THE ADOPTION AND CONSIDERATION

OF COMMUTE-ORIENTED TRAVEL ALTERNATIVES

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ATTITUDES TOWARD MOBILITY
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EXECUTIVE SUMMARY

While metropolitan congestion continues to be an important social issue, comparatively little research exists in the area of individual traveler responses to congestion. This study explores the adoption and consideration of 19 alternatives having travel implications. The key purpose of this study is to empirically examine the role of travel-related attitudes, preferences, personality and lifestyle traits, among other variables, in the adoption and consideration of various possible responses to congestion (travel-related alternatives).

The data analyzed in this study come from a fourteen-page self-administered survey mailed in May 1998 to 8,000 randomly selected households in three neighborhoods of the San Francisco Bay Area. Half of the total surveys were sent to an urban neighborhood of North San Francisco and the other half were divided evenly between the suburban cities of Concord and Pleasant Hill. These areas were chosen to represent the diverse lifestyles, land use patterns, and mobility options in the Bay Area.

These data were analyzed in several ways. First, descriptive information was obtained and presented. Next, using chi-square and t-tests, individual relationships were explored between the adoption/consideration of travel-related alternatives and the respondents' demographics, objective mobility, subjective mobility, relative desired mobility, travel liking, travel-related attitudes, and personality and lifestyle preferences. The final set of analyses deals with the travel-related alternatives as bundles rather than as individual measures.

In order to better understand how the travel-related alternatives interact with travel attitudes, demographics and the other variables in our analysis, the travel-related alternatives were grouped into bundles based on conceptual and empirical similarities. Two types of travel-related bundles are analyzed in this report. The first set consists of three bundles (travel maintaining/increasing, travel reducing, and major location/life change) that were created based on conceptual similarities between the alternatives' generalized costs and amount of lifestyle change associated with adopting them. The second set of bundles was created using factor analysis of the responses to identify groupings having a similar empirical pattern of responses. Eight bundles emerged from this second method. The two sets of bundles are presented in Table ES-1 below.

It was hypothesized that people with a strong positive attitude toward travel, and who want to travel more than they are currently doing, are less likely to adopt or consider alternatives that will reduce or restrict their travel (and conversely for those with a strong negative attitude toward travel, and who want to travel less). This report presents evidence in support of these hypotheses. A more detailed listing of some of the initial hypotheses and results is presented in Table ES- 2.

In general the results were consistent with prior hypotheses, but a few unexpected relationships emerged. For example, adventure seekers and the family/community oriented appeared inclined to try the full range of travel-related alternatives, not just those supporting travel (in the former case) or reducing it (in the latter case). Ambiguous directions of causality were likely responsible for some unexpected results. While a given variable could generally be viewed as

antecedent to consideration (and hence plausible as a cause), it could often be viewed as a cause or an effect in the case of adoption.

Table ES- 1: Conceptual and Factor-based Bundles of the Travel-related Alternatives

Conceptual Bundles	
Group 1. Travel maintaining/increasing	a. Buy a car stereo system b. Get a mobile phone c. Get a better car d. Get a more fuel efficient car e. Change work trip departure time f. Hire someone to do house or yard work g. Adopt flextime j. Change from another means of getting to work to driving alone
Group 2. Travel reducing	h. Adopt compressed work week (such as a "9/80" schedule) i. Change from driving alone to work to some other means k. Buy equipment/services to help you work from home l. Telecommute (part- or full-time)
Group 3. Major location/lifestyle change	m. Change jobs closer to home n. Move your home closer to work o. Work part-time instead of full-time p. Start home-based business or put more effort into an existing one q. Retire or stop working
Factor-based Bundles	
Group 1. Auto improvement	a. Buy a car stereo system c. Get a better car d. Get a more fuel efficient car
Group 2. Mobile phone	b. Get a mobile phone
Group 3. Work-schedule changes	e. Change work trip departure time g. Adopt flextime h. Adopt compressed work week (such as a "9/80" schedule)
Group 4. Hire someone to do house or yard work	f. Hire someone to do house or yard work
Group 5. Mode change	i. Change from driving alone to work to some other means j. Change from some other means of getting to work to driving alone
Group 6. Home-based work	k. Buy equipment/services to help you work from home l. Telecommute (part- or full-time) p. Start home-based business or put more effort into an existing one
Group 7. Residential/employment relocation	m. Change jobs closer to home n. Move your home closer to work
Group 8. Alter employment status	o. Work part-time instead of full-time q. Retire or stop working

