.58	343442	17	0.89
10	232332	30	1.58	343443	17	0.89
11	232333	30	1.58	443332	15	0.79
12	332333	29	1.52	333333	13	0.68
13	222211	28	1.47	333432	13	0.68
14	332322	28	1.47	342432	12	0.63
15	332222	25	1.31	443443	12	0.63
16	232311	24	1.26	332342	11	0.58
17	232222	22	1.16	343434	11	0.58
18	231321	21	1.10	443433	11	0.58
19	231322	19	1.00	443442	11	0.58
20	231333	19	1.00	443342	10	0.53
21	331331	19	1.00	443453	10	0.53
22	332221	19	1.00	342452	9	0.47
23	332232	19	1.00	343343	9	0.47
24	221231	18	0.95	443343	9	0.47
25	231232	18	0.95	453433	9	0.47
Total Top 25	25	722	37.92	25	416	21.85
Total in Sample	365	1904	100.00	864	1904	100.00

* Vector Code – TL SD - TL LD - RDM SD - RDM LD - PM SD - PM LD

6.2.2 Travel Liking

The four-dimensional Travel Liking vectors contain the responses for short and long distance questions on Travel Liking for the commute to work/school and entertainment/recreation/social questions. The vector sequence is as follows: SD Commute to Work/School (Work) - SD Entertainment/Recreation/Social (Soc) - LD Work - LD Soc. This vector is abbreviated TL Summary in Appendix E. The Travel Liking vector results are discussed below and displayed in Table 41.

For the three-point scale, the top 25 of 70 total unique sequences (out of $3^4 = 81$ possible) captured 87% of the sample. The top 15 vectors contained all possible vector combinations where Travel Liking for both short distance and long distance entertainment/recreation/social activities was equal to three (like). This means that nine vectors out of the top 15 had people who liked traveling for social activities (46.4% of the sample), which shows just how common it is for people to enjoy a trip for social reasons. The attitudes for social trips are much more consistent than the attitudes for work trips. Only six of the possible nine sequences that dislike both short distance and long distance work travel were found in the top 25 vectors (20.9% of the sample). However, disliking short distance commute travel (1xxx, those patterns starting with a one) was a more common trait. Twenty-seven patterns are possible, and 11 of these appear among the top 25 patterns, accounting for 715 people (37.6% of the sample). Other notable sequences include the third-ranked neutral group (2222) with 120 responses (6.3% of the sample), the fourth-ranked liking group (3333) with 104 responses (5.5% of the sample), and the 25th-ranked dislike group (1111) with 23 responses (1.2%). Some notable sequences did not make the top 25 listing but were represented in the sample: short distance lovers (3311) with 14 responses, long distance lovers (1133) with 8 responses, like the commute to work but dislike all other travel (3111) with 4 responses, and like short distance social travel but dislike the three other categories (1311) with 20 responses.

Table 41 - Travel Liking Vectors

	3 Point Scales (N=1904)			5 Point Scales (N=1904)		
Rank	Vector*	Frequency	Percent	Vector*	Frequency	Percent
1	2323	178	9.35	3333	120	6.30
2	1313	172	9.03	3434	111	5.83
3	2222	120	6.30	3334	62	3.26
4	3333	104	5.46	2434	44	2.31
5	1323	98	5.15	4444	44	2.31
6	1333	82	4.31	2424	43	2.26
7	1213	78	4.10	4434	35	1.84
8	2223	77	4.04	2333	34	1.79
9	2313	76	3.99	2323	32	1.68
10	3323	65	3.41	1414	31	1.63
11	1212	64	3.36	3323	31	1.63
12	2333	63	3.31	3435	31	1.63
13	1223	50	2.63	2324	30	1.58
14	1222	47	2.47	3433	30	1.58
15	3313	46	2.42	2444	29	1.52
16	2233	44	2.31	3424	29	1.52
17	2212	42	2.21	3324	26	1.37
18	1233	41	2.15	2334	24	1.26
19	2213	36	1.89	3344	24	1.26
20	2322	34	1.79	3444	24	1.26
21	1211	33	1.73	4433	22	1.16
22	3322	30	1.58	2435	21	1.10
23	1312	27	1.42	3535	21	1.10
24	2211	24	1.26	1313	20	1.05
25	1111	23	1.21	4424	19	1.00
Total Top 25	25	1654	86.87	25	937	49.21
Total in Sample	70	1904	100.00	246	1904	100.00

* Vector Code – TL SD Commute - TL SD Social - TL LD Work/School - TL LD Social

The five-point scale data (Table 41) has 246 total vectors (out of $5^4 = 625$ possible) with 49% of the sample comprising the top 25. The only responses of strongly like are in the social columns with one among the short distance responses and three in the long distance responses. Conversely, the only strongly dislikes are in the work columns, occurring for both short distance and long distance in the two patterns in which they appear. In the social category, no top 25 vector had a value below neutral for either short distance or long distance. This means that a large portion of people enjoy travel for entertainment/recreation/social activities. The top vector was the neutral group (3333) who encompassed 6.3% of the sample (120 responses). Other

notable vectors not in the top 25 sequences are the travel likers (5555), the travel haters (1111), and the short distance lovers (5511). The travel haters had the largest percentage of these groups at 0.3%, and the travel likers and the short distance lovers followed with 0.2% each. An interesting note is that exclusive long distance lovers (1155) did not exist in the sample. To get a better idea what type of people enjoy the different types of travel, Travel Liking was selected for the cluster analysis whose results follow the vector sorting analysis section.

6.2.3 Relative Desired Mobility (RDM)

The four dimensional RDM vectors contain the responses for short and long distance questions on RDM for the commute to work/school and entertainment/recreation/social questions. The sequence is as follows: SD Commute to Work/School (Work) - SD Entertainment/Recreation/ Social (Soc) - LD Work - LD Soc. This vector is abbreviated S Summary in Appendix E, where "S" stands for satisfaction (former name for RDM). The RDM vector results are discussed below and displayed in Table 42.

The three-point vectors (Table 42) captured 90% of the sample in the top 25. The top 5 sequences alone netted 44% of the sample. This suggests that the responses on these four variables are much more closely dependent than in the other cases studied, with a certain few patterns appearing quite frequently. There were 65 total vectors out of 81 possible patterns. The top 25 vectors contained six of nine sequences where people wanted to travel more for both short and long distance social travel (x3x3) (22.0% of the sample) and six of nine sequences where people wanted to travel less for both short and long distance work travel (1x1x) (19.3%). The most frequently occurring pattern was neutrality across the board (12.0% of sample), or people who do not want to increase or decrease their travel. This is significant for two reasons: the first reason is that the single largest group of people wants to stay the same, and the second reason is that 88% of the sample wants to change the amount of their travel in some way. About a third of

the sample (34.7%) wants to change their travel in at most one category. On the other hand, another third of the sample (34.1%) wants to change the amount they travel in at least three of the four categories studied here, with one in nine people wanting to change all four. These percentages show that there are a lot of people who want to change their travel behavior in some direction. There are 38 people (2%) who want to decrease their travel in all four categories (1111), and only 6 (0.3%) who want to increase their travel in all four categories (3333). The direction of change can be quite complicated to predict and probably relies on many factors (see regression analysis for more details on modeling the RDM). The desire to travel more for the commute to work (3xxx) was found in 41 responses (2.2%) occurring for the first time in the 35th ranked position.

Table 42 - Relative Desired Mobility Vectors

	3 Point Scales (N=1904)			5 Point Scales (N=1904)		
Rank	Vector*	Frequency	Percent	Vector*	Frequency	Percent
1	2222	229	12.03	3333	229	12.03
2	2223	200	10.50	3334	160	8.40
3	1223	143	7.51	2334	92	4.83
4	2323	137	7.20	3434	86	4.52
5	1222	128	6.72	2333	80	4.20
6	1313	99	5.20	1333	48	2.52
7	1212	91	4.78	1313	44	2.31
8	1213	85	4.46	3335	40	2.10
9	1323	80	4.20	3435	33	1.73
10	2213	59	3.10	3323	32	1.68
11	2233	48	2.52	3324	32	1.68
12	2212	46	2.42	2434	31	1.63
13	1233	43	2.26	3344	30	1.58
14	2313	43	2.26	2323	28	1.47
15	1111	38	2.00	1314	25	1.31
16	1211	35	1.84	1414	25	1.31
17	1333	32	1.68	1334	24	1.26
18	1123	28	1.47	2324	22	1.16
19	2333	28	1.47	3314	21	1.10
20	2322	22	1.16	2344	18	0.95
21	2211	21	1.10	3433	18	0.95
22	1113	20	1.05	1434	16	0.84
23	1122	20	1.05	2335	16	0.84
24	2122	17	0.89	3233	15	0.79
25	2123	16	0.84	3424	15	0.79
Total Top 25	25	1708	89.71	25	1180	61.97
Total in Sample	65	1904	100.00	209	1904	100.00

* Vector Code – RDM SD Commute - RDM SD Social - RDM LD Work/School - RDM LD Social

The patterns based on the five-point scales (Table 42) captured 62% of the responses among the top 25 (209 different sequences were found in the sample, out of 625 possible). Among the top 25 vectors only three patterns (involving 89 people) indicated wanting to travel much more (5), and all three had that response in the long distance social travel category. Six vectors among the top 25 involved wanting to commute to work much less (1xxx) and four vectors had wanting to travel long distance for work much less (xx1x). No other top vectors contained a "much less" rating. Also, no top vector involved wanting to commute to work more or much more. The first

vector with such a response was the 82nd vector that had 5 responses. Thus, not surprisingly, it is quite common to not want to increase the work commute. This is not to say that no one enjoys or does not want to have a commute to work. Twelve of the top 25 sequences (comprising 37.3% of the sample) and 61 of the total 209 sequences found (49.4%) have people who want to commute the same amount. Some other notable patterns are the travel surfeited (1111) who want to travel much less in all four categories and the travel deprived (5555) who want to travel much more in all four categories. The travel surfeited account for 0.7% of the sample with 14 responses, and the travel deprived number 2 responses or 0.1%.

6.2.4 Perceived Mobility

The four-dimensional Perceived Mobility vectors contain the responses for short and long distance questions on Perceived Mobility for the commute to work/school and entertainment/ recreation/social questions. The sequence is as follows: SD Commute to Work/School (Work) - SD Entertainment/Recreation/Social (Soc) - LD Work - LD Soc. This vector is abbreviated PM Summary in Appendix E. The Perceived Mobility vector results are discussed below and displayed in Table 43.

The top 25 patterns based on the three-point scales (Table 43) accounted for 76.3% of the sample with 79 (out of a possible 81) total vectors being represented. Only two of the top 25 vectors have values other than "a little" for long distance work (xx1x), indicating that this sample does not include many heavy business travelers. Another observation is that 5 of the top 6 vectors have a "1" (little) response for long distance social travel. This means that it is quite common for respondents to feel that they do not travel that much long distance for social purposes. This could be due to vacation schedules where people only take one or maybe two long distance trips a year.

The "don't travel much" vector (1111) was the largest group with 174 responses (9.1% of the sample). This vector could be capturing some of the retirees or the unemployed portions of the sample. Other notable vectors include the 2nd ranked commuter group (3111), the heavy travel group (3333), and the medium group (2222). The commuter vector was quite large at 136 responses (7.1%), but the heavy travel group (0.9%) and the medium group (0.8%) were not sizable.

Table 43 - Perceived Mobility Vectors

	3 Point Scales (N=1904)			5 Point Scales (N=1904)		
Rank	Vector*	Frequency	Percent	Vector*	Frequency	Percent
1	1111	174	9.14	1313	47	2.47
2	3111	136	7.14	1212	40	2.10
3	1212	105	5.51	1312	37	1.94
4	1211	91	4.78	5212	37	1.94
5	3211	81	4.25	2212	31	1.63
6	2111	79	4.15	2222	29	1.52
7	1313	70	3.68	3222	29	1.52
8	1213	56	2.94	3312	27	1.42
9	3212	55	2.89	2313	26	1.37
10	3312	53	2.78	2323	26	1.37
11	2211	52	2.73	1414	25	1.31
12	3313	47	2.47	1111	24	1.26
13	1112	46	2.42	3323	24	1.26
14	1311	42	2.21	3212	23	1.21
15	3311	42	2.21	5222	23	1.21
16	2212	41	2.15	5313	23	1.21
17	3213	40	2.10	5211	20	1.05
18	3112	39	2.05	5312	20	1.05
19	3131	35	1.84	2213	19	1.00
20	1113	31	1.63	2312	19	1.00
21	1312	30	1.58	1211	17	0.89
22	2313	30	1.58	3313	17	0.89
23	3113	30	1.58	3322	17	0.89
24	2213	24	1.26	4312	17	0.89
25	3222	23	1.21	5322	17	0.89
Total Top 25	25	1452	76.26	25	634	33.30
Total in Sample	79	1904	100.00	360	1904	100.00

* Vector Code – PM SD Commute - PM SD Social - PM LD Work/School - PM LD Social

The top 25 patterns based on the five-point scales (Table 43) accounted for 33.3% of the sample with 360 (out of a possible 625) total vectors being represented. The only vectors in the top 25 showing people who perceive they travel "a lot" were those in the short distance commute category (5xxx). This occurred six times and demonstrates the amount people travel to get to work or school. No vector in the top 25 has a medium or greater response in the top 25 for long distance work. Only one vector in the top 25 has a value on the high side (4 or 5) for long distance social travel. Most people do not perceive that they travel a lot for long distance entertainment/recreation/social activities. This could be due to family commitments, the cost of long distance travel, or vacation time restrictions for workers. Some notable vectors are the "don't travel much" vector (1111), the commuter groups (5111 & 4111), the heavy travel group (5555), and the medium group (3333). Of these, the "don't travel much" group was the largest at 1.3% of the sample, followed by the medium group at 0.8%, then the commuter groups at 0.4% & 0.3%, respectively, and then the heavy travel group was last at 0.2%. These groups did not show up in high numbers due to the low engagement in long distance work trips. However, the short distance travelers (5511) also did not show up in large numbers at 0.2%.

CHAPTER 7 - CLUSTER ANALYSIS

7.1 DESCRIPTION OF APPROACH

The goal of cluster analysis is approximately the same as vector sorting in that cases with similar response patterns are grouped together. The difference is that cluster analysis groups similar response vectors together, rather than only identical vectors, where (in our case) dissimilarity between vectors is calculated to be the Euclidean distance between them. The cluster analysis is only being performed on Case 2 of the vector sorting analysis. Analyzing only one case is due to the added complexity of cluster analysis and because the final clusters will be analyzed using the demographic information in Part F and specific questions from other parts. Case 2 looks at Travel Liking using the four categories short distance commute to work or school, long distance work/school-related activities, and short and long distance entertainment/recreation/social activities. For greater accuracy in determining the distance between vectors, in this analysis we use only the original five-point qualitative scale, not the three-point version.

The cluster analysis method selected was the K-means clustering in SPSS. Although the Travel Liking questions use an ordinal scale, the scale is being treated as interval in order to use the K-means cluster analysis technique. K-means clustering starts with the computer selecting coordinates of distant vectors as initial cluster centers, or centroids. SPSS then assigns each case to the nearest cluster center based on the Euclidean distance between the case and the centroid. After all cases are assigned, the cluster center is recomputed as the element-by-element average of all the vectors assigned to that cluster. The program then reassigns each case to the nearest new cluster center. The process is iterated until the final cluster centers move a distance less than the convergence criterion. In this study the convergence criterion was set to 0, meaning that the process was stopped only when each case was assigned to the same cluster for two iterations in a row. One option that can be used is the running means option. This updates the cluster center

after each case is assigned, rather than only after all cases are assigned. After all cases are assigned, the process is repeated with the final cluster centers from the previous iteration, just as previously described. The running means option was selected for this analysis.

The first stage in the cluster analysis was to obtain quick cluster results for sets of 5-10 clusters. These sets are then analyzed to determine the preferred solution, that is, how many clusters are best. The decision is made based on how similar clusters are to each other, how many respondents are within each cluster, and whether the clusters identify interesting subsets of the sample. If the clusters are too similar to each other than the comparison between clusters might not give meaningful results. If one cluster contains very few respondents then it could be difficult to statistically test certain demographics because the expected count in each cell would be quite low. Or if one cluster clearly dominates in number of respondents then that cluster might be combining too many patterns that should instead be separate entities. The clusters should be relatively similar in size so that the comparisons between clusters are more robust and easier to interpret. However, this principle should be applied judiciously. If a small but extreme cluster is identified, it may be more important to keep it separate even if it cannot be analyzed with statistical reliability. Keeping the extreme cluster separate permits that extreme group to be identified as such, and also prevents distorting another cluster by combining it with the extreme group.

Lastly, it was important to choose a cluster set that contains interesting subsets of the sample so that the analysis is interesting. The chosen solution should contain clusters that represent different factions of the sample such as short distance versus long distance travel lovers, or work versus entertainment lovers. One way to try to pull out interesting clusters is to seed the analysis with initial cluster centers. Rather than allow the data to start clustering with the computer generated cluster centers, seeding an initial cluster center forces the clustering to start around

certain vectors. The hope is to stimulate the clustering to occur in certain areas and create interesting subsets around those areas.

There is thus a tradeoff to consider in selecting the number of clusters. The smaller the number of clusters, the greater the heterogeneity within the cluster – that is, more dissimilar types are being combined into a group whose average may be relatively central but conceals a lot of variation. On the other hand, the larger the number of clusters, the greater the homogeneity within clusters and the more "types" that can be identified. However, comparing characteristics across a large number of relatively small clusters is both more difficult cognitively and less reliable statistically. Thus it is desirable to review a range of cluster solutions on either side of a potential optimum, in order to identify that optimum number of clusters.

Once the cluster set is obtained, then the clusters can be analyzed by their responses to various portions of the survey. The first set of comparisons will be on the demographic data, to see if anything is objectively different between the groups before analyzing responses to different attitudinal questions. The demographics that will be examined are: city of residence, driver's license holding, gender, age, personal income, household income, type of vehicle driven most often, employment status, type of occupation, type of household, number of children in the household, and number of adults in the household. After analyzing the demographics then the responses to the commute questions will be examined: commute time, ideal commute time, and commute distance.

To perform the analysis on the demographic variables listed above four variables will be altered to make the analysis more useful and/or appropriate. The first alteration is for vehicle type where some categories will be eliminated and others combined in order to use the Chi-Squared test on the results. The "unspecified", "blank", "none", and "other" categories will be removed and the

"subcompact" category will be combined with the "small" category. The "subcompact" category only has seven responses due to the Consumer Guide classification scheme used. The classification of vehicle types is discussed in detail in the data cleaning section of Chapter 3. Subcompacts are rather closely related to small cars in relative size and cost, and the type of person purchasing the vehicle is likely to be the same. The vehicles in ascending order of size are subcompact, small, compact, mid, and large. The second alteration is for the employment status where "unemployed" and "non-employed student" will be combined to form one group of non-employed people. The third alteration is for occupation where "service/repair" and "production/ construction/crafts" will be combined to form one group, and the "other" category will be dropped. The two occupation categories that are combined could both involve traveling for the job, and both are relatively small if kept separate (97 and 79, respectively) which could create cell expectation problems in the Chi-Squared tests. The analysis will be performed with them separate and together to see if the combination is appropriate. The fourth alteration is for the household members question. Four categories will be created for household type: single adult with no kids, single adult with kids, two or more adults with no kids, and two or more adults with kids. This combination will give perspective on what types of households exist within each cluster.

The discrete variables are analyzed using cross-classification tables with the variable categories constituting the columns and the clusters constituting the rows. The row percent and column percent are calculated for each variable and a Chi-Squared test is performed for the table. All of the demographics are analyzed using cross-classification tables. The continuous variables, namely the commute questions, are analyzed using a one-way analysis of variance (ANOVA) which obtains for each cluster the number, mean, standard deviation, standard error, 95% confidence interval for the mean, minimum, and maximum. The ANOVA then tests whether there is a significant difference in mean value of the variable between groups.

7.2 RESULTS

7.2.1 Travel Liking Cluster Set

The Travel Liking cluster set was determined following the guidelines presented previously. The five-cluster set obtained without seeding initial cluster centers was undesirable, among other reasons, because no cluster had a mean short distance commute to work travel liking above neutral. While the proportion of respondents with a commute travel liking above neutral is not large (18.2%), there is a sizable enough number (345) to try to capture them in a cluster. When seeding the five-cluster set, many different seed variations were used, however, the majority ended up with the same result as the quick cluster without seeds. This showed the robustness of the cluster set, but was still undesirable. One seeding attempt did result in a cluster set with a Short Distance Lover group where both short distance means were equal to four (like). However, the Short Distance Lover group's entry forced out the Neutral group which softened some of the clusters such as the Hater group. The Hater group had mean answers of dislike on three of the four questions but with the entry of the Short Distance Lovers, the group was softened by the changing of a dislike to neutral. At this point, it was decided to try to work with the six-cluster set to pull out the Short Distance Lover group.

The six-cluster set without seeding did contain the Short Distance Lovers and the Hater group, but had three clusters that were rather similar. The initial six-cluster set is shown in Table 44. Clusters 2 through 5 all have the same characteristics of liking both short and long distance entertainment/recreation/social activities. The third and fifth cluster only varied by one level for the short distance commute to work question while all the other answers were the same. Also, cluster 3 had 683 responses, clearly dominating the other five clusters. The Short Distance Lovers only had 75 responses, which was much lower than the next lowest at 231 responses. So while this particular six-cluster solution was clearly undesirable, it did prompt the identification of six types that would be interesting for analysis. The six types were the Haters (2322), Long

Distance Lovers (xx44), Entertainment Lovers (x4x4), Short Distance Lovers (44xx), Work Lovers (4x4x), and All Lovers (4444). We experimented with initial cluster center seeds using different values for the X's and for the Hater group until a satisfactory cluster set was created.

Table 44 – Final Cluster Centers Before Seeding

	Cluster					
	1	**2**	**3**	**4**	**5**	**6**
SD Commute to work or school	2	3	2	2	4	3
SD Entertainment/Recreation/Social Activities	3	4	4	4	4	4
LD Work/School Related Activities	2	3	1	3	2	2
LD Entertainment/Recreation/Social Activities	2	4	4	4	2	5
Number of Cases in Each Cluster	231	683	313	352	75	250

Table 45 – Seeded Initial Cluster Centers

	Cluster					
	1	**2**	**3**	**4**	**5**	**6**
SD Commute to work or school	2	4	1	1	4	4
SD Entertainment/Recreation/Social Activities	2	4	4	1	4	2
LD Work/School Related Activities	1	4	1	4	2	4
LD Entertainment/Recreation/Social Activities	2	4	4	4	2	2

The preferred six-cluster solution was identified from the initial cluster centers shown in Table 45; the final centroids are shown in Table 46. Two clusters remained the same from the first cluster set shown in Table 44: the Entertainment Lovers (cluster 2), and the Entertainment Lovers/Work Haters (cluster 3). Cluster 1, the Haters, became more extreme with the short distance entertainment mean dropping from a 3 (neutral) to a 2 (dislike), and the long distance work mean dropping from a 2 to a 1 (strongly dislike). Cluster 4, Short Distance Work Haters, also became more extreme with the mean for Long Distance Work/School Activities moving from a 3 (neutral) to a 4 (like). Cluster 5, Short Distance Lovers, softened a little with the Long Distance Social mean moving from a 2 (dislike) to a 3 (neutral). The result of having two clusters move to a more extreme position was the emergence of a Neutral group, cluster 6. The word "travel" was left out of each cluster group's name for brevity. However, it should be remembered that each cluster name refers to the liking of the travel, not to the activity itself. Therefore a person may love her work but hate the commute to work.

The size of each cluster indicates that Haters and Short Distance Lovers are a minority within the sample. Not unexpectedly, the largest clusters were the ones closest to neutral, specifically the Neutral group and the Entertainment Lover/Work Neutral group, with 21.6% and 25.3% of the respondents, respectively. An interesting outcome was that no group contained a mean Short Distance Entertainment response of less than three, and only one group, the Haters, had a mean Long Distance Entertainment response less than three. Thus liking for work travel, whether long or short distance, is the most important distinction between clusters for this analysis. Some respondents like the work travel and others simply dislike the work travel.

Table 46 – Final Cluster Centers After Seeding (Six-Cluster, Preferred Solution, N=1904)

	Cluster					
	1 Haters	**2** Entertainment Lover/ Work Neutral	**3** Entertainment Lover/Work Hater	**4** Short Distance Work Hater	**5** Short Distance Lover	**6** Neutral
SD Commute to work/sch	2	3	2	2	4	3
SD Ent/Rec/ Soc Activities	3	4	4	4	4	3
LD Work/Sch Related Act	1	3	1	4	2	3
LD Ent/Rec/ Soc Activities	2	4	4	4	3	3
# (%) of Cases in Each Cluster	170 (8.9)	481 (25.3)	314 (16.5)	353 (18.5)	174 (9.1)	412 (21.6)

7.2.2 Cluster Characteristics

The similarities and differences between the six cluster groups identified above are analyzed in this section with respect to demographics, commute distance, and commute times. The discrete variables were analyzed with Chi-Squared statistical tests on cross tabulation tables. The bar charts for discrete variables indicate the percentage of each cluster falling into each category. The lines on the bar charts indicate the percentage of the total sample falling into each category. Comparing the bars with the lines helps indicate which categories are under or over represented in each cluster. The continuous variables were analyzed using an ANOVA and the means by

cluster are plotted on bar charts. Each bar chart also has a line representing the mean of the entire sample. Each bar has error bars representing the upper and lower bound of the 95% confidence interval for the mean.

City of Residence - Figure 5 displays the data for city of residence by cluster. The Pearson Chi-Squared test showed that the relationship between cluster and city is significant (*i.e.*, that proportions living in each city differ by cluster), with a p-value of 0.019. The average lines in this figure merely represent what proportion of people responded from each city: 888 (46.6%) for North San Francisco, 543 (28.5%) for Pleasant Hill, and 473 (24.8%) for Concord. Short distance lovers contained the smallest proportion of North San Francisco residents and short distance work haters contained the largest proportion. The short distance lovers appear to reject the hypothesis that people who live in higher density areas do so in part because they prefer shorter trips. Instead, these results imply that they still do not enjoy the short distance work trips, though it says nothing about whether their dissatisfaction would be greater if they lived in the suburbs. While North San Francisco residents tend to be underrepresented in the Short Distance Lover cluster, Concord residents are overrepresented in this group. This is the only occurrence where Concord residents outnumber Pleasant Hill residents. Also, the suburban neighborhoods (Concord and Pleasant Hill) stay together in terms of both being either over or under average. When North San Francisco is disproportionately high for a cluster, Concord and Pleasant Hill are both below average for the same cluster, and vice versa. This trend demonstrates some of the possible differences between attitudes in different urban settings, which is a topic for further research.

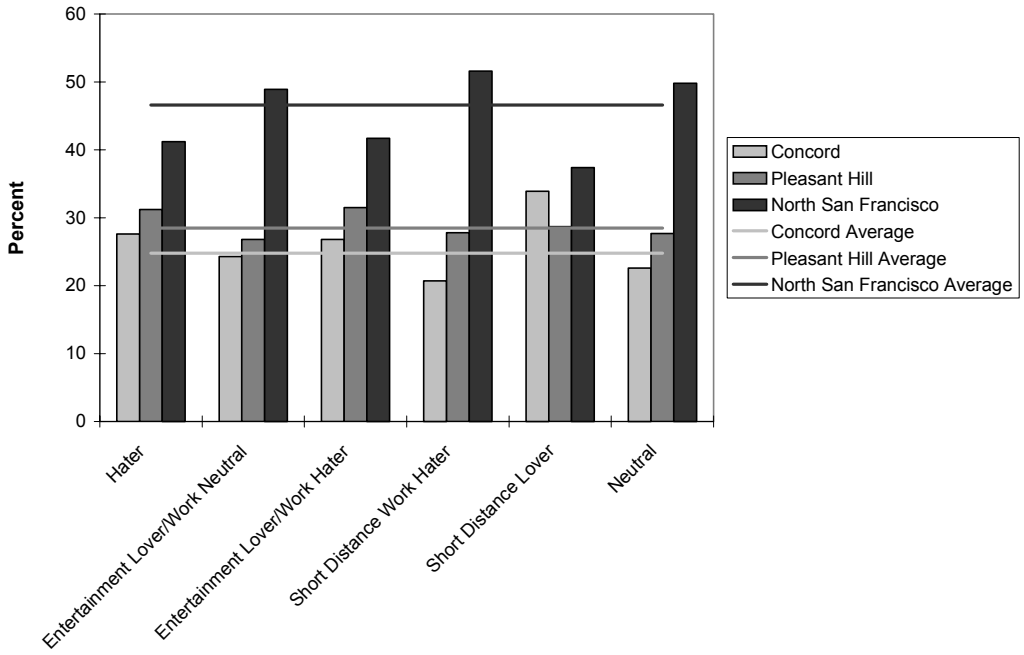

Figure 5 – City of Residence by Cluster

Driver's License - Figure 6 displays the data for driver's license possession by cluster. The Pearson Chi-Squared test showed that the relationship between cluster and driver's license is not strongly significant, with a p-value of 0.072. Thus, the fluctuations that are seen probably represent random variation, however, one interesting thing to note from this graph is that the Hater group had the largest percentage of people who did not possess a driver's license. The graph also shows that close to 98% of the entire sample possesses a driver's license.

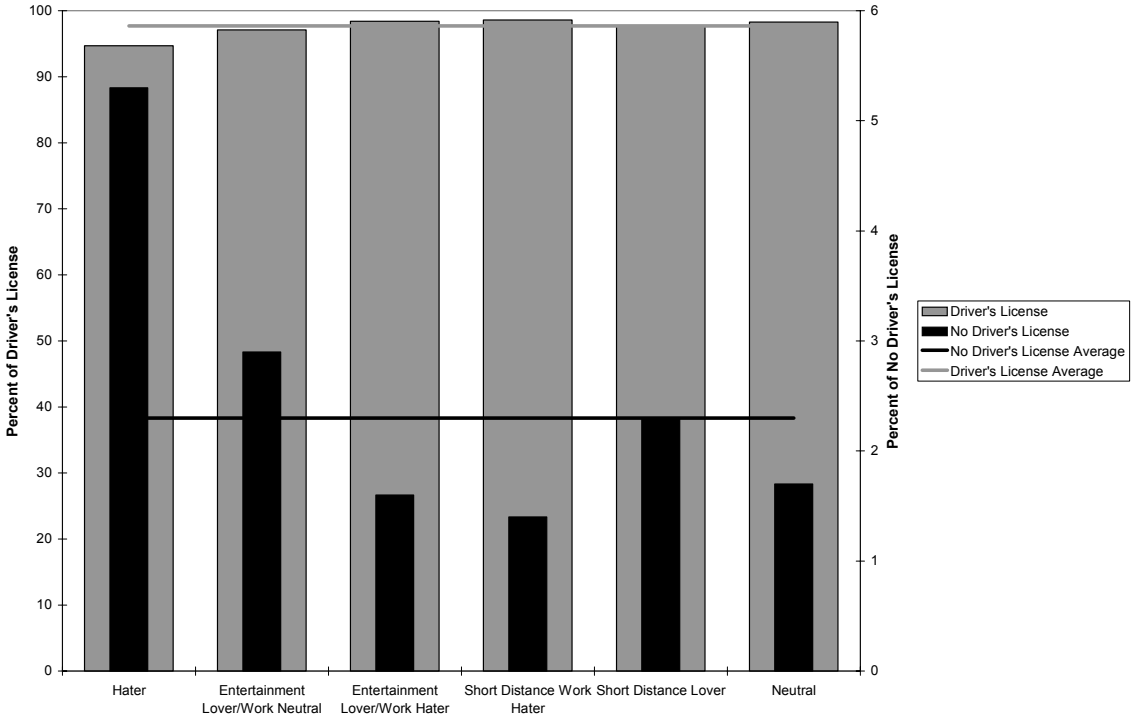

Figure 6 – Driver's License by Cluster

Gender - Figure 7 displays the data for gender by cluster. The Pearson Chi-Squared test showed that the relationship between cluster and gender is not significant, with a p-value of 0.298.

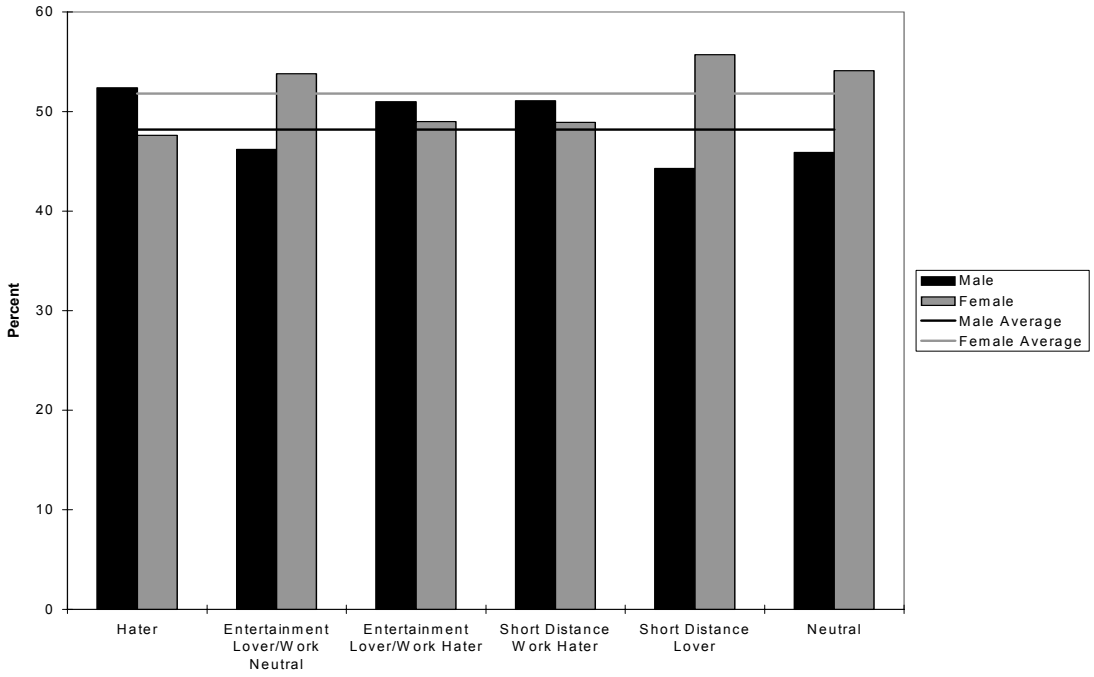

Figure 7 – Gender by Cluster

Age - Figure 8 displays the data for the age of the survey respondent by cluster. The Pearson Chi-Squared test showed that the relationship between cluster and age is significant, with a p-value of 0.000. First, the chart shows that the sample mainly comprises 41 to 64 year olds with the 24-40 group about ten percentage points lower. The elder groups, 65-74 and 75+, have strong representations in the Hater cluster and the Entertainment Lover/Work Hater cluster. The high percentage in the Hater cluster could be due to mobility restrictions or constraints due to deteriorating health or vision. The 24-40 age group are found in high proportions in the Short Distance Hater cluster. This could be due to job location inflexibility with starting a career, or not being able to afford

housing near the job location. However, they still enjoy their independence and freedom associated with long distance travel to see the world.

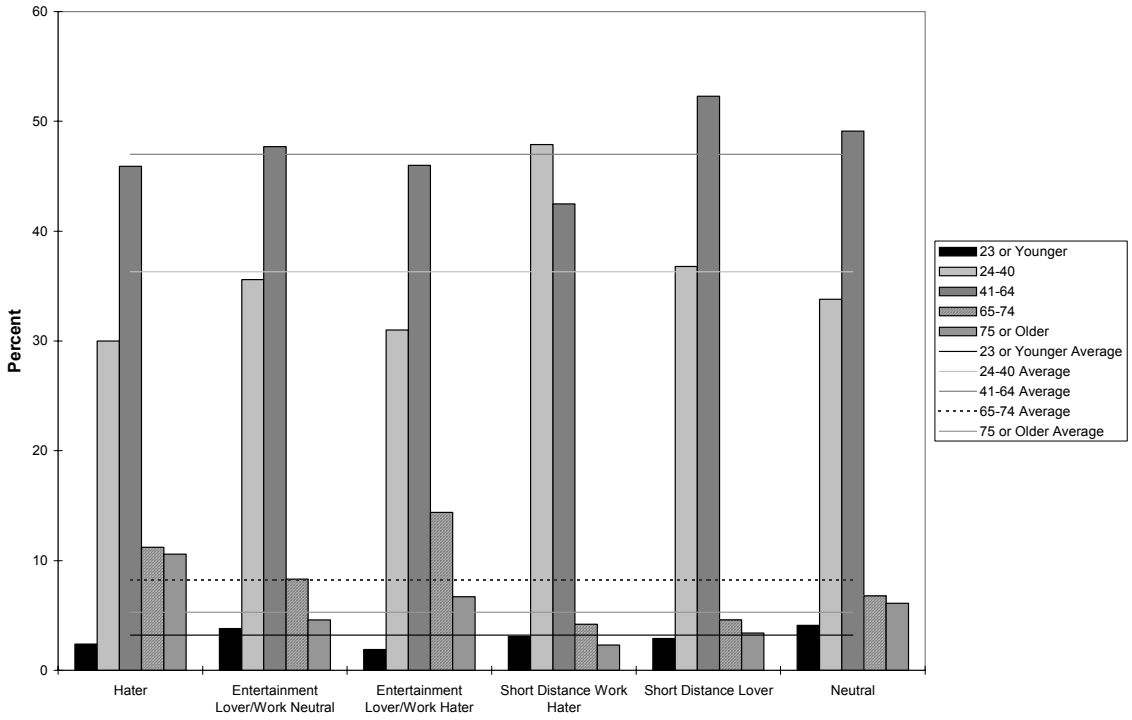

Figure 8 – Age by Cluster

Personal Income **-** Figure 9 displays the data for personal income by cluster. The Pearson Chi-Squared test showed that the relationship between cluster and personal income is significant, with a p-value of 0.000. The Short Distance Lover cluster has a large percentage, nearly twice the sample average, of people with income less than $15,000. The Short Distance Lovers also had proportionally more women and fewer North San Francisco residents. This suggests the possibility that this cluster contains a number of suburban women who are 2nd wage earners. As second wage earners, they might be eager to leave the house and thus enjoy short distance travel. This hypothesis could be tested by separating out the females in this cluster, and seeing if they have a higher proportion of the lower incomes and seeing how their incomes relate to the overall household income. This hypothesis is also

supported by the lower than average proportion of middle to high incomes ($55,000+) in the same cluster. Another interesting result is that the Short Distance Work Hater cluster had much higher proportions of high incomes ($75,000+). This could help explain why the group loves entertainment travel and long distance travel so much, because they can afford to do the travel and not worry about the expenses the entire time. This same cluster had the lowest proportions of low and middle low incomes ($34,999 or less). The cluster with the highest proportion of middle-income people (especially $15,000-34,999 and $55,000-74,999) was the Entertainment Lovers/Work Haters.