Table ES- 2: Summary of Hypotheses and Results

Variable type	General hypotheses	Results
Demographics (Sections 5.2.1 and 6.3.1)	(1) Females are disproportionately represented among the most costly/travel-reducing alternatives. (2) Those in upper income and education categories are more able and therefore more likely to adopt and consider a wide range of alternatives.	(1) Our findings support this hypothesis. (2) Our findings provide support for this; however, income appears to be related to the adoption and consideration of more alternatives and bundles than is education. Further, both income and education play more of a role in the adoption of alternatives and bundles than in the consideration of alternatives and bundles.
Objective mobility (Sections 5.2.2 and 6.3.2)	(1) The more respondents travel the more likely they will be to adopt and consider travel alternatives.	(1) Our findings support this hypothesis. Both travel maintaining and travel reducing alternatives are involved, for different reasons.
Subjective mobility (Sections 5.2.2 and 6.3.3)	(1) The more respondents feel that they travel the more likely they will be to adopt and consider travel-related alternatives/bundles.	(1) Our findings support this hypothesis, similarly to objective mobility.
Relative desired mobility (Sections 5.2.3 and 6.3.4)	(1) The more respondents want to travel the less likely they will be to consider travel-reducing or major lifestyle change alternatives/bundles and the more likely they will be to consider travel-maintaining/ increasing alternatives/bundles.	(1) Our findings generally support this hypothesis, for the relationships that are significant.
Travel liking (Sections 5.2.4 and 6.3.5)	(1)The more respondents like to travel the less likely they will be to adopt or consider travel-reducing or major lifestyle change alternatives/bundles and (2) the more likely they will be to adopt and consider travel-maintaining/increasing alternatives and bundles.	(1) Our findings offer mixed support for this hypothesis. (2) Our findings provide some support for this, however, this hypothesis holds much better for consideration than for adoption.
Travel attitudes (Sections 5.2.5 and 6.3.6)	(1) Respondents with attitudes favoring travel would be more likely to adopt and consider travel-maintaining strategies while (2) those with attitudes not favoring travel would be more likely to adopt and consider travel-reducing and major lifestyle change strategies.	(1)(2) Our findings provide support for these hypotheses although that support is stronger for consideration than for adoption.
Personality types/lifestyle preference (Sections 5.2.6 and 6.3.7)	(1) The "adventure seeker" along with the "workaholic" and the "status seeker" would be more likely to adopt and consider travel maintaining/increasing alternatives while (2) those with a "family/community oriented" lifestyle preference would be more likely to adopt and consider adopting travel reducing and perhaps major lifestyle changing alternatives.	(1) Our findings provide some support for this hypothesis. Adventure-seekers were also more likely to adopt/consider travel reducing strategies, however. (2) Our findings provide some support for this hypothesis. However, they also adopt/consider travel-maintaining strategies.

While further research is needed to clarify many of the complex relationships discussed in this report, the results presented here are useful in that they identify pairwise relationships between the respondents' characteristics (amount of travel, perception of travel, desire for travel, demographics, attitudes, liking of travel, and personality and lifestyle preferences) and the travel-related strategies that they have adopted and are considering.

1. INTRODUCTION

Metropolitan congestion continues to claim a large share of attention as a pressing social problem (Arnott and Small, 1994). Policies intended to alleviate congestion are debated and tested. These policies are often directed at reducing peak-period vehicle travel through increasing its cost (congestion or value pricing, fuel and emission taxes), increasing the attractiveness of modes other than the private automobile (improving transit service, providing a bicycle- and pedestrian-friendly environment), locating activities closer together (through denser and more mixed-use land development), or promoting telecommunications alternatives to travel (such as telecommuting or teleshopping).

Historically, however, many such policies have failed to have the expected or desired effect. Vehicle-miles traveled continue to rise while use of transit and ridesharing modes declines (Pisarski, 1992). The falling costs, wider availability, increased sophistication, and rising adoption of telecommunications "substitutes" have not been accompanied by a decrease in travel (Mokhtarian and Salomon, 2002). It is too soon to judge the actual effect of pricing policies, but there will continue to be political challenges to the implementation of such policies in a form strong enough to have a noticeable effect on systemwide congestion (Lave, 1994; Wachs, 1994).

Many reasons have been advanced for the continued rise in vehicle travel, including shifts to smaller households, increasing participation of women in the work force, continued driving by the elderly, greater vehicle availability, increases in trip lengths (due in part to increased suburbanization of the population), and the strong economy (Pisarski, 1992). These are indeed major structural or external factors that are quite powerful. We believe, however, that insufficient attention has been paid to internal factors, that is to travel-related attitudes and predispositions. It is these internal motivations (together, to be sure, with external constraints and facilitators) that greatly influence how a person will react to the external factors described above. These attitudes and predispositions will help determine whether a person or household acquires a car (or a second car); whether a mixed-use neighborhood is the chosen residential location; or whether the reaction to a long commute is to telecommute, change job or home location, or make the most of the time in other ways.