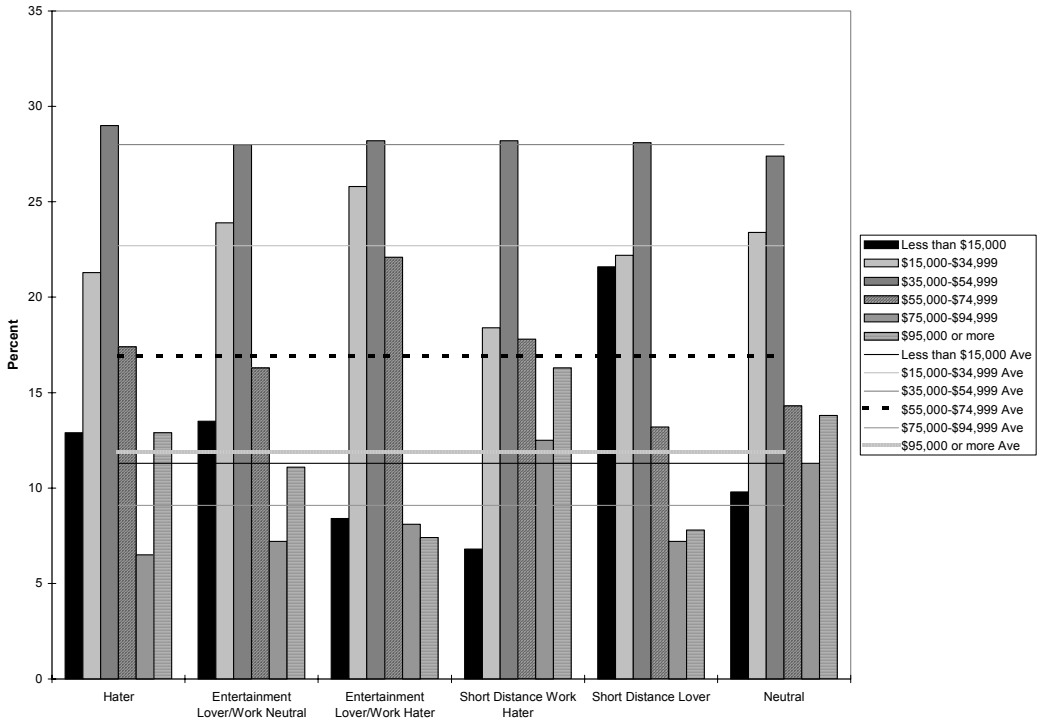

Figure 9 – Personal Income by Cluster

Household Income - Figure 10 displays the data for household income by cluster. The Pearson Chi-Squared test showed that the relationship between cluster and household income is significant, with a p-value of 0.000. Household income is interesting when compared to personal incomes to see the changes when the rest of the household members are added in.

The Short Distance Lover cluster still has the largest proportion of incomes less than $15,000, though the percentage dropped from 21.6% to 10.1%. This cluster also had the largest proportion of people in the income bracket of $55,000-$74,999 when it previously had the lowest proportion with that range of personal incomes. The cluster also has the lowest percentages in the high-income categories of $75,000 or more. The Short Distance Work Haters also displayed an interesting effect of having the lowest proportion of incomes in brackets less than $55,000, and having the highest proportion in the $95,000+ category with an increase from 16.3% (for the personal income variable) to 37.9%. The Entertainment Lovers/Work Haters continued to have a dominance on the middle-income brackets with the highest proportions in the $15,000-$54,999 range of any of the clusters.

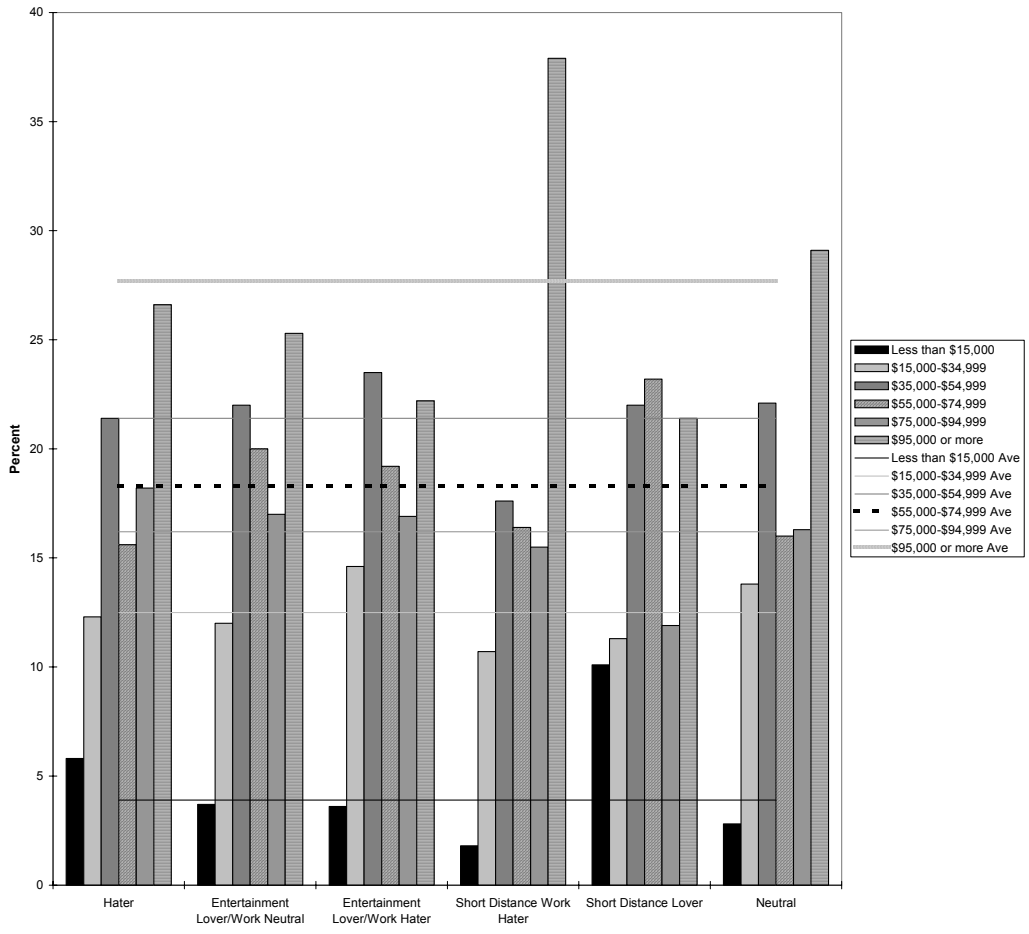

Figure 10 – Household Income by Cluster

Vehicle Type - Figures 11 and 12 displays the data for the type of vehicle a survey respondent drives most often by cluster. The Pearson Chi-Squared test showed that the relationship between cluster and vehicle type is not significant, with a p-value of 0.102. The vehicle type results were split into two charts due to the large number of types. A couple of interesting results were found in this analysis though it was not statistically significant. The Hater cluster had the largest percentages of people driving the large, luxury, and mid-size vehicle types and the lowest percentage in the minivan/van category. This could be a sign that people try to alleviate their dislike of travel by traveling in more comfortable vehicles, but also that such people are less inclined to invest in a vehicle designed to comfortably transport groups (especially long distances), such as a minivan. The Short Distance Work Hater cluster drives the largest percentage of SUVs and sports cars, which is consistent with their enjoyment of recreational travel. The Short Distance Lover cluster had the highest level of compact vehicles and the lowest level of sports cars and luxury vehicles. This suggests that the appeal of the latter types of vehicles may be stronger for the "open road" of long distance travel or for the comfort on long trips and less important for the practicalities of day-to-day short-distance travel (*e.g.* parking, fuel efficiency for stop and go traffic). Combined with the knowledge that this cluster tended toward lower personal and household incomes, the levels for compact and luxury vehicles are also more understandable.

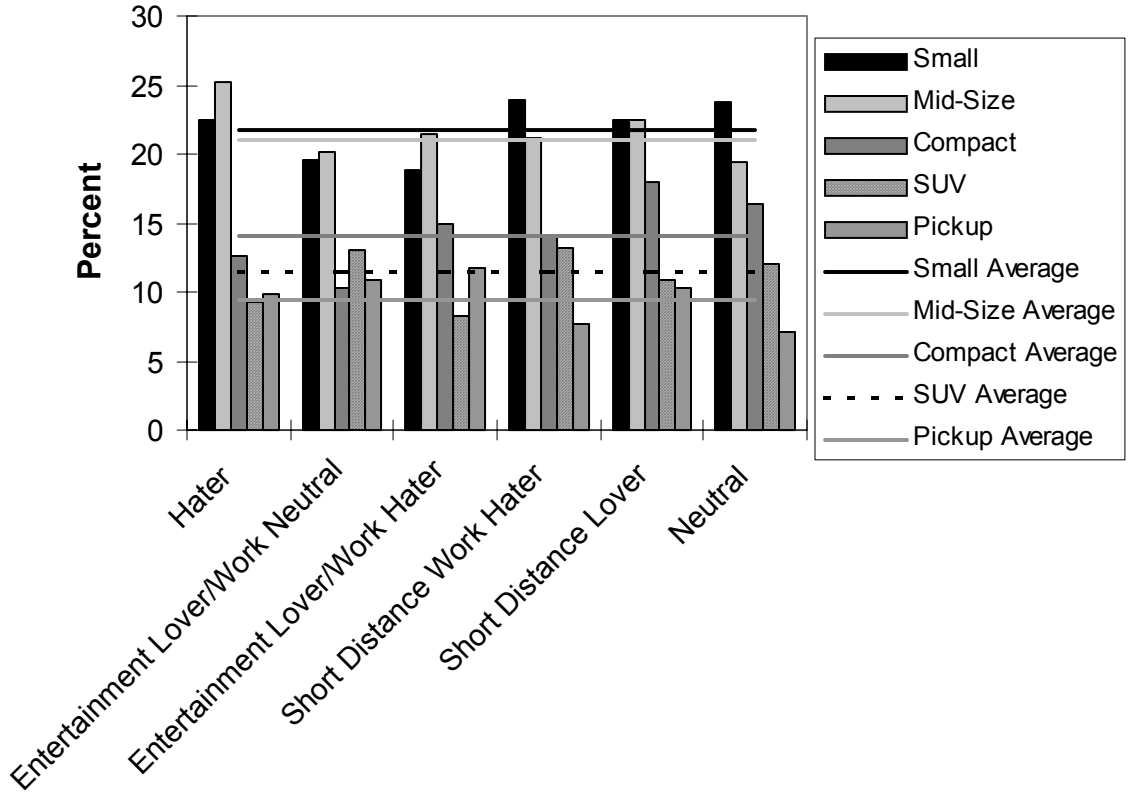

Figure 11 – Vehicle Type by Cluster (1)

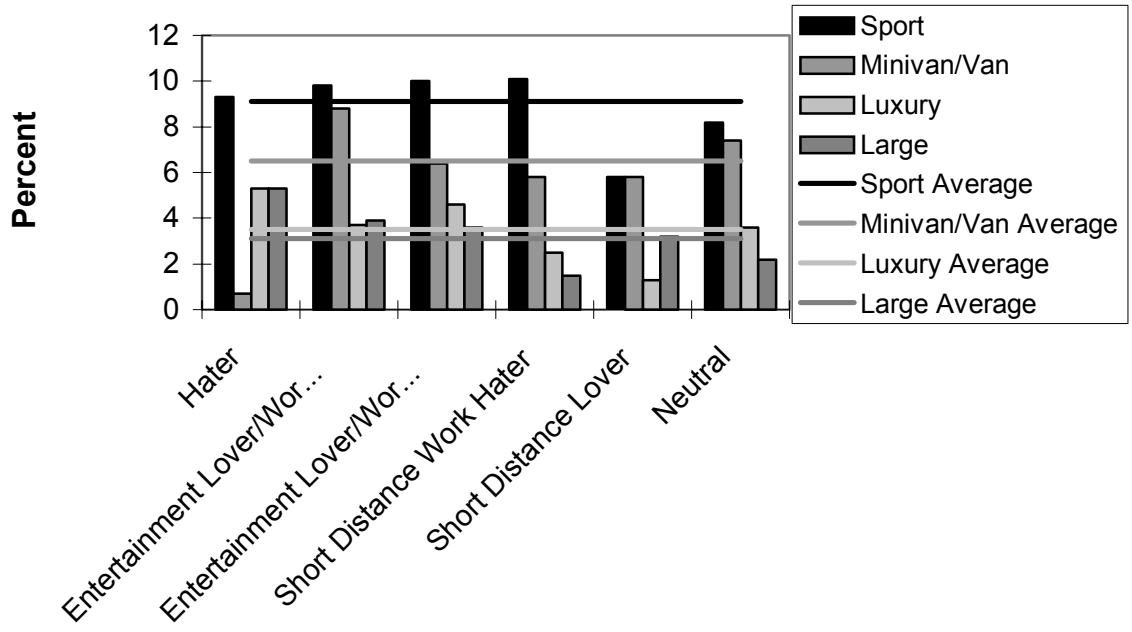

Figure 12 – Vehicle Type by Cluster (2)

Employment Status - Figure 13 displays the data for the survey respondent's employment status by cluster. The Pearson Chi-Squared test showed that the relationship between cluster and employment status is significant, with a p-value of 0.000. As might be expected, the Short Distance Work Hater cluster is overwhelmingly composed of full-time employees, at close to 80.4% of the cluster. The cluster also has the lowest percentages of part-time, homemaker, and non-employed people. The Hater cluster has the largest representation of retired people, possibly indicating the difficulties some retired people have traveling due to physical ailments. Retired people also showed up in large numbers in the Entertainment Lover/Work Hater cluster, demonstrating their love for entertainment travel and their relief at no longer having to travel to work. Homemakers were also abundant in the Entertainment Lover/Work Hater cluster, which suggests that they enjoy entertainment travel because they are at home much of the time, yet they enjoy being at home because they hate traveling to work. The largest percentage of non-employed people appeared in the Short Distance Lover cluster, which is consistent with the personal income chart where this cluster also had the largest share of incomes of $15,000 or less.

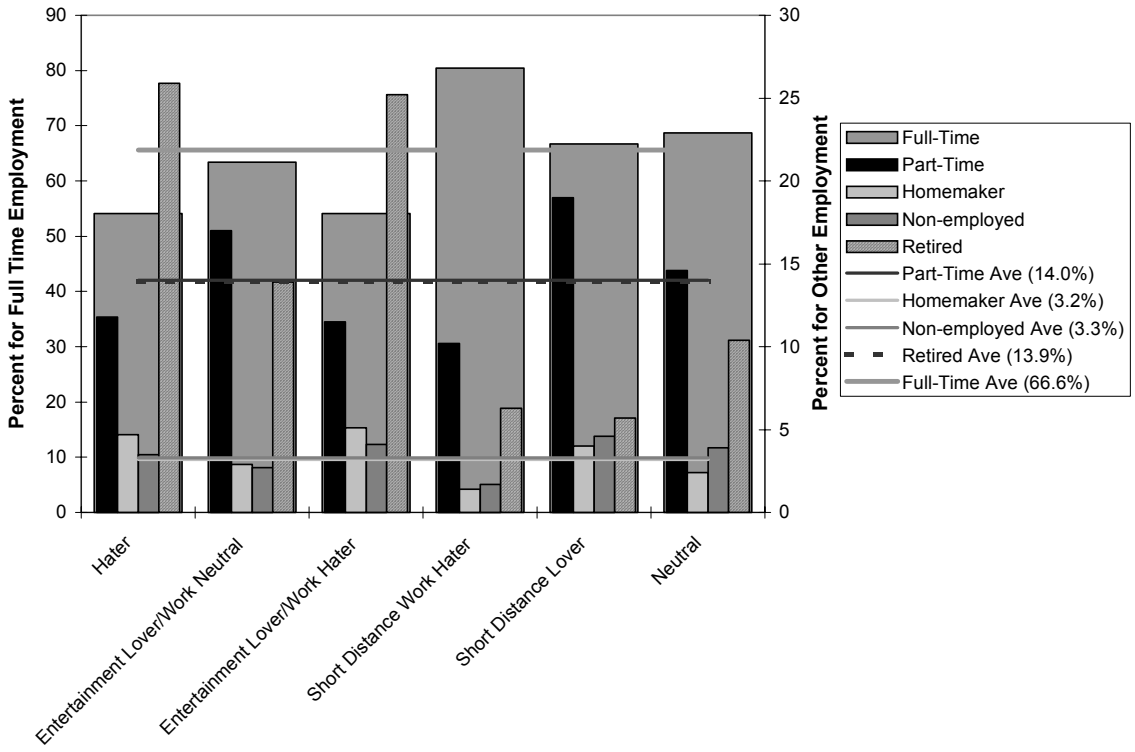

Figure 13 – Employment Status by Cluster

Occupation - Figure 14 displays the data for the survey respondent's occupation by cluster. The Pearson Chi-Squared test showed that the relationship between cluster and occupation is significant, with a p-value of 0.009. Some very interesting results occurred with the Short Distance Lovers and the Short Distance Work Haters. The Short Distance Lovers comprise higher than average proportions of service/construction, sales, and clerical/administration support employees. The Short Distance Work Haters on the other hand comprise mainly manager/administration and professional/technical employees. A possible reason for the polarity is that people who are in higher level positions may have more job related stress. They might work more hours per week and as shown below, this cluster has longer commutes. The sales or service/construction workers might enjoy short distance travel explaining why they are in positions that require such travel. Another possibility is that these

occupations might have different commutes: instead of congested highway travel they might take more surface streets to the work location. The analysis below shows that this cluster has the shortest commute on average.

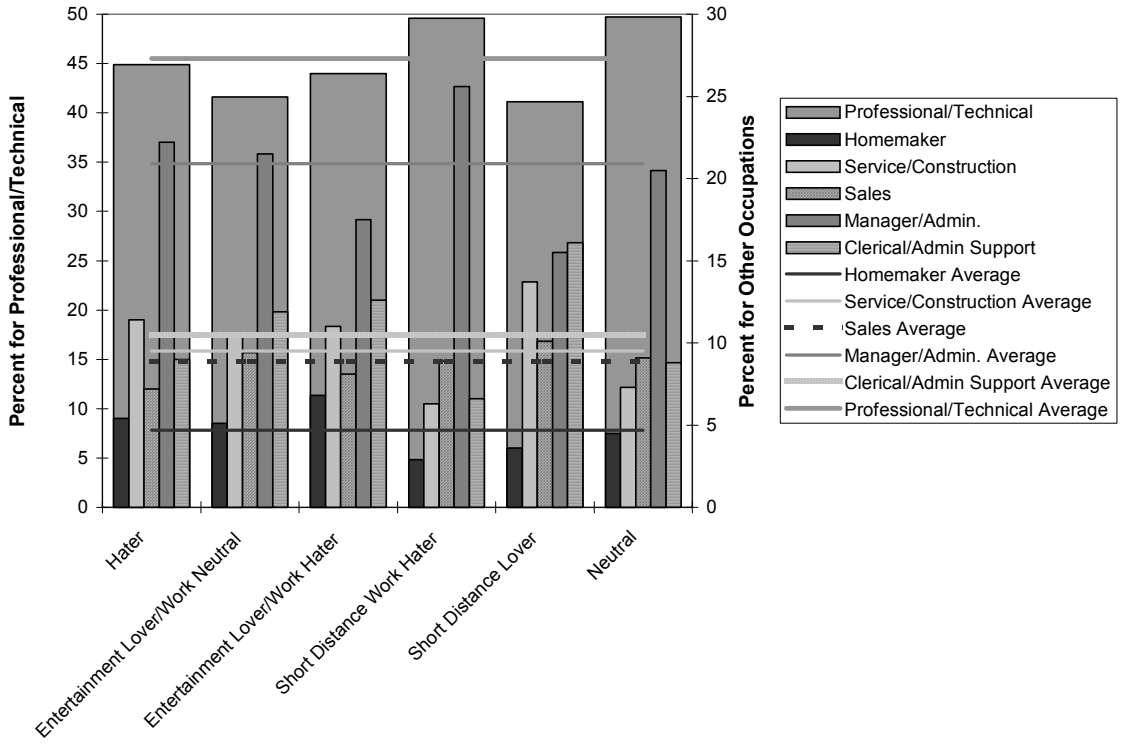

Figure 14 – Occupation by Cluster

Household Type - Figure 15 displays the data for the type of household the survey respondent lives in by cluster. The Pearson Chi-Squared test showed that the relationship between cluster and household type is significant, with a p-value of 0.006. On the other hand, separate analyses of the number of adults and number of children in the household showed no significant differences across clusters, with Pearson Chi-Squared significance values of 0.112 for adults and 0.116 for children. One result showed a possible bias within the sample. The category of single adults with children was very low at 32 total responses (1.7% of the sample). Due to differences in the definitions of categories, the sample distribution for this

variable could not be directly compared to the census data, but the single parents appear to be substantially underrepresented in the sample. With the combination of parenting, work, and personal obligations, this group probably had the least time and inclination to complete the survey. The Hater group was composed largely of 2 or more adults with no kids, consistent with the tendency to be older and retired. The Short Distance Work Haters had a high percentage of single person households, perhaps indicating that these young, single, professional adults are impatient with congested commutes but enjoy the other main forms of travel, including long distance work trips. The Short Distance Lover cluster had the highest percentages of both categories involving children. Short Distance Lovers might enjoy the short distance travel because it is associated with spending more time with their children (the recreational travel may involve taking the children to sports or other leisure activities), or because the commute offers a welcome break from dealing with their children. The first statement is derived from Rosenbloom's conclusion from NPTS data that "deeply embedded in the travel patterns of salaried parents, and particularly mothers, are the needs of their children" (Rosenbloom, 1992, page 50). The statement regarding the commute as a break from the children is consistent with results reported by Edmondson, "Average Americans look forward to driving with pleasure, because they see it as a time for quiet relaxation" (Edmondson, 1998, page 50).

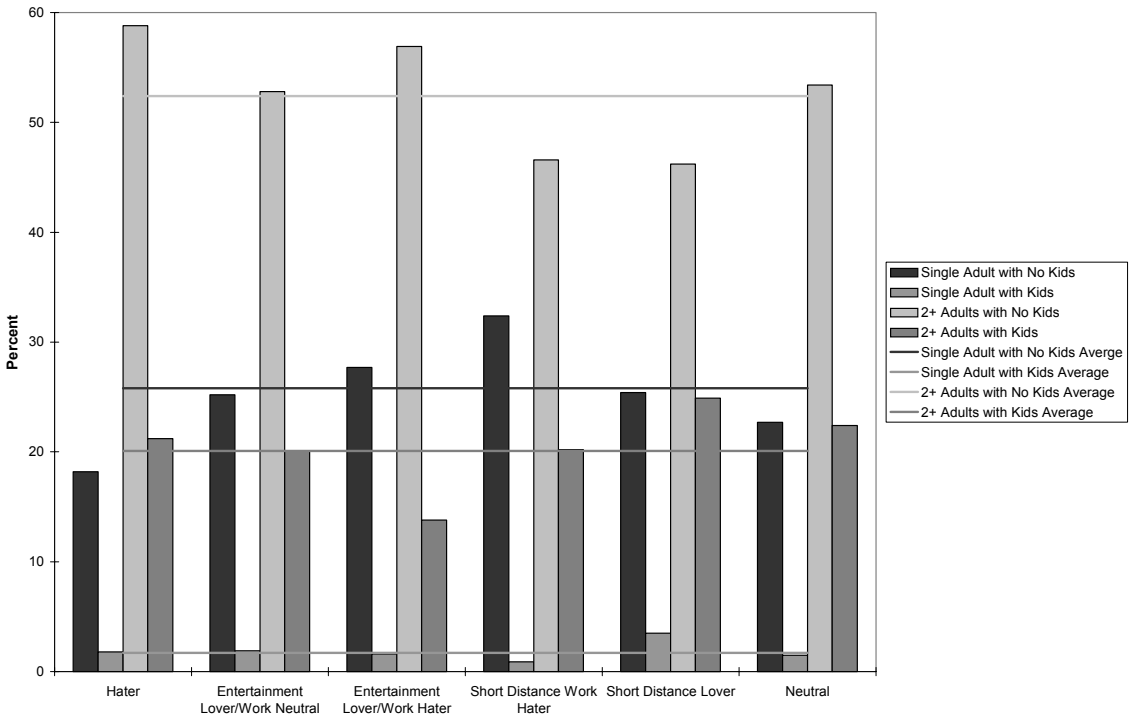

Figure 15 – Household Type by Cluster

Commute Time - Figure 16 displays the average commute time by cluster. The ANOVA test showed that mean commute time differed by cluster, with a significance of 0.000. In these three charts relating to the commute, the clusters are graphed in ascending order of their mean rating on the liking of commute travel. With this in mind, the last three clusters in Figure 16 demonstrate an interesting pattern. As the members of these groups enjoy the commute more, they tend to spend less time commuting. So rather than the hypothesis that people would commute more because they enjoy the travel, people may enjoy commuting more because they spend less time doing it. The first three clusters all dislike commute travel on average (see Table 46) and seem to support the first hypothesis that the more you dislike commuting and other travel, the more you will try to limit the travel (or conversely, that the less you dislike commuting, the longer you are willing for your commute to be). Thus, we may be seeing opposite causal mechanisms at work in different clusters. An interesting observation is that for every group that dislikes commuting, the mean commute time is more

than 30 minutes each way, whereas for the groups that are neutral towards commuting the means are between 25 and 30 minutes, and the group that enjoys commuting travels just 22 minutes each way on average. This shows a linkage between commute liking and the amount of time spent commuting.

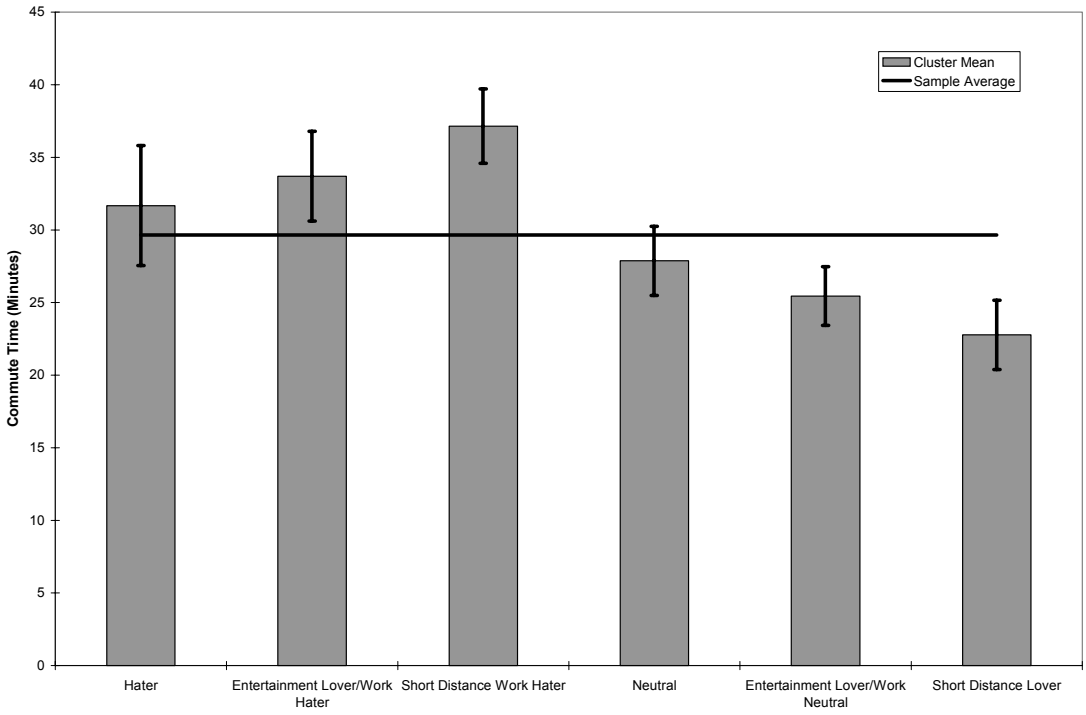

Figure 16 – Average Commute Time by Cluster

Commute Distance - Figure 17 displays the average commute distance in miles by cluster. The ANOVA test showed that mean commute distance differed by cluster, with a significance of 0.000. The commute distance chart shows the same trend as the commute time graph (Figure 16) except that the Short Distance Work Hater group commutes fewer miles than the Entertainment Lover/Work Hater group, they just spend more time traveling those commute miles. Thus they apparently have a congested commute, which could explain why they dislike their commute travel. The three groups that dislike their commute average more than 14.5 miles each way whereas the three groups that are neutral or like their

commute average less than 14.5 miles each way. The group that enjoys their commute only commutes an average of 9.43 miles each way, which offers additional support for the hypothesis that for some people, the less you commute the more you enjoy the commute.

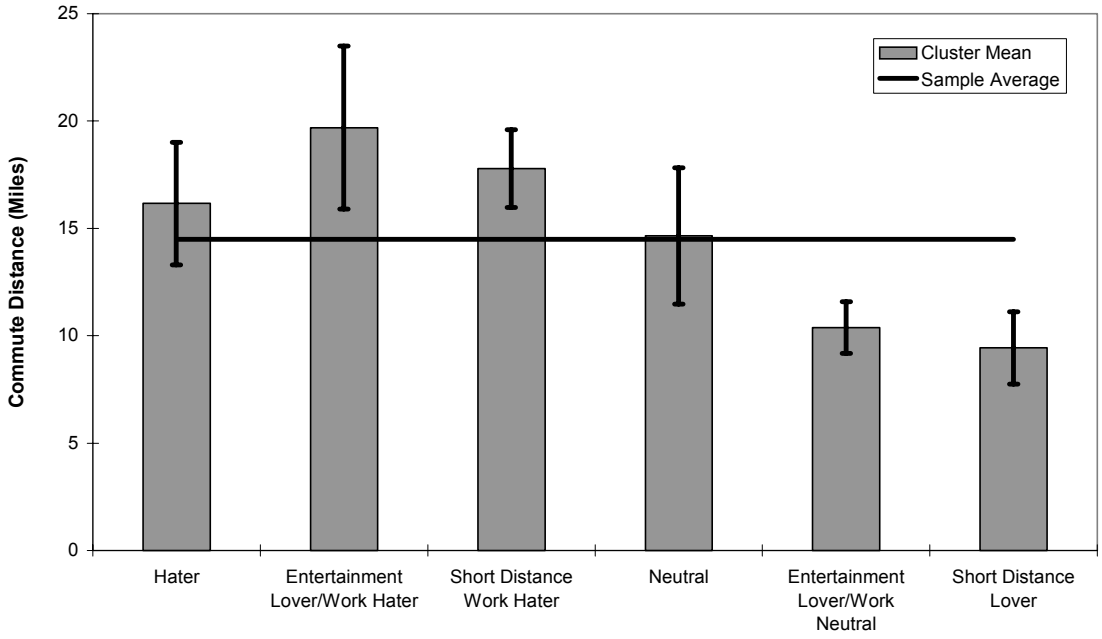

Figure 17 – Average Commute Distance by Cluster

Ideal Commute Time - Figure 18 displays the average ideal commute time by cluster. The ANOVA test showed that mean ideal commute time differed by cluster, with a significance of 0.000. The ideal commute time chart is nearly an inverse of the current commute time chart (Figure 16). The three clusters that showed the highest current commute times exhibited the smallest ideal commute times. Since these clusters contain people who dislike commuting, this is a natural result. The clusters that are neutral or like their commute on average, also wanted to decrease their commute time, but the magnitude of decrease (an average of 9.0 minutes across the last three clusters, Figure 19) was much less compared to an average 20.2-

minute decrease for the first three clusters. People are less likely to look for drastic changes in behavior when they are relatively content with their current conditions.

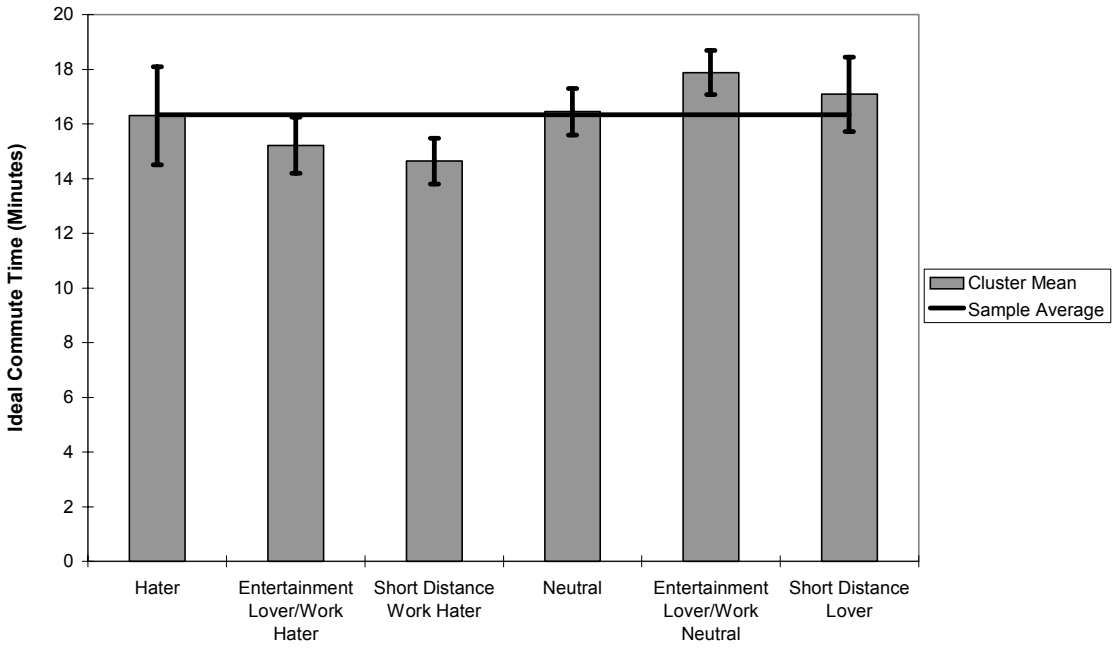

Figure 18 – Average Ideal Commute Time by Cluster

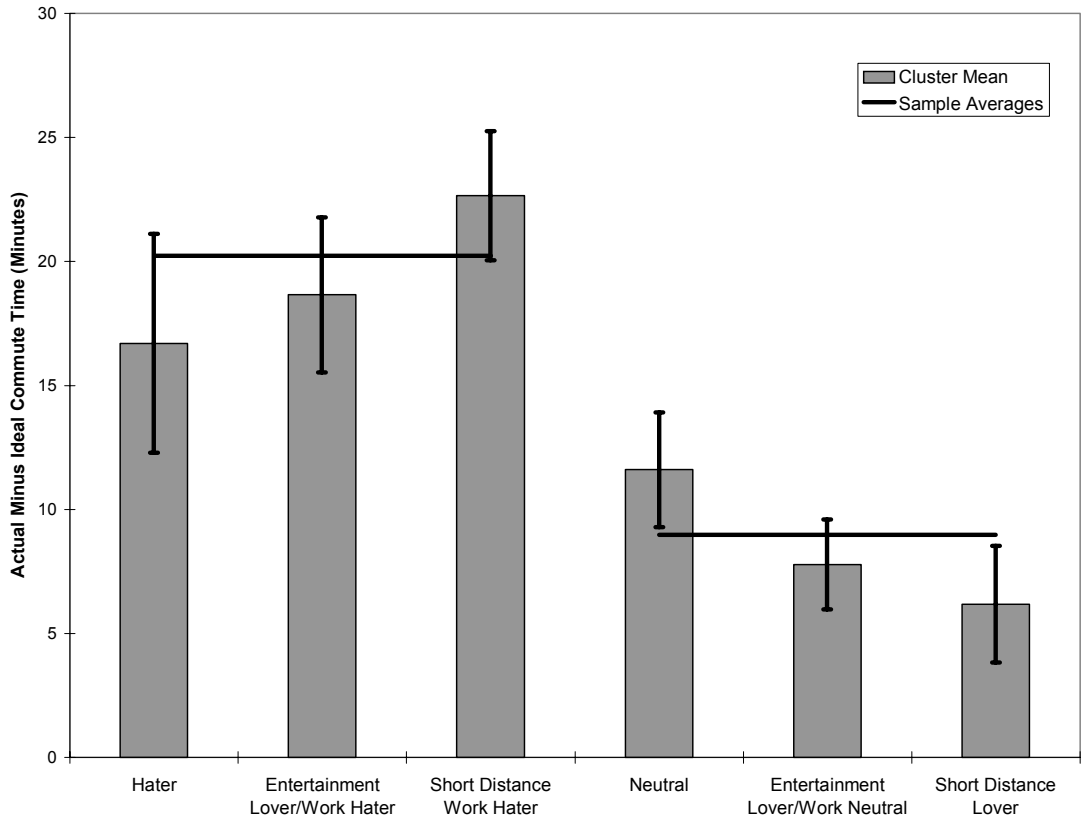

Figure 19 – Actual Minus Ideal Commute Time by Cluster

7.2.3 Cluster Composites

The previous paragraphs analyze the similarities and differences among the six cluster groups identified with respect to demographics, commute distance, and commute times. This section takes the individual results and groups them into a composite view of each cluster. The high and low cluster presented in the previous graphs for each demographic or commute question are displayed in Table 47. The following key cluster observations are based on the summarized results in Table 47. The clusters are composed of a variety of people; therefore the characteristics discussed are the tendencies of the cluster toward certain directions. This does not mean that everyone in the cluster possesses the exact same characteristics.

Cluster 1 - Haters – The Haters are first characterized by having the lowest percentage of people with driver's licenses. This is possibly due to a higher percentage of retired people and homemakers. The retirees probably contributed to this cluster having the highest percentage of people aged 75 or older and the highest proportion of households having two or more adults with no children. A possible result of disliking travel is that the Haters tried to help compensate for that dislike by driving higher than average percentages of large, luxury, and mid-size vehicles. This result may also be due to retirees buying large or luxury cars before retiring, or may just be an anomaly in the data. The low minivan percentage is probably due to the high percentage of adults with no kids, meaning that they would not have a reason for a vehicle that carries larger groups of people. The Haters also tend to not live in North San Francisco, which might suggest that they avoid living in locations with high density and accessibility. Interestingly enough, the Haters did not have the highest or 2nd highest commute time or distance (31.7 minutes and 16.2 miles, respectively), again probably because of the high proportion of older people. Their dislike of travel may be more related to personal issues such as physical health problems, or a feeling of vulnerability or insecurity, than to system-level issues such as congestion.

Cluster 2 - Entertainment Lover/ Work Neutral – This cluster did not have many demographic extremes relative to the overall sample. It had fewer people in Professional/ Technical occupations, fewer living in Pleasant Hill, fewer driving compact cars, and more driving minivans or sports cars. The most extreme traits were that this group had the highest average ideal commute time (17.9 minutes) while having the second lowest average commute time (25.5 minutes) and distance (10.4 miles). This implies that the more people like their commute, whether for the transition between work and home, the chance to daydream, or other reasons, the smaller the reduction in desired (or ideal) commute time.

Cluster 3 - Entertainment Lover/Work Haters – As the "work hater" portion of the name suggests, this cluster had unlikable commutes with the highest average commute distance (19.7 miles) and the 2nd highest average commute time (33.7 minutes). Given this dislike for the commute, it is not surprising that the average ideal commute time (15.2 minutes) for this cluster was the 2nd lowest of the six. The cluster had a high proportion of people with medium household incomes and a higher than average proportion of Pleasant Hill residents. The very high retiree percentage is consistent with the high proportion in the 65-74 age group and the low percentage of households having two or more adults with kids.

Cluster 4 - Short Distance Work Haters – As with the previous cluster, the "work hater" portion of the cluster name is indicative of the type of commute they face. This cluster had the highest average commute time (37.2 minutes) with the second highest average commute distance (17.8 miles). Naturally, this cluster also wished to have a low commute time, with the lowest average ideal commute time of any group (14.7 minutes). This cluster was filled with extreme values for demographics. Low percentages of people with personal and household incomes of less than $34,999 and $54,999, respectively, as well as high percentages of both incomes in the $95,000 or more range correspond to the higher occupation status (professional/technical and manager/administration) and the higher employment status (relatively more full-time workers and fewer part-time and non-employed workers) of this group. The cluster had a tendency to live in North San Francisco and not in Concord while driving SUVs or sports cars. The cluster was also young with a large percentage of 24 to 40 year olds. The high commute times and distances for this affluent group are consistent with results from the 1995 NPTS (Pucher) where the most affluent households traveled twice as much as the poorest households.