This study explores the adoption and consideration of 19 alternatives having travel implications. It is the sequel to a previous study of a similar set of alternatives placed in a questionnaire focused on telecommuting attitudes, preferences, and choices. The previous study offered several suggestions for further research that have been adopted in the current study. Specific differences from the earlier work are noted in Section 4. The data analyzed in this study come from a fourteen-page self-administered survey mailed in May 1998 to 8,000 randomly selected households in three neighborhoods of the San Francisco Bay Area. (For further discussion of the data see Section 3).

The key purpose of this study is to empirically examine the role of travel-related attitudes, preferences, personality and lifestyle traits, among other variables, in the adoption and consideration of various possible responses to congestion (travel-related alternatives). We hypothesize that people with a strong positive attitude toward travel, and who want to travel more than they are currently doing, are less likely to adopt or consider alternatives that will

reduce or restrict their travel (and conversely for those with a strong negative attitude toward travel, and who want to travel less).

The organization of this report is as follows. The next section will introduce the key concepts of the study and how they were measured in the survey. Section 3 discusses the survey, sample for this study, and the data preparation for this analysis. Section 4 compares this study to its predecessor and notes the key differences from that earlier work. Section 5 presents the analysis of the 19 individual travel-related alternatives with demographic, objective and subjective mobility indicators, attitudinal, personality and lifestyle preferences, and relative desired mobility indicators (these variables are explained in Section 2 and analyzed in Sections 5 and 6). Section 6 presents the methods used to create bundles of the travel-related alternatives and explains why such bundles are useful in this analysis. This section contains the analysis of the chi-square and t-tests used to identify relationships between our variables and the adoption and consideration of the bundles. Finally, Section 7 concludes by summarizing the findings in this report and suggesting areas for future study.

2. MEASUREMENT OF KEY CONCEPTS

As background to the concepts described below, it should be noted that in the cover letter to the survey, travel was defined as "moving any distance by any means of transportation, from walking around the block to flying around the world." In questions relating to the amount of travel conducted or desired by respondents, they were asked (borrowing wording from the American Travel Survey) to exclude "travel you do as an operator or crew member on a train, airplane, truck, bus, or ship."

Most of the variables measured by the questionnaire can be grouped into 11 categories, of which nine are applicable to this study: Objective Mobility, Subjective Mobility, Relative Desired Mobility, Travel Liking, Attitudes, Personality, Lifestyle, Travel-related Alternatives, and Demographics. Each of the nine categories is briefly described below.

The three mobility categories and the Travel Liking category had similar structures. In each case, measures were obtained both overall and separately by purpose and mode, for short-distance and long-distance travel. Consistent with the American Travel Survey, long-distance trips were defined as those longer than 100 miles, one way. The short-distance modes measured were: personal vehicle, bus, Bay Area Rapid Transit (heavy rail)/light rail/train, walking/jogging/cycling, and other. The short-distance purposes measured were: commuting to work or school, work/ school-related, grocery shopping, eating a meal, and taking other people where they need to go. Long-distance measures were obtained for the personal vehicle and airplane modes, and for the work/school-related and entertainment/social/recreational purposes.

2.1. Objective Mobility

These questions asked about distance and frequency of travel by mode and trip purpose, as well as travel time for the commute trip. For short-distance trips, respondents were asked how often they traveled for each purpose, with six categorical responses ranging from “never” to “5 or more times a week”. Frequency of trips by mode was not obtained (a conscious design choice,

to reduce the burden on the respondent). Respondents were also asked to specify how many miles they traveled each week, in total and by mode and purpose.

On one hand, reported estimations of *typical* travel, such as we obtained here, are not as reliable as travel diary data. On the other hand, travel diaries can be criticized for generally encompassing only a few days of travel and therefore potentially being unrepresentative at the disaggregate level. Of course, these measures are respondents' *reports* of the distance, frequency, and time they are traveling, and hence are "objective" only in the sense of referring to those *externally measurable* quantities (in contrast to the subjective measures of Subjective and Relative Desired Mobility described below), rather than in the sense of *actually* being measured through external observation.

For long-distance trips, pre-testing indicated that respondents would not be able to estimate distances reliably. Thus, respondents were simply asked to tabulate how many trips they made "last year" for each mode-purpose combination (personal vehicle/work, personal vehicle/ entertainment, etc.), to each of nine regions of the world. Those responses indicated number of trips directly, and were also transformed to approximate measures of distance, through judgmental average distances developed between the Bay Area and each of the nine world areas.

In addition to trips and distances, two transformations of the long distance objective mobility indicators are utilized in this report: the natural log of the total miles, and the summation of the natural log of miles for each purpose/mode combination[1]. The reason for performing a natural log transformation 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 have as strong an incremental effect as the previous mile). These variables are displayed in Tables 8, 9, 23, and 24. The footnotes on Table 8 differentiate the variable names.

2.2. Subjective Mobility

We are interested not only in the Objective amount an individual travels, but also in how that amount of travel is perceived. One person may consider 100 miles a week to be a lot, while another considers it minimal. For each of the same categories as for Objective Mobility (overall, purpose, and mode categories for short- and long-distance), respondents were asked to rate the amount of their travel on a five-point semantic-differential scale anchored by "none" and "a lot".

2.3. Relative Desired Mobility

An individual may consider that she travels "a lot", but want to do even more. Thus Relative Desired Mobility refers to how much a person wants to travel compared to what she is doing now. The structure of this question mirrors the structure for Subjective Mobility, with respondents rating the amount of travel they want to do (in each category) compared to the present, on a five-point scale from "much less" to "much more".

[1] Actually, Ln(miles + 1) was used to prevent combinations having zero miles from being transformed to negative infinity (Ln[0]).

2.4. Travel Liking

Whether a respondent who already travels a lot wants to reduce it or do even more is likely to depend on how much he enjoys traveling. To directly measure the affinity for travel, the question was asked, "How do you feel about *traveling* in each of the following categories? We are *not* asking about the activity at the destination, but about the travel required to get there." Respondents were then asked to rate each of the same categories as Subjective Mobility on a five-point scale from "strongly dislike" to "strongly like".

Despite our attempt to alert respondents to distinguish the destination activity from the travel, it is likely that even many of those who actually read the instructions (and more of those who did not) were unsuccessful at doing so. Future studies should perhaps make this distinction even more forcefully to the respondent; interactive interviews would be one mechanism for probing answers and helping the participant to separate these components of the utility for travel. Nevertheless, we believe that the responses to this question are essentially measuring the degree of the respondent's affinity for travel for its own sake, even if that measurement is imperfect.

2.5. Attitudes

The survey contained 32 attitudinal statements related to travel, land use, and the environment, to which individuals responded on the five-point Likert-type scale from "strongly disagree" to "strongly agree". Factor analysis was then used to extract the relatively uncorrelated fundamental dimensions spanned by these 32 variables. Six underlying dimensions were identified, using principal axis factoring with oblique rotation (see Redmond, 2000 or Mokhtarian, *et al.*, 2001 for details): travel dislike, pro-environmental solutions, commute benefit, travel freedom, travel stress, and pro-high density.

2.6. Personality

Respondents were asked to indicate how well (on a five-point scale from "hardly at all" to "almost completely") each of 17 words and phrases described their personality. Each of these traits was hypothesized to relate in some way to one's orientation toward travel, or to reasons for wanting to travel for its own sake. These 17 attributes reduced to four personality factors: adventure-seeker, organizer, loner, and the calm personality.

2.7. Lifestyle

The survey contained 18 Likert-type scale statements relating to work, family, money, status, and the value of time. These 18 questions comprised four lifestyle factors: status seeker, workaholic, family/community-oriented and a frustrated factor.

2.8. Travel-related Alternatives

One section of the survey asked respondents if they had made, and were considering, certain choices that would change their travel. Previous analysis (Salomon and Mokhtarian, 1997; Mokhtarian, *et al*., 1997; Raney, *et al*., 2000) of a similar list provided in an earlier survey

classified the options as *travel-maintaining* strategies (such as getting a mobile phone or buying a more comfortable car), *travel-reducing* strategies (such as compressed work week schedules or telecommuting), and *major lifestyle/location changes* (such as moving home and work closer together, changing to part-time work, or quitting work altogether). For options that were adopted or considered, respondents were further asked to indicate the reason(s): personal, family related, work related, reducing or easing travel, and other (multiple responses allowed). For adopted options respondents were asked to indicate how long ago (in years) they were adopted. Analyzing the variables associated with the adoption and consideration of these strategies is the purpose of the present study.

2.9. Demographics

Finally, the survey included an extensive list of Demographic variables to allow for comparison to other surveys and to Census data. These variables include neighborhood and car type dummies, age, years in the U.S., education and employment information, and household information such as number of people in the household, their age group, and personal and household income.