Cluster 5 - Short Distance Lovers – As the cluster name suggests, this cluster has a favorable commute, which may contribute to their affinity for short distance travel. They have the lowest average commute time (22.8 minutes) and distance (9.4 miles). This enjoyment of a shorter commute than average leads them to have the 2nd highest ideal commute time (17.1 minutes) with the smallest difference between actual and ideal commute times (5.7 minutes). This group has the highest percentage of incomes less than $15,000, possibly due to the high proportions of people with homemaker, part-time, and non-employed status. The lower incomes might also be a factor in the higher percentage of compact cars and lower percentages of luxury and sports cars driven by members of this group. This cluster also has the highest percentages in both household type categories with children, which is consistent with the larger percentage of middle age people (41-64). The low commute times and distances for this less affluent group are consistent with results from the 1995 NPTS (Pucher, 1998) where the poorest households traveled half as much as the most affluent households.

Cluster 6 - Neutral – Again the name of the cluster is suggestive of its demographic characteristics. This group was neutral in terms of its Travel Liking, and is exactly that with respect to most demographics as well. There was a large percentage of people age 23 or younger, which could imply that they have not yet developed strong attitudes regarding travel. The cluster also has a relatively high proportion of Professional/technical occupations.

Table 47 – Cluster Characteristics – High and Low Values

	1	2	3	4	5	6
	Haters	Entertainment Lover/ Work Neutral	Entertainment Lover/Work Hater	Short Distance Work Hater	Short Distance Lover	Neutral
City of Residence	Low North San Francisco	Low Pleasant Hill	High Pleasant Hill	High North San Francisco, Low Concord	High Concord	
Driver's License	Low Driver's License			High Driver's License		
Gender	Low Female				High Female	
Age	Low 24-40, High 75+		Low 23 or Younger, High 65-74	High 24-40, Low 41-64, Low 65-74, Low 75+	High 41-64	High 23 or Younger
Personal Income	High $35,000-54,999, Low $75,000-94,999		High $15,000-34,999, High $55,000-74,999, Low $95,000+	Low Less than $15,000, Low $15,000-34,999, High $75,000-94,999, High $95,000+	High Less than $15,000, Low $35,000-54,999, Low $55,000-74,999	Low $35,000-54,999
Household Income	Low $55,000-74,999, High $75,000-94,999		High $15,000-34,999, High $35,000-54,999	Low Less than $15,000, Low $15,000-34,999, Low $35,000-54,999, High $95,000+	High Less than $15,000, High $55,000-74,999, Low $75,000-94,999, Low $95,000+	
Vehicle Type	High Large, High Luxury, High Mid-size, Low Minivan	Low Compact, High Minivan, High Sports Car	High Pickup, Low SUV, Low Small	Low Large, High SUV, High Small, High Sports Car	High Compact, Low Luxury, Low Sports Car	Low Mid-size, Low Pickup, High Small

	1 Haters	2 Entertainment Lover/ Work Neutral	3 Entertainment Lover/Work Hater	4 Short Distance Work Hater	5 Short Distance Lover	6 Neutral
Employment Status	Low Full-Time, High Homemaker, Very High Retired		Low Full-Time, High Homemaker, Very High Retired	High Full-Time, Low Part-Time, Low Non-employed	High Part-Time, High Homemaker, High Non-Employed, Low Retired	
Occupation	Low Sales	Low Professional	High Homemaker	Low Homemaker, Low Service, High Admin., Low Clerical, High Professional	High Service, High Sales, Low Admin., High Clerical, Low Professional	High Professional
Household Type (Single Adult=SA)	Low SA No Kids, High 2+ Adults No Kids		Low 2+ Adults With Kids	High SA No Kids, Low SA With Kids, Low 2+ Adults No Kids	High SA With Kids, Low 2+ Adults No Kids, High 2+ Adults With Kids	
Commute Time		2nd Lowest	2nd Highest	Highest	Lowest	
Commute Distance		2nd Lowest	Highest	2nd Highest	Lowest	
Ideal Commute Time		Highest	2nd Lowest	Lowest	2nd Highest	
Actual – Ideal Commute Time		2nd Lowest	2nd Highest	Highest	Lowest	

CHAPTER 8 - CONCLUSIONS/RECOMMENDATIONS

Three categories of questions were asked of 1,904 San Francisco Bay Area residents (in the three cities of Concord, Pleasant Hill, and north San Francisco) as part of a larger attitudinal travel survey. The categories asked how much people perceive they travel, how much they enjoy travel, and if they want to increase or decrease their travel. Each category probed for responses on a five-point ordinal scale for both short distance and long distance travel broken into overall, purpose, and mode related questions. The focus of this thesis was to determine the relationships among the attitudinal variables Perceived Mobility (PM), Travel Liking (TL), and Relative Desired Mobility (RDM). The relationships among these variables will help us better understand some of the attitudes that underlie the travel that is done and the motivation for increasing and decreasing that travel. Six different analysis methodologies were used: correlation analysis, three-way analysis (cross tabulation, graphical analysis, and regression analysis), vector sorting, and cluster analysis. The following sections discuss the key findings from the methodologies listed above.

8.1 KEY FINDINGS

8.1.1 Correlation Findings

The correlation analysis was performed in several different ways. The first was to correlate long and short distance overall answers for Perceived Mobility, RDM, and Travel Liking with each other and with the section C answers for overall frequency of trips and total miles traveled (*i.e.*, measures of Objective Mobility). The second, third, and fourth analyses were pairwise comparisons across all distances, purpose, and mode categories, for each of the three main questions: Perceived Mobility versus RDM, Perceived Mobility versus Travel Liking, and RDM

versus Travel Liking. The correlation analysis demonstrates that there are distinct relationships among Perceived Mobility, Travel Liking, and RDM.

Objective Mobility and Perceived Mobility - The strong positive correlations between corresponding overall measures of Objective Mobility and Perceived Mobility indicates that there is some consistency across people in assigning similar perceptions to the same amounts of objective travel. The correlation between Objective Mobility and Perceived Mobility is consistent with Ramon's findings in Jerusalem (1981). However, although highly significant, the correlations were not extremely large (ranging from 0.27 to 0.48), indicating that there is considerable variability in the amount of Objective Mobility given the same Perceived Mobility label by different people.

RDM and Perceived Mobility - The large number of significant correlations between RDM with respect to a particular category, and Perceived Mobility for the same category (15 of 18 categories) suggests that the amount you travel will have an impact on whether you want to increase or decrease the amount you travel. The significant correlations are mixed in sign with ten positive correlations (ranging from 0.046 to 0.298) and five negative correlations (ranging from –0.067 to –0.217). Some of the negative correlations are for purposes that are normally considered onerous: overall short distance travel, commuting, taking others where they want to go. The negative results were consistent with the general hypothesis for the correlation between Perceived Mobility and RDM, however the positive correlations were unexpected. These imply that in those ten categories, the more people travel the more they want to increase their travel, suggesting (for those who travel a lot) an "insatiability" effect where they cannot get enough travel. Conversely, in these same categories, the less people travel the more they want to reduce their travel, suggesting (for those who travel little) a dampening effect where they have found better things to do with their time than to travel.

The lower levels of correlation between RDM and Perceived Mobility indicate that while the amount you travel will have an impact on increasing or decreasing the amount you travel, it is not the sole reason for changing travel behavior. As is seen in the three-way analysis, these pairwise results are moderated somewhat when Travel Liking is taken into account.

Travel Liking and RDM - The significant positive correlation between every Travel Liking category and the corresponding RDM category (ranging from 0.309 to 0.753) demonstrated how important liking travel is to wanting to increase or decrease the amount one travels. This is consistent with the first hypothesis where the correlation between Travel Liking and RDM was hypothesized to be positive with an inferred casual direction of "The greater the travel liking, the more a person will want to increase travel". A key observation also was that overall short distance RDM was linked more closely to the liking of travel to specific activities than to the liking of travel by specific modes. This is the same sort of psychology involved in using activity diaries over travel diaries, in that people can remember their activities better than the trips they made.

Perceived Mobility and Travel Liking - The positive correlation between Perceived Mobility and Travel Liking for every single activity and mode (ranging from 0.132 to 0.507), except short distance overall and commuting (both insignificant), suggests that people are somewhat able to satisfy their desires in the travel they do. This is consistent with hypothesis 3B: those who dislike travel tend to achieve a lower Perceived Mobility, and those who like to travel do tend to perceive they travel a lot. This also means that hypothesis 3A was not validated: higher levels of perceived travel do not lead to disliking the travel, or disliking travel does not lead to exaggerating one's perception of the amount of travel performed.

8.1.2 Cross Tabulation Findings

This analysis tabulates the average RDM value for each combination of Travel Liking and Perceived Mobility levels. The analysis was performed for all purposes, modes, and overall questions. The conclusion for short distance overall travel is that, on average, even those who liked travel and were doing little of it did not feel deprived of short distance travel. Those who liked short distance travel tended to feel balanced, those who disliked travel tended to feel surfeited, and those who were neutral tended to be split between balanced and surfeited. Short distance commute travel displayed a pattern similar to that for the overall short distance response, indicating the effect commuting has on the overall perception. It is not surprising that the commute perception overwhelms the short distance overall travel beliefs, given the percentage of time and/or miles people travel for commuting compared to other short distance activities. Since the commute cross tabulation shows that in general people are not deprived and are generally surfeited, it shows that people are traveling longer amounts than they want to and in more undesirable conditions, such as congested urban areas, etc (this is not a universal condition, however, as Redmond and Mokhtarian, 2000 demonstrate: a large minority of the sample was satisfied with their current commute, and a much smaller minority even wanted a longer commute). The mode results again showed a different pattern than the overall short distance results, which further illustrates the stronger connection between activities and overall travel attitudes than between modes and those attitudes.

The long distance RDM appeared to be independent of the respondents' Perceived Mobility unless they perceived they traveled a lot, in which case the average RDM is one level lower (*e.g.* slightly deprived instead of deprived). However, the amount people like long distance travel is an important determinant of whether they want to increase or decrease their travel. People who dislike long distance trips still have an RDM average that indicates they want to travel less, no matter what their Perceived Mobility is.

8.1.3 Graphical Findings

The graphical method displays the data contained in the cross tabulation. The RDM average is along the y-axis, Perceived Mobility along the x-axis, and each line is a different Travel Liking level. The graphing is performed for every question (overall, purpose, and mode) for both three-point and five-point versions of each scale (in the three-point versions, the two categories on each end of the original five-point scale are collapsed into one and the middle category left unchanged). The result is 32 graphs, 16 for each point scale.

In the three-point scale graphs, Travel Liking has substantial influence on the RDM average for each level of Perceived Mobility. With each increase in Travel Liking, there is an increase in the RDM average. This reemphasizes the conclusion drawn earlier that Travel Liking is a critical attitude to know in predicting a person's RDM. Most graphs demonstrated a decrease in RDM as Perceived Mobility increased, for each level of Travel Liking. This supports the hypothesis that the more you travel the less you want to increase that travel, but is seemingly not consistent with the correlation results where ten out of fifteen significant relationships between RDM and Perceived Mobility were positive. The correlation results did not control for Travel Liking and therefore do not distinguish the difference between each level of Travel Liking. So for each value of Perceived Mobility, there is actually a different level of RDM depending on how much the travel is liked. The correlation analysis therefore agglomerates the Travel Liking levels and produces results that are not indicative of the actual relationship when Travel Liking is accounted for. The short distance entertainment and long distance personal vehicle graphs displayed flat relationships between Perceived Mobility and RDM. This indicates that for these categories the amount you perceive you travel makes no difference in whether you want to increase or decrease your travel.

The long distance graphs had higher RDM averages than the short distance graphs, which demonstrates the greater demand people have for long distance travel compared to their current levels. This could be because long distance travel is not typically routine travel. Unlike commuting to work or traveling to the grocery store, you do not usually take the same exact path since your destinations change, which makes your travel new and more adventurous. Long distance work travel had the lowest RDM average for long distance travel. This is probably due to the focus of preparing for the work that is at the destination and the stress of having to perform job-related responsibilities.

There appears to be three different types of categories for the relationship of RDM and Perceived Mobility depending on the activity being performed or mode being used: those for which desired travel is inversely related to Perceived Mobility (Commuting to Work, BART), those for which desired travel is inelastic or unaffected by Perceived Mobility (short distance Entertainment/ Recreation/Social, long distance Personal Vehicle), and those for which desired travel is actually stimulated by Perceived Mobility (short distance Walking/Jogging/Bicycling, long distance Entertainment/Recreation/Social). The first category (those for which desired travel is inversely related to Perceived Mobility) is the largest category as indicated by the graphical results, and is the expected relationship indicated in the hypotheses. The application of the categories to each travel purpose or mode is not always distinct due to small variations that occur among Travel Liking levels.

8.1.4 Regression Findings

The regression analysis modeled RDM as the dependent variable in equations with Perceived Mobility, Travel Liking, and a Perceived Mobility-Travel Liking interaction term as the independent variables. Low to moderate R^2 values indicate that more explanatory variables of attitudes, feelings, or demographics are needed to more precisely determine if people want to

increase or decrease their travel. Travel Liking and Perceived Mobility appear to be quite important in the determination of RDM, but not exhaustive. Consistent with the hypothesis, Travel Liking was significant and positive in 15 of 16 equations, showing how essential it is for determining RDM. In order to know if people want to increase or decrease their travel, you really need to know first if they enjoy that travel. Perceived Mobility entered most equations with a negative coefficient thereby indicating that the more you travel, the less likely you are to want to travel more. The interesting exceptions were for Walking/Jogging/Bicycling and long distance Entertainment/Recreation/ Social Activities for which Perceived Mobility was significant but positive. This suggests a sort of snowball effect for travel in these categories: the more one does them, the more one wants to do them.

These results lead us back to the discussion from the graphical analysis, that there are three different types of relations between RDM and Perceived Mobility depending on the activity being performed or mode being used. Where the desired travel is inelastic or unaffected by Perceived Mobility (short distance Entertainment/Recreation/Social, long distance Personal Vehicle), Perceived Mobility did not enter the regression equation. Where desired travel is inversely related to Perceived Mobility (Commuting to Work, BART), Perceived Mobility entered the regression equation with a negative coefficient. Where desired travel is actually stimulated by Perceived Mobility (short distance Walking/Jogging/Bicycling, long distance Entertainment/ Recreation/Social), Perceived Mobility entered as a positive term.

8.1.5 Vector Sorting Findings

The vector sorting approach differed slightly from the earlier analysis in focusing more on intrarelationships among individual questions relating to a single concept such as Perceived Mobility, rather than on the interrelationships between concepts. The exception was for the Overall Travel Liking/RDM/Perceived Mobility vector where the interrelationships were

analyzed. In vector sorting a single string is created for each individual where each digit of the string is the response of an individual on the corresponding dimension of the vector. Once the vectors are created for each respondent then the frequencies of occurrence of each vector are tabulated. The most frequently occurring vectors for each combination of questions analyzed represent common response patterns that exist within the sample.

The Overall sequence (or vector) included responses for short distance overall Travel Liking, long distance overall Travel Liking, short distance overall RDM, long distance overall RDM, short distance overall Perceived Mobility, and long distance overall Perceived Mobility. The common theme in the most frequently occurring patterns for the Overall vector was that people enjoyed long distance travel and wanted to do more of it. Absolutely no one in the top 38 sequences based on the five-point scale (accounting for 27.3% of the sample) or the top 48 sequences based on the three-point scale (accounting for 52.4% of the sample) disliked long distance travel (only 10.7% of the sample indicated that they dislike or strongly dislike long distance overall travel). For short distance travel, people in the top 62 five-point scale sequences (accounting for 35.5% of the sample) or the top 31 three-point scale sequences (accounting for 43.1% of the sample) either are neutral towards or like travel overall and the majority of them want to travel about the same (only 12.8% of the sample indicated that they dislike or strongly dislike short distance overall travel). This is another way of showing the balance many people exhibited in the cross tabulations.

The Travel Liking sequence (or vector) included responses for Travel Liking with respect to short distance commute to work/school, short distance entertainment/recreation/social activities, long distance work/school related, and long distance entertainment/recreation/social activities. In the Travel Liking analysis, 46% of the sample has a liking for both short and long distance entertainment/recreation/social travel. The most frequent patterns indicate that work travel is the

category that people strongly dislike. The neutral group (neutral liking on all four categories) contained only 6.3% of the sample, which shows that the vast majority of people either liked or disliked some type of travel. This helps to demonstrate that most people did not just put down "neutral" in an attempt to complete the survey quickly and return it to be in the drawing for a cash prize. Instead most of them formed opinions about their travel and indicated that they have stronger feelings than neutrality. The fact that travel is liked under many circumstances suggests that it is not entirely the disutility that may have been expected by some.

The RDM sequence (or vector) included responses for RDM with respect to short distance commute to work/school, short distance entertainment/recreation/social activities, long distance work/school related, and long distance entertainment/recreation/social activities. The RDM results pointed towards people wanting more long and short distance social travel and less long and short distance work travel. This was hypothesized, and is not surprising, but may also be partly based on confounding the desirability of the activity at the destination with the travel itself. One interesting outcome though is that the "travel the same" or neutral group (those wanting to "travel the same" amount in all four categories) contained only 12% of the sample. Thus, few people are completely satisfied in their travel desires. Most people are forced into doing travel that they don't like, such as a longer commute for a better job, or being a taxi for the kids. Or they are forced away from travel that they want to do, such as long distance roadtrips, a lazy afternoon drive to the park for a picnic, or a jog at sunset. Whether or not people are confounding destinations with trips, it is apparent that people want to make the trips they enjoy and don't want to make the trips they dislike. People who dislike long distance trips still have an RDM average that indicates they want to travel less, no matter what the Perceived Mobility is.

The Perceived Mobility sequence (or vector) included responses for Perceived Mobility with respect to short distance commute to work/school, short distance entertainment/recreation/social

activities, long distance work/school related, and long distance entertainment/recreation/social activities. The top Perceived Mobility patterns supported the expectation that people perceive they do not travel much for long distance social activities. The majority of them also indicated that they traveled relatively little for long distance work trips. Though Perceived Mobility was strongly positively correlated to Objective Mobility, there are certainly variations in the correspondence of Objective Mobility to specific levels of Perceived Mobility. The majority of the sample (76.7%) traveled a medium amount (*i.e.*, the third point on the five point scale ranging from "none" to "a lot") or less for long-distance entertainment/social/recreational activities, and forty-six percent of the sample traveled below medium. Some of this could be due to the cost of long distance social travel, or possibly the inflexibility of family commitments to allow for a lot of long distance travel. The other possibility is that many people take one long distance trip a year as their vacation and spend the rest of the time saving up and planning for next year's trip. Also there was a large commuter group (136 responses, 7.1% of the sample) in the analysis of the three-point scale that responded that they travel a lot for commuting but below medium for the other purposes (3111). The "don't travel much" vector (1111) was the largest three-point scale group with 174 responses (9.1% of the sample). This vector could be capturing some of the retirees or the unemployed portions of the sample.

8.1.6 Cluster Analysis Findings

The goal of cluster analysis is approximately the same as vector sorting in that cases with similar response patterns are grouped together. The difference is that cluster analysis groups similar response vectors together, rather than only identical vectors. The cluster analysis was performed on Travel Liking using the four categories short distance commute to work or school, long distance work/school-related activities, and short and long distance entertainment/recreation/ social activities. The analysis looked at the similarities and differences among the six clusters identified, with respect to demographics, commute distance, and commute times. The clusters are

composed of a variety of people; therefore the characteristics discussed are the tendencies of the cluster toward certain directions. This does not mean that everyone in the cluster possesses the exact same characteristics. The labels for each of the clusters refer to the Travel Liking not to the liking for each activity. For example, cluster group number three (Entertainment Lover/Work Haters) likes traveling for entertainment and dislikes the commute to work rather than liking entertainment and hating work itself. Table 46 from Chapter 7 is repeated here for reference when viewing the cluster analysis conclusions in order to describe each cluster in terms of its average on each Travel Liking category.

Table 46 – Final Cluster Centers After Seeding (Six-Cluster, Preferred Solution, N=1904)

	Cluster					
	1 Haters	**2** Entertainment Lover/ Work Neutral	**3** Entertainment Lover/Work Hater	**4** Short Distance Work Hater	**5** Short Distance Lover	**6** Neutral
SD Commute to Work/Sch	2	3	2	2	4	3
SD Ent/Rec/ Soc Activities	3	4	4	4	4	3
LD Work/Sch Related Act	1	3	1	4	2	3
LD Ent/Rec/ Soc Activities	2	4	4	4	3	3
# (%) of Cases in Each Cluster	170 (8.9)	481 (25.3)	314 (16.5)	353 (18.5)	174 (9.1)	412 (21.6)

Cluster 1 - Haters – A high percentage of retirees probably contributed to this cluster having the highest percentage of people aged 75 or older and the highest proportion of households having two or more adults with no children. A possible result of disliking travel is that the Haters tried to help compensate for that dislike by driving higher than average percentages of large, luxury, and mid-size vehicles. This result may also be due to retirees buying large or luxury cars before retiring, or may just be an anomaly in the data. Interestingly enough, the Haters did not have the highest or 2nd highest commute time or distance (31.7 minutes and 16.2 miles, respectively), again probably because of the high proportion of older people.

Their dislike of travel may be more related to personal issues such as physical health problems, or a feeling of vulnerability or insecurity, than to system-level issues such as congestion.

Cluster 2 - Entertainment Lover/ Work Neutral – This cluster, the largest (containing a quarter of the sample), did not have many demographic extremes relative to the overall sample. It had fewer people in Professional/Technical occupations, fewer living in Pleasant Hill, fewer driving compact cars, and more driving minivans or sports cars. The most extreme traits were that this group had the highest average ideal commute time (17.9 minutes) while having the second lowest average commute time (25.5 minutes) and distance (10.4 miles). This implies that the more people like their commute, whether for the transition between work and home, the chance to daydream, or other reasons, the smaller the reduction needed to achieve their desired (or ideal) commute time.

Cluster 3 - Entertainment Lover/Work Haters – As the "work hater" portion of the name suggests, this cluster had undesirable commutes with the highest average commute distance (19.7 miles) and the 2nd highest average commute time (33.7 minutes). Given this dislike for the commute, it is not surprising that the average ideal commute time (15.2 minutes) for this cluster was the 2nd lowest of the six.

Cluster 4 - Short Distance Work Haters – As with the previous cluster, the "work hater" portion of the cluster name is indicative of the type of commute they face. This cluster had the highest average commute time (37.2 minutes) with the second highest average commute distance (17.8 miles). Naturally, this cluster also wished to have a low commute time, with the lowest average ideal commute time of any group (14.7 minutes). Low percentages of people with personal and household incomes of less than $34,999 and $54,999, respectively,

correspond to the higher occupation status (professional/technical and manager/ administration) and the higher employment status (relatively more full-time workers and fewer part-time and non-employed workers) of this group. The cluster had a tendency to live in North San Francisco and not in Concord while driving SUVs or sports cars. The cluster was also young with a large percentage of 24 to 40 year olds.

Cluster 5 - Short Distance Lovers – As the cluster name suggests, this cluster has a favorable commute, which may contribute to their affinity for short distance travel. They have the lowest average commute time (22.8 minutes) and distance (9.4 miles). This enjoyment of a shorter commute than average leads them to have the 2nd highest ideal commute time (17.1 minutes) with the smallest difference between actual and ideal commute times (5.7 minutes). This group has the highest percentage of incomes less than $15,000, possibly due to the high proportions of people with homemaker, part-time, and non-employed status. The lower incomes might also be a factor in the higher percentage of compact cars and lower percentages of luxury and sports cars driven by members of this group.

Cluster 6 - Neutral – Again the name of the cluster is suggestive of its demographic characteristics. This group was neutral in terms of its Travel Liking, and is exactly that with respect to most demographics as well. There was a large percentage of people age 23 or younger, which could imply that they have not developed strong attitudes as of yet regarding travel.

8.2 ALTERNATIVE EXPLANATIONS

As with most results and conclusions, alternative reasons exist that might explain the patterns that exist within the data. Reasons could include events that occurred outside the survey that could affect the respondents' answer -- such as an airplane crash, which might diminish the

respondents' liking and wanting to travel more by that mode. Two of the potentially more important threats to the validity of the conclusions are discussed below.

The likelihood that the respondent is partly confounding the enjoyment of the activities at the destination with the enjoyment of travel and the desire for more such *activities* with the RDM for *travel* has been mentioned several times throughout this thesis. Although the survey anticipated this problem and the respondent was cautioned accordingly, this is still a concern and another possible explanation for the high Travel Liking and RDM ratings for social travel, and the low ratings for commuting to work. However, it is also reasonable to expect that people's attitudes toward an activity would legitimately affect the way they perceive the travel itself. On a vacation trip most people are upbeat and happy because they are on vacation, which might also increase their enjoyment of the travel involved. Therefore the higher ratings for social travel and lower ratings for commuting to work could at least in part be a genuine reflection of the overall attitude toward that type of travel.

The results regarding the effect of mode versus purpose on overall travel attitudes could be due to placement of the questions. The purpose questions are located directly under the overall travel question and might attract the readers while reading the overall question. To test this possible impact, the group of mode questions should be placed closer to the overall question to see if their patterns then match the overall question. If the mode questions then have the same pattern, the effect can be attributed to the survey design. If however the activities remain more closely matched to the overall ratings then it further confirms the psychological connection between travel purposes and overall travel attitudes.

8.3 CONTRIBUTIONS AND LIMITATIONS OF THIS WORK

The major contribution of this thesis is the insight it offers into the relationships among RDM, Travel Liking, and Perceived Mobility. These relationships were examined from many different angles. Each methodological approach provided a different view of the picture, though it still led to the same overall conclusions. Though the results were very thorough and detailed, they are but a small piece to a larger puzzle. This thesis is a stepping stone for future research. The regression results point to trying more explanatory variables, and the vector sorting and cluster analysis lead to wanting to try different combinations of purposes and modes.

The sample was not chosen to be representative of the entire population of the country. Instead it was chosen for demonstration of a range of attitudes and other characteristics. The neighborhoods were selected based on the stereotype of urban (North San Francisco) versus suburban (Concord and Pleasant Hill) land use patterns. The surveys were sent to randomly-selected residential locations in each of the cities. Because the Bay Area has a wide diversity of transportation modes (rapid transit, bus, two airports, bike, walk, etc.) and accessibility to many activities, the responses should cover the full range of attitudes for purposes and modes.

The degree of representativeness of the sample could limit the generalizability of the results. The Bay Area Rapid Transit is available to each city in our sample, and two major airports (San Francisco International and Metropolitan Oakland International) connect the area to locations all over the world. The San Francisco residents of our sample also enjoy a good bus system and numerous activities are accessible by bike or foot. While this helps to create diversity within the answers and allow more modes to be addressed in the survey, individual variables may not be representative of the population. People who have differing qualities of service in different regions might answer differently. However, since we are addressing the relationships among variables, this limitation is not severe. If a person in the Bay Area likes traveling on a bus, she

might want to travel more on it. A person in a different region, with lower quality service, would likely still want to travel more if he liked bus travel. The relationship between Travel Liking and RDM would remain the same; there would just be a smaller percentage of people who like bus travel in the region with worse service.

8.4 RECOMMENDATIONS FOR FURTHER RESEARCH

Throughout the analysis of the data, numerous possibilities for further research have presented themselves. Recommendations for further research are discussed below, first in terms of additional analysis on the same data and then in terms of new data collection and analysis efforts.

The first suggestion for further research is to conduct vector sorting and cluster analysis along a more diversified set of dimensions. After identifying common patterns appearing among each set of dimensions, it is desirable to analyze the demographic and other characteristics of the people exhibiting those patterns. Some potentially interesting groupings include a short distance mode vector (personal vehicle, bus, BART, walk), a short distance commute vector (commute, personal vehicle, bus, BART), a long distance vector (work, social, personal vehicle, airplane), a short distance household-serving vector (grocery, taking others), and a long distance mode vector (personal vehicle, airplane). The cases involving more travel categories (*e.g.* the first two examples above) could be applied to just Perceived Mobility, Travel Liking, or RDM separately, whereas the cases with fewer categories could combine all three concepts into one vector. Many other different combinations could be created to focus on a specific area of interest, so the above list is by no means comprehensive.

The second suggestion for further research is to perform a mode-specific and a purpose-specific correlation analysis. This would test the relationships to investigate, for example, if liking for BART travel would be correlated to the Relative Desired Mobility for a personal vehicle. The

third suggestion is to develop more rigorous models of RDM with more explanatory variables. It would be interesting to see if, after including additional variables, Travel Liking and Perceived Mobility are still as significant in determining if someone wants to travel more or less. Fourth, after developing initial regression models, RDM should more appropriately be analyzed using ordinal response models such as ordinal probit. Performing regression analyses, as was done here, implicitly treats RDM as a continuous, ratio-scaled variable, when in fact it is only ordinally-scaled. Although this is a common approximation, future analyses should account for the true nature of the dependent variable. The more rigorous single-equation analysis would be the first step toward a full-scale structural equations model, which would account for multiple casual relationships among the variables of interest. The fifth suggestion is that this analysis could be repeated for each city separately to see if there are variations among the three different cities. The sixth suggestion is that a study could be performed on the Objective Mobility indicators derived for the correlation analysis in relation to Perceived Mobility. It would be interesting to see what kind of person feels that 50 miles is a medium amount of travel, and for what kind of person is it "A Lot". Last, the identified cluster analysis groups could be compared to more variables such as those comprising the Objective Mobility, Perceived Mobility, Travel Liking (categories not used to create the vectors), and RDM concepts.

Some modifications to the survey would be to change the order of mode, purpose, and overall questions to test the impact of question order on attitudes. The "overall" attitude might be influenced by seeing the activities immediately below since there is no control over the order in which the respondent looks at the questions. Also, some questions could be added to the survey to test further the differences between responses for the activity at the destination and the travel to reach the activity. This might help clarify in the respondent's mind that one set of questions is for destination activities, and the other set of questions is for the travel to those activities. Studying the difference between the attitudes obtained in that survey and the results from this thesis would

help identify the extent to which there are effects due to the confusion between destination and travel. The survey could also be performed in different geographic locations to analyze the distribution of travel attitudes across the United States and in different countries, and how they differ in various regions. Another possibility would be to ask what city the person works in to see if travel attitudes affect the choice of work or residential location with respect to commute distance. Last, a panel survey could be conducted to see whether people change their behavior in the direction indicated by the RDM response or whether people would continue to travel the same and just wish they could travel more or less.

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Appendix A

Census & Sample Demographics

1990 Census of Population and Housing and 1998 Mobility Survey: Comparison of Totals

Gender:

Gender	1990 Census* (U.S. Population)		1990 Census* (Combined total for Concord, Pleasant Hill & North San Francisco)		Mobility Survey (Total)	
	Frequency	Valid Percent	Frequency	Valid Percent	Frequency	Valid Percent
Female	96,450,301	52.11%	127,391	50.67%	980	51.80%
Male	88,655,140	47.89%	124,010	49.33%	912	48.20%
Total	185,105,441	100.00%	251,401	100.00%	1,892	100%

* 1990 Census totals are for adults age 18 years and over, which corresponds to the criterion for responding to the survey.

Age Distribution in Households:

Age Distribution	1990 Census (U.S. Population)		1990 Census (Combined total for Concord, Pleasant Hill and North San Francisco)		Mobility Survey* (Total)	
	Frequency	Valid Percent	Frequency	Valid Percent	Frequency	Valid Percent
Number of persons under 6 years old	21,951,110	8.83%	17,904	7.12%	260	5.84%
Number of persons 6-15	34,929,492	14.04%	24,758	9.85%	407	9.14%
Number of persons 16-18	10,333,461	4.15%	7,196	2.86%	133	2.99%
Number of persons 19-24*	22,627,374	9.10%	24,920	9.91%	227	5.10%
Number of persons 25-39*	63,406,716	25.49%	82,652	32.88%	1,384	31.07%
Number of persons 40-64*	64,266,445	25.84%	67,340	26.79%	1,563	35.08%
Number of persons 65-74	18,218,481	7.33%	15,673	6.23%	283	6.35%
Number of persons 75 and older	12,976,794	5.22%	10,958	4.36%	198	4.44%
Total	248,709,873	100%	251,401	100%	4,455	100%

* The Mobility Survey age distribution breakdown differs from the 1990 Census age distribution breakdown. The age distribution breakdowns for the Mobility Survey are: number of persons 19 - 23, number of persons 24 - 40, and number of persons 41 -64.

***Household Size*:**

Persons in Household	1990 Census (U.S. Population)		1990 Census (Combined total for Concord, Pleasant Hill and North San Francisco)		Mobility Survey (Total)	
	Frequency	Valid Percent	Frequency	Valid Percent	Frequency	Valid Percent
1 person	22,421,114	24.37%	33,495	31.79%	486	25.53%
2 persons	29,379,586	31.94%	35,439	33.63%	759	39.86%
3 persons	15,962,545	17.35%	16,506	15.67%	321	16.86%
4 persons	13,956,079	15.17%	11,909	11.30%	235	12.34%
5 persons	6,445,357	7.01%	5,181	4.92%	68	3.57%
6 persons	2,320,250	2.52%	1,822	1.73%	27	1.42%
7 or more persons	1,508,651	1.64%	1,012	0.96%	8	0.42%
Total	91,993,582	100%	105,364	100%	1,904	100%

Household Income:

Approximate Household Income	1990 Census (U.S. Population)		1990 Census (Combined total for Concord, Pleasant Hill and North San Francisco)		Mobility Survey* (Total)	
	Frequency	Valid Percent	Frequency	Valid Percent	Frequency	Valid Percent
Less than $15,000	22,347,770	24.29%	16,711	15.86%	71	3.91%
$15,000 - $34,999	30,698,867	33.37%	29,313	27.82%	228	12.55%
$35,000 - $54,999	20,506,467	22.29%	25,948	24.63%	389	21.41%
$55,000 - $74,999	9,699,871	10.54%	16,195	15.37%	332	18.27%
$75,000 - $99,999 *	4,704,808	5.11%	9,433	8.95%	294	16.18%
$100,000 or more*	4,035,799	4.39%	7,764	7.37%	503	27.68%
Total	91,993,582	100%	105,364	100%	1,817	100%

* The cut-off point of the approximate household income for the 1990 Census of Population and Housing (U.S. Population and Selected Zip Code totals) and the Mobility Survey differ. The income cut-off points for the Mobility Survey are: $75,000 - $94,999 and $95,000 or more.

Automobile Ownership:

Vehicles Available in Household	1990 Census* (U.S. Population)		1990 Census* (Combined total for Concord, Pleasant Hill & North San Francisco)		Mobility Survey (Total)	
	Frequency	Valid Percent	Frequency	Valid Percent	Frequency	Valid Percent
0	10,602,297	11.53%	17,224	16.41%	105	5.53%
1	31,038,711	33.76%	40,163	38.26%	653	34.39%
2	34,361,045	37.37%	33,234	31.66%	756	39.81%
3 or more	15,945,357	17.34%	14,356	13.68%	385	20.27%
Total	91,947,410	100%	104,977	100%	1,899	100%

* 1990 Census totals are obtained by adding subtotals for owners and renters; no grand total was available.

Commute Time to Work:

Commute Time to Work	1990 Census * (U.S. Population)		1990 Census* (Combined total for Concord, Pleasant Hill & North San Francisco)		Mobility Survey (Total)	
	Frequency	Valid Percent	Frequency	Valid Percent	Frequency	Valid Percent
Less than 5 minutes	4,314,682	3.86%	2,424	1.77%	25	1.76%
5 to 9 minutes	13,943,239	12.49%	10,126	7.41%	75	5.28%
10 to 14 minutes	17,954,128	16.08%	18,343	13.42%	171	12.04%
15 to 19 minutes	19,026,053	17.04%	21,989	16.08%	239	16.83%
20 to 24 minutes	16,243,343	14.55%	19,487	14.25%	186	13.10%
25 to 29 minutes	6,193,587	5.55%	6,990	5.11%	84	5.92%
30 to 34 minutes	14,237,947	12.75%	20,175	14.76%	182	12.82%
35 to 39 minutes	2,634,749	2.36%	3,713	2.72%	56	3.94%
40 to 44 minutes	3,180,413	2.85%	5,423	3.97%	63	4.44%
45 to 59 minutes	7,191,455	6.44%	13,413	9.81%	164	11.55%
60 to 89 minutes	4,980,662	4.46%	11,454	8.38%	139	9.79%
90 or more minutes	1,763,991	1.58%	3,184	2.33%	36	2.54%
Total	111,664,249	100%	136,721	100%	1,420	100%

* 1990 Census totals are based on workers who are age 16 years and over.

Workers in Household:

Number of Workers	1990 Census* (U.S. Population)		1990 Census (Combined total for Concord, Pleasant Hill and North San Francisco)		Mobility Survey (Total)	
	Frequency	Valid Percent	Frequency	Valid Percent	Frequency	Valid Percent
0	8,477,151	13.03%	5,796	10.17%	195	10.42%
1	18,243,077	28.04%	15,196	26.66%	685	36.59%
2	29,637,580	45.56%	28,748	50.43%	801	42.79%
3 or more	8,691,620	13.36%	7,265	12.74%	191	10.20%
Total	65,049,428	100.00%	57,005	100.00%	1,872	100.00%

* 1990 Census (U.S. Population) totals for the number of workers are based on the number of workers in the family, not household. Data on non-family households were not available.

Educational Attainment:

Education	1990 Census* (U.S. Population)		1990 Census* (Combined total for Concord, Pleasant Hill and North San Francisco)		Mobility Survey (Total)	
	Frequency	Valid Percent	Frequency	Valid Percent	Frequency	Valid Percent
Some grade school or high school	45,518,277	24.59%	25,063	12.27%	15	0.79%
High school diploma	55,769,325	30.13%	43,438	21.27%	126	6.62%
Some college or technical school	49,513,634	26.75%	65,510	32.08%	506	26.60%
Bachelor's degree or some graduate school	22,709,074	12.27%	47,190	23.11%	814	42.80%
Completed graduate degree(s)	11,593,019	6.26%	23,000	11.26%	441	23.19%
Total	185,103,329	100%	204,201	100%	1,902	100%

* 1990 Census totals are based on persons who are age 18 years and over.