3. DATA COLLECTION AND PREPARATION

As mentioned in the Introduction, the data analyzed in this study come from a fourteen-page self-administered survey mailed in May 1998 to 8,000 randomly selected households in three neighborhoods of the San Francisco Bay Area. Half of the total surveys were sent to an urban neighborhood of North San Francisco and the other half were divided evenly between the suburban cities of Concord and Pleasant Hill. These areas were chosen to represent the diverse lifestyles, land use patterns, and mobility options in the Bay Area. Approximately 2,000 surveys were completed by an adult member of the household and returned, for a 25% response rate. The subset of 1,282 used in this analysis consists of commuting workers with relatively complete responses to key questions, as described below.

Table 1 presents some key demographic characteristics of the study data. The sample is relatively balanced in terms of representation by neighborhood and gender. Higher incomes are overrepresented compared to Census data.

Figures 1 and 2 reproduce the two pages of the survey dealing with the travel-related alternatives analyzed in this study. The questions under E1 asked about the adoption, and E2 about the consideration, of 19 options having travel-related implications. The first column of boxes for each question was coded as a binary variable, equal to 1 if the box was checked (i.e. if the alternative was not adopted), and 0 otherwise. Years since adopting was coded as whole years (rounded to the nearest full year, with anything less than 6 months coded as zero). Regarding the reasons for adoption and consideration, since more than one reason could be indicated, they were coded separately as binary variables equal to 1 if the reason was checked and 0 otherwise.

Questions “m” and “n” had two parts each: “change jobs . . . closer to home” and “. . . farther from home” (referred to as “m1” and “m2,” respectively), and “move your home . . . closer to work” and “. . . farther from work” (“n1” and “n2”). The format for these two questions, shown

in Figures 1 and 2, was designed to economize on vertical space. Unfortunately, it had the unanticipated effect of confusing many respondents (apparently leading them to think that they needed to respond to only one member of each pair) and resulted in a disproportionately high number of non-responses, particularly on the second half of each question. (See Tables 2 and 3).

Given the large amounts of missing data on the m2 and n2 alternatives, we excluded these variables from some portions of the analysis described here. In particular, we did not use these alternatives to screen out cases with missing data, nor did we attempt to fill any missing data on these variables.

In previous analysis of the data from the survey as a whole, cases missing a large number of responses were removed from the sample. Where possible, consistency checks were performed and inconsistent data were reconciled or discarded. In the attitudinal, lifestyle, and personality sections, responses for the small proportion of cases that were missing only a few items were filled with the neighborhood-specific mean. These steps resulted in 1,904 cases containing relatively complete data for variables other than the travel-related alternatives.

Table 1—Demographic Characteristics of Sample Used in this Analysis

		Number	Percent	
Concord (suburban)		294	22.93%	(n=1,282)
Pleasant Hill (suburban)		346	26.99%	
North San Francisco (urban)		642	50.08%	
Female		650	50.86%	(n=1,278)
Have a driver's license		1,263	98.59%	(n=1,281)
Work full-time		1,079	84.17%	(n=1,282)
Personal income:	< $15,000	91	7.26%	(n=1,254)
	$15,000-34,999	266	21.21%	
	$35,000-54,999	385	30.70%	
	$55,000-74,999	229	18.26%	
	$75,000-94,999	126	10.05%	
	> $95,000	157	12.52%	
Age:	18-23	42	3.28%	(n=1,282)
	24-40	563	43.92%	
	41-64	639	49.84%	
	> 65	38	2.96%	

	Mean	Std. Dev.	
Total people in household	2.4	1.24	(n=1,282)
Total children under 18 in HH	0.46	0.85	(n=1,276)
Total workers in HH (full/part-time)	1.77	0.82	(n=1,279)
Number of personal vehicles in HH	1.87	1.09	(n=1,279)

Figure 1—Section E1 (Adoption) from the Survey

PART E: YOUR TRAVEL-RELATED CHOICES

A number of choices can be made that affect the amount and nature of people's travel. We are interested in knowing some of the choices you have made or may be considering making. *"How long ago"* refers to the most recent time you made that choice.

1. First, we are interested in knowing which of the following you have already done **and why**.

		Not done or not applicable	*Done: How long ago?*	*Why? (CHECK ALL THAT APPLY)* *Personal*	*Family related*	*Work related*	*Reducing or easing travel*	*Other*
a.	Buy a car stereo system	☐	____yrs	☐	☐	☐	☐	☐
b.	Get a mobile phone	☐	____yrs	☐	☐	☐	☐	☐
c.	Get a better car	☐	____yrs	☐	☐	☐	☐	☐
d.	Get a fuel efficient car	☐	____yrs	☐	☐	☐	☐	☐
e.	Change work trip departure time	☐	____yrs	☐	☐	☐	☐	☐
f.	Hire someone to do house or yard work	☐	____yrs	☐	☐	☐	☐	☐
g.	Adopt flextime	☐	____yrs	☐	☐	☐	☐	☐
h.	Adopt compressed work week (such as a "9/80" schedule)	☐	____yrs	☐	☐	☐	☐	☐
i.	Change from driving alone to work, to some other means	☐	____yrs	☐	☐	☐	☐	☐
j.	Change from another means of getting to work, to driving alone	☐	____yrs	☐	☐	☐	☐	☐
k.	Buy equipment/services to help you work from home	☐	____yrs	☐	☐	☐	☐	☐
l.	Telecommute (part- or full-time)	☐	____yrs	☐	☐	☐	☐	☐
m.	Change jobs...closer to home	☐	____yrs	☐	☐	☐	☐	☐
	...farther from home	☐	____yrs	☐	☐	☐	☐	☐
n.	Move your home...closer to work	☐	____yrs	☐	☐	☐	☐	☐
	...farther from work	☐	____yrs	☐	☐	☐	☐	☐
o.	Work part- instead of full-time	☐	____yrs	☐	☐	☐	☐	☐
p.	Start home-based business or put more effort into an existing one	☐	____yrs	☐	☐	☐	☐	☐
q.	Retire or stop working	☐	____yrs	☐	☐	☐	☐	☐

Figure 2—Section E2 (Considering Adoption) from the Survey

2. *Now, even if you have already made some of these choices,* you could be thinking about making a similar change again, or considering new options. For this question we are interested in which of the following you have been considering **and why**.

	Not seriously considering	*Seriously considering: Why? (CHECK ALL THAT APPLY)*				
		Personal	*Family related*	*Work related*	*Reducing or easing travel*	*Other*
a. Buy a car stereo system	☐	☐	☐	☐	☐	☐
b. Get a mobile phone	☐	☐	☐	☐	☐	☐
c. Get a better car	☐	☐	☐	☐	☐	☐
d. Get a fuel efficient car	☐	☐	☐	☐	☐	☐
e. Change work trip departure time	☐	☐	☐	☐	☐	☐
f. Hire someone to do house or yard work	☐	☐	☐	☐	☐	☐
g. Adopt flextime	☐	☐	☐	☐	☐	☐
h. Adopt compressed work week (such as a "9/80" schedule)	☐	☐	☐	☐	☐	☐
i. Change from driving alone to work, to some other means	☐	☐	☐	☐	☐	☐
j. Change from another means of getting to work, to driving alone	☐	☐	☐	☐	☐	☐
k. Buy equipment/services to help you work from home	☐	☐	☐	☐	☐	☐
l. Telecommute (part- or full-time)	☐	☐	☐	☐	☐	☐
m. Change jobs...closer to home	☐	☐	☐	☐	☐	☐
...farther from home	☐	☐	☐	☐	☐	☐
n. Move your home...closer to work	☐	☐	☐	☐	☐	☐
...farther from work	☐	☐	☐	☐	☐	☐
o. Work part-time instead of full-time	☐	☐	☐	☐	☐	☐
p. Start home-based business or put more effort into an existing one	☐	☐	☐	☐	☐	☐
q. Retire or stop working	☐	☐	☐	☐	☐	☐

The travel-related alternatives had not been previously analyzed in depth. Thus, before proceeding with this study it was necessary to review this set of variables for missing data.

Several steps were involved in cleaning the data for this analysis. First, any case missing responses for more than two out of the 17 alternatives for either the adoption or consideration sections of the travel-related alternatives was removed. This reduced the sample size to 1,784 cases. For adoption, 45 of these cases were missing responses for two of the 17 alternatives, and 187 were missing responses for only one alternative. For consideration, 38 of these cases were missing responses for two of the 17 alternatives, and 172 were missing responses for only one alternative. Only one case was missing responses for two alternatives for both adoption and consideration.