Appendix B

Correlations

Correlation.xls

Appendix C

Cross Tabulation

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SSD_ALL * TLSD_ALL * PMSD_ALL	1904	100.0%	0	.0%	1904	100.0%

SSD_ALL * TLSD_ALL * PMSD_ALL Crosstabulation

Count

PMSD_ALL			TLSD_ALL 1.00	TLSD_ALL 2.00	TLSD_ALL 3.00	Total
1.00	SSD_ALL	1.00	18	32	11	61
		2.00	18	137	63	218
		3.00	3	12	14	29
	Total		39	181	88	308
2.00	SSD_ALL	1.00	40	119	44	203
		2.00	29	296	164	489
		3.00	1	15	31	47
	Total		70	430	239	739
3.00	SSD_ALL	1.00	112	217	67	396
		2.00	19	209	177	405
		3.00	4	13	39	56
	Total		135	439	283	857

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SSD_WRK * TLSD_WRK * PMSD_WRK	1904	100.0%	0	.0%	1904	100.0%

SSD_WRK * TLSD_WRK * PMSD_WRK Crosstabulation

Count

PMSD_WRK			TLSD_WRK 1.00	TLSD_WRK 2.00	TLSD_WRK 3.00	Total
1.00	SSD_WRK	1.00	168	85	17	270
		2.00	137	241	103	481
		3.00	3	9	6	18
	Total		308	335	126	769
2.00	SSD_WRK	1.00	81	69	14	164
		2.00	33	124	56	213
		3.00		1	4	5
	Total		114	194	74	382
3.00	SSD_WRK	1.00	337	104	48	489
		2.00	38	119	89	246
		3.00	5	5	8	18
	Total		380	228	145	753

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SSD_ACT * TLSD_ACT * PMSD_ACT	1904	100.0%	0	.0%	1904	100.0%

SSD_ACT * TLSD_ACT * PMSD_ACT Crosstabulation

Count

PMSD_ACT			TLSD_ACT 1.00	TLSD_ACT 2.00	TLSD_ACT 3.00	Total
1.00	SSD_ACT	1.00	184	133	23	340
		2.00	184	530	121	835
		3.00	4	14	12	30
	Total		372	677	156	1205
2.00	SSD_ACT	1.00	63	43	17	123
		2.00	19	162	63	244
		3.00		1	4	5
	Total		82	206	84	372
3.00	SSD_ACT	1.00	79	60	20	159
		2.00	21	79	52	152
		3.00	3	4	9	16
	Total		103	143	81	327

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SSD_GRO * TLSD_GRO * PMSD_GRO	1904	100.0%	0	.0%	1904	100.0%

SSD_GRO * TLSD_GRO * PMSD_GRO Crosstabulation

Count

PMSD_GRO			TLSD_GRO 1.00	TLSD_GRO 2.00	TLSD_GRO 3.00	Total
1.00	SSD_GRO	1.00	81	68	20	169
		2.00	133	524	204	861
		3.00	1	5	7	13
	Total		215	597	231	1043
2.00	SSD_GRO	1.00	66	53	18	137
		2.00	39	293	119	451
		3.00	1	1	4	6
	Total		106	347	141	594
3.00	SSD_GRO	1.00	31	27	18	76
		2.00	9	90	75	174
		3.00	1	3	13	17
	Total		41	120	106	267

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SSD_EAT * TLSD_EAT * PMSD_EAT	1904	100.0%	0	.0%	1904	100.0%

SSD_EAT * TLSD_EAT * PMSD_EAT Crosstabulation

Count

PMSD_EAT			TLSD_EAT			Total
			1.00	2.00	3.00	
1.00	SSD_EAT	1.00	41	62	33	136
		2.00	62	499	291	852
		3.00	2	26	79	107
	Total		105	587	403	1095
2.00	SSD_EAT	1.00	14	41	16	71
		2.00	16	252	223	491
		3.00	1	11	36	48
	Total		31	304	275	610
3.00	SSD_EAT	1.00	5	12	13	30
		2.00	7	56	83	146
		3.00		2	21	23
	Total		12	70	117	199

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SSD_SOC * TLSD_SOC * PMSD_SOC	1904	100.0%	0	.0%	1904	100.0%

SSD_SOC * TLSD_SOC * PMSD_SOC Crosstabulation

Count

PMSD_SOC			TLSD_SOC 1.00	TLSD_SOC 2.00	TLSD_SOC 3.00	Total
1.00	SSD_SOC	1.00	25	42	25	92
		2.00	21	241	198	460
		3.00	2	45	133	180
	Total		48	328	356	732
2.00	SSD_SOC	1.00	17	36	18	71
		2.00	12	226	238	476
		3.00	2	29	145	176
	Total		31	291	401	723
3.00	SSD_SOC	1.00	15	20	25	60
		2.00	8	73	162	243
		3.00	3	17	126	146
	Total		26	110	313	449

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SSD_GO * TLSD_GO * PMSD_GO	1903	99.9%	1	.1%	1904	100.0%

SSD_GO * TLSD_GO * PMSD_GO Crosstabulation

Count

PMSD_GO			TLSD_GO 1.00	TLSD_GO 2.00	TLSD_GO 3.00	Total
1.00	SSD_GO	1.00	227	124	29	380
		2.00	180	714	127	1021
		3.00	6	16	16	38
	Total		413	854	172	1439
2.00	SSD_GO	1.00	51	50	9	110
		2.00	10	91	49	150
		3.00		1	6	7
	Total		61	142	64	267
3.00	SSD_GO	1.00	57	43	12	112
		2.00	4	33	37	74
		3.00	3	1	7	11
	Total		64	77	56	197

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SSD_PV * TLSD_PV * PMSD_PV	1904	100.0%	0	.0%	1904	100.0%

SSD_PV * TLSD_PV * PMSD_PV Crosstabulation

Count

PMSD_PV			TLSD_PV			Total
			1.00	2.00	3.00	
1.00	SSD_PV	1.00	35	32	14	81
		2.00	29	82	89	200
		3.00	3	11	37	51
	Total		67	125	140	332
2.00	SSD_PV	1.00	16	32	22	70
		2.00	10	89	132	231
		3.00	2	5	32	39
	Total		28	126	186	340
3.00	SSD_PV	1.00	91	112	153	356
		2.00	17	214	510	741
		3.00	5	4	126	135
	Total		113	330	789	1232

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SSD_BUS * TLSD_BUS * PMSD_BUS	1904	100.0%	0	.0%	1904	100.0%

SSD_BUS * TLSD_BUS * PMSD_BUS Crosstabulation

Count

PMSD_BUS			TLSD_BUS 1.00	TLSD_BUS 2.00	TLSD_BUS 3.00	Total
1.00	SSD_BUS	1.00	483	74	16	573
		2.00	480	297	53	830
		3.00	63	74	34	171
	Total		1026	445	103	1574
2.00	SSD_BUS	1.00	34	10	1	45
		2.00	23	26	13	62
		3.00	5	6	12	23
	Total		62	42	26	130
3.00	SSD_BUS	1.00	71	35	6	112
		2.00	17	28	26	71
		3.00	2	5	10	17
	Total		90	68	42	200

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SSD_BRT * TLSD_BRT * PMSD_BRT	1904	100.0%	0	.0%	1904	100.0%

SSD_BRT * TLSD_BRT * PMSD_BRT Crosstabulation

Count

PMSD_BRT			TLSD_BRT			Total
			1.00	2.00	3.00	
1.00	SSD_BRT	1.00	259	119	44	422
		2.00	233	417	179	829
		3.00	26	125	229	380
	Total		518	661	452	1631
2.00	SSD_BRT	1.00	11	12	5	28
		2.00	4	29	34	67
		3.00	1	6	35	42
	Total		16	47	74	137
3.00	SSD_BRT	1.00	26	25	22	73
		2.00	2	17	13	32
		3.00		4	27	31
	Total		28	46	62	136

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SSD_JOG * TLSD_JOG * PMSD_JOG	1904	100.0%	0	.0%	1904	100.0%

SSD_JOG * TLSD_JOG * PMSD_JOG Crosstabulation

Count

PMSD_JOG			TLSD_JOG 1.00	TLSD_JOG 2.00	TLSD_JOG 3.00	Total
1.00	SSD_JOG	1.00	111	50	18	179
		2.00	62	209	141	412
		3.00	11	98	357	466
	Total		184	357	516	1057
2.00	SSD_JOG	1.00	6	7	4	17
		2.00	3	56	112	171
		3.00	2	27	261	290
	Total		11	90	377	478
3.00	SSD_JOG	1.00	3	2	5	10
		2.00	1	15	102	118
		3.00	3	15	223	241
	Total		7	32	330	369

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SLD_ALL * TLLD_ALL * PMLD_ALL	1904	100.0%	0	.0%	1904	100.0%

SLD_ALL * TLLD_ALL * PMLD_ALL Crosstabulation

Count

PMLD_ALL			TLLD_ALL 1.00	2.00	3.00	Total
1.00	SLD_ALL	1.00	24	21	11	56
		2.00	60	147	108	315
		3.00	30	90	359	479
	Total		114	258	478	850
2.00	SLD_ALL	1.00	16	20	9	45
		2.00	22	85	146	253
		3.00	14	57	315	386
	Total		52	162	470	684
3.00	SLD_ALL	1.00	23	25	17	65
		2.00	7	37	70	114
		3.00	7	18	166	191
	Total		37	80	253	370

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SLD_WRK * TLLD_WRK * PMLD_WRK	1904	100.0%	0	.0%	1904	100.0%

SLD_WRK * TLLD_WRK * PMLD_WRK Crosstabulation

Count

PMLD_WRK			TLLD_WRK 1.00	2.00	3.00	Total
1.00	SLD_WRK	1.00	302	111	31	444
		2.00	285	475	104	864
		3.00	16	43	93	152
	Total		603	629	228	1460
2.00	SLD_WRK	1.00	29	19	7	55
		2.00	13	58	44	115
		3.00	1	4	27	32
	Total		43	81	78	202
3.00	SLD_WRK	1.00	71	32	10	113
		2.00	14	49	38	101
		3.00	2	3	23	28
	Total		87	84	71	242

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SLD_SOC * TLLD_SOC * PMLD_SOC	1904	100.0%	0	.0%	1904	100.0%

SLD_SOC * TLLD_SOC * PMLD_SOC Crosstabulation

Count

PMLD_SOC			TLLD_SOC 1.00	TLLD_SOC 2.00	TLLD_SOC 3.00	Total
1.00	SLD_SOC	1.00	37	44	23	104
		2.00	50	156	120	326
		3.00	18	71	356	445
	Total		105	271	499	875
2.00	SLD_SOC	1.00	13	10	11	34
		2.00	13	73	106	192
		3.00	9	41	309	359
	Total		35	124	426	585
3.00	SLD_SOC	1.00	7	5	9	21
		2.00	7	37	69	113
		3.00	10	21	279	310
	Total		24	63	357	444

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SLD_PV * TLLD_PV * PMLD_PV	1904	100.0%	0	.0%	1904	100.0%

SLD_PV * TLLD_PV * PMLD_PV Crosstabulation

Count

PMLD_PV			TLLD_PV			Total
			1.00	2.00	3.00	
1.00	SLD_PV	1.00	72	40	25	137
		2.00	106	210	144	460
		3.00	14	28	137	179
	Total		192	278	306	776
2.00	SLD_PV	1.00	30	24	16	70
		2.00	35	107	134	276
		3.00	3	15	107	125
	Total		68	146	257	471
3.00	SLD_PV	1.00	36	30	24	90
		2.00	36	94	234	364
		3.00	5	20	178	203
	Total		77	144	436	657

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SLD_AIR * TLLD_AIR * PMLD_AIR	1904	100.0%	0	.0%	1904	100.0%

SLD_AIR * TLLD_AIR * PMLD_AIR Crosstabulation

Count

PMLD_AIR			TLLD_AIR 1.00	TLLD_AIR 2.00	TLLD_AIR 3.00	Total
1.00	SLD_AIR	1.00	66	37	23	126
		2.00	65	124	128	317
		3.00	34	69	447	550
	Total		165	230	598	993
2.00	SLD_AIR	1.00	16	8	9	33
		2.00	16	49	73	138
		3.00	16	22	233	271
	Total		48	79	315	442
3.00	SLD_AIR	1.00	31	17	17	65
		2.00	13	41	88	142
		3.00	17	16	229	262
	Total		61	74	334	469

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
overall, for All Short-Distance travel, i'd like to travel... * feeling about short-distance trips, OVERALL for ALL short-distance trips * for short distance travel - OVERALL i feel that i travel	1904	100.0%	0	.0%	1904	100.0%

overall, for All Short-Distance travel, i'd like to travel... * feeling about short-distance trips, OVERALL for ALL short-distance trips * for short distance travel - OVERALL i feel that i travel Crosstabulation

Count

for short distance travel - OVERALL i feel that i travel			feeling about short-distance trips, OVERALL for ALL short-distance trips					Total
			strongly dislike	Dislike	neutral	Like	strongly like	
None	overall, for All Short-Distance travel, i'd like to travel...	Much less		2	1			3
		Less	1	1	2		1	5
		About the same		1	13	5		19
		More			2	2		4
		Total	1	4	18	7	1	31
2	overall, for All Short-Distance travel, i'd like to travel...	Much less	1	2	6	1		10
		Less		11	23	7	2	43
		About the same		17	124	51	7	199
		More		2	9	10		21
		Much more		1	1	1	1	4
		Total	1	33	163	70	10	277
3	overall, for All Short-Distance travel, i'd like to travel...	Much less		3	21	3	2	29
		Less	1	36	98	35	4	174
		About the same		29	296	152	12	489
		More		1	15	27	1	44
		Much more				1	2	3
		Total	1	69	430	218	21	739
4	overall, for All Short-Distance travel, i'd like to travel...	Much less	3	7	5	2		17
		Less	3	29	103	27		162
		About the same	1	11	137	89	7	245
		More		3	8	14	3	28
		Much more			1			1
		Total	7	50	254	132	10	453
A lot	overall, for All Short-Distance travel, i'd like to travel...	Much less	7	24	21	9	2	63
		Less	4	35	88	25	2	154
		About the same	2	5	72	68	13	160
		More		1	3	15	3	22
		Much more			1	1	3	5
		Total	13	65	185	118	23	404

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
for short-distance, i'd like to travel...commuting to work or school * feeling for short-distance trips, commuting to work or school * i feel that i travel - short distance - commuting to work or school	1904	100.0%	0	.0%	1904	100.0%

for short-distance, i'd like to travel...commuting to work or school * feeling for short-distance trips, commuting to work or school * i feel that i travel - short distance - commuting to work or school Crosstabulation

Count

i feel that i travel - short distance - commuting to work or school			feeling for short-distance trips, commuting to work or school					Total
			strongly dislike	Dislike	neutral	Like	strongly like	
None	for short-distance, i'd like to travel...commuting to work or school	Much less	79	26	43	3	3	154
		Less	12	9	11	1	1	34
		About the same	46	29	108	14	3	200
		More		1	5	3		9
		Much more			2			2
	Total		137	65	169	21	7	399
2	for short-distance, i'd like to travel...commuting to work or school	Much less	2	8	5	1	1	17
		Less	3	29	26	6	1	65
		About the same	8	54	133	75	11	281
		More		2	2	3		7
	Total		13	93	166	85	13	370
3	for short-distance, i'd like to travel...commuting to work or school	Much less	6	12	3		1	22
		Less	5	58	66	11	2	142
		About the same	5	28	124	52	4	213
		More			1	3	1	5
	Total		16	98	194	66	8	382
4	for short-distance, i'd like to travel...commuting to work or school	Much less	14	22	3	1		40
		Less	7	64	41	17	2	131
		About the same	3	19	56	32	3	113
		More		1	2	1		4
		Much more		1		1		2
	Total		24	107	102	52	5	290
A lot	for short-distance, i'd like to travel...commuting to work or school	Much less	75	60	8	5	3	151
		Less	10	85	52	19	1	167
		About the same	3	13	63	48	6	133
		More	1	2	2			5
		Much more			1	4	2	7
	Total		89	160	126	76	12	463

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
for short distance, i'd like to travel...for work/school-related activities * feeling for short-distance trips, for work/school related activities * for short distance travel, i feel that i travel...for work/school-related activities	1904	100.0%	0	.0%	1904	100.0%

for short distance, i'd like to travel...for work/school-related activities * feeling for short-distance trips, for work/school related activities * for short distance travel, i feel that i travel...for work/school-related activities Crosstabulation

Count

for short distance travel, i feel that i travel...for work/school-related activities			feeling for short-distance trips, for work/school related activities					Total
			strongly dislike	Dislike	neutral	Like	strongly like	
None	for short distance, i'd like to travel...for work/school-related activities	Much less	79	26	60	3	4	172
		Less	2	9	16	3	2	32
		About the same	46	49	208	25	7	335
		More		3	4	4		11
		Much more			2	1	1	4
	Total		127	87	290	36	14	554
2	for short distance, i'd like to travel...for work/school-related activities	Much less	11	14	10	1	2	38
		Less	5	38	47	8		98
		About the same	9	80	322	86	3	500
		More		1	6	6		13
		Much more			2			2
	Total		25	133	387	101	5	651
3	for short distance, i'd like to travel...for work/school-related activities	Much less	3	9		3		15
		Less	4	47	43	13	1	108
		About the same		19	162	61	2	244
		More			1	2	1	4
		Much more				1		1
	Total		7	75	206	80	4	372
4	for short distance, i'd like to travel...for work/school-related activities	Much less	1	8	2	1		12
		Less		20	21	8	1	50
		About the same	3	8	51	21		83
		More		2	2	2		6
	Total		4	38	76	32	1	151
A lot	for short distance, i'd like to travel...for work/school-related activities	Much less	6	12	5	2	2	27
		Less	4	28	32	6		70
		About the same	2	8	28	28	3	69
		More		1		4		5
		Much more			2		3	5
	Total		12	49	67	40	8	176

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
for short-distance travel, i'd like to travel...for grocery shopping * feeling for short-distance trips, for grocery shopping * for short distance, i feel that i travel...for grocery shopping	1904	100.0%	0	.0%	1904	100.0%

for short-distance travel, i'd like to travel...for grocery shopping * feeling for short-distance trips, for grocery shopping * for short distance, i feel that i travel...for grocery shopping Crosstabulation

Count

for short distance, i feel that i travel...for grocery shopping			feeling for short-distance trips, for grocery shopping					
			strongly dislike	Dislike	neutral	Like	strongly like	Total
None	for short-distance travel, i'd like to travel...for grocery shopping	Much less	7	2	8	1		18
		Less	4	2	2	1		9
		About the same	6	13	43	12	4	78
		Total	17	17	53	14	4	105
2	for short-distance travel, i'd like to travel...for grocery shopping	Much less	3	7	6			16
		Less	8	48	52	16	2	126
		About the same	12	102	481	176	12	783
		More		1	5	7		13
		Total	23	158	544	199	14	938
3	for short-distance travel, i'd like to travel...for grocery shopping	Much less	1	7	3		2	13
		Less	5	53	50	16		124
		About the same	4	35	293	112	7	451
		More			1	3		4
		Much more	1				1	2
		Total	11	95	347	131	10	594
4	for short-distance travel, i'd like to travel...for grocery shopping	Much less	2	2	1	1	1	7
		Less	1	17	19	8	1	46
		About the same	1	3	66	49	2	121
		More			3	3	1	7
		Much more				1	3	4
		Total	4	22	89	62	8	185
A lot	for short-distance travel, i'd like to travel...for grocery shopping	Much less		2		1	1	4
		Less		7	7	5		19
		About the same		5	24	24		53
		More		1		3	1	5
		Much more					1	1
		Total		15	31	33	3	82

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
for short distance travel, i'd like to travel...to eat a meal * feeling for short-distance trips, to eat a meal * for short distance travel, i feel that i travel... to eat a meal	1904	100.0%	0	.0%	1904	100.0%

for short distance travel, i'd like to travel...to eat a meal * feeling for short-distance trips, to eat a meal * for short distance travel, i feel that i travel... to eat a meal Crosstabulation

Count

for short distance travel, i feel that i travel... to eat a meal			feeling for short-distance trips, to eat a meal					
			strongly dislike	Dislike	neutral	Like	strongly like	Total
None	for short distance travel, i'd like to travel...to eat a meal	Much less	7	2	3	2	1	15
		Less	1	4	5	2		12
		About the same	2	4	46	17	2	71
		More			5	7	1	13
		Much more					1	1
	Total		10	10	59	28	5	112
2	for short distance travel, i'd like to travel...to eat a meal	Much less	3	2	9	3	1	18
		Less		22	45	23	1	91
		About the same	5	51	453	249	23	781
		More		2	21	58	9	90
		Much more				1	2	3
	Total		8	77	528	334	36	983
3	for short distance travel, i'd like to travel...to eat a meal	Much less	1	2	1			4
		Less	1	10	40	16		67
		About the same	1	15	252	206	17	491
		More		1	11	30	4	46
		Much more				1	1	2
	Total		3	28	304	253	22	610
4	for short distance travel, i'd like to travel...to eat a meal	Much less		2			1	3
		Less		3	10	9	1	23
		About the same	1	4	49	67	6	127
		More			2	8	5	15
		Much more				1	2	3
	Total		1	9	61	85	15	171
A lot	for short distance travel, i'd like to travel...to eat a meal	Much less			1		1	2
		Less			1	1		2
		About the same		2	7	7	3	19
		More				3		3
		Much more				1	1	2
	Total			2	9	12	5	28

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
for short distance travel, i'd like to travel... for entertainment/recreation/social activities * feeling for short-distance trips, for entertainment/recreation/social activities * for short distance travel, i feel that i travel... for entertainment/recreation/social activities	1904	100.0%	0	.0%	1904	100.0%

for short distance travel, i'd like to travel... for entertainment/recreation/social activities * feeling for short-distance trips, for entertainment/recreation/social activities * for short distance travel, i feel that i travel... for entertainment/recreation/social activities Crosstabulation

Count

for short distance travel, i feel that i travel... for entertainment/recreation/social activities			feeling for short-distance trips, for entertainment/recreation/social activities					
			strongly dislike	Dislike	neutral	Like	strongly like	Total
None	for short distance travel, i'd like to travel... for entertainment/recreation/social activities	Much less	2	1	4	2	2	11
		Less	1	4	5			10
		About the same	1	1	27	13	1	43
		More		1	5	7	2	15
		Much more			3	1	3	7
	Total		4	7	44	23	8	86
2	for short distance travel, i'd like to travel... for entertainment/recreation/social activities	Much less	4	2	3	2	1	12
		Less	1	10	30	16	2	59
		About the same		19	214	165	19	417
		More		1	33	83	22	139
		Much more			4	7	8	19
	Total		5	32	284	273	52	646
3	for short distance travel, i'd like to travel... for entertainment/recreation/social activities	Much less	1	1	1			3
		Less		15	35	16	2	68
		About the same		12	226	211	27	476
		More	1		24	102	27	154
		Much more		1	5	6	10	22
	Total		2	29	291	335	66	723
4	for short distance travel, i'd like to travel... for entertainment/recreation/social activities	Much less		1			1	2
		Less		7	17	15		39
		About the same	2	2	59	111	20	194
		More		2	10	47	24	83
		Much more			2	7	8	17
	Total		2	12	88	180	53	335
A lot	for short distance travel, i'd like to travel... for entertainment/recreation/social activities	Much less		1				1
		Less		6	3	6	3	18
		About the same	1	3	14	20	11	49
		More		1	3	16	17	37
		Much more			2		7	9
	Total		1	11	22	42	38	114

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
for short-distance travel, i'd like to travel...just taking others where they need to go * feeling for short-distance trips, just taking others where they need to go * for short distance travel, i feel that i travel... just taking others where they need to go	1903	99.9%	1	.1%	1904	100.0%

for short-distance travel, i'd like to travel...just taking others where they need to go * feeling for short-distance trips, just taking others where they need to go * for short distance travel, i feel that i travel... just taking others where they need to go Crosstabulation

Count

for short distance travel, i feel that i travel... just taking others where they need to go			feeling for short-distance trips, just taking others where they need to go					
			strongly dislike	Dislike	neutral	Like	strongly like	Total
None	for short-distance travel, i'd like to travel...just taking others where they need to go	Much less	84	16	41	4	4	149
		Less	12	13	15	1	2	43
		About the same	50	64	340	30	9	493
		More		1	10	4	1	16
		Much more	3	1	2	1		7
	Total		149	95	408	40	16	708
2	for short-distance travel, i'd like to travel...just taking others where they need to go	Much less	15	14	9		2	40
		Less	12	61	59	13	3	148
		About the same	9	57	374	82	6	528
		More		1	4	8	2	15
	Total		36	133	446	103	13	731
3	for short-distance travel, i'd like to travel...just taking others where they need to go	Much less	4	9	6	1		20
		Less	4	34	44	8		90
		About the same	3	7	91	45	4	150
		More			1	5	1	7
	Total		11	50	142	59	5	267
4	for short-distance travel, i'd like to travel...just taking others where they need to go	Much less		1	3		1	5
		Less	2	23	21	4	2	52
		About the same	1	1	22	21	1	46
		More			1	2	2	5
		Much more		1				1
	Total		3	26	47	27	6	109
A lot	for short-distance travel, i'd like to travel...just taking others where they need to go	Much less	6	7	4	1		18
		Less		18	15	4		37
		About the same		2	11	12	3	28
		More		2		1		3
		Much more					2	2
	Total		6	29	30	18	5	88

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
for short distance travel, i'd like to travel...in a personal vehicle * feeling for short-distance trips, in a personal vehicle * for short distance travel, i feel that i travel...as a driver/passenter in any personal vehicle	1904	100.0%	0	.0%	1904	100.0%

for short distance travel, i'd like to travel...in a personal vehicle * feeling for short-distance trips, in a personal vehicle * for short distance travel, i feel that i travel...as a driver/passenter in any personal vehicle Crosstabulation

Count

for short distance travel, i feel that i travel...as a driver/passenter in any			feeling for short-distance trips, in a personal vehicle					
			strongly dislike	Dislike	neutral	Like	strongly like	Total
None	for short distance travel, i'd like to travel...in a personal vehicle	Much less	4	1	1	1	1	8
		Less	1	2	4	2		9
		About the same	3	3	18	12	2	38
		More	1		3	5		9
		Much more					3	3
	Total		9	6	26	20	6	67
2	for short distance travel, i'd like to travel...in a personal vehicle	Much less	2	4	1	2		9
		Less	4	17	26	8		55
		About the same	1	22	64	71	4	162
		More		2	5	18	8	33
		Much more			3	2	1	6
	Total		7	45	99	101	13	265
3	for short distance travel, i'd like to travel...in a personal vehicle	Much less	4	3	2	2		11
		Less		9	30	18	2	59
		About the same		10	89	113	19	231
		More	1	1	3	17	7	29
		Much more			2	4	4	10
	Total		5	23	126	154	32	340
4	for short distance travel, i'd like to travel...in a personal vehicle	Much less	3	5	1	1		10
		Less		19	40	29		88
		About the same	1	9	87	144	13	254
		More		1	1	31	8	41
		Much more				2	6	8
	Total		4	34	129	207	27	401
A lot	for short distance travel, i'd like to travel...in a personal vehicle	Much less	13	17	14	16	3	63
		Less	6	28	57	96	8	195
		About the same	1	6	127	262	91	487
		More	1	1	2	31	19	54
		Much more	2		1	3	26	32
	Total		23	52	201	408	147	831

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
for short distance travel, i'd like to travel...in a bus * feeling for short-distance trips, in a bus * for short distance travel, i feel that i travel... in a bus	1904	100.0%	0	.0%	1904	100.0%

for short distance travel, i'd like to travel...in a bus * feeling for short-distance trips, in a bus * for short distance travel, i feel that i travel... in a bus Crosstabulation

Count

for short distance travel, i feel that i travel... in a bus			feeling for short-distance trips, in a bus					Total
			strongly dislike	Dislike	neutral	Like	strongly like	
None	for short distance travel, i'd like to travel...in a bus	Much less	240	102	49	9	2	402
		Less	25	37	7	2	1	72
		About the same	184	215	218	23		640
		More	6	19	44	16		85
		Much more	6	9	5	1	1	22
	Total		461	382	323	51	4	1221
2	for short distance travel, i'd like to travel...in a bus	Much less	23	17	2		1	43
		Less	8	31	16	1		56
		About the same	17	64	79	30		190
		More	4	17	21	14	1	57
		Much more		2	4		1	7
	Total		52	131	122	45	3	353
3	for short distance travel, i'd like to travel...in a bus	Much less	5	2	1			8
		Less	4	23	9	1		37
		About the same	3	20	26	13		62
		More		5	5	10		20
		Much more			1	1	1	3
	Total		12	50	42	25	1	130
4	for short distance travel, i'd like to travel...in a bus	Much less	3	1	1			5
		Less	9	10	16			35
		About the same	1	8	17	12		38
		More			2	3	1	6
		Much more				1	1	2
	Total		13	19	36	16	2	86
A lot	for short distance travel, i'd like to travel...in a bus	Much less	13	8	3			24
		Less	2	25	15	6		48
		About the same	1	7	11	12	2	33
		More			3	1		4
		Much more		2		1	2	5
	Total		16	42	32	20	4	114

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
for short distance travel, i'd like to travel... on a train/BART/light rail * feeling for short-distance trips_on a train/BART/light rail * for short distance travel, i feel that i travel... on a train/BART/light rail	1904	100.0%	0	.0%	1904	100.0%

for short distance travel, i'd like to travel... on a train/BART/light rail * feeling for short-distance trips_on a train/BART/light rail * for short distance travel, i feel that i travel... on a train/BART/light rail Crosstabulation

Count

for short distance travel, i feel that i travel... on a train/BART/light rail			feeling for short-distance trips_on a train/BART/light rail					Total
			strongly dislike	Dislike	neutral	Like	strongly like	
None	for short distance travel, i'd like to travel... on a train/BART/light rail	Much less	123	59	63	18	8	271
		Less	6	14	21	6		47
		About the same	65	116	251	74	3	509
		More	4	10	64	91	6	175
		Much more		1	8	11	4	24
	Total		198	200	407	200	21	1026
2	for short distance travel, i'd like to travel... on a train/BART/light rail	Much less	17	14	8	3	1	43
		Less	4	22	27	8		61
		About the same	8	44	166	100	2	320
		More	3	6	50	94	9	162
		Much more		2	3	9	5	19
	Total		32	88	254	214	17	605
3	for short distance travel, i'd like to travel... on a train/BART/light rail	Much less	3	1	2			6
		Less	1	6	10	5		22
		About the same	1	3	29	31	3	67
		More	1		6	26	3	36
		Much more				2	4	6
	Total		6	10	47	64	10	137
4	for short distance travel, i'd like to travel... on a train/BART/light rail	Much less	1	2	2			5
		Less		9	7	9		25
		About the same	1		9	3		13
		More			2	9	3	14
		Much more			1	1	4	6
	Total		2	11	21	22	7	63
A lot	for short distance travel, i'd like to travel... on a train/BART/light rail	Much less	3	2	8	4	1	18
		Less	2	7	8	7	1	25
		About the same		1	8	6	4	19
		More			1	7	1	9
		Much more					2	2
	Total		5	10	25	24	9	73

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
for short-distance trips, i'd like to travel.... walking/jogging/bicycling * feeling for short-distance trips, walking/jogging/bicycling * for short distance trips, i feel that i travel...walking/jogging/bicycling	1904	100.0%	0	.0%	1904	100.0%

for short-distance trips, i'd like to travel.... walking/jogging/bicycling * feeling for short-distance trips, walking/jogging/bicycling * for short distance trips, i feel that i travel...walking/jogging/bicycling Crosstabulation

Count

for short distance trips, i feel that i travel...walking/jo			feeling for short-distance trips, walking/jogging/bicycling					
			strongly dislike	Dislike	neutral	Like	strongly like	Total
None	for short-distance trips, i'd like to travel.... walking/jogging/bicycling	Much less	50	14	21	4		89
		Less	2	8	3			13
		About the same	19	24	68	18		129
		More	2	5	28	29	4	68
		Much more			3	6	6	15
	Total		73	51	123	57	10	314
2	for short-distance trips, i'd like to travel.... walking/jogging/bicycling	Much less	9	9	9	5	1	33
		Less	4	15	17	8		44
		About the same	5	14	141	118	5	283
		More	1	3	61	240	21	326
		Much more			6	27	24	57
	Total		19	41	234	398	51	743
3	for short-distance trips, i'd like to travel.... walking/jogging/bicycling	Much less	2		2	4		8
		Less		4	5			9
		About the same	2	1	56	96	16	171
		More	1	1	27	170	47	246
		Much more				13	31	44
	Total		5	6	90	283	94	478
4	for short-distance trips, i'd like to travel.... walking/jogging/bicycling	Much less	1		1			2
		Less		1	1	2	1	5
		About the same			13	37	12	62
		More		2	9	71	45	127
		Much more			2	8	14	24
	Total		1	3	26	118	72	220
A lot	for short-distance trips, i'd like to travel.... walking/jogging/bicycling	Much less	1			1		2
		Less				1		1
		About the same		1	2	26	27	56
		More			3	20	40	63
		Much more	1		1	1	24	27
	Total		2	1	6	49	91	149

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
overall, for ALL Long-Distance travel * Feeling for long-distance trips, OVERALL feeling for ALL long-distance travel * for Long distance trips, OVERALL for all long-distance travel	1904	100.0%	0	.0%	1904	100.0%

overall, for ALL Long-Distance travel * Feeling for long-distance trips, OVERALL feeling for ALL long-distance travel * for Long distance trips, OVERALL for all long-distance travel Crosstabulation

Count

for Long distance trips, OVERALL for all long-distance travel			Feeling for long-distance trips, OVERALL feeling for ALL long-distance travel					Total
			strongly dislike	Dislike	neutral	Like	strongly like	
None	overall, for ALL Long-Distance travel	Much less	6	2	4			12
		Less	3		3	1		7
		About the same	3	12	31	15		61
		More	1	3	11	16	3	34
		Much more			2	5	5	12
	Total		13	17	51	37	8	126
2	overall, for ALL Long-Distance travel	Much less	4	3	3	2		12
		Less		6	11	8		25
		About the same	3	42	116	84	9	254
		More	1	16	68	215	31	331
		Much more		9	9	48	36	102
	Total		8	76	207	357	76	724
3	overall, for ALL Long-Distance travel	Much less	2		4	1		7
		Less	1	13	16	8		38
		About the same	1	21	85	133	13	253
		More	1	10	47	197	44	299
		Much more		3	10	36	38	87
	Total		5	47	162	375	95	684
4	overall, for ALL Long-Distance travel	Much less		3				3
		Less		2	14	5	1	22
		About the same		4	22	34	5	65
		More		5	13	69	19	106
		Much more			3	12	18	33
	Total			14	52	120	43	229
A lot	overall, for ALL Long-Distance travel	Much less	4	7	4	1	1	17
		Less		7	7	8	1	23
		About the same		3	15	20	11	49
		More	1		2	23	14	40
		Much more		1		4	7	12
	Total		5	18	28	56	34	141

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
for long-distance travel, i'd like to travel... for work/school-related activities * feeling for long-distance trips, for work/school related activities * for long-distance trips, for work/school-related activities	1904	100.0%	0	.0%	1904	100.0%

for long-distance travel, i'd like to travel... for work/school-related activities * feeling for long-distance trips, for work/school related activities * for long-distance trips, for work/school-related activities Crosstabulation

Count

for long-distance trips, for work/school-related activities			feeling for long-distance trips, for work/school related activities					Total
			strongly dislike	Dislike	neutral	Like	strongly like	
None	for long-distance travel, i'd like to travel... for work/school-related activities	Much less	139	37	57	13	7	253
		Less	18	45	15	3	2	83
		About the same	89	129	331	37	2	588
		More	2	2	21	23	3	51
		Much more	3	2	3	4	5	17
	Total		251	215	427	80	19	992
2	for long-distance travel, i'd like to travel... for work/school-related activities	Much less	10	8	10			28
		Less	12	33	29	5	1	80
		About the same	9	58	144	62	3	276
		More	1	6	19	46	8	80
		Much more				2	2	4
	Total		32	105	202	115	14	468
3	for long-distance travel, i'd like to travel... for work/school-related activities	Much less	3	6	1	1		11
		Less		20	18	5	1	44
		About the same		13	58	43	1	115
		More	1		2	18	3	24
		Much more			2	2	4	8
	Total		4	39	81	69	9	202
4	for long-distance travel, i'd like to travel... for work/school-related activities	Much less	2	2	1			5
		Less	1	21	10	3		35
		About the same	1	8	25	19	1	54
		More		1	3	12		16
	Total		4	32	39	34	1	110
A lot	for long-distance travel, i'd like to travel... for work/school-related activities	Much less	7	15	6	3	1	32
		Less	2	21	15	3		41
		About the same	1	4	24	14	4	47
		More				5		5
		Much more	1			2	4	7
	Total		11	40	45	27	9	132

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
for long-distance travel, i'd like to travel...for entertainment/recreation/social activities * feeling for long-distance travel, for entertainment/recreation/social activities * for long-distance trips, for entertainment/recreation/social activities	1904	100.0%	0	.0%	1904	100.0%

for long-distance travel, i'd like to travel...for entertainment/recreation/social activities * feeling for long-distance travel, for entertainment/recreation/social activities * for long-distance trips, for entertainment/recreation/social activities Crosstabulation

Count

for long-distance trips, for entertainment/recreation/ social activities			feeling for long-distance travel, for entertainment/recreation/social activities					Total
			strongly dislike	Dislike	neutral	Like	strongly like	
None	for long-distance travel, i'd like to travel...for entertainment/recreation/social activities	Much less	10	3	11	3	1	28
		Less	1	3	9	4		17
		About the same	10	9	50	23	2	94
		More		3	16	28	5	52
		Much more		2	2	5	11	20
	Total		21	20	88	63	19	211
2	for long-distance travel, i'd like to travel...for entertainment/recreation/social activities	Much less	4	2	5	2		13
		Less	3	11	19	12	1	46
		About the same	2	29	106	83	12	232
		More	1	9	46	172	46	274
		Much more		3	7	25	64	99
	Total		10	54	183	294	123	664
3	for long-distance travel, i'd like to travel...for entertainment/recreation/social activities	Much less	4	3	3	3		13
		Less	1	5	7	6	2	21
		About the same	4	9	73	86	20	192
		More		7	36	156	59	258
		Much more	1	1	5	26	68	101
	Total		10	25	124	277	149	585
4	for long-distance travel, i'd like to travel...for entertainment/recreation/social activities	Much less	2	1	1			4
		Less		2	1	2		5
		About the same		5	28	38	8	79
		More		5	12	88	45	150
		Much more	1	1	3	16	38	59
	Total		3	14	45	144	91	297
A lot	for long-distance travel, i'd like to travel...for entertainment/recreation/social activities	Much less		1		3	1	5
		Less	1		3	1	2	7
		About the same		2	9	15	8	34
		More	1	1	3	33	27	65
		Much more		1	3	7	25	36
	Total		2	5	18	59	63	147

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
for long-distance travel, i'l like to travel... in any personal vehicle * feeling for long-distance travel, in a personal vehicle * for long distance trips, driver/passenger in any personal vehcile	1904	100.0%	0	.0%	1904	100.0%

for long-distance travel, i'l like to travel... in any personal vehicle * feeling for long-distance travel, in a personal vehicle * for long distance trips, driver/passenger in any personal vehcile Crosstabulation

Count

for long distance trips, driver/passenger in any personal vehcile			feeling for long-distance travel, in a personal vehicle					Total
			strongly dislike	Dislike	neutral	Like	strongly like	
None	for long-distance travel, i'l like to travel... in any personal vehicle	Much less	16	8	9	3		36
		Less	2	3	6	4		15
		About the same	12	29	59	31	4	135
		More		5	5	15	6	31
		Much more				4	6	10
	Total		30	45	79	57	16	227
2	for long-distance travel, i'l like to travel... in any personal vehicle	Much less	3	5	4	3		15
		Less	3	32	21	15		71
		About the same	8	57	151	99	10	325
		More	1	7	20	88	8	124
		Much more		1	3	3	7	14
	Total		15	102	199	208	25	549
3	for long-distance travel, i'l like to travel... in any personal vehicle	Much less	2	8	3	1		14
		Less	3	17	21	13	2	56
		About the same	5	30	107	118	16	276
		More		3	12	71	23	109
		Much more			3	7	6	16
	Total		10	58	146	210	47	471
4	for long-distance travel, i'l like to travel... in any personal vehicle	Much less	3	1				4
		Less		9	18	9		36
		About the same	3	15	50	109	7	184
		More			9	53	15	77
		Much more		1	1	3	9	14
	Total		6	26	78	174	31	315
A lot	for long-distance travel, i'l like to travel... in any personal vehicle	Much less	1	7	3	3	1	15
		Less	1	14	9	11		35
		About the same	1	17	44	86	32	180
		More	1		8	44	25	78
		Much more	2	1	2	6	23	34
	Total		6	39	66	150	81	342

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
for long-distance travel, i'd like to travel... in an airplane * feeling for long-distance travel, in an airplane * for long distance trips, in an airplane	1904	100.0%	0	.0%	1904	100.0%