Table 2—Adoption: Number of Missing Cases for Each Travel Alternative (N = 1,904)

Travel-related alternatives	Number missing	Percent missing
a. Buy a car stereo	41	2.15%
b. Get a mobile phone	38	2.00%
c. Get a better car	37	1.94%
d. Get a fuel efficient car	73	3.83%
e. Change work trip departure time	57	2.99%
f. Hire someone to do house or yard work	49	2.57%
g. Adopt flextime	51	2.68%
h. Adopt compressed work week	41	2.15%
i. Change from driving alone to work, to some other means	43	2.26%
j. Change from some other means of getting to work, to driving alone	47	2.47%
k. Buy equipment/services to help you work from home	33	1.73%
l. Telecommute (part- or full-time)	75	3.94%
m1. Change job closer to home	104	5.46%
m2. Change job farther from home	**321**	**16.86%**
n1. Move your home closer to work	94	4.94%
n2. Move your home farther from work	**256**	**13.45%**
o. Work part-time instead of full-time	45	2.36%
p. Start home-based business or put more effort into an existing one	40	2.10%
q. Retire or stop working	65	3.41%
Total missing	1,510	4.17%

Second, stochastic data filling was used for the remaining missing responses. These fills were performed using a proportional assignment methodology. Using a random number generator, random 1s and 0s were generated for the missing values in proportion to the 1s and 0s in the complete cases, meaning cases that were not missing data on that variable. This process started with the "not applicable/not tried" for adopted and "not considered" for the consideration variables. For those cases that received a 0 in an "N/A" variable (meaning that they were

assumed to have adopted or considered the option in question) further proportional fills were completed for each of the subsequent "reasons for adopting" or "reasons for considering adoption." The years since adoption variable was filled using the median value for that particular variable among the complete cases. For the cases that received a 1 in the N/A column (meaning they were assumed not to have adopted or considered that strategy) the remaining variables for that alternative (years since adoption and reasons for adopting/considering) were assigned zeros.

Table 3—Consideration: Number of Missing Cases for Each Travel Alternative (N = 1,904)

Travel-related alternatives	Number missing	Percent missing
a. Buy a car stereo	61	3.20%
b. Get a mobile phone	88	4.62%
c. Get a better car	58	3.05%
d. Get a fuel efficient car	75	3.94%
e. Change work trip departure time	50	2.63%
f. Hire someone to do house or yard work	82	4.31%
g. Adopt flextime	62	3.26%
h. Adopt compressed work week	56	2.94%
i. Change from driving alone to work, to some other means	54	2.84%
j. Change from some other means of getting to work, to driving alone	51	2.68%
k. Buy equipment/services to help you work from home	74	3.89%
l. Telecommute (part- or full-time)	83	4.36%
m1. Change job closer to home	59	3.10%
m2. Change job farther from home	**230**	**12.08%**
n1. Move your home closer to work	61	3.20%
n2. Move your home farther from work	**199**	**10.45%**
o. Work part-time instead of full-time	59	3.10%
p. Start home-based business or put more effort into an existing one	74	3.89%
q. Retire or stop working	102	5.36%
Total missing	1,578	4.36%

Of the 30,328 (1,784 x 17) total alternatives analyzed in the adopted section of the travel-related alternatives, responses for 277 or about 0.91% were missing and subsequently filled. For the consideration of strategies, responses for 248 or about 0.82% were filled.

Finally, consistent with the focus of previous analyses of these data on commuting workers (in view of the observation that they tend to have different travel patterns and attitudes than non-commuters or non-workers), cases were removed if the respondent did not report working part- or full-time and commuting to work. This brought the final usable data set for this analysis from 1,784 to 1,282 cases.

4. COMPARISON TO THE PREVIOUS STUDY

As mentioned in the Introduction, this study is based on earlier research involving a similar set of travel-related alternatives used in a different survey (Raney, *et al.*, 2000, and Mokhtarian, *et al.*, 1997). Since we will wish to compare our results to those of the previous study, it is important to delineate the differences between the two studies. Survey design differences include the following:

1. In the first study the questions for adoption (E1 in the current study) and consideration (E2 in the current study) were combined: each strategy had the three response alternatives "Have already done this," "Have been considering this," and "Have not seriously considered this." Respondents were requested to select only one of the three. However, as noted in the instructions for question E2 shown in Figure 2, it is possible both to have adopted an alternative (such as changing work trip departure time) and to be considering adopting it again. Hence, the new survey allowed for this possibility.

2. The current survey asked how long ago a given alternative was adopted, with the hypothesis that the effectiveness of a choice diminishes over time and thus knowing the time since adoption would be important to predicting the (re-) consideration of that or other alternatives. In the previous survey a specific (but not always equal) time element (e.g. "During the past 6 months . . . ", "Within the past year . . .", or "Within the past 2 years . . .") was part of the question structure for some questions, and for others not mentioned at all.