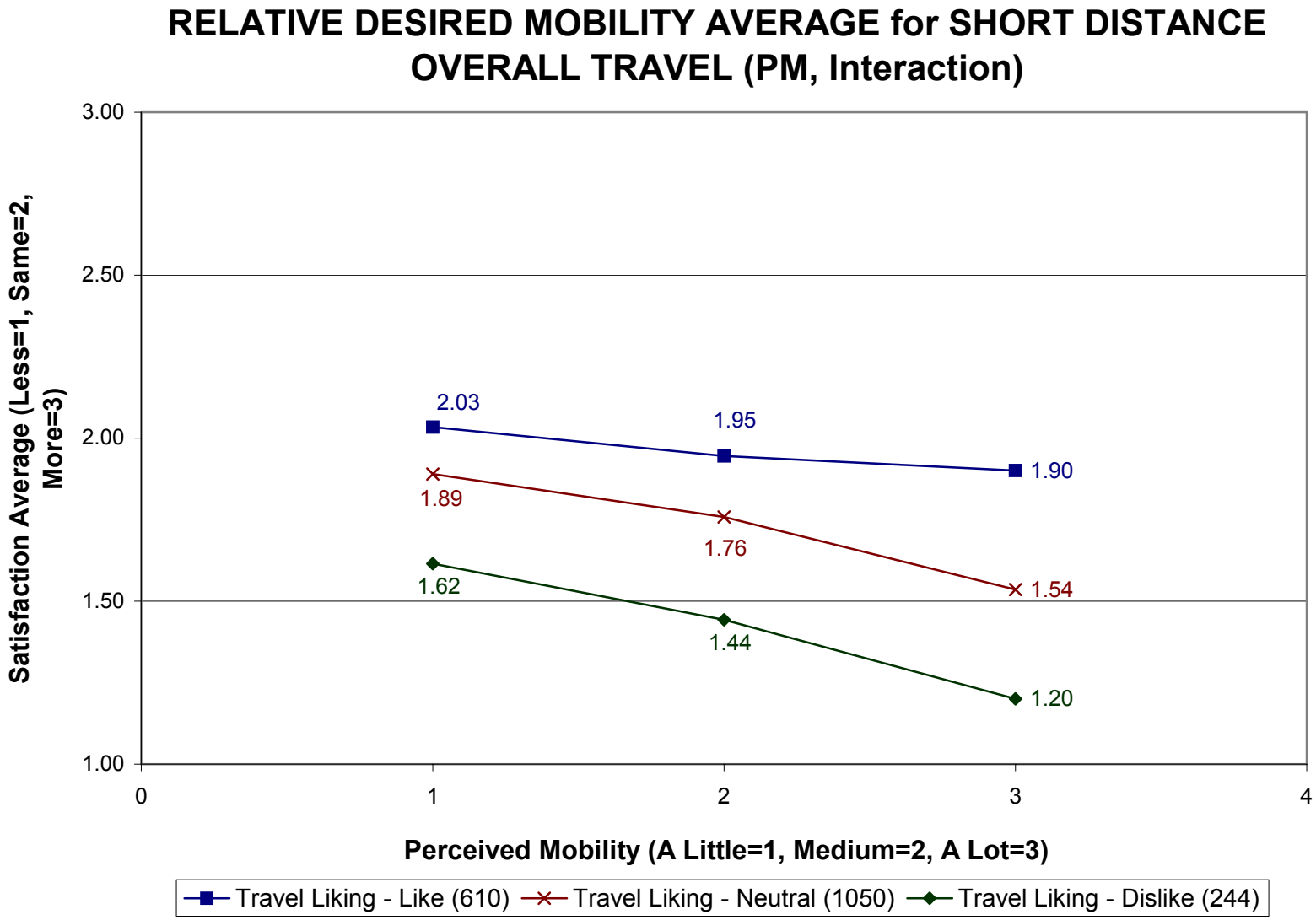
for long-distance travel, i'd like to travel... in an airplane * feeling for long-distance travel, in an airplane * for long distance trips, in an airplane Crosstabulation

Count

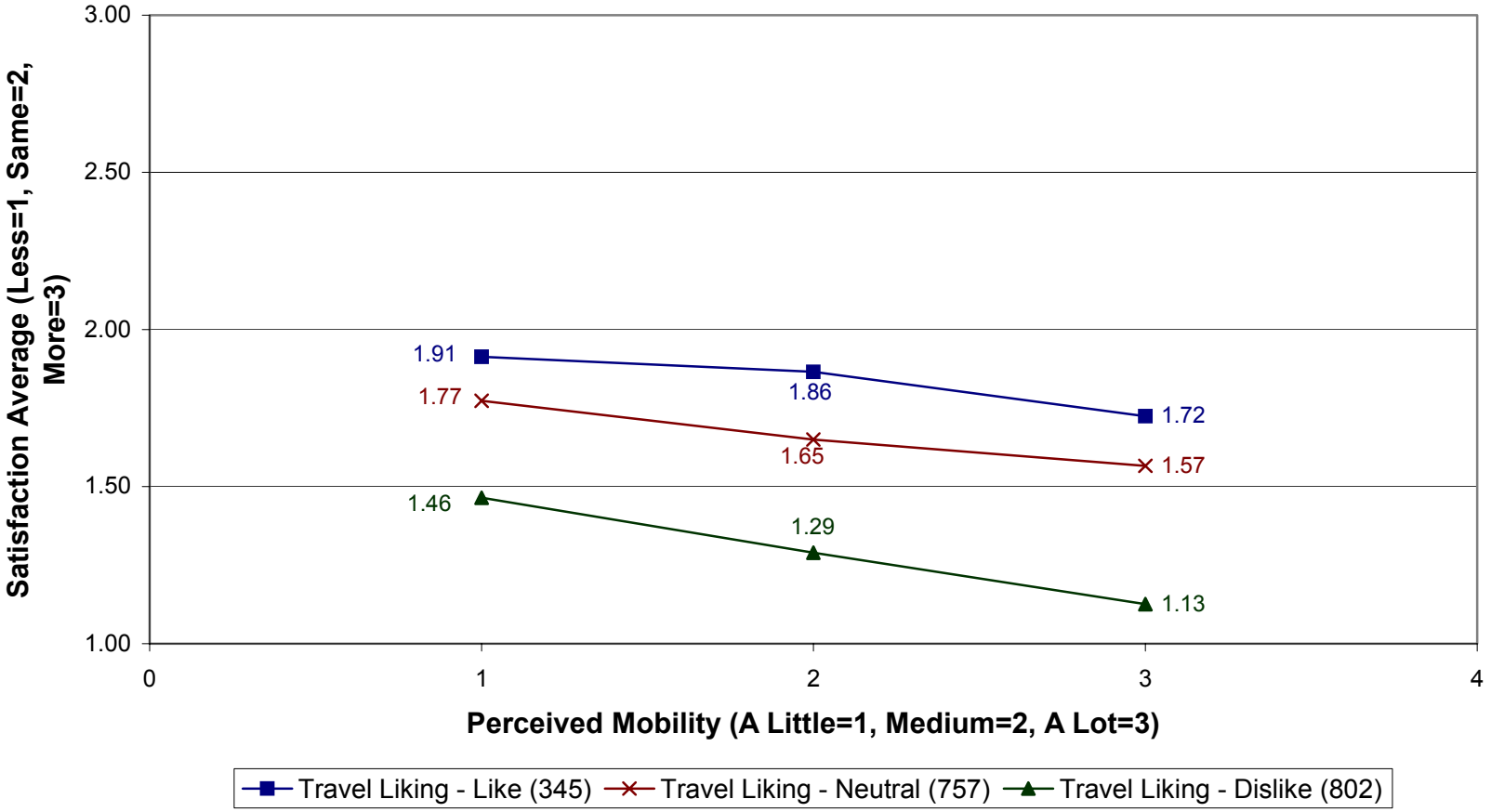
for long distance trips, in an airplane			feeling for long-distance travel, in an airplane					Total
			strongly dislike	Dislike	neutral	Like	strongly like	
None	for long-distance travel, i'd like to travel... in an airplane	Much less	31	1	15	7	2	56
		Less	4	6	5	3		18
		About the same	12	16	41	26		95
		More	1	4	20	53	12	90
		Much more	1		3	8	18	30
	Total		49	27	84	97	32	289
2	for long-distance travel, i'd like to travel... in an airplane	Much less	6	3	4			13
		Less	4	11	13	11		39
		About the same	5	32	83	92	10	222
		More	2	23	39	209	64	337
		Much more	1	2	7	32	51	93
	Total		18	71	146	344	125	704
3	for long-distance travel, i'd like to travel... in an airplane	Much less	3	4	1	1		9
		Less	1	8	7	7	1	24
		About the same	4	12	49	59	14	138
		More	1	13	21	127	37	199
		Much more	1	1	1	21	48	72
	Total		10	38	79	215	100	442
4	for long-distance travel, i'd like to travel... in an airplane	Much less	2	2		1		5
		Less		6	9	1		16
		About the same		8	24	44	10	86
		More	2	7	11	94	29	143
		Much more	1	2		11	30	44
	Total		5	25	44	151	69	294
A lot	for long-distance travel, i'd like to travel... in an airplane	Much less	7	4	3	3		17
		Less	2	8	5	12		27
		About the same	1	4	17	23	11	56
		More	1	4	4	25	15	49
		Much more			1	2	23	26
	Total		11	20	30	65	49	175

Appendix D

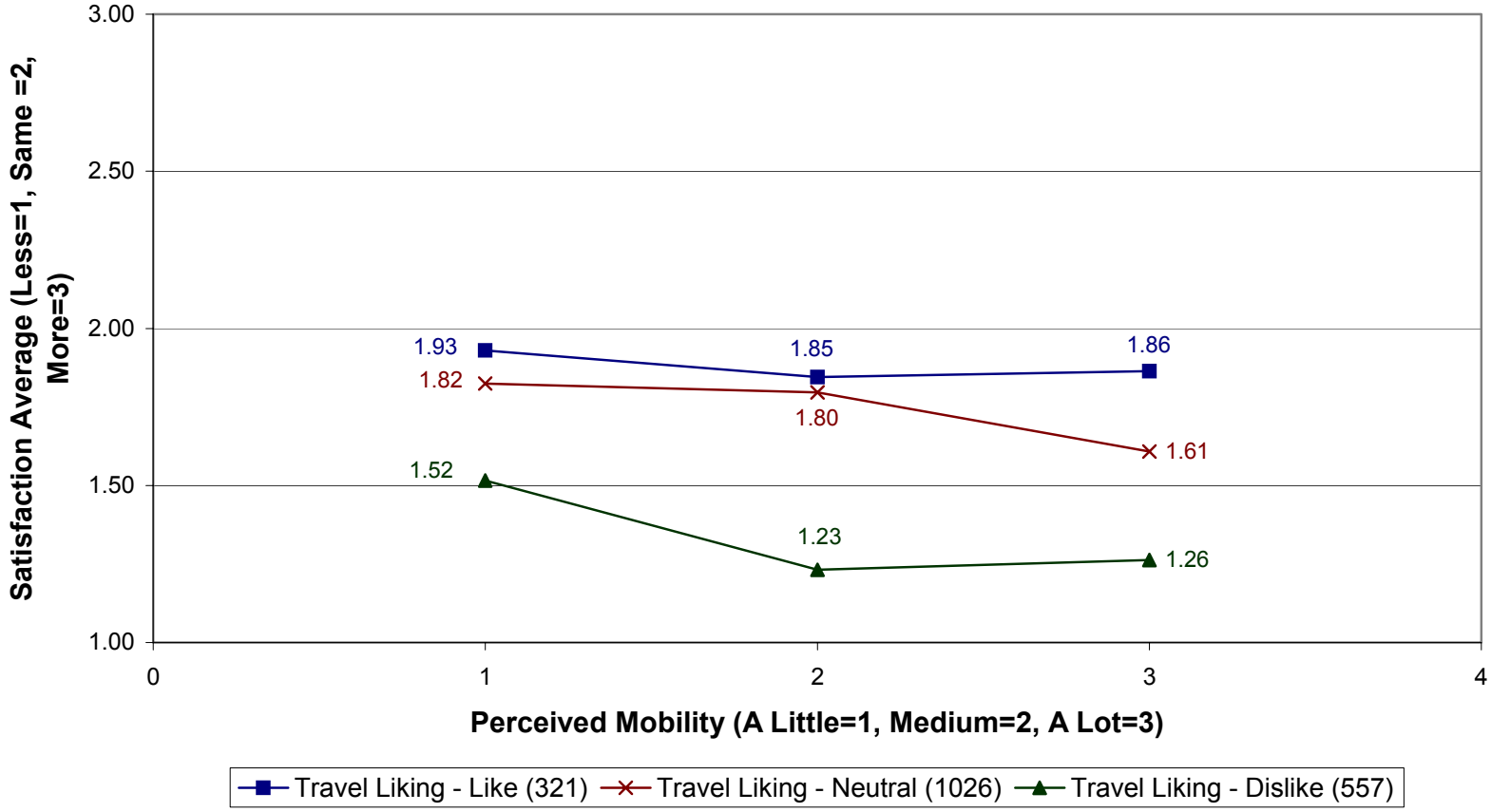
Graphs


RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE OVERALL TRAVEL (PM, Interaction)
Satisfaction Average (Less=1, Same=2, More=3)
3.00
2.50
2.00
1.50
1.00
0
1
2
3
4
2.03
1.95
1.90
1.89
1.76
1.54
1.62
1.44
1.20
Perceived Mobility (A Little=1, Medium=2, A Lot=3)
Travel Liking - Like (610)
Travel Liking - Neutral (1050)
Travel Liking - Dislike (244)

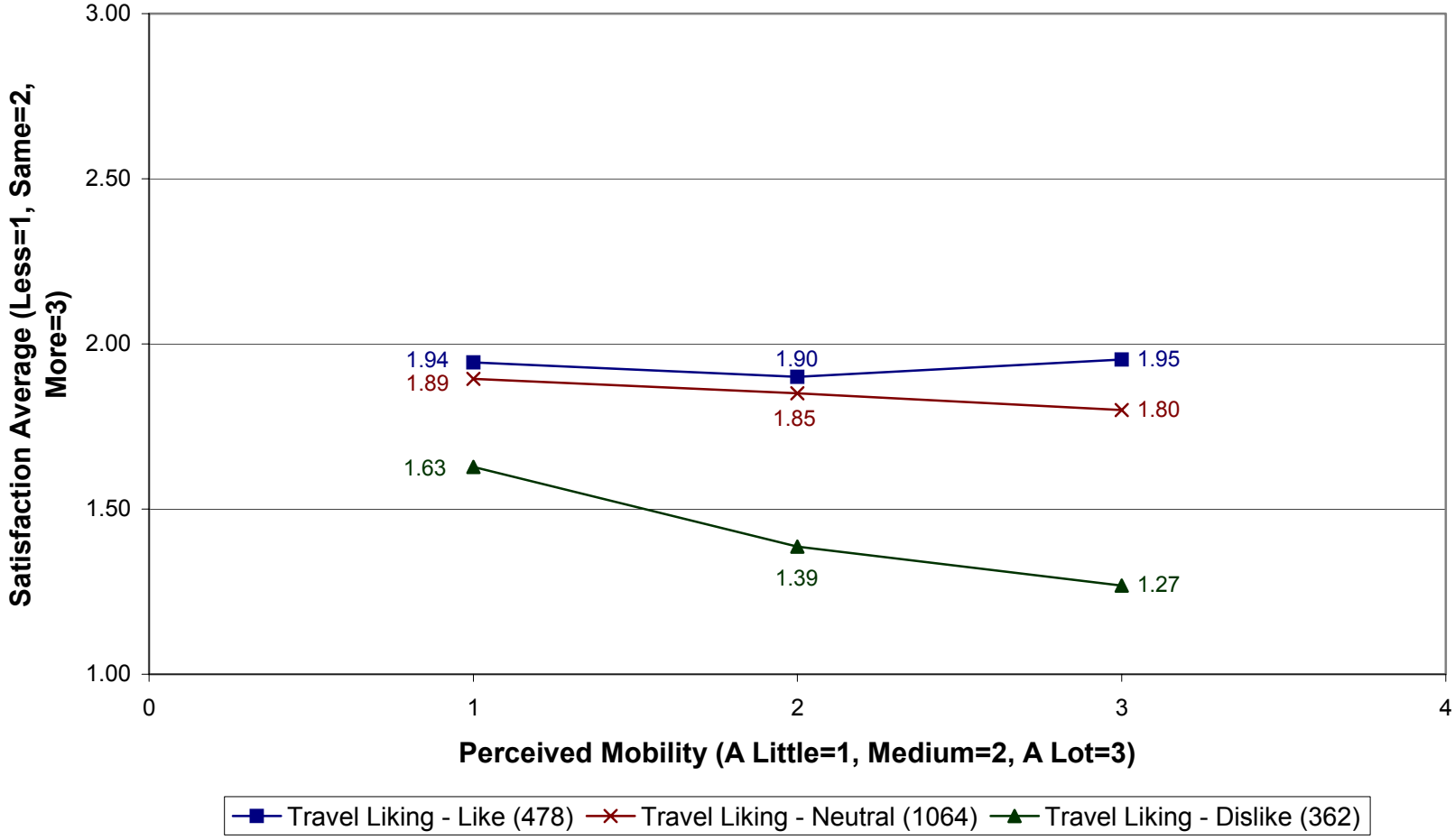
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE TRAVEL - COMMUTING to WORK or SCHOOL (TL, PM, Interaction)



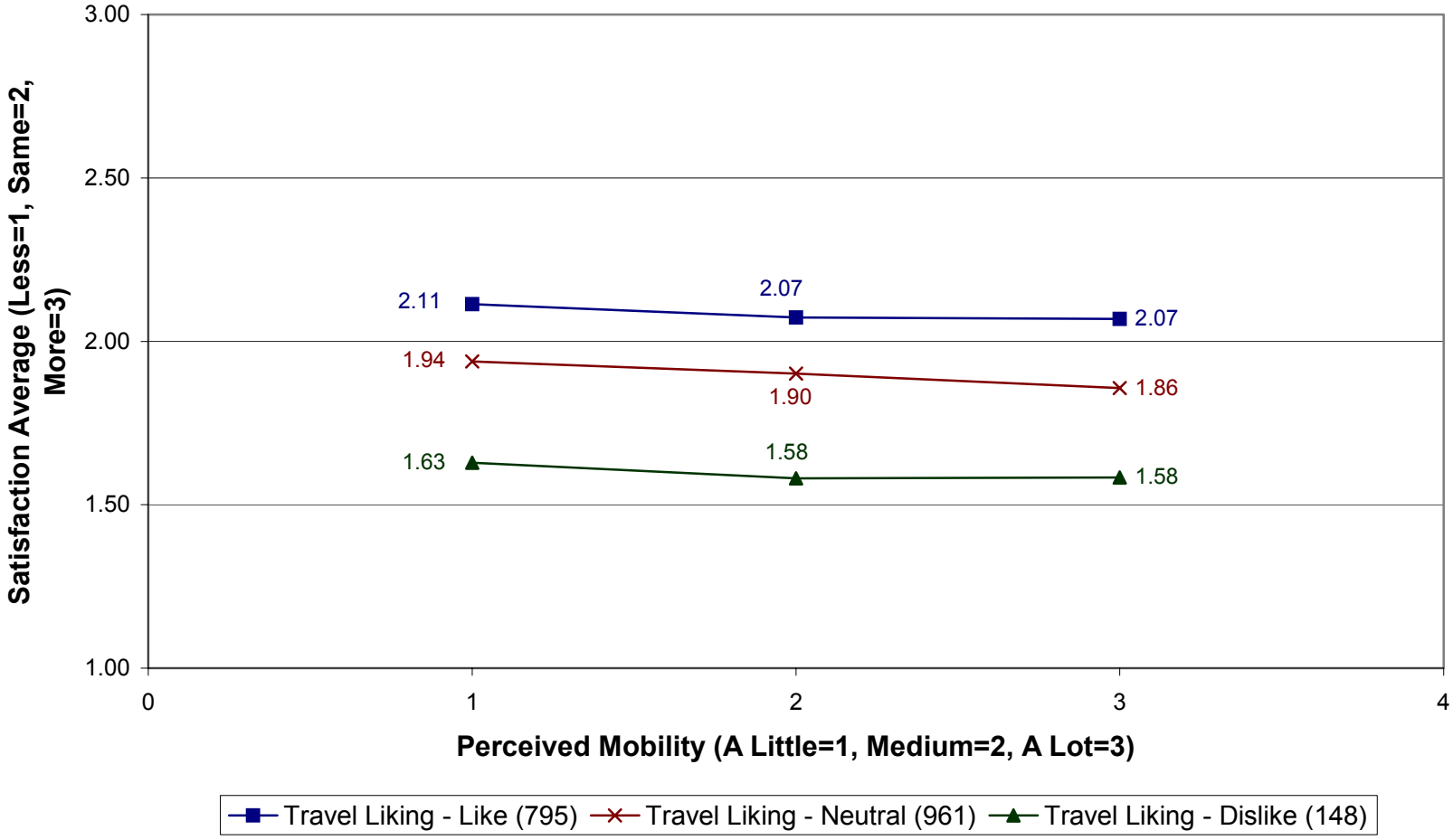
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE TRAVEL - WORK/SCHOOL-RELATED ACTIVITIES (TL, PM, Interaction)



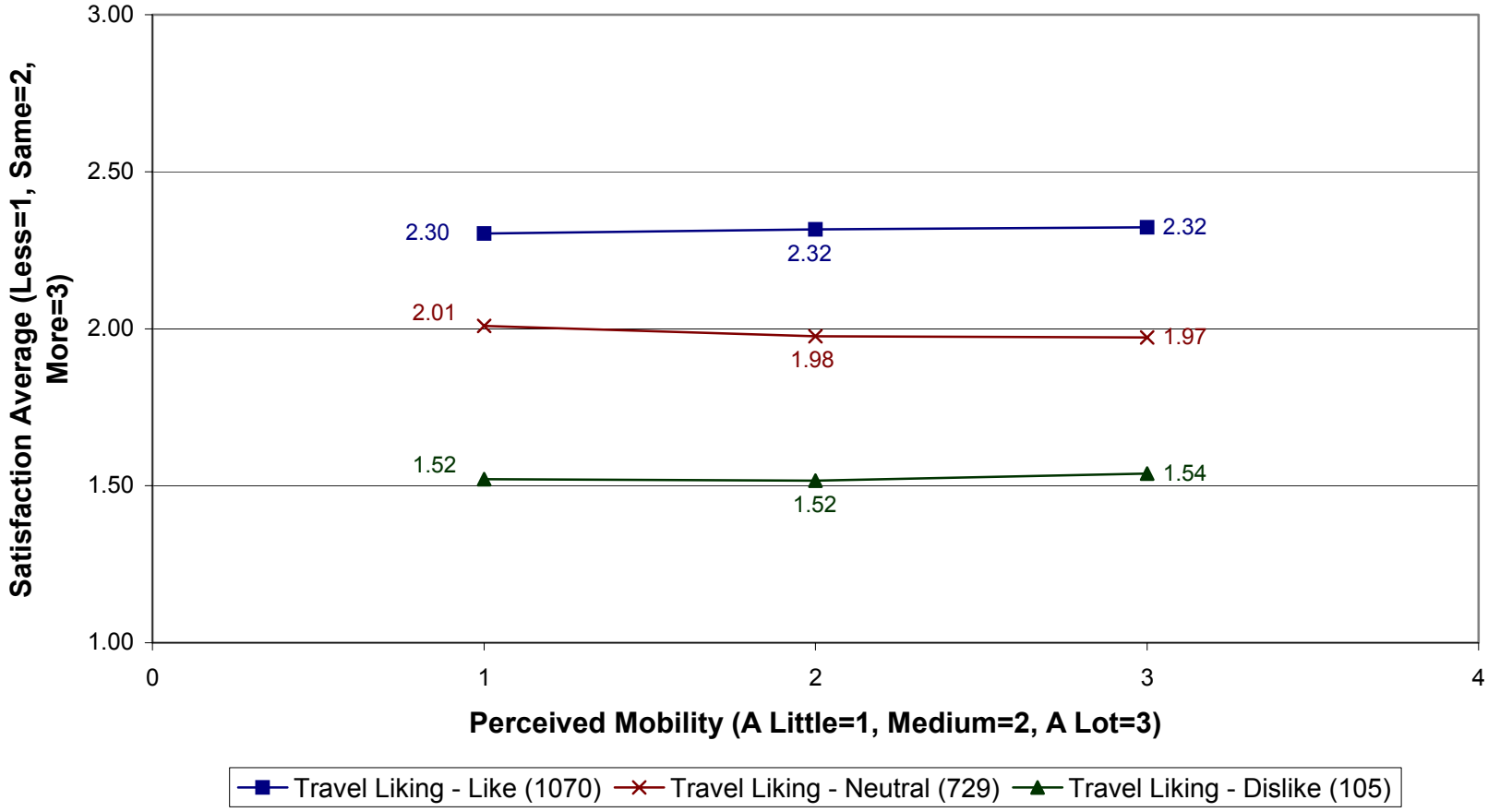
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE GROCERY SHOPPING TRAVEL (TL, PM, Interaction)



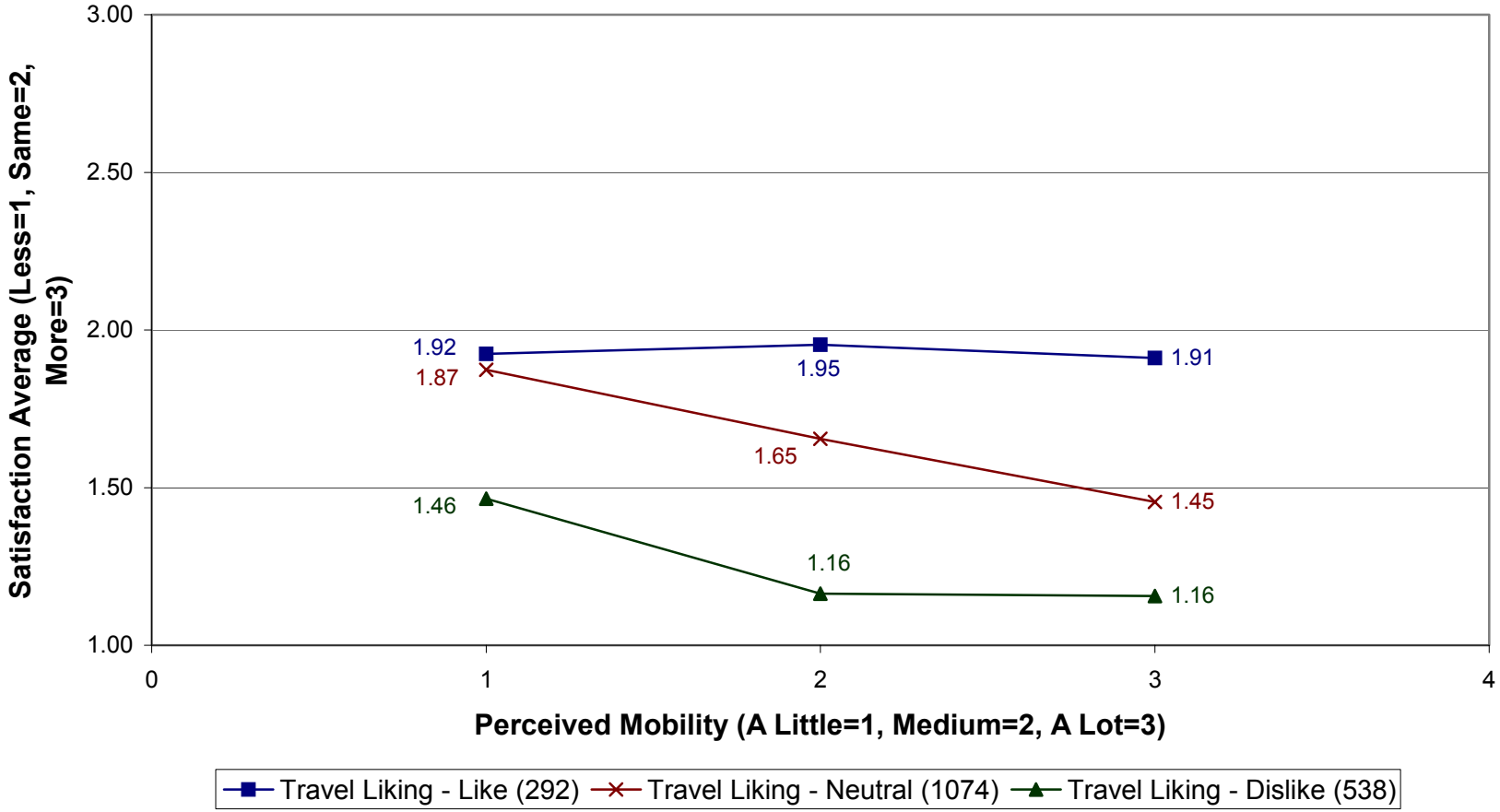
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE GOING OUT to EAT (TL)



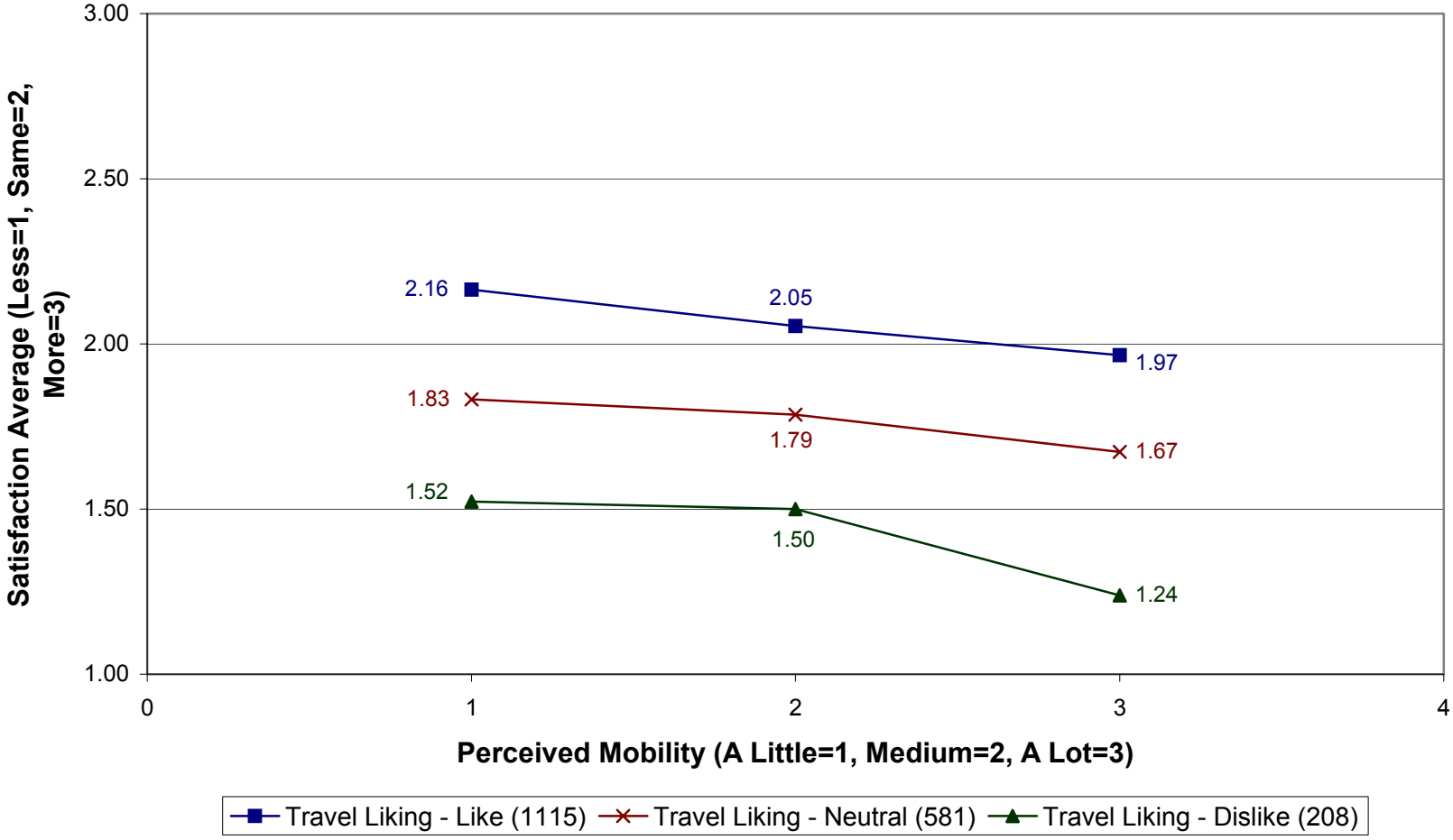
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE TRAVEL - ENTERTAINMENT/RECREATION/SOCIAL ACTIVITIES (TL)



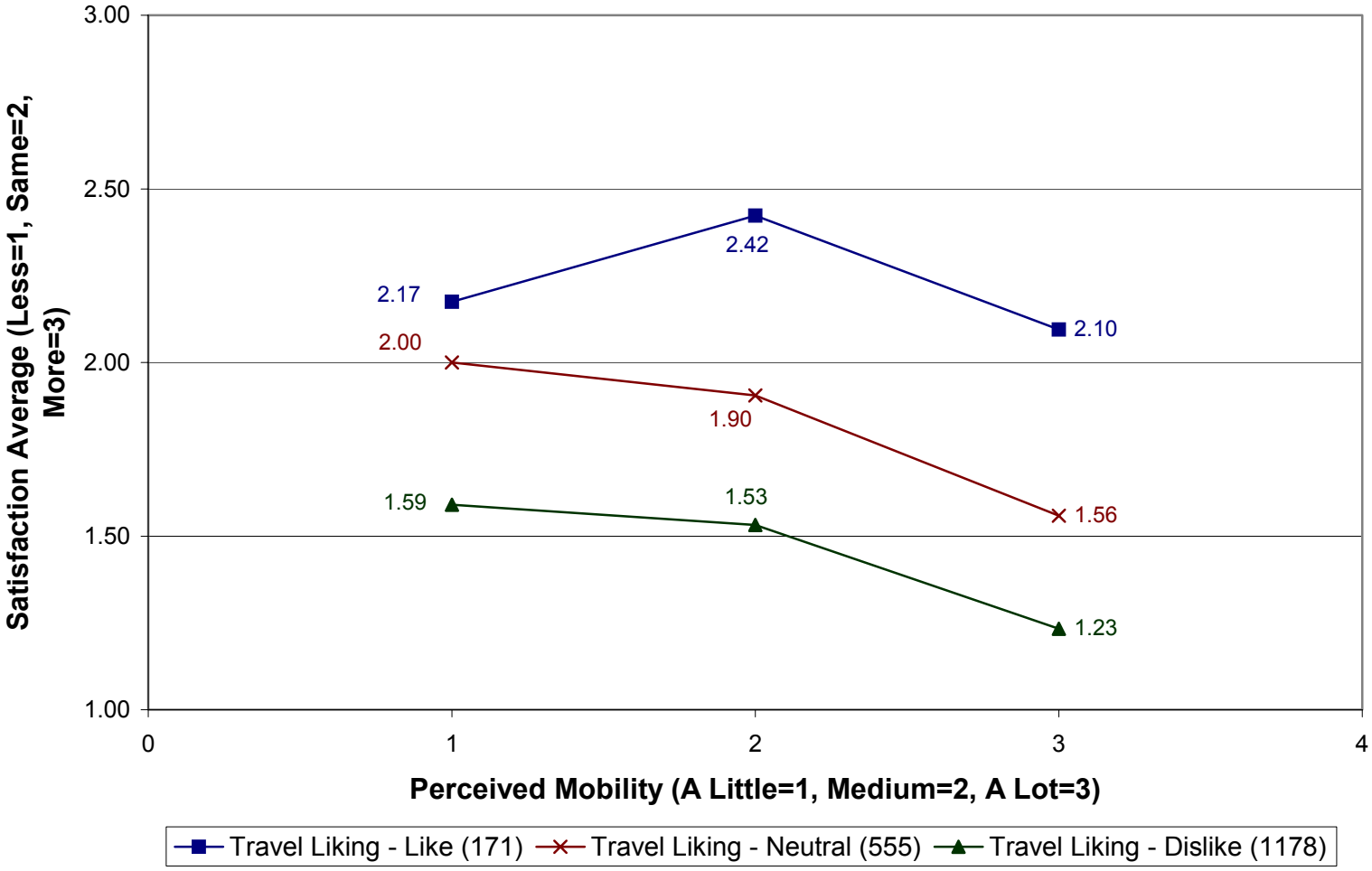
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE TRAVEL - TAKING OTHERS WHERE THEY NEED TO GO (TL, PM, Interaction)



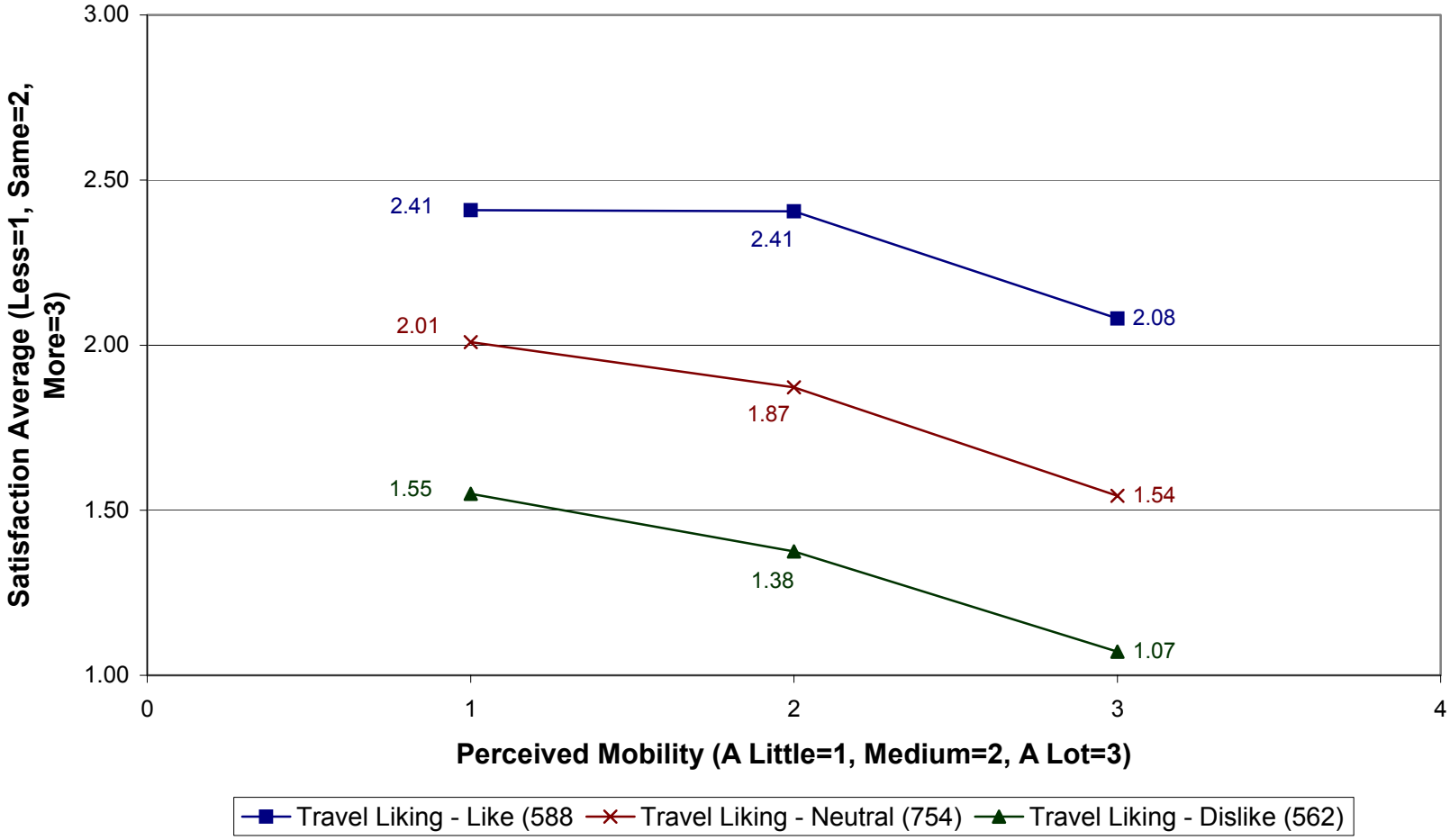
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE PERSONAL VEHICLE TRAVEL (TL, PM)



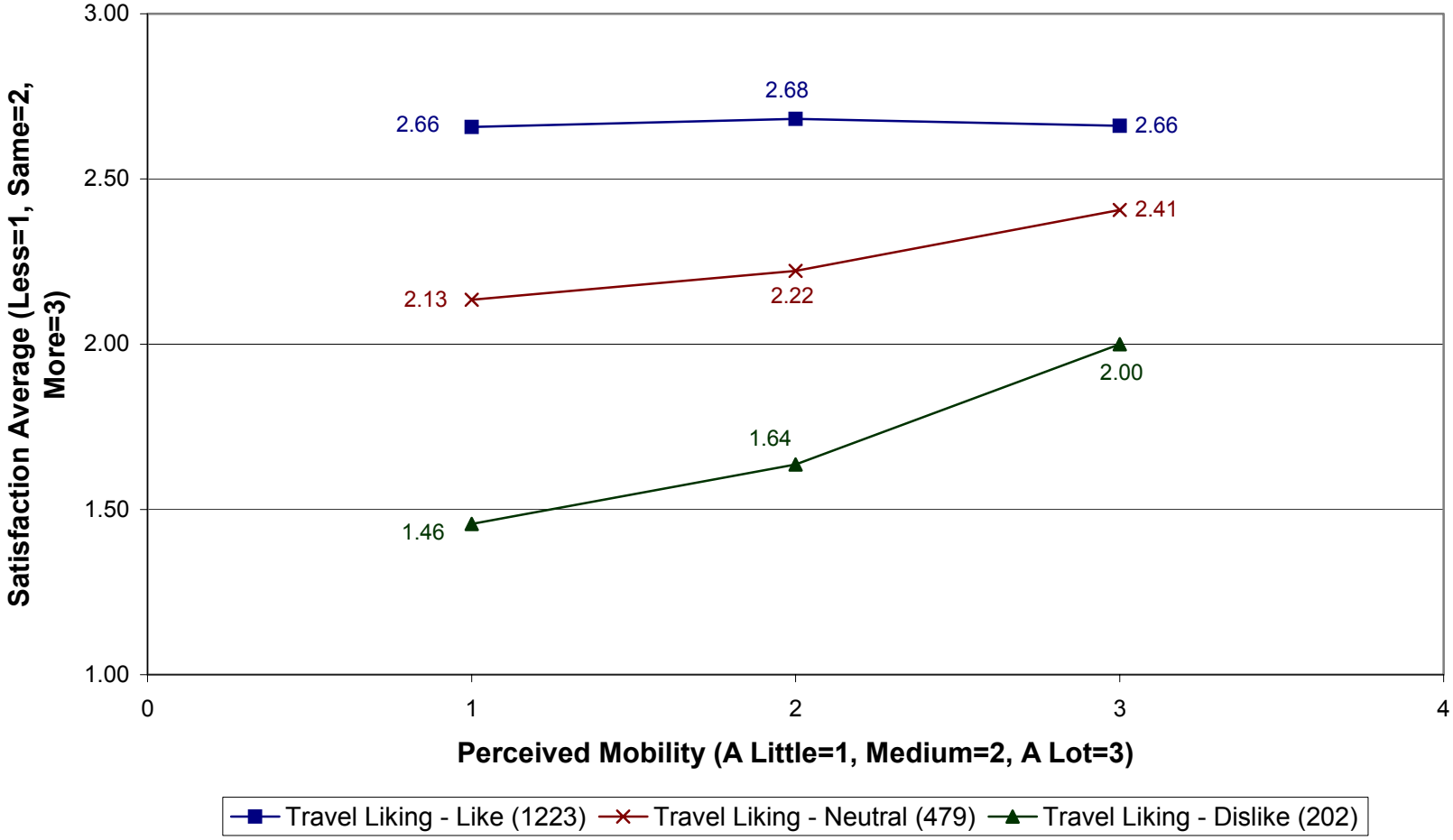
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE BUS TRAVEL (TL, PM)



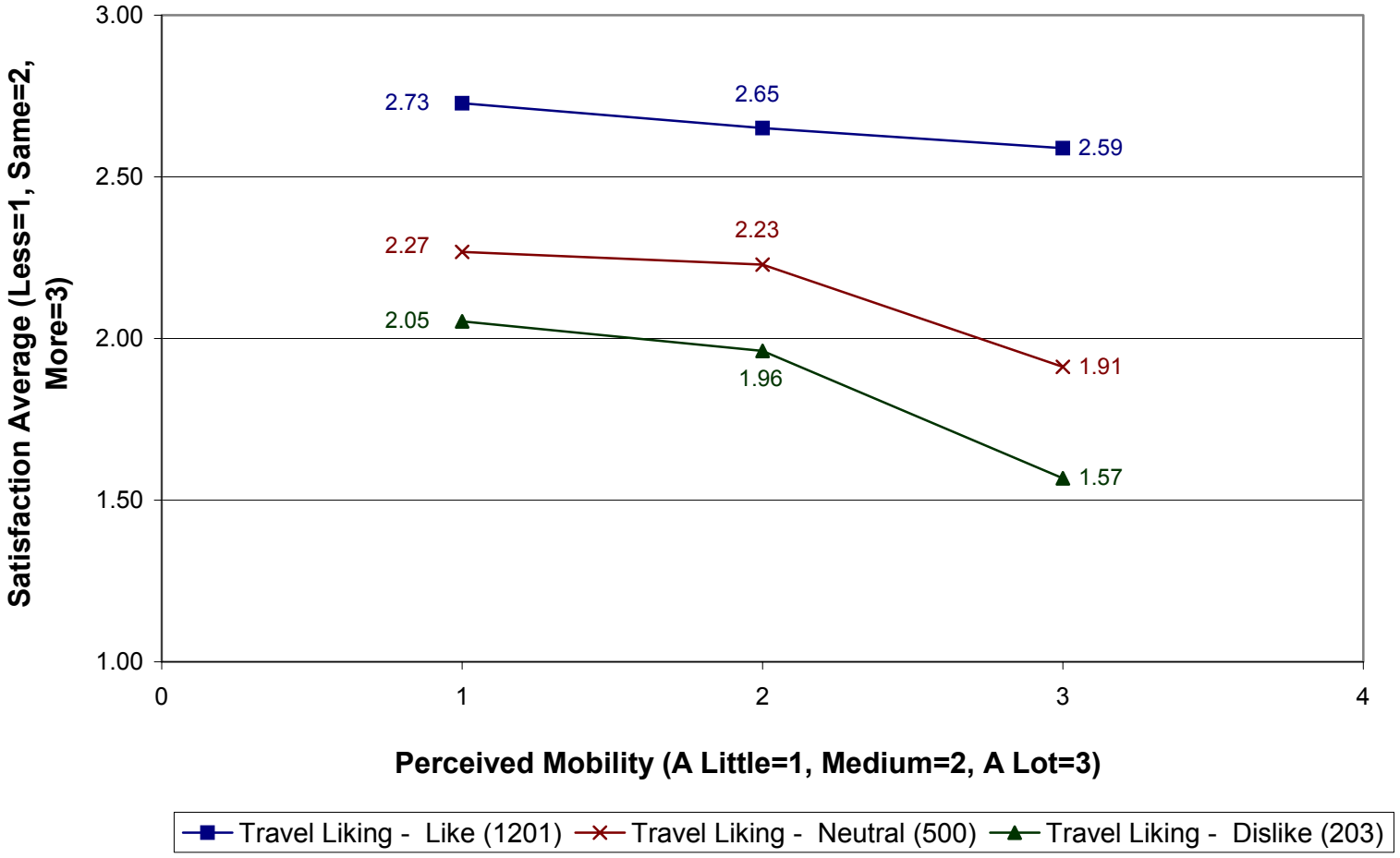
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE BART TRAVEL (TL, PM)



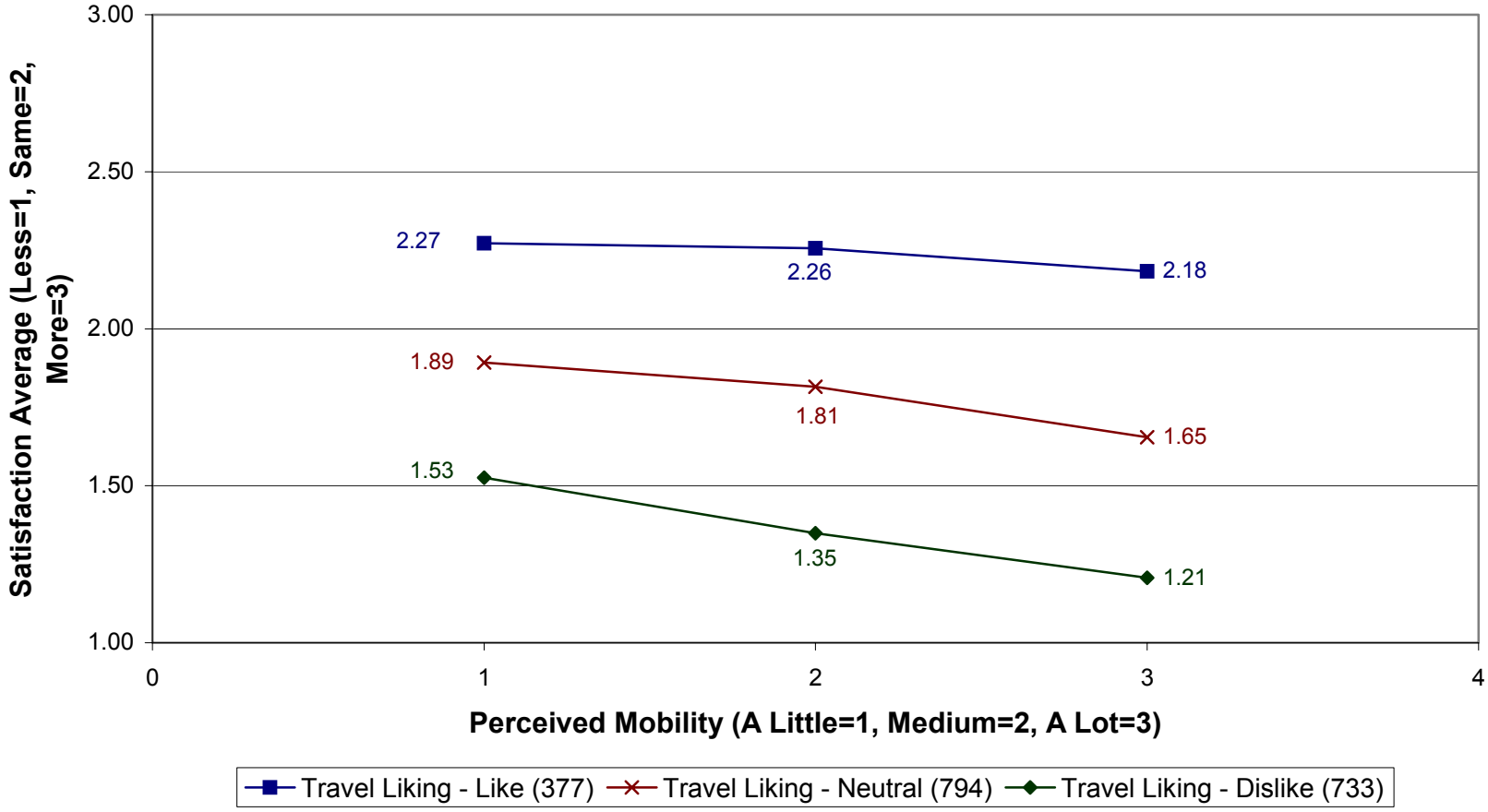
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE WALKING/JOGGING/BICYCLING (TL, PM, Interaction)



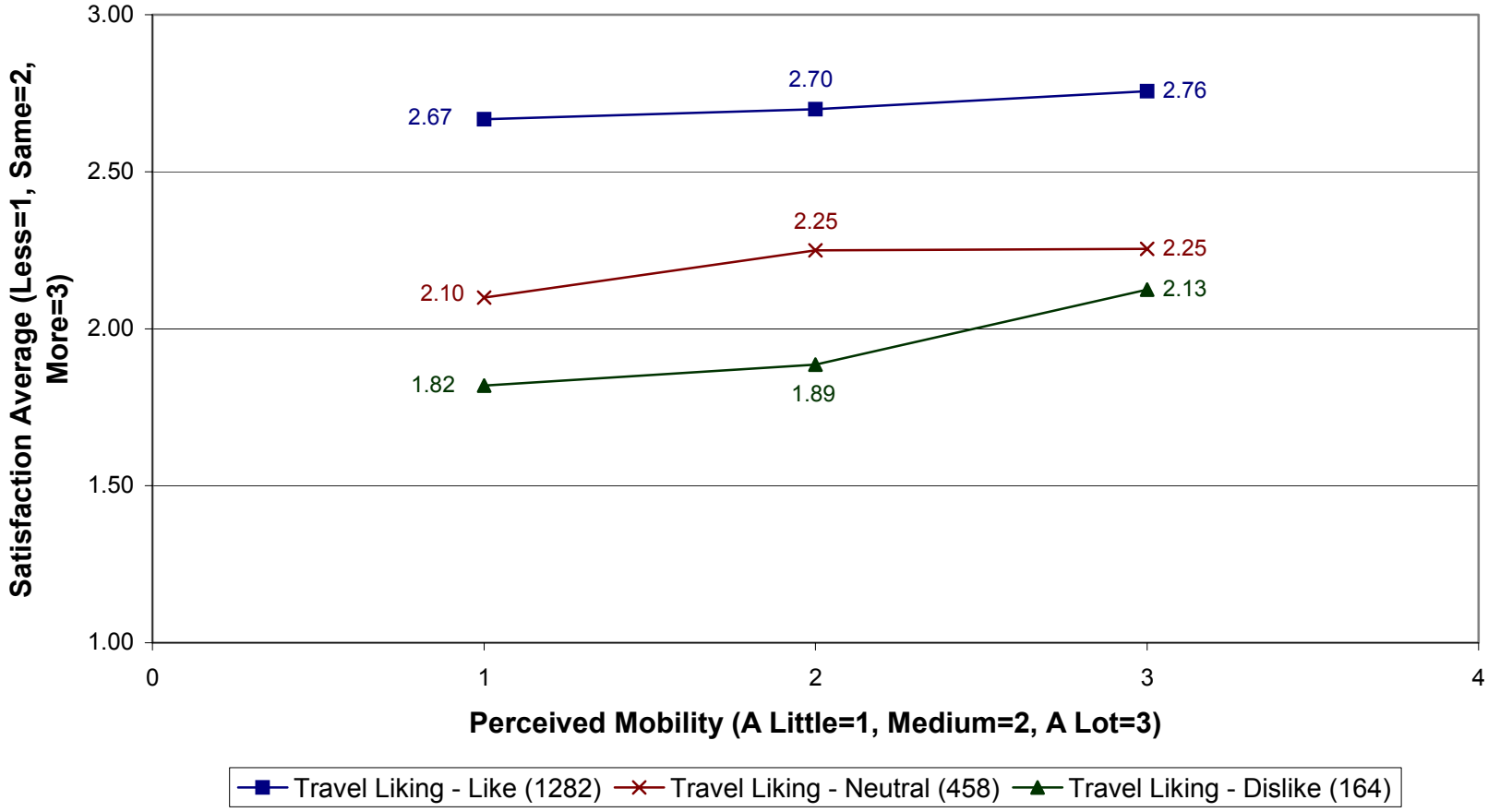
RELATIVE DESIRED MOBILITY AVERAGE for LONG DISTANCE OVERALL TRAVEL (TL, PM, Interaction)



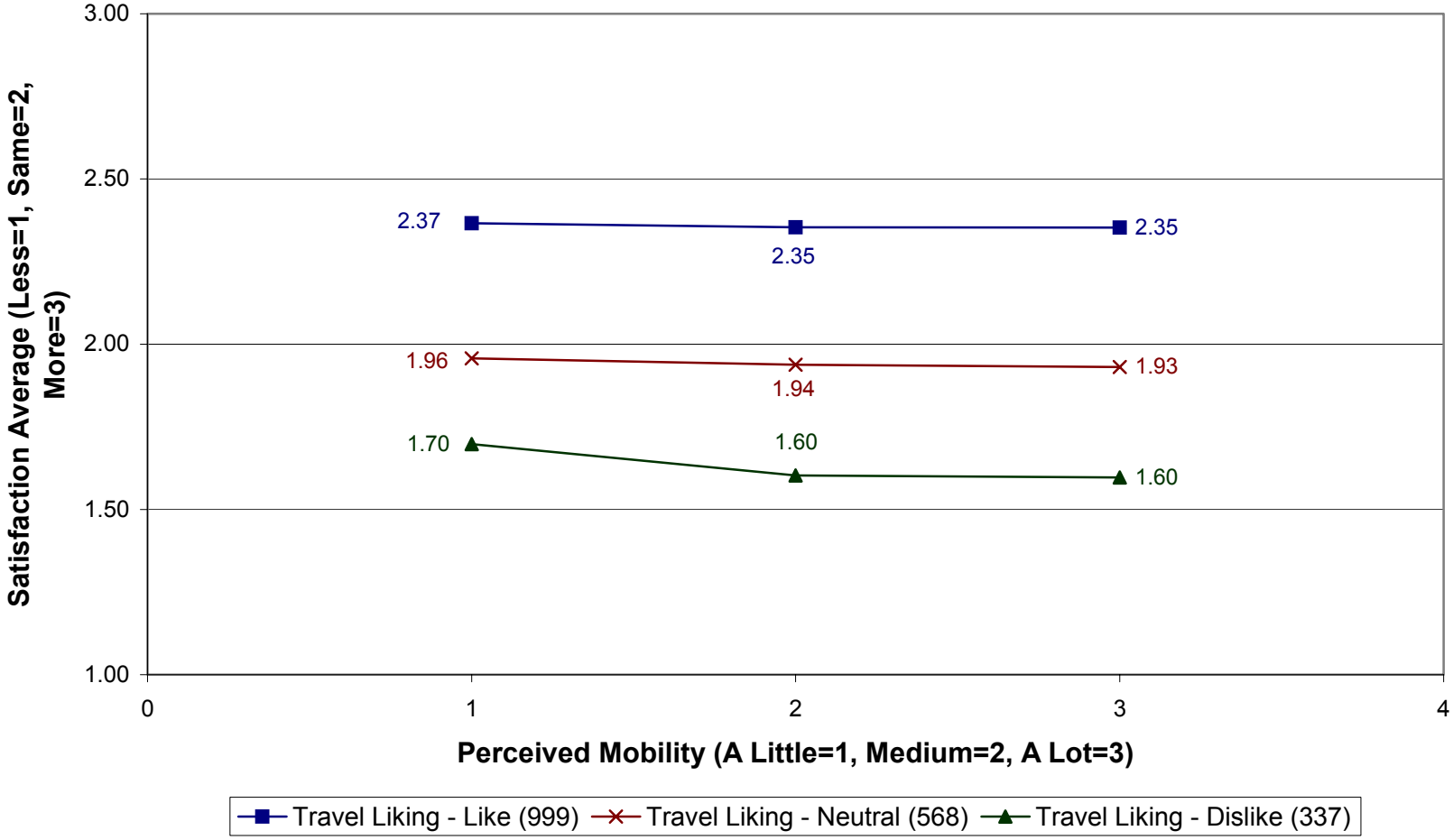
RELATIVE DESIRED MOBILITY AVERAGE for LONG DISTANCE TRAVEL - WORK/SCHOOL RELATED ACTIVITIES (TL, PM, Interaction)



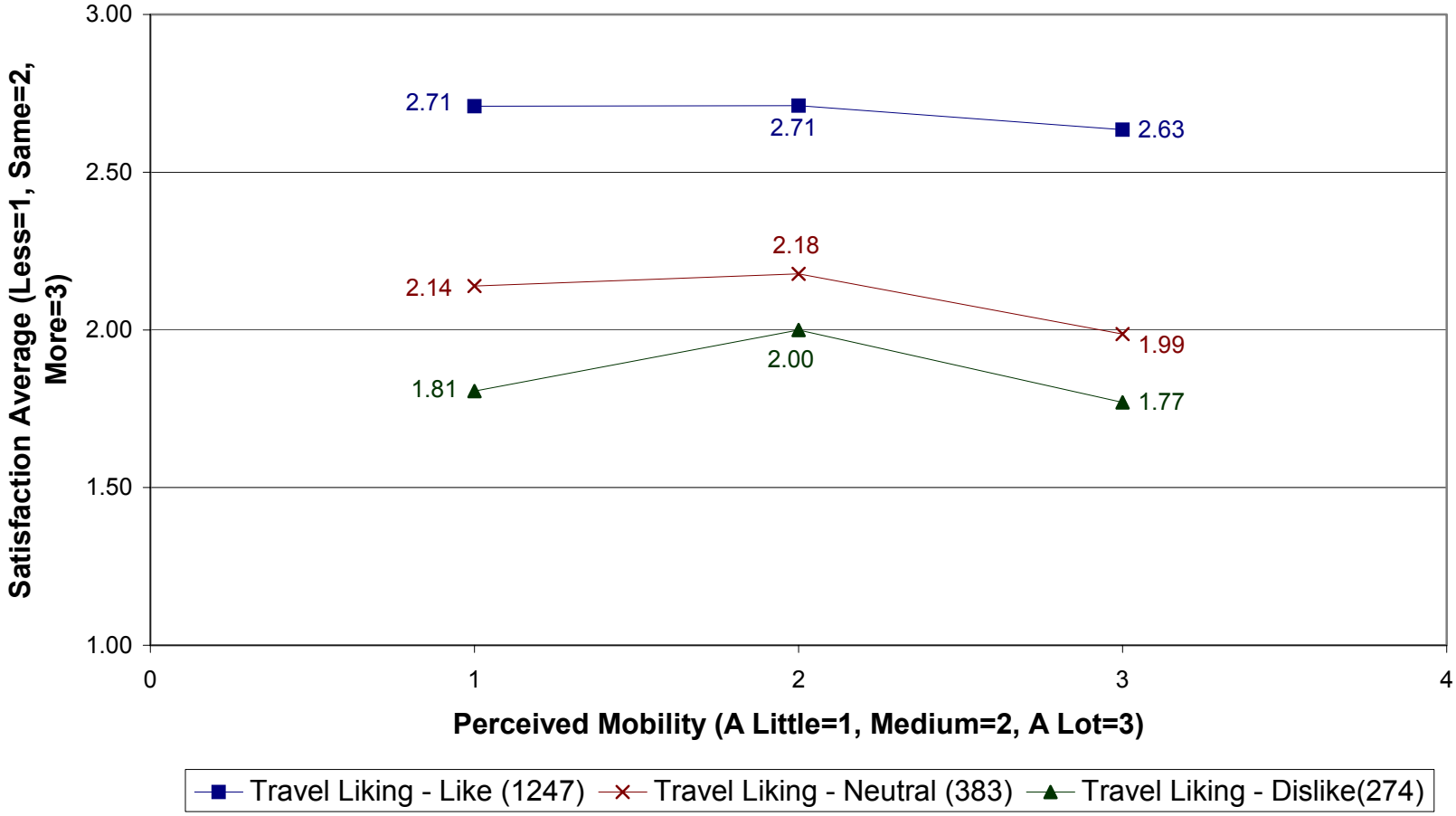
RELATIVE DESIRED MOBILITY AVERAGE for LONG DISTANCE TRAVEL - ENTERTAINMENT/RECREATION/SOCIAL ACTIVITIES (TL, PM)



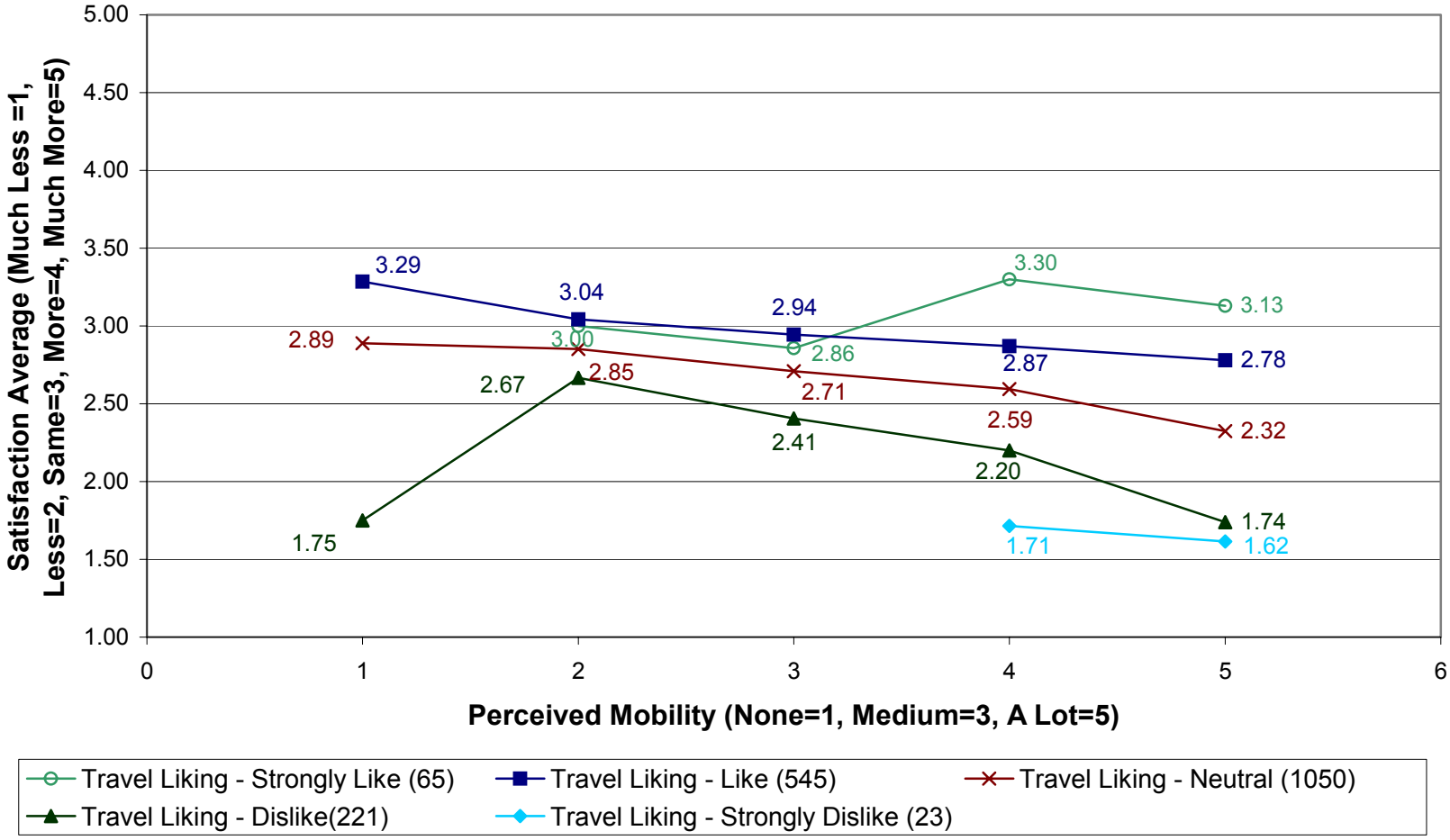
RELATIVE DESIRED MOBILITY AVERAGE for LONG DISTANCE PERSONAL VEHICLE TRAVEL (TL)



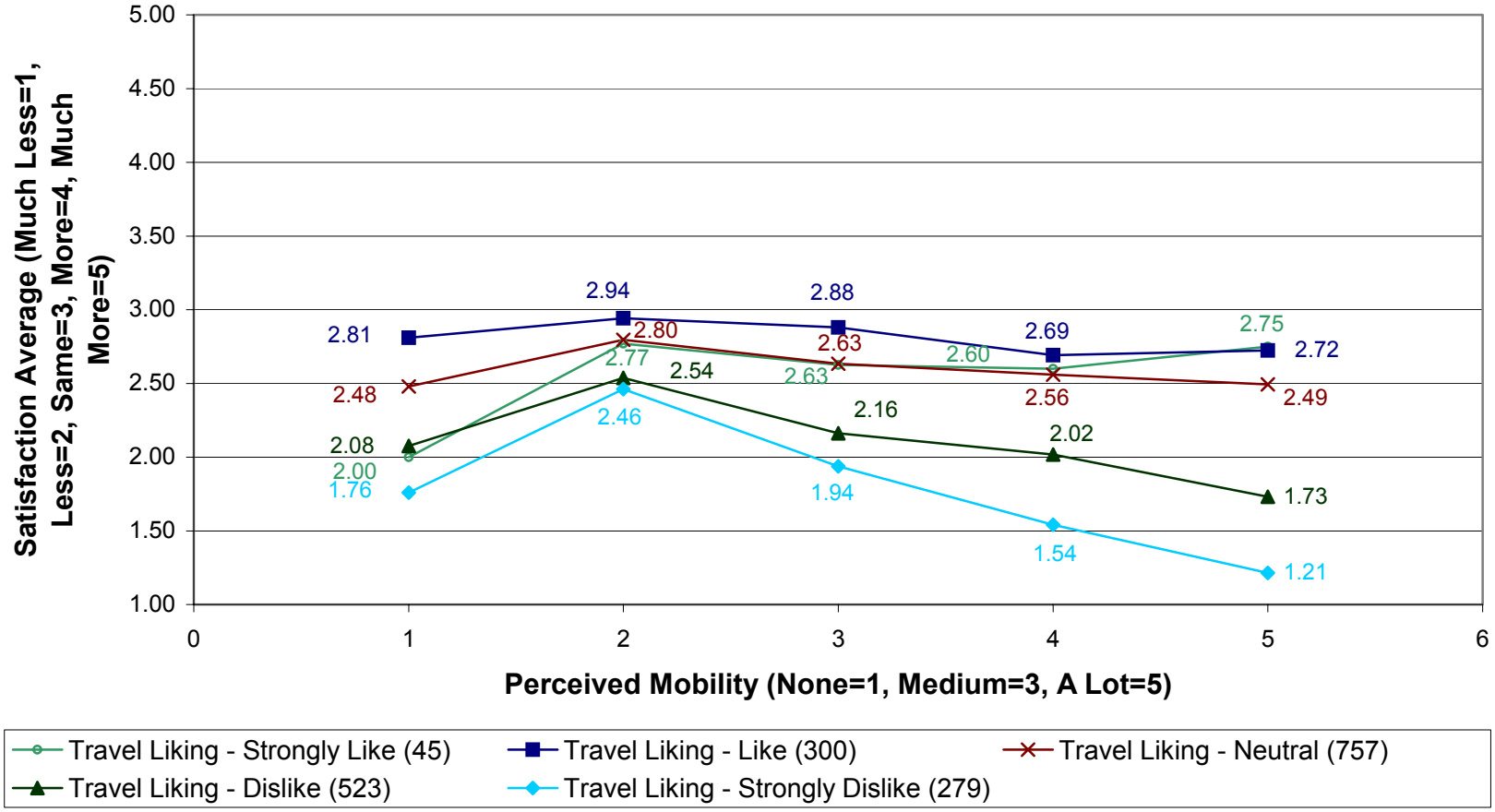
RELATIVE DESIRED MOBILITY AVERAGE for LONG DISTANCE AIRPLANE TRAVEL (TL)



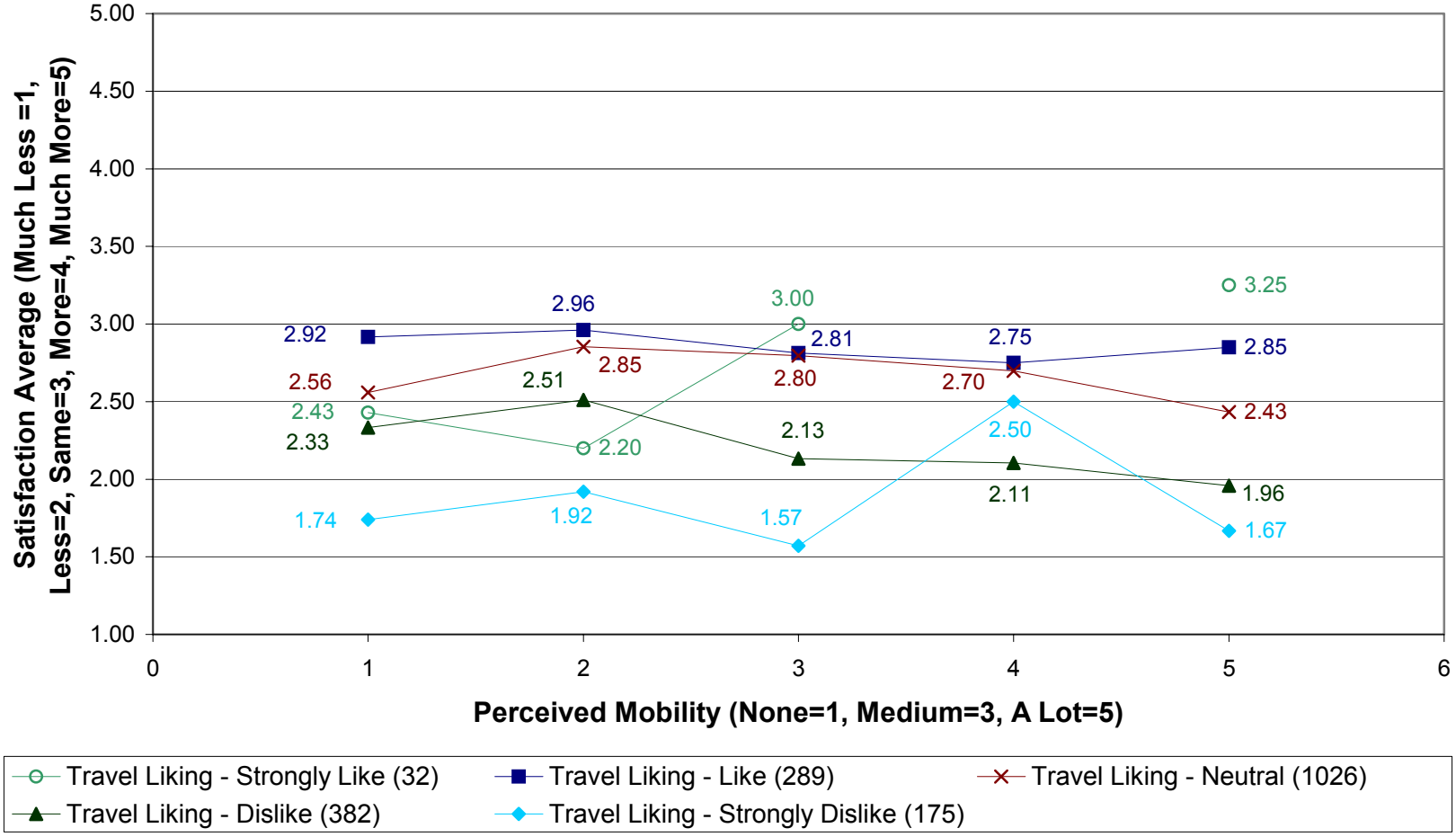
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE OVERALL TRAVEL (PM, Interaction)



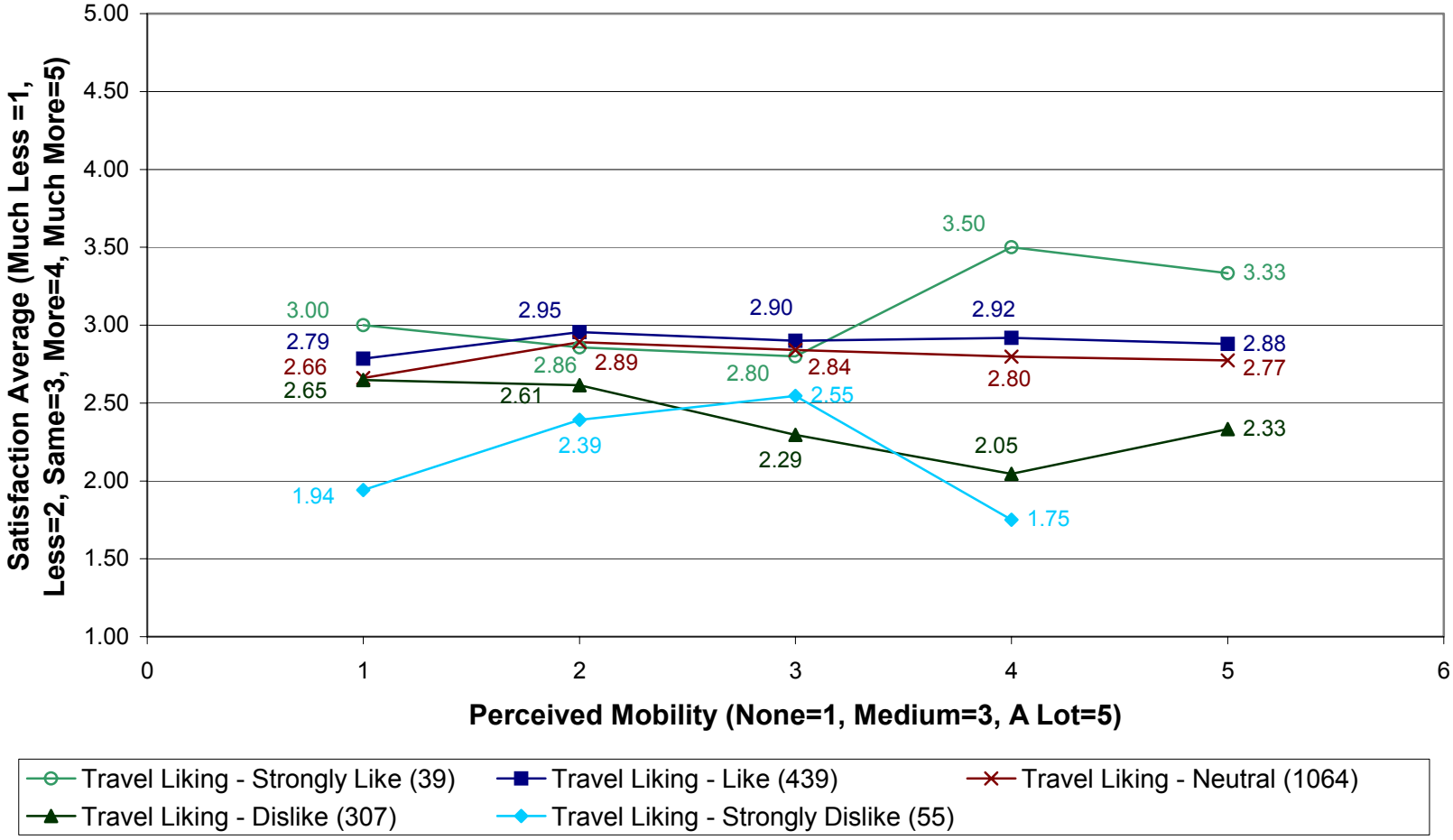
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE TRAVEL - COMMUTING to WORK or SCHOOL (TL, PM, Interaction)



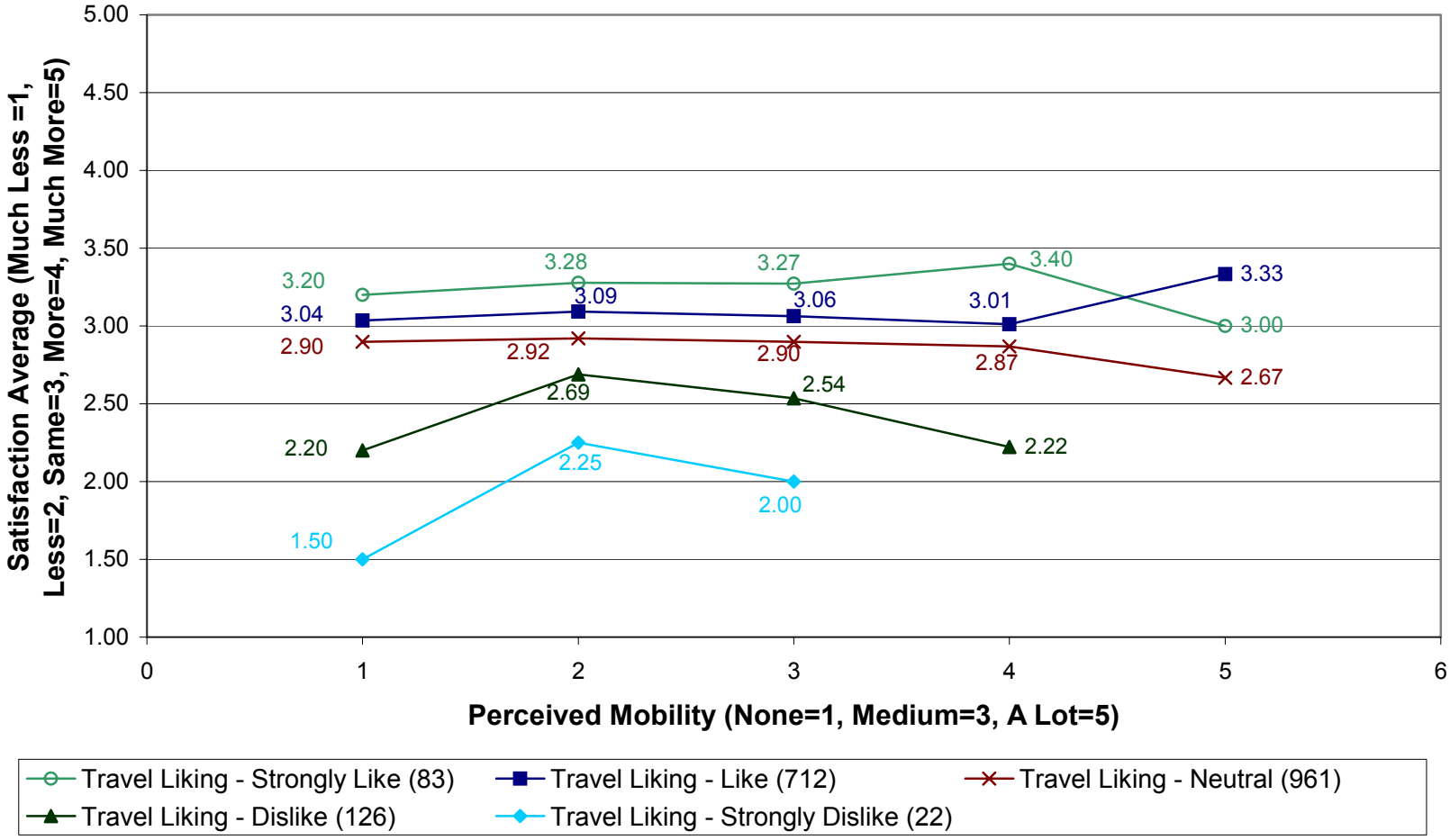
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE TRAVEL - WORK/SCHOOL-RELATED ACTIVITIES (TL)



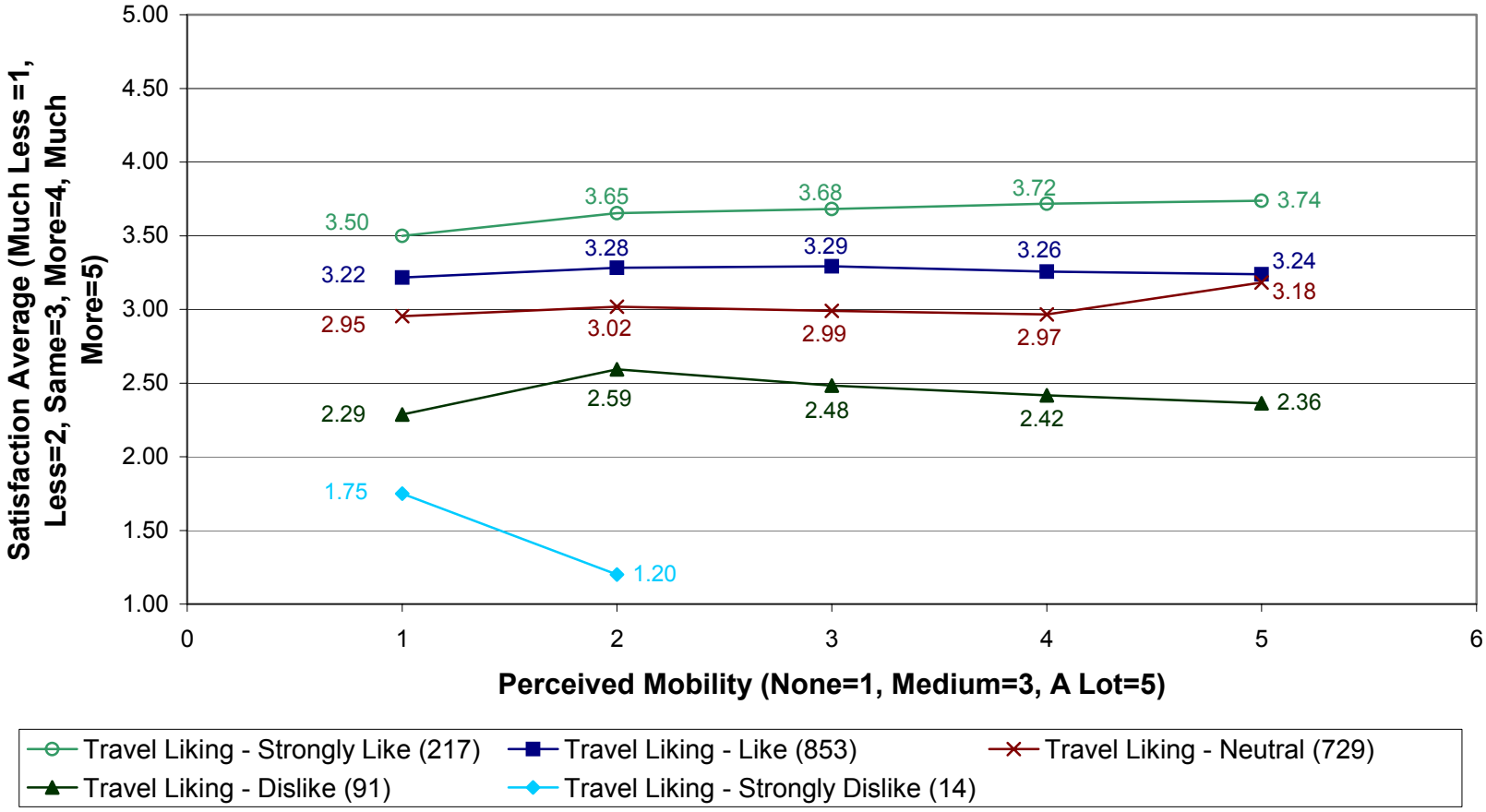
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE GROCERY SHOPPING TRAVEL (TL, PM, Interaction)



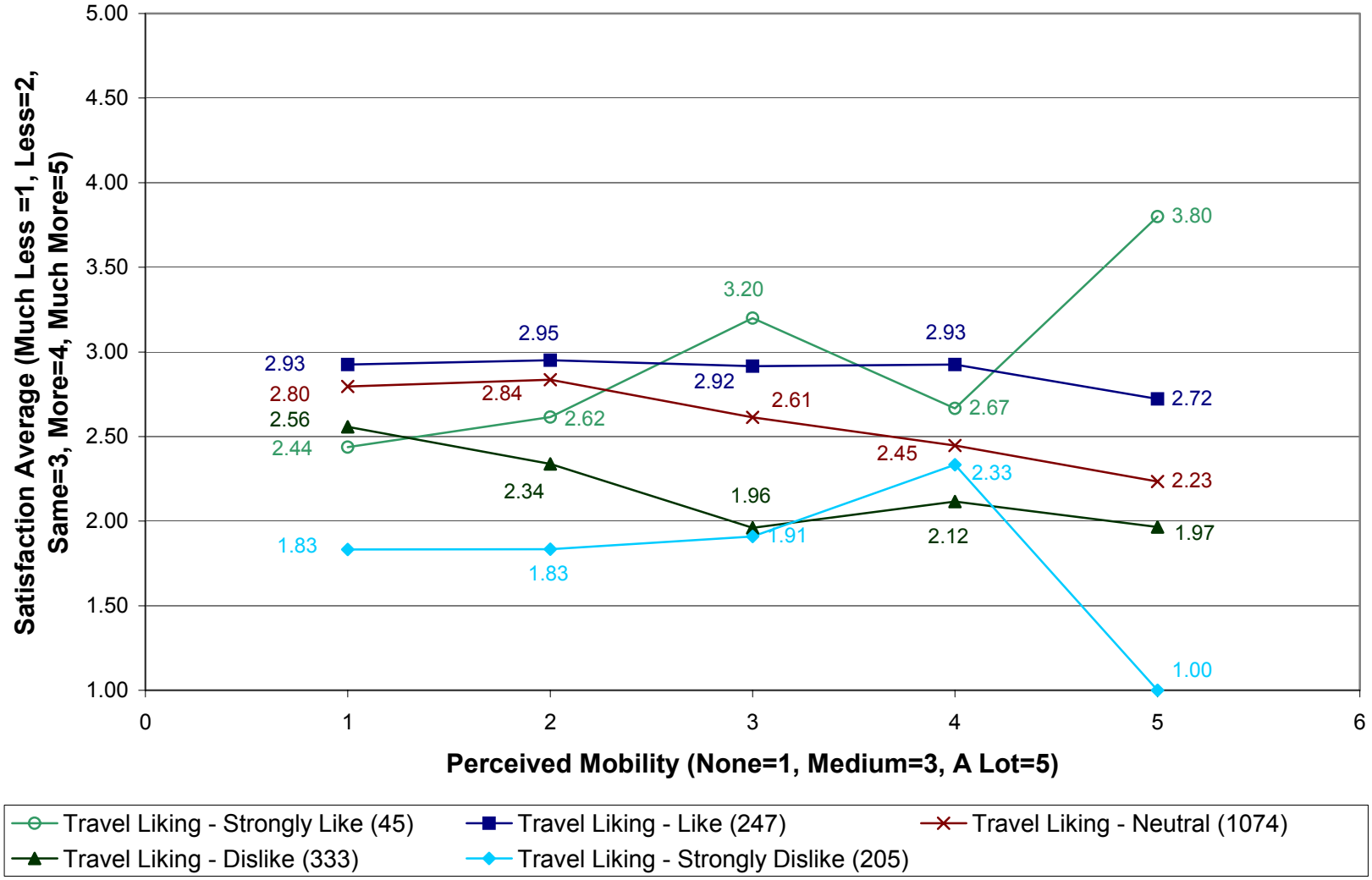
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE GOING OUT to EAT (TL, PM, Interaction)



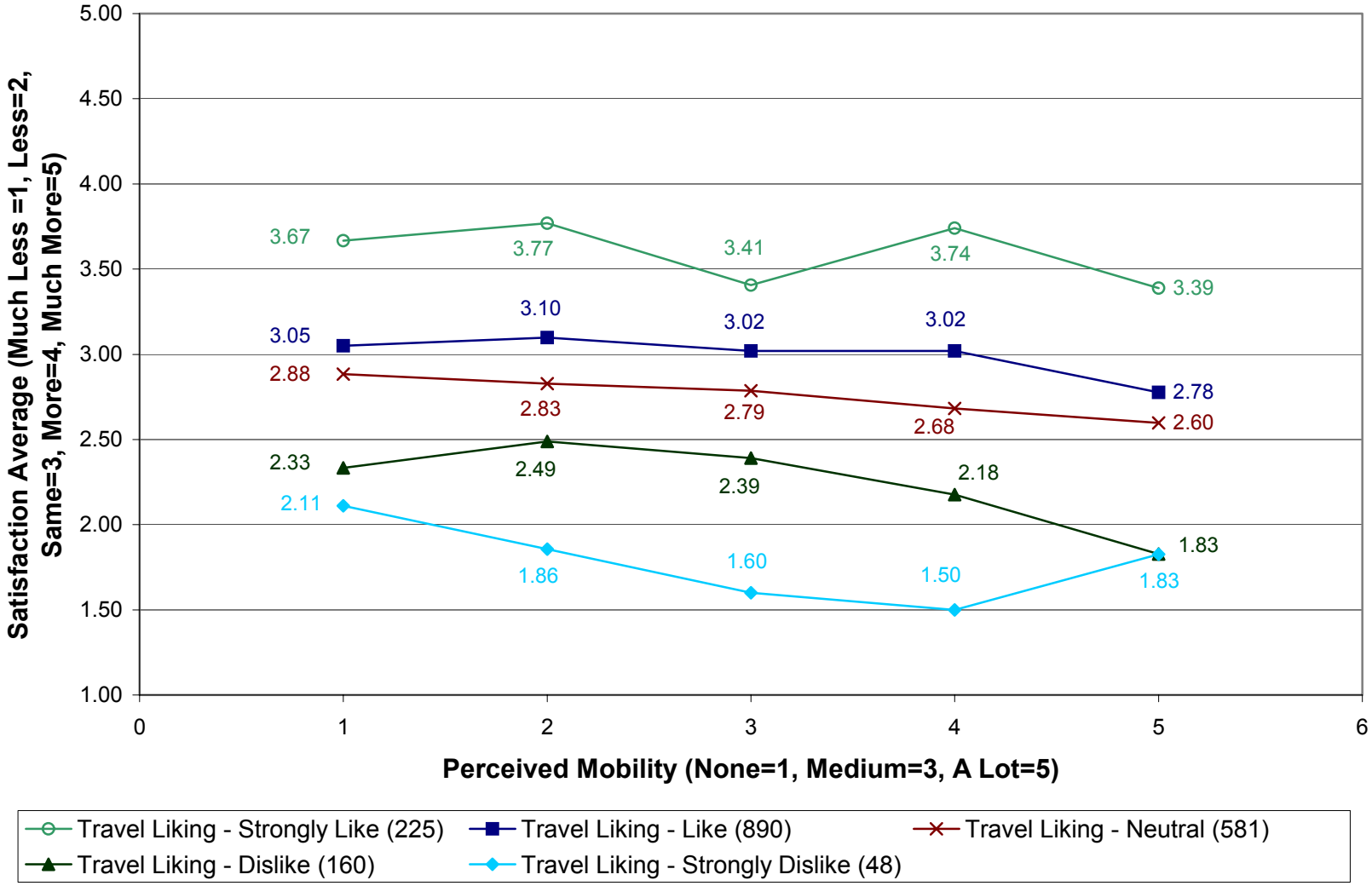
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE TRAVEL - ENTERTAINMENT/RECREATION/SOCIAL ACTIVITIES (TL)



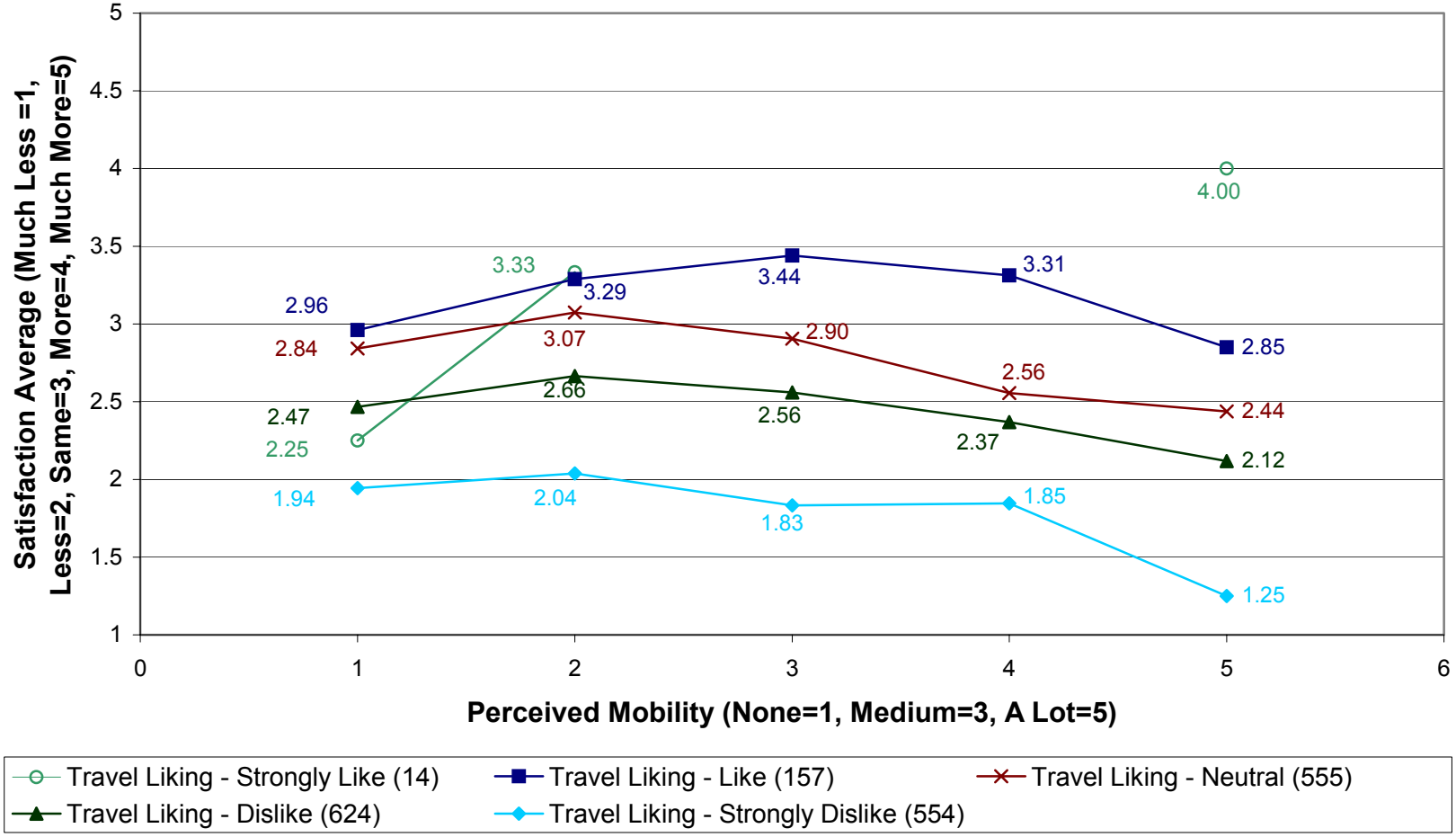
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE TRAVEL - TAKING OTHERS WHERE THEY NEED TO GO (TL, PM)



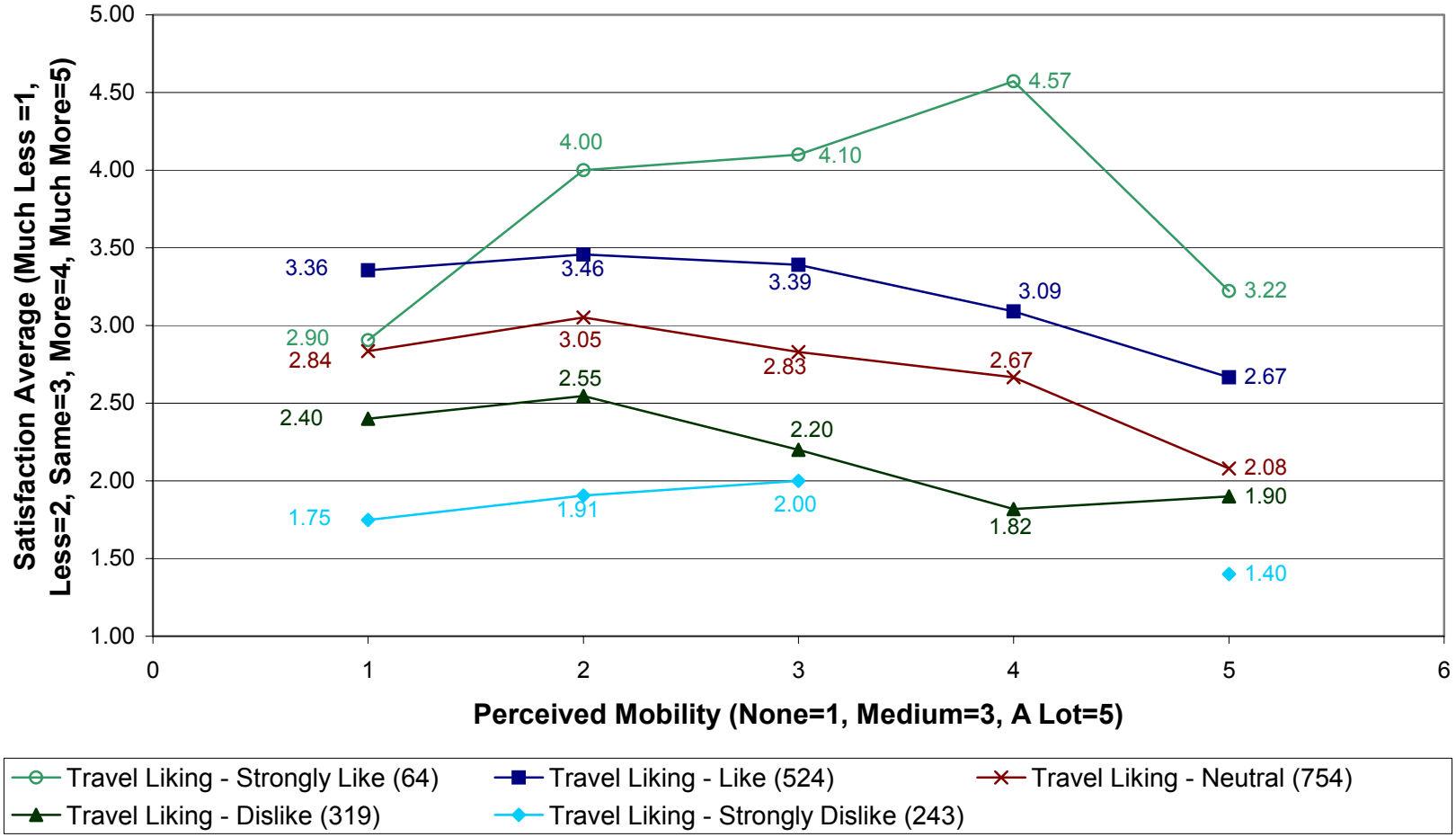
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE PERSONAL VEHICLE TRAVEL (TL, PM)



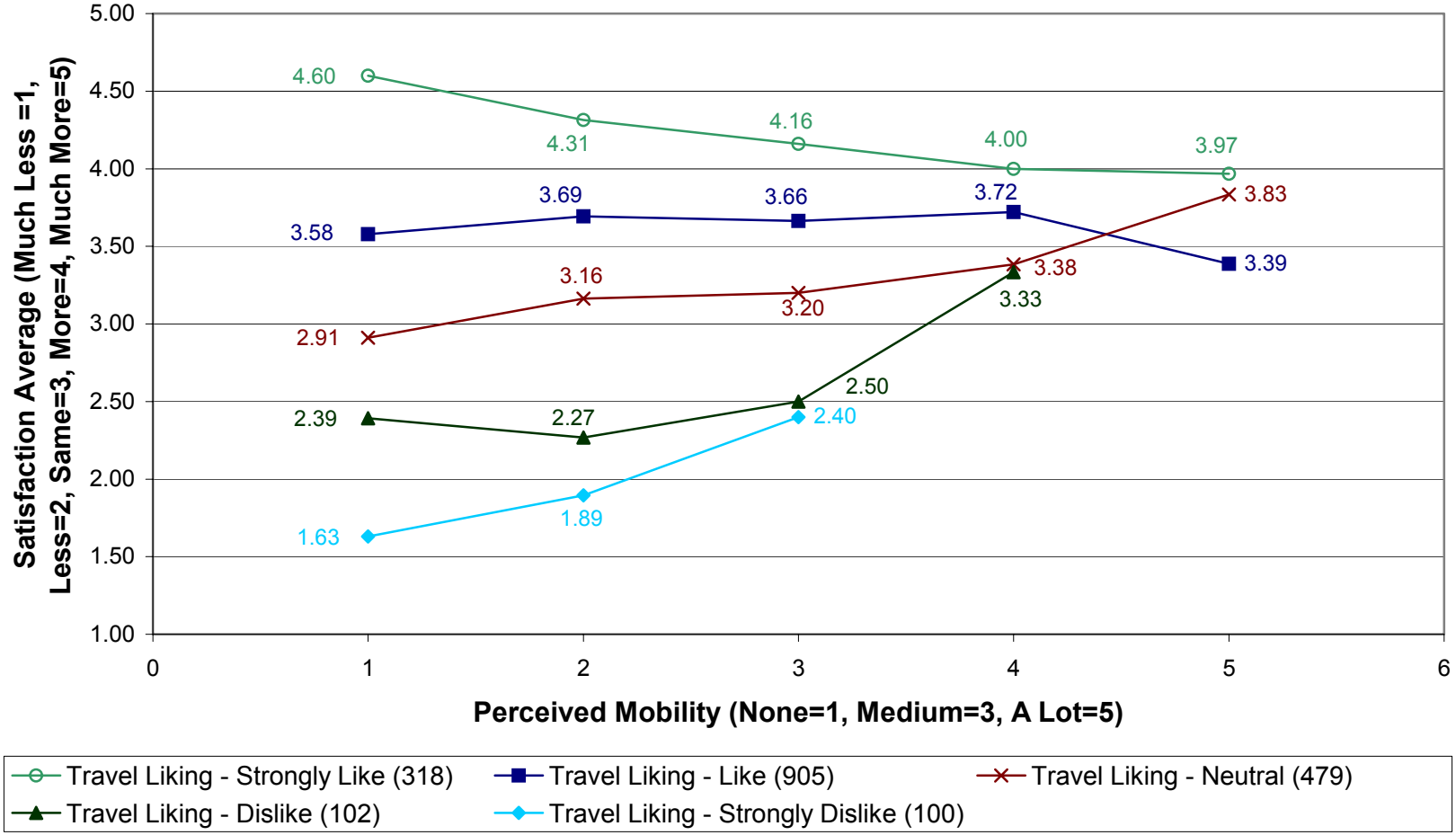
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE BUS TRAVEL (TL, PM)



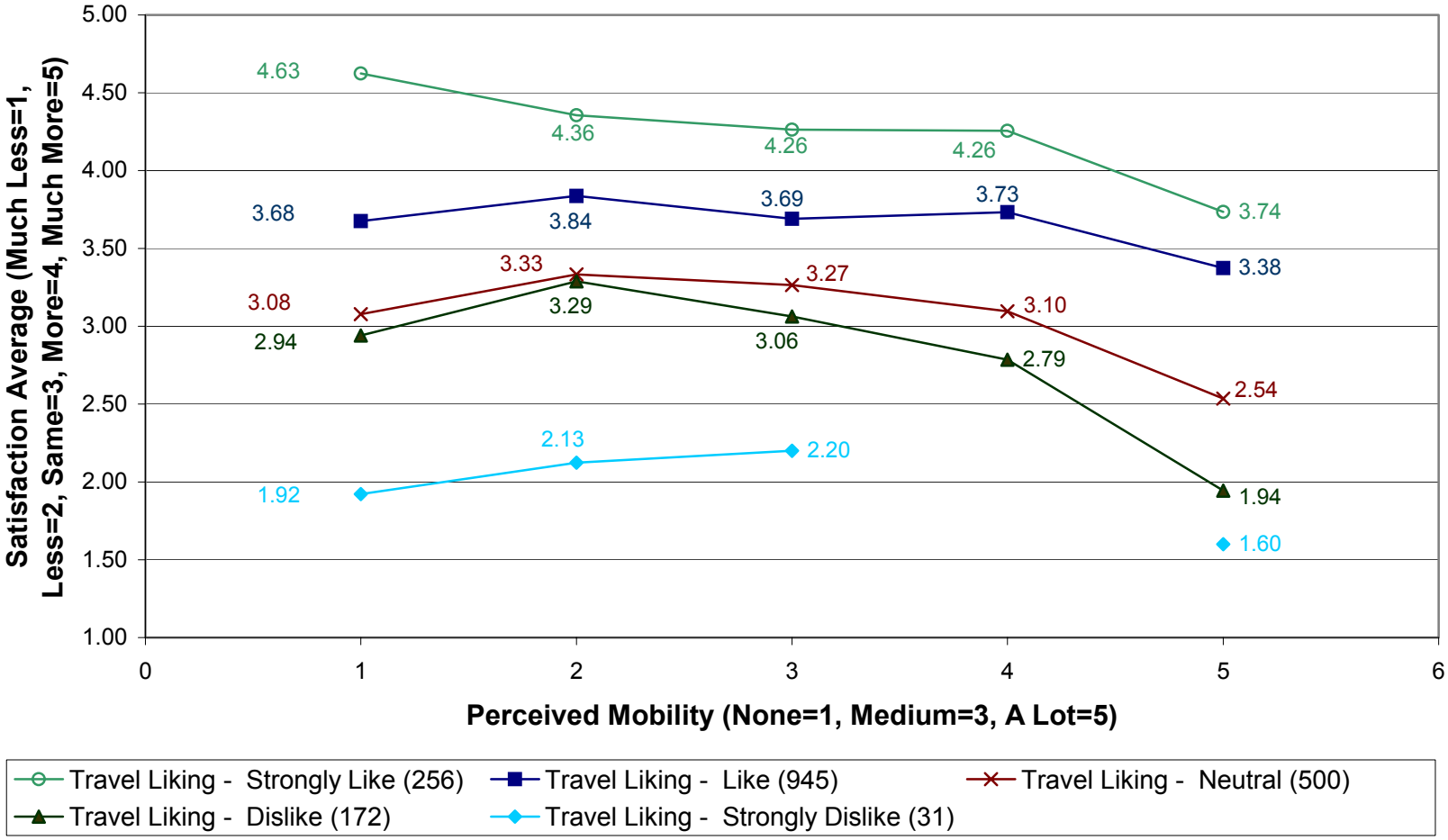
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE BART TRAVEL (TL)



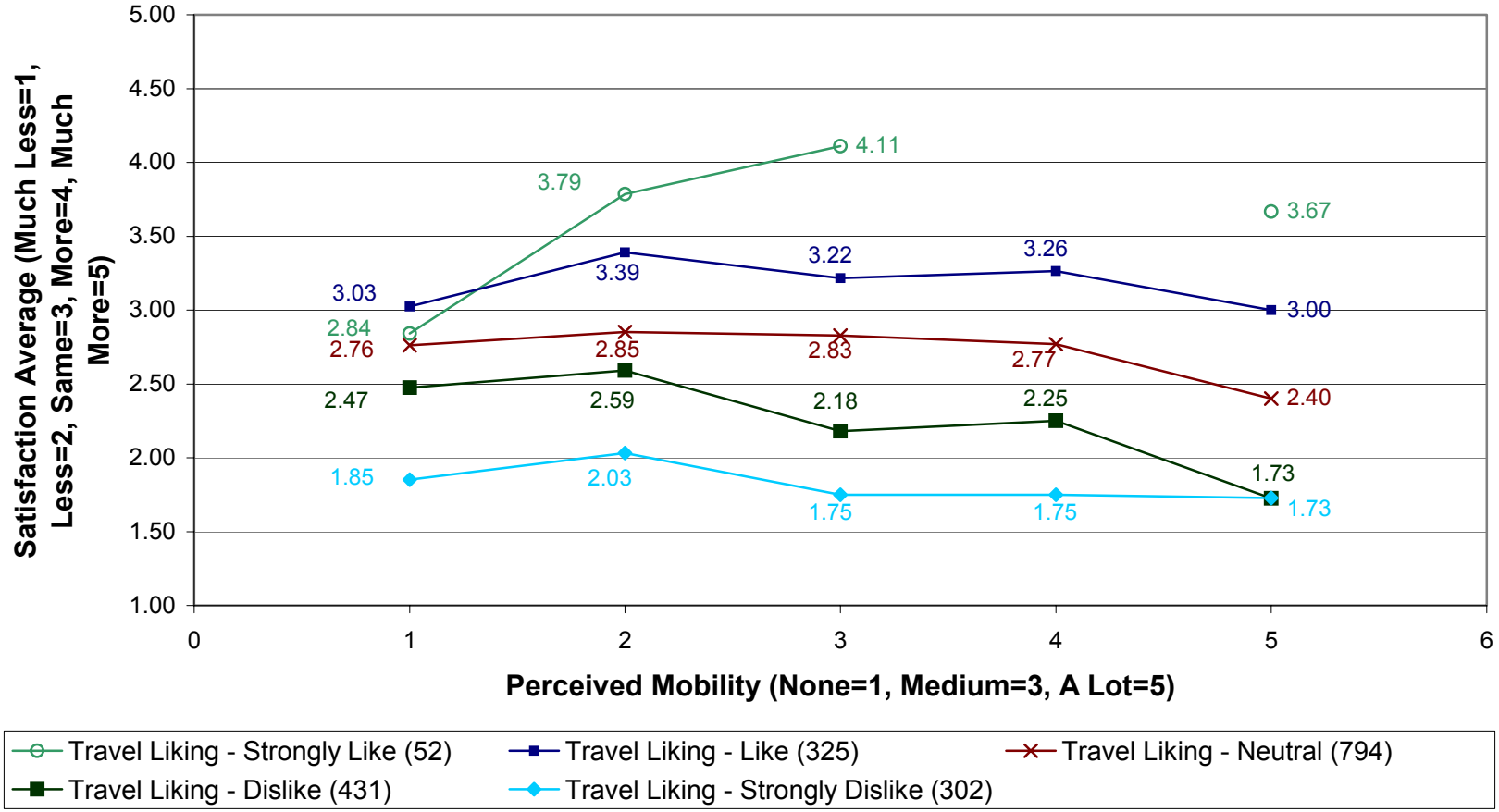
RELATIVE DESIRED MOBILITY AVERAGE for SHORT DISTANCE WALKING/JOGGING/BICYCLING (TL, PM, Interaction)



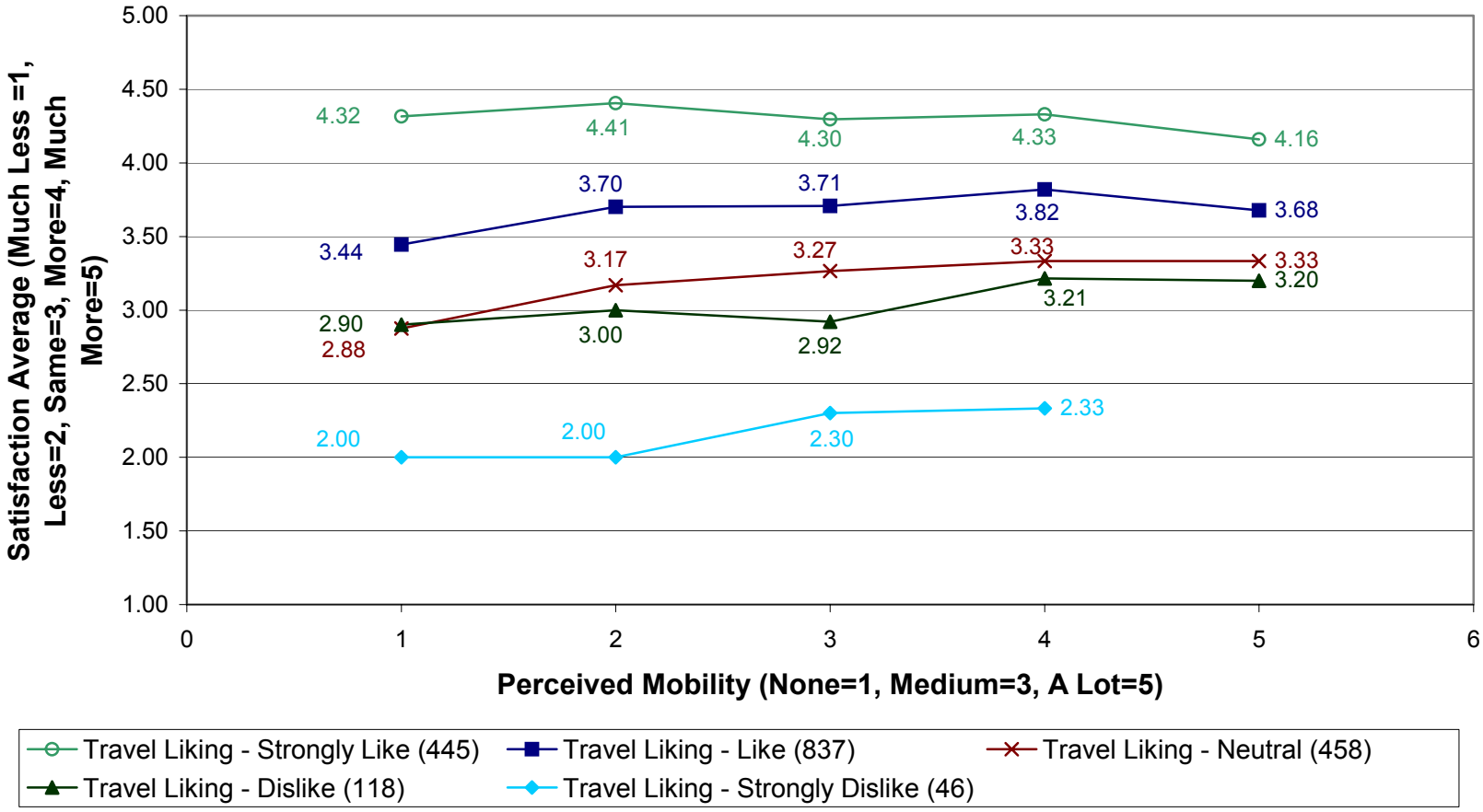
RELATIVE DESIRED MOBILITY AVERAGE for LONG DISTANCE OVERALL TRAVEL (TL, PM)



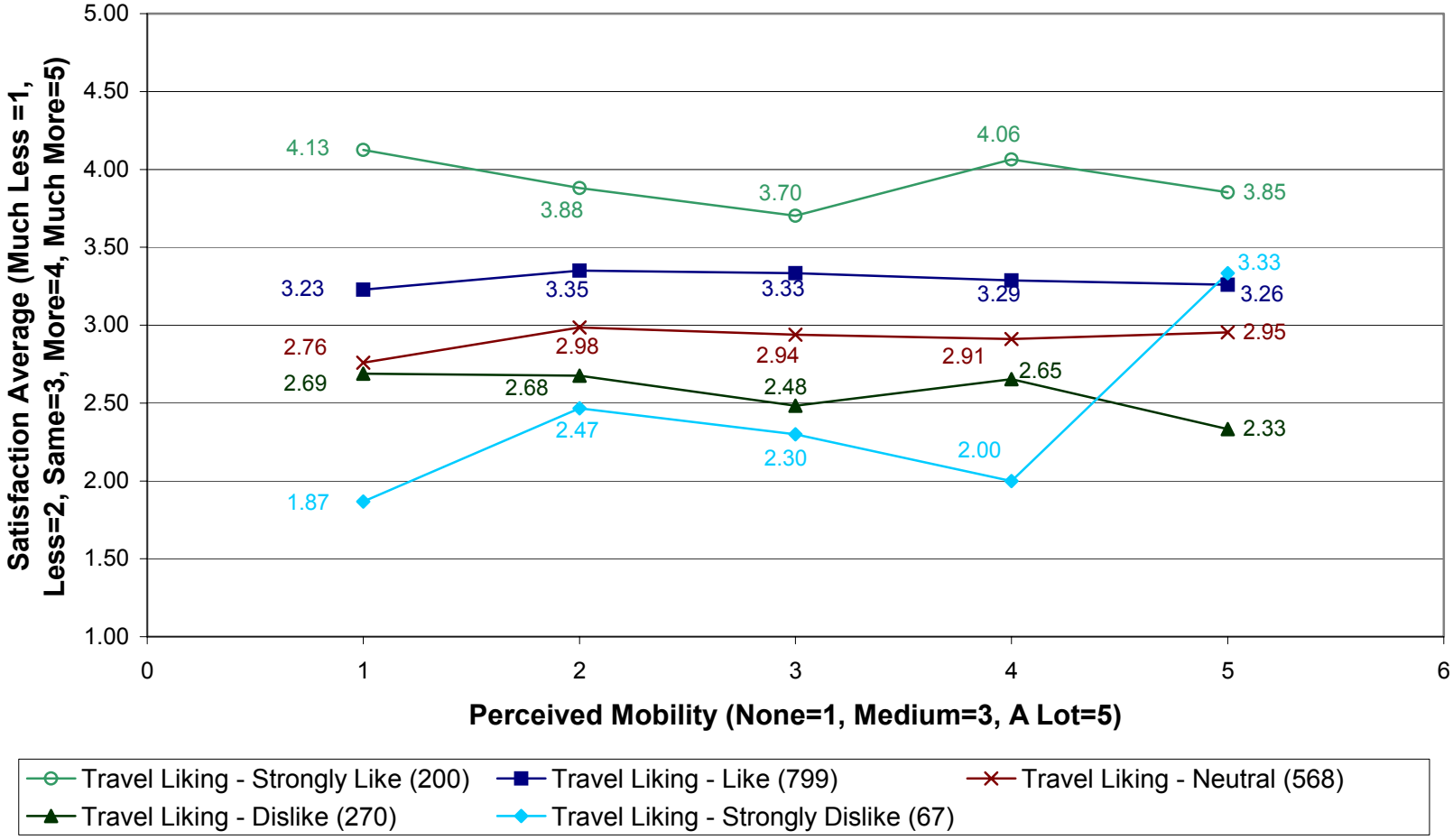
RELATIVE DESIRED MOBILITY AVERAGE for LONG DISTANCE TRAVEL - WORK/SCHOOL RELATED ACTIVITIES (TL, PM, Interaction)



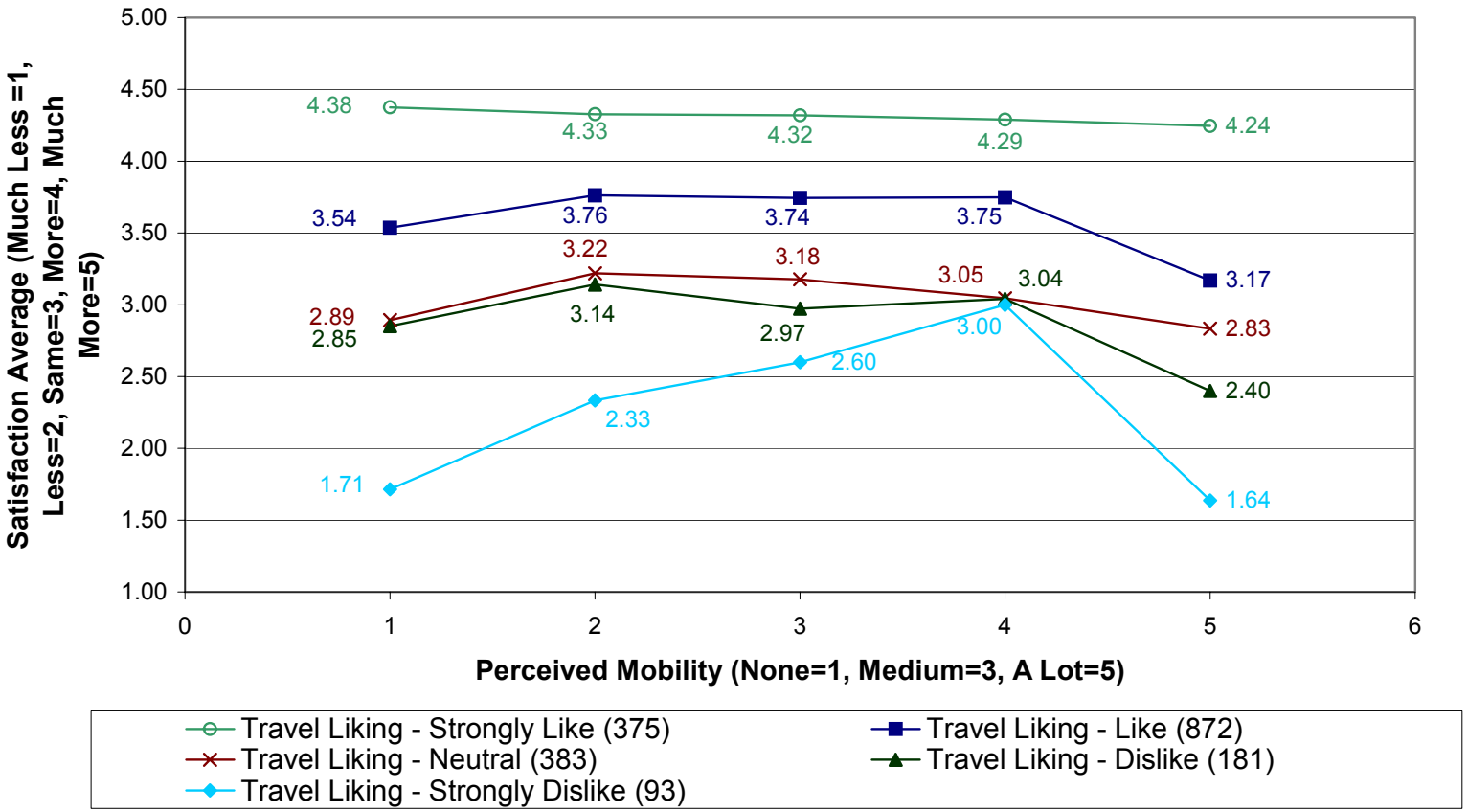
RELATIVE DESIRED MOBILITY AVERAGE for LONG DISTANCE TRAVEL - ENTERTAINMENT/RECREATION/SOCIAL ACTIVITIES (TL, PM, Interaction)



RELATIVE DESIRED MOBILITY AVERAGE for LONG DISTANCE PERSONAL VEHICLE TRAVEL (TL)



RELATIVE DESIRED MOBILITY AVERAGE for LONG DISTANCE AIRPLANE TRAVEL (TL)



Appendix E

Vector Sorting

Vector Sorting.xls

Appendix F

Cluster Analysis

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Cluster Number of Case * City Code	1904	100.0%	0	.0%	1904	100.0%

Cluster Number of Case * City Code Crosstabulation

			City Code			
			Concord	Pleasant Hill	North San Francisco	Total
Cluster Number of Case	1	Count	47	53	70	170
		% within Cluster Number of Case	27.6%	31.2%	41.2%	100.0%
		% within City Code	9.9%	9.8%	7.9%	8.9%
	2	Count	117	129	235	481
		% within Cluster Number of Case	24.3%	26.8%	48.9%	100.0%
		% within City Code	24.7%	23.8%	26.5%	25.3%
	3	Count	84	99	131	314
		% within Cluster Number of Case	26.8%	31.5%	41.7%	100.0%
		% within City Code	17.8%	18.2%	14.8%	16.5%
	4	Count	73	98	182	353
		% within Cluster Number of Case	20.7%	27.8%	51.6%	100.0%
		% within City Code	15.4%	18.0%	20.5%	18.5%
	5	Count	59	50	65	174
		% within Cluster Number of Case	33.9%	28.7%	37.4%	100.0%
		% within City Code	12.5%	9.2%	7.3%	9.1%
	6	Count	93	114	205	412
		% within Cluster Number of Case	22.6%	27.7%	49.8%	100.0%
		% within City Code	19.7%	21.0%	23.1%	21.6%
Total		Count	473	543	888	1904
		% within Cluster Number of Case	24.8%	28.5%	46.6%	100.0%
		% within City Code	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.337[a]	10	.019
Likelihood Ratio	21.110	10	.020
Linear-by-Linear Association	.704	1	.401
N of Valid Cases	1904		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 42.23.

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Cluster Number of Case * Do you have a driver's license?	1901	99.8%	3	.2%	1904	100.0%

Cluster Number of Case * Do you have a driver's license? Crosstabulation

			Do you have a driver's license?		
			Yes	No	Total
Cluster Number of Case	1	Count	161	9	170
		% within Cluster Number of Case	94.7%	5.3%	100.0%
		% within Do you have a driver's license?	8.7%	20.5%	8.9%
	2	Count	465	14	479
		% within Cluster Number of Case	97.1%	2.9%	100.0%
		% within Do you have a driver's license?	25.0%	31.8%	25.2%
	3	Count	309	5	314
		% within Cluster Number of Case	98.4%	1.6%	100.0%
		% within Do you have a driver's license?	16.6%	11.4%	16.5%
	4	Count	348	5	353
		% within Cluster Number of Case	98.6%	1.4%	100.0%
		% within Do you have a driver's license?	18.7%	11.4%	18.6%
	5	Count	170	4	174
		% within Cluster Number of Case	97.7%	2.3%	100.0%
		% within Do you have a driver's license?	9.2%	9.1%	9.2%
	6	Count	404	7	411
		% within Cluster Number of Case	98.3%	1.7%	100.0%
		% within Do you have a driver's license?	21.8%	15.9%	21.6%
Total		Count	1857	44	1901
		% within Cluster Number of Case	97.7%	2.3%	100.0%
		% within Do you have a driver's license?	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.122[a]	5	.072
Likelihood Ratio	8.661	5	.123
Linear-by-Linear Association	4.770	1	.029
N of Valid Cases	1901		

a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is 3.93.

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Cluster Number of Case * Are you male or female?	1892	99.4%	12	.6%	1904	100.0%

Cluster Number of Case * Are you male or female? Crosstabulation

			Are you male or female?		
			Female	Male	Total
Cluster Number of Case	1	Count	80	88	168
		% within Cluster Number of Case	47.6%	52.4%	100.0%
		% within Are you male or female?	8.2%	9.6%	8.9%
	2	Count	256	220	476
		% within Cluster Number of Case	53.8%	46.2%	100.0%
		% within Are you male or female?	26.1%	24.1%	25.2%
	3	Count	154	160	314
		% within Cluster Number of Case	49.0%	51.0%	100.0%
		% within Are you male or female?	15.7%	17.5%	16.6%
	4	Count	171	179	350
		% within Cluster Number of Case	48.9%	51.1%	100.0%
		% within Are you male or female?	17.4%	19.6%	18.5%
	5	Count	97	77	174
		% within Cluster Number of Case	55.7%	44.3%	100.0%
		% within Are you male or female?	9.9%	8.4%	9.2%
	6	Count	222	188	410
		% within Cluster Number of Case	54.1%	45.9%	100.0%
		% within Are you male or female?	22.7%	20.6%	21.7%
Total		Count	980	912	1892
		% within Cluster Number of Case	51.8%	48.2%	100.0%
		% within Are you male or female?	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.083[a]	5	.298
Likelihood Ratio	6.086	5	.298
Linear-by-Linear Association	1.046	1	.307
N of Valid Cases	1892		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 80.98.

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Cluster Number of Case * What is your age?	1901	99.8%	3	.2%	1904	100.0%

Cluster Number of Case * What is your age? Crosstabulation

			What is your age?					
			23 or younger	24-40	41-64	65-74	75 or older	Total
Cluster Number of Case	1	Count	4	51	78	19	18	170
		% within Cluster Number of Case	2.4%	30.0%	45.9%	11.2%	10.6%	100.0%
		% within What is your age?	6.6%	7.4%	8.7%	12.3%	18.0%	8.9%
	2	Count	18	171	229	40	22	480
		% within Cluster Number of Case	3.8%	35.6%	47.7%	8.3%	4.6%	100.0%
		% within What is your age?	29.5%	24.7%	25.6%	25.8%	22.0%	25.2%
	3	Count	6	97	144	45	21	313
		% within Cluster Number of Case	1.9%	31.0%	46.0%	14.4%	6.7%	100.0%
		% within What is your age?	9.8%	14.0%	16.1%	29.0%	21.0%	16.5%
	4	Count	11	169	150	15	8	353
		% within Cluster Number of Case	3.1%	47.9%	42.5%	4.2%	2.3%	100.0%
		% within What is your age?	18.0%	24.5%	16.8%	9.7%	8.0%	18.6%
	5	Count	5	64	91	8	6	174
		% within Cluster Number of Case	2.9%	36.8%	52.3%	4.6%	3.4%	100.0%
		% within What is your age?	8.2%	9.3%	10.2%	5.2%	6.0%	9.2%
	6	Count	17	139	202	28	25	411
		% within Cluster Number of Case	4.1%	33.8%	49.1%	6.8%	6.1%	100.0%
		% within What is your age?	27.9%	20.1%	22.6%	18.1%	25.0%	21.6%
Total		Count	61	691	894	155	100	1901
		% within Cluster Number of Case	3.2%	36.3%	47.0%	8.2%	5.3%	100.0%
		% within What is your age?	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	70.284[a]	20	.000
Likelihood Ratio	68.173	20	.000
Linear-by-Linear Association	6.183	1	.013
N of Valid Cases	1901		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.46.

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Cluster Number of Case * CARTYPE3	1687	88.6%	217	11.4%	1904	100.0%

Cluster Number of Case * CARTYPE3 Crosstabulation

			CARTYPE3									
			Compact	Large	Luxury	Mid	Minivan/Van	Pickup	SUV	Small	Sport	Total
Cluster Number of Case	1	Count	19	8	8	38	1	15	14	34	14	151
		% within Cluster Number of Case	12.6%	5.3%	5.3%	25.2%	.7%	9.9%	9.3%	22.5%	9.3%	100.0%
		% within CARTYPE3	8.0%	15.4%	13.6%	10.7%	.9%	9.4%	7.2%	9.3%	9.1%	9.0%
	2	Count	42	16	15	82	36	44	53	80	40	408
		% within Cluster Number of Case	10.3%	3.9%	3.7%	20.1%	8.8%	10.8%	13.0%	19.6%	9.8%	100.0%
		% within CARTYPE3	17.7%	30.8%	25.4%	23.1%	32.7%	27.7%	27.3%	21.8%	26.0%	24.2%
	3	Count	42	10	13	60	18	33	23	53	28	280
		% within Cluster Number of Case	15.0%	3.6%	4.6%	21.4%	6.4%	11.8%	8.2%	18.9%	10.0%	100.0%
		% within CARTYPE3	17.7%	19.2%	22.0%	16.9%	16.4%	20.8%	11.9%	14.4%	18.2%	16.6%
	4	Count	46	5	8	69	19	25	43	78	33	326
		% within Cluster Number of Case	14.1%	1.5%	2.5%	21.2%	5.8%	7.7%	13.2%	23.9%	10.1%	100.0%
		% within CARTYPE3	19.4%	9.6%	13.6%	19.4%	17.3%	15.7%	22.2%	21.3%	21.4%	19.3%
	5	Count	28	5	2	35	9	16	17	35	9	156
		% within Cluster Number of Case	17.9%	3.2%	1.3%	22.4%	5.8%	10.3%	10.9%	22.4%	5.8%	100.0%
		% within CARTYPE3	11.8%	9.6%	3.4%	9.9%	8.2%	10.1%	8.8%	9.5%	5.8%	9.2%
	6	Count	60	8	13	71	27	26	44	87	30	366
		% within Cluster Number of Case	16.4%	2.2%	3.6%	19.4%	7.4%	7.1%	12.0%	23.8%	8.2%	100.0%
		% within CARTYPE3	25.3%	15.4%	22.0%	20.0%	24.5%	16.4%	22.7%	23.7%	19.5%	21.7%
Total		Count	237	52	59	355	110	159	194	367	154	1687
		% within Cluster Number of Case	14.0%	3.1%	3.5%	21.0%	6.5%	9.4%	11.5%	21.8%	9.1%	100.0%
		% within CARTYPE3	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	51.671[a]	40	.102
Likelihood Ratio	58.065	40	.032
Linear-by-Linear Association	.255	1	.614
N of Valid Cases	1687		

a. 2 cells (3.7%) have expected count less than 5. The minimum expected count is 4.65.

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Cluster Number of Case * Approximate PERSONAL income	1815	95.3%	89	4.7%	1904	100.0%

Cluster Number of Case * Approximate PERSONAL income Crosstabulation

			Approximate PERSONAL income						
			Less than $15,000	$15,00 - $34,999	$35,000 - $54,999	$55,000 - $74,999	$75,000 - $94,999	$95,000 or more	Total
Cluster Number of Case	1	Count	20	33	45	27	10	20	155
		% within Cluster Number of Case	12.9%	21.3%	29.0%	17.4%	6.5%	12.9%	100.0%
		% within Approximate PERSONAL income	9.8%	8.0%	8.8%	8.8%	6.0%	9.3%	8.5%
	2	Count	62	110	129	75	33	51	460
		% within Cluster Number of Case	13.5%	23.9%	28.0%	16.3%	7.2%	11.1%	100.0%
		% within Approximate PERSONAL income	30.2%	26.7%	25.3%	24.4%	19.9%	23.6%	25.3%
	3	Count	25	77	84	66	24	22	298
		% within Cluster Number of Case	8.4%	25.8%	28.2%	22.1%	8.1%	7.4%	100.0%
		% within Approximate PERSONAL income	12.2%	18.7%	16.5%	21.5%	14.5%	10.2%	16.4%
	4	Count	23	62	95	60	42	55	337
		% within Cluster Number of Case	6.8%	18.4%	28.2%	17.8%	12.5%	16.3%	100.0%
		% within Approximate PERSONAL income	11.2%	15.0%	18.7%	19.5%	25.3%	25.5%	18.6%
	5	Count	36	37	47	22	12	13	167
		% within Cluster Number of Case	21.6%	22.2%	28.1%	13.2%	7.2%	7.8%	100.0%
		% within Approximate PERSONAL income	17.6%	9.0%	9.2%	7.2%	7.2%	6.0%	9.2%
	6	Count	39	93	109	57	45	55	398
		% within Cluster Number of Case	9.8%	23.4%	27.4%	14.3%	11.3%	13.8%	100.0%
		% within Approximate PERSONAL income	19.0%	22.6%	21.4%	18.6%	27.1%	25.5%	21.9%
Total		Count	205	412	509	307	166	216	1815
		% within Cluster Number of Case	11.3%	22.7%	28.0%	16.9%	9.1%	11.9%	100.0%
		% within Approximate PERSONAL income	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	64.612[a]	25	.000
Likelihood Ratio	62.641	25	.000
Linear-by-Linear Association	2.523	1	.112
N of Valid Cases	1815		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.18.

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Cluster Number of Case * Approximate HOUSEHOLD income	1817	95.4%	87	4.6%	1904	100.0%

Cluster Number of Case * Approximate HOUSEHOLD income Crosstabulation

			Approximate HOUSEHOLD income						
			Less than $15,000	$15,00 - $34,999	$35,000 - $54,999	$55,000 - $74,999	$75,000 - $94,999	$95,000 or more	Total
Cluster Number of Case	1	Count	9	19	33	24	28	41	154
		% within Cluster Number of Case	5.8%	12.3%	21.4%	15.6%	18.2%	26.6%	100.0%
		% within Approximate HOUSEHOLD income	12.7%	8.3%	8.5%	7.2%	9.5%	8.2%	8.5%
	2	Count	17	55	101	92	78	116	459
		% within Cluster Number of Case	3.7%	12.0%	22.0%	20.0%	17.0%	25.3%	100.0%
		% within Approximate HOUSEHOLD income	23.9%	24.1%	26.0%	27.7%	26.5%	23.1%	25.3%
	3	Count	11	44	71	58	51	67	302
		% within Cluster Number of Case	3.6%	14.6%	23.5%	19.2%	16.9%	22.2%	100.0%
		% within Approximate HOUSEHOLD income	15.5%	19.3%	18.3%	17.5%	17.3%	13.3%	16.6%
	4	Count	6	36	59	55	52	127	335
		% within Cluster Number of Case	1.8%	10.7%	17.6%	16.4%	15.5%	37.9%	100.0%
		% within Approximate HOUSEHOLD income	8.5%	15.8%	15.2%	16.6%	17.7%	25.2%	18.4%
	5	Count	17	19	37	39	20	36	168
		% within Cluster Number of Case	10.1%	11.3%	22.0%	23.2%	11.9%	21.4%	100.0%
		% within Approximate HOUSEHOLD income	23.9%	8.3%	9.5%	11.7%	6.8%	7.2%	9.2%
	6	Count	11	55	88	64	65	116	399
		% within Cluster Number of Case	2.8%	13.8%	22.1%	16.0%	16.3%	29.1%	100.0%
		% within Approximate HOUSEHOLD income	15.5%	24.1%	22.6%	19.3%	22.1%	23.1%	22.0%
Total		Count	71	228	389	332	294	503	1817
		% within Cluster Number of Case	3.9%	12.5%	21.4%	18.3%	16.2%	27.7%	100.0%
		% within Approximate HOUSEHOLD income	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	56.879[a]	25	.000
Likelihood Ratio	52.047	25	.001
Linear-by-Linear Association	.402	1	.526
N of Valid Cases	1817		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.02.

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Cluster Number of Case * EMPLOY45	1903	99.9%	1	.1%	1904	100.0%

Cluster Number of Case * EMPLOY45 Crosstabulation

			EMPLOY45					
			Full-Time	Part-Time	Homemaker	Non-Employed	Retired	Total
Cluster Number of Case	1	Count	92	20	8	6	44	170
		% within Cluster Number of Case	54.1%	11.8%	4.7%	3.5%	25.9%	100.0%
		% within EMPLOY45	7.4%	7.5%	13.3%	9.7%	16.6%	8.9%
	2	Count	305	82	14	13	67	481
		% within Cluster Number of Case	63.4%	17.0%	2.9%	2.7%	13.9%	100.0%
		% within EMPLOY45	24.4%	30.7%	23.3%	21.0%	25.3%	25.3%
	3	Count	170	36	16	13	79	314
		% within Cluster Number of Case	54.1%	11.5%	5.1%	4.1%	25.2%	100.0%
		% within EMPLOY45	13.6%	13.5%	26.7%	21.0%	29.8%	16.5%
	4	Count	283	36	5	6	22	352
		% within Cluster Number of Case	80.4%	10.2%	1.4%	1.7%	6.3%	100.0%
		% within EMPLOY45	22.7%	13.5%	8.3%	9.7%	8.3%	18.5%
	5	Count	116	33	7	8	10	174
		% within Cluster Number of Case	66.7%	19.0%	4.0%	4.6%	5.7%	100.0%
		% within EMPLOY45	9.3%	12.4%	11.7%	12.9%	3.8%	9.1%
	6	Count	283	60	10	16	43	412
		% within Cluster Number of Case	68.7%	14.6%	2.4%	3.9%	10.4%	100.0%
		% within EMPLOY45	22.7%	22.5%	16.7%	25.8%	16.2%	21.7%
Total		Count	1249	267	60	62	265	1903
		% within Cluster Number of Case	65.6%	14.0%	3.2%	3.3%	13.9%	100.0%
		% within EMPLOY45	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	122.040[a]	20	.000
Likelihood Ratio	119.931	20	.000
Linear-by-Linear Association	30.462	1	.000
N of Valid Cases	1903		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.36.

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Cluster Number of Case * OCCUP1_6	1856	97.5%	48	2.5%	1904	100.0%

Cluster Number of Case * OCCUP1_6 Crosstabulation

			OCCUP1_6						
			Homemaker	Service/Construction	Sales	Manager/Admin	Clerical/Admin Support	Professional/Technical	Total
Cluster Number of Case	1	Count	9	19	12	37	15	75	167
		% within Cluster Number of Case	5.4%	11.4%	7.2%	22.2%	9.0%	44.9%	100.0%
		% within OCCUP1_6	10.2%	10.8%	7.3%	9.5%	7.7%	8.9%	9.0%
	2	Count	24	49	44	101	56	195	469
		% within Cluster Number of Case	5.1%	10.4%	9.4%	21.5%	11.9%	41.6%	100.0%
		% within OCCUP1_6	27.3%	27.8%	26.7%	26.0%	28.7%	23.1%	25.3%
	3	Count	21	34	25	54	39	136	309
		% within Cluster Number of Case	6.8%	11.0%	8.1%	17.5%	12.6%	44.0%	100.0%
		% within OCCUP1_6	23.9%	19.3%	15.2%	13.9%	20.0%	16.1%	16.6%
	4	Count	10	22	31	89	23	172	347
		% within Cluster Number of Case	2.9%	6.3%	8.9%	25.6%	6.6%	49.6%	100.0%
		% within OCCUP1_6	11.4%	12.5%	18.8%	22.9%	11.8%	20.4%	18.7%
	5	Count	6	23	17	26	27	69	168
		% within Cluster Number of Case	3.6%	13.7%	10.1%	15.5%	16.1%	41.1%	100.0%
		% within OCCUP1_6	6.8%	13.1%	10.3%	6.7%	13.8%	8.2%	9.1%
	6	Count	18	29	36	81	35	197	396
		% within Cluster Number of Case	4.5%	7.3%	9.1%	20.5%	8.8%	49.7%	100.0%
		% within OCCUP1_6	20.5%	16.5%	21.8%	20.9%	17.9%	23.3%	21.3%
Total		Count	88	176	165	388	195	844	1856
		% within Cluster Number of Case	4.7%	9.5%	8.9%	20.9%	10.5%	45.5%	100.0%
		% within OCCUP1_6	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	44.803[a]	25	.009
Likelihood Ratio	45.227	25	.008
Linear-by-Linear Association	3.816	1	.051
N of Valid Cases	1856		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.92.

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Cluster Number of Case * HOUSHOLD	1893	99.4%	11	.6%	1904	100.0%

Cluster Number of Case * HOUSHOLD Crosstabulation

			HOUSHOLD				
			Single Adult - No Kids	Single Adult - With Kids	2+ Adults - No Kids	2+ Adults - With Kids	Total
Cluster Number of Case	1	Count	31	3	100	36	170
		% within Cluster Number of Case	18.2%	1.8%	58.8%	21.2%	100.0%
		% within HOUSHOLD	6.4%	9.4%	10.1%	9.4%	9.0%
	2	Count	120	9	252	96	477
		% within Cluster Number of Case	25.2%	1.9%	52.8%	20.1%	100.0%
		% within HOUSHOLD	24.6%	28.1%	25.4%	25.2%	25.2%
	3	Count	86	5	177	43	311
		% within Cluster Number of Case	27.7%	1.6%	56.9%	13.8%	100.0%
		% within HOUSHOLD	17.6%	15.6%	17.8%	11.3%	16.4%
	4	Count	114	3	164	71	352
		% within Cluster Number of Case	32.4%	.9%	46.6%	20.2%	100.0%
		% within HOUSHOLD	23.4%	9.4%	16.5%	18.6%	18.6%
	5	Count	44	6	80	43	173
		% within Cluster Number of Case	25.4%	3.5%	46.2%	24.9%	100.0%
		% within HOUSHOLD	9.0%	18.8%	8.1%	11.3%	9.1%
	6	Count	93	6	219	92	410
		% within Cluster Number of Case	22.7%	1.5%	53.4%	22.4%	100.0%
		% within HOUSHOLD	19.1%	18.8%	22.1%	24.1%	21.7%
Total		Count	488	32	992	381	1893
		% within Cluster Number of Case	25.8%	1.7%	52.4%	20.1%	100.0%
		% within HOUSHOLD	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	32.092[a]	15	.006
Likelihood Ratio	32.340	15	.006
Linear-by-Linear Association	.048	1	.826
N of Valid Cases	1893		

a. 2 cells (8.3%) have expected count less than 5. The minimum expected count is 2.87.

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Cluster Number of Case * ADLT_1_4	1893	99.4%	11	.6%	1904	100.0%

Cluster Number of Case * ADLT_1_4 Crosstabulation

			ADLT_1_4				
			1.00	2.00	3.00	4+	Total
Cluster Number of Case	1	Count	34	116	17	3	170
		% within Cluster Number of Case	20.0%	68.2%	10.0%	1.8%	100.0%
		% within ADLT_1_4	6.5%	10.6%	8.7%	3.8%	9.0%
	2	Count	129	272	52	24	477
		% within Cluster Number of Case	27.0%	57.0%	10.9%	5.0%	100.0%
		% within ADLT_1_4	24.8%	24.8%	26.5%	30.4%	25.2%
	3	Count	91	177	31	12	311
		% within Cluster Number of Case	29.3%	56.9%	10.0%	3.9%	100.0%
		% within ADLT_1_4	17.5%	16.1%	15.8%	15.2%	16.4%
	4	Count	117	189	29	17	352
		% within Cluster Number of Case	33.2%	53.7%	8.2%	4.8%	100.0%
		% within ADLT_1_4	22.5%	17.2%	14.8%	21.5%	18.6%
	5	Count	50	101	16	6	173
		% within Cluster Number of Case	28.9%	58.4%	9.2%	3.5%	100.0%
		% within ADLT_1_4	9.6%	9.2%	8.2%	7.6%	9.1%
	6	Count	99	243	51	17	410
		% within Cluster Number of Case	24.1%	59.3%	12.4%	4.1%	100.0%
		% within ADLT_1_4	19.0%	22.1%	26.0%	21.5%	21.7%
Total		Count	520	1098	196	79	1893
		% within Cluster Number of Case	27.5%	58.0%	10.4%	4.2%	100.0%
		% within ADLT_1_4	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.845[a]	15	.112
Likelihood Ratio	22.485	15	.096
Linear-by-Linear Association	.025	1	.874
N of Valid Cases	1893		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.09.

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Cluster Number of Case * KID_1_3	1894	99.5%	10	.5%	1904	100.0%

Cluster Number of Case * KID_1_3 Crosstabulation

			KID_1_3				Total
			.00	1.00	2.00	3+	
Cluster Number of Case	1	Count	131	20	16	3	170
		% within Cluster Number of Case	77.1%	11.8%	9.4%	1.8%	100.0%
		% within KID_1_3	8.8%	9.3%	10.2%	7.1%	9.0%
	2	Count	373	54	39	12	478
		% within Cluster Number of Case	78.0%	11.3%	8.2%	2.5%	100.0%
		% within KID_1_3	25.2%	25.2%	24.8%	28.6%	25.2%
	3	Count	263	28	16	4	311
		% within Cluster Number of Case	84.6%	9.0%	5.1%	1.3%	100.0%
		% within KID_1_3	17.8%	13.1%	10.2%	9.5%	16.4%
	4	Count	278	38	27	9	352
		% within Cluster Number of Case	79.0%	10.8%	7.7%	2.6%	100.0%
		% within KID_1_3	18.8%	17.8%	17.2%	21.4%	18.6%
	5	Count	124	18	25	6	173
		% within Cluster Number of Case	71.7%	10.4%	14.5%	3.5%	100.0%
		% within KID_1_3	8.4%	8.4%	15.9%	14.3%	9.1%
	6	Count	312	56	34	8	410
		% within Cluster Number of Case	76.1%	13.7%	8.3%	2.0%	100.0%
		% within KID_1_3	21.1%	26.2%	21.7%	19.0%	21.6%
Total		Count	1481	214	157	42	1894
		% within Cluster Number of Case	78.2%	11.3%	8.3%	2.2%	100.0%
		% within KID_1_3	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.704[a]	15	.116
Likelihood Ratio	20.843	15	.142
Linear-by-Linear Association	1.384	1	.239
N of Valid Cases	1894		

a. 2 cells (8.3%) have expected count less than 5. The minimum expected count is 3.77.

Oneway

Descriptives

How long does it usually take you to get to work_____minutes?

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	103	31.68	21.12	2.08	27.55	35.81	1	95
2	366	25.45	19.56	1.02	23.43	27.46	0	130
3	200	33.70	22.14	1.57	30.61	36.79	0	120
4	284	37.15	21.94	1.30	34.59	39.71	1	120
5	150	22.78	14.82	1.21	20.39	25.17	0	75
6	317	27.87	21.52	1.21	25.50	30.25	0	180
Total	1420	29.66	21.11	.56	28.56	30.76	0	180

ANOVA

How long does it usually take you to get to work_____minutes?

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	34220.75	5	6844.151	16.185	.000
Within Groups	597951.3	1414	422.879		
Total	632172.1	1419			

Oneway

Descriptives

How far do you live from work _____miles

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	102	16.16	14.51	1.44	13.31	19.01	1	70
2	356	10.38	11.61	.62	9.17	11.59	0	80
3	197	19.69	27.01	1.92	15.90	23.49	0	300
4	283	17.78	15.46	.92	15.97	19.59	1	70
5	144	9.43	10.25	.85	7.74	11.12	0	60
6	312	14.66	28.53	1.61	11.48	17.83	0	450
Total	1394	14.48	20.16	.54	13.42	15.54	0	450

ANOVA

How far do you live from work _____miles

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	18363.51	5	3672.702	9.310	.000
Within Groups	547576.5	1388	394.508		
Total	565940.0	1393			

Oneway

Descriptives

Ideal one way commute time _____(minutes)

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	151	16.30	11.16	.91	14.50	18.09	0	60
2	444	17.88	8.68	.41	17.07	18.69	0	60
3	276	15.22	8.69	.52	14.19	16.25	0	60
4	326	14.65	7.67	.43	13.81	15.48	0	45
5	157	17.09	8.61	.69	15.73	18.45	0	55
6	377	16.45	8.40	.43	15.59	17.30	0	60
Total	1731	16.33	8.75	.21	15.91	16.74	0	60

ANOVA

Ideal one way commute time _____(minutes)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2418.796	5	483.759	6.414	.000
Within Groups	130095.0	1725	75.417		
Total	132513.8	1730			

Appendix G

Data Cleaning Regression Equations

Short Distance - Enter

	Concord			Pleasant Hill			North San Francisco		
Question	D1	D2	D3	D1	D2	D3	D1	D2	D3
# of Cases	394	392	399	439	429	446	736	746	760
Adjusted R^2	0.388	0.338	0.359	0.330	0.249	0.399	0.379	0.425	0.296
Significance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Constant	0.787	0.537	0.600	0.711	0.949	0.637	0.589	0.045	0.875
Significance	0.003	0.013	0.003	0.006	0.000	0.002	0.001	0.809	0.000
Commute	0.291	0.286	0.185	0.220	0.325	0.231	0.338	0.387	0.161
Significance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Work/School	0.008	-0.098	-0.001	0.024	-0.095	-0.016	0.089	-0.026	0.092
Significance	0.848	0.037	0.986	0.497	0.062	0.737	0.003	0.440	0.016
Grocery	0.140	0.122	0.085	0.081	-0.048	0.042	0.143	0.173	0.070
Significance	0.009	0.047	0.126	0.112	0.467	0.391	0.000	0.000	0.038
Eat a Meal	-0.067	0.086	0.107	0.048	0.060	0.098	0.039	0.082	0.104
Significance	0.300	0.179	0.098	0.445	0.389	0.138	0.434	0.986	0.019
Ent/Social/Rec	0.156	0.091	0.126	0.154	0.111	0.251	0.145	0.181	0.117
Significance	0.002	0.052	0.019	0.003	0.033	0.000	0.000	0.000	0.003
Taking others	0.112	0.068	0.006	0.068	0.056	0.014	0.067	0.030	-0.001
Significance	0.007	0.105	0.874	0.072	0.217	0.704	0.060	0.306	0.968
Personal Vehicle	0.239	0.293	0.242	0.293	0.300	0.225	0.135	0.232	0.187
Significance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bus	-0.053	-0.092	0.006	0.009	-0.038	0.023	0.029	0.012	0.058
Significance	0.505	0.025	0.873	0.904	0.330	0.513	0.330	0.645	0.034
Train/BART/LR	0.082	0.016	0.058	0.018	0.004	0.017	0.015	-0.013	-0.001
Significance	0.075	0.673	0.121	0.667	0.914	0.592	0.706	0.611	0.974
Walk/Jog/Bike	-0.056	-0.006	-0.001	-0.008	-0.020	-0.077	0.003	0.004	-0.038
Significance	0.206	0.865	0.986	0.841	0.567	0.013	0.909	0.871	0.146

Short Distance - Stepwise

	Concord			Pleasant Hill			North San Francisco		
Question	D1	D2	D3	D1	D2	D3	D1	D2	D3
# of Cases	394	392	399	439	429	446	736	746	760
Adjusted R^2	0.371	0.323	0.359	0.316	0.253	0.403	0.369	0.428	0.297
Significance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Constant	0.750	0.790	0.806	0.969	0.889	0.718	0.771	0.068	0.759
Significance	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.628	0.000
Commute	0.303	0.250	0.203	0.225	0.321	0.235	0.339	0.382	0.162
Significance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Work/School					-0.101		0.099		0.083
Significance					0.034		0.001	0.000	0.023
Grocery	0.107						0.175	0.176	0.073
Significance	0.029						0.000	0.000	0.030
Eat a Meal		0.183	0.167			0.135			0.106
Significance		0.001	0.002			0.018			0.016
Ent/Social/Rec	0.125		0.127	0.184	0.131	0.242	0.166	0.183	0.107
Significance	0.007		0.016	0.000	0.003	0.000	0.000	0.000	0.006
Taking others	0.106			0.081					
Significance	0.009			0.030					
Personal Vehicle	0.239	0.330	0.241	0.301	0.323	0.226	0.126	0.232	0.192
Significance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bus		-0.085							0.055
Significance		0.005							0.020
Train/BART/LR									
Significance									
Walk/Jog/Bike						-0.067			
Significance						0.023			

Long Distance - Enter

	Concord			Pleasant Hill			North San Francisco		
Question	D1	D2	D3	D1	D2	D3	D1	D2	D3
# of Cases	395	424	423	431	460	478	720	770	771
Adjusted R^2	0.483	0.548	0.529	0.455	0.443	0.518	0.595	0.565	0.539
Significance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Constant	0.490	0.404	0.505	0.514	1.014	0.369	0.286	0.135	0.292
Significance	0.000	0.007	0.001	0.000	0.000	0.017	0.001	0.251	0.013
Work/School	0.256	0.052	0.081	0.306	-0.033	0.081	0.311	0.156	0.135
Significance	0.000	0.122	0.011	0.000	0.287	0.003	0.000	0.000	0.000
Ent/Social/Rec	0.327	0.337	0.394	0.314	0.349	0.434	0.329	0.338	0.387
Significance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Personal Vehicle	0.098	0.292	0.238	0.122	0.125	0.229	0.047	0.139	0.153
Significance	0.002	0.000	0.000	0.000	0.002	0.000	0.052	0.000	0.000
Airplane	0.252	0.240	0.162	0.173	0.276	0.171	0.284	0.354	0.269
Significance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Long Distance - Stepwise

	Concord			Pleasant Hill			North San Francisco		
Question	D1	D2	D3	D1	D2	D3	D1	D2	D3
# of Cases	395	424	423	431	460	478	720	770	771
Adjusted R^2	0.477	0.546	0.529	0.450	0.442	0.518	0.591	0.565	0.539
Significance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Constant	0.490	0.491	0.505	0.514	0.956	0.369	0.356	0.135	0.292
Significance	0.000	0.000	0.001	0.000	0.000	0.017	0.000	0.251	0.013
Work/School	0.256		0.081	0.306		0.081	0.321	0.156	0.135
Significance	0.000		0.011	0.000		0.003	0.000	0.000	0.000
Ent/Social/Rec	0.327	0.343	0.394	0.314	0.342	0.434	0.354	0.338	0.387
Significance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Personal Vehicle	0.098	0.290	0.238	0.122	0.127	0.229		0.139	0.153
Significance	0.002	0.000	0.000	0.000	0.002	0.000		0.000	0.000
Airplane	0.252	0.247	0.162	0.173	0.273	0.171	0.271	0.354	0.269
Significance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000