3. In the earlier study the section that dealt with travel-related alternatives contained 23 questions, instead of the 19 that appear in Figures 1 and 2. The earlier survey asked several questions about work that were not included in the present study: work unpaid overtime, take work home, change to a new job at the same location, and work full-time instead of part-time. In addition to the removal of these questions, six questions were consolidated into three and one question was expanded into two. Two pairs of questions that dealt with telecommuting and equipment to support working from home were combined into one question each (l and k). Further, since the reasons for adopting and considering were now being asked explicitly (see Figures 1 and 2), two questions that dealt with changing the work trip departure time (one "for personal reasons" and the other "to avoid congestion") were consolidated into one (e). A single question was asked in the earlier study about changing modes of travel; this was expanded into questions i and j in the current study.

4. Although each of the 19 strategies has transportation impacts, it was recognized that they could be adopted for many reasons other than travel. For example, one could change jobs for more money or greater fulfillment, not to reduce travel. Accordingly, the later survey explicitly asked for the reasons respondents adopted or considered a strategy. As can be seen in Figures 1 and 2 the respondents were asked to "check all [the reasons] that apply" and travel was purposely placed toward the end of the list of possible reasons to reduce bias toward that reason.

5. The previous survey was designed primarily to study the adoption of telecommuting and hence the set of variables available to relate to adoption and consideration was limited and mostly focused on telecommuting. The variables described in Section 2 are expected to be far more relevant to the decision-making context applicable to the alternatives under study.

The samples obtained for the two studies also differed in important ways. Respondents to the earlier (1992) survey were all employees of the City of San Diego, whereas the current respondents (1998) were all residents of the San Francisco Bay Area and could be employed in the public or private sector, self-employed or salaried.

Thus, differences in results between the two studies may be confounded not only by the extensive survey design changes described above, but also by the greater employment heterogeneity of the later sample. This is in addition to the differences due to the different venues (San Diego vs. San Francisco) and 6-year time span between the two data collections.

5. ANALYSIS OF INDIVIDUAL STRATEGIES

The presentation of the analysis of these data proceeds as follows. First (Section 5.1), we discuss the frequency with which each strategy was adopted and considered, and the reasons stated in each case. Next (Section 5.2), we relate the adoption and consideration of each strategy to the other variables using t-tests and chi-square tests (future analysis will involve building logit models to capture multivariate relationships). We then (Section 6) analyze ways to group the individual strategies into tiers or bundles of related strategies. Finally, we relate the adoption and consideration of each bundle of alternatives to the other variables available.

Note that one way of grouping the strategies is based on their conceptual identification as being travel-maintaining or even increasing (alternatives "a" through "g" and "j"), travel-reducing (alternatives "h," "i," "k," and "l") or major lifestyle/location changes (alternatives "m" thru "q"). This classification is one basis for grouping the strategies into bundles (discussed further in Section 6), but we will also refer to individual strategies falling into these categories, independently of the analysis by bundle.

5.1. Frequency Analysis

Tables 4 and 5 present the raw frequency data from the survey (N = 1,282). The column marked "Ranking" identifies the rank, based on total number who adopted/considered adoption, of the specific travel-related alternative with respect to the other alternatives listed. As expected the less costly, travel-maintaining alternatives are generally the most commonly adopted/considered, followed by the travel-reducing alternatives and finally the more costly, major lifestyle-changing alternatives which are generally the least commonly adopted or considered.

Table 4—Frequencies and Rankings for Adoption of Travel-related Alternatives (N = 1,282)[2]

			Reasons for adopting[3]				
	Ranking	Number who adopted	Personal	Family related	Work related	Reducing or easing travel	Other
a. Buy a car stereo	2	620	473	96	29	283	19
b. Get a mobile phone	3	527	318	177	287	128	30
c. Get a better car	1	850	568	260	235	278	74
d. Get a fuel efficient car	4	514	337	106	144	112	67
e. Change work trip departure time	5	490	138	78	271	197	17
f. Hire someone to do house or yard work	6	392	284	130	55	13	33
g. Adopt flextime	9	275	136	89	148	82	11
h. Adopt compressed work week	17	132	70	39	74	29	8
i. Change from driving alone to work, to some other means	10	235	77	19	104	117	29
j. Change from some other means of getting to work, to driving alone	15	160	58	5	88	44	16
k. Buy equipment/services to help you work from home	7	385	212	82	284	99	16
l. Telecommute (part- or full-time)	12	204	96	43	145	76	8
m1. Change job closer to home	8	337	168	65	190	99	28
m2. Change job farther from home[4]	13	184	55	11	138	4	14
n1. Move your home closer to work	14	177	109	46	48	62	15
n2. Move your home farther from work[4]	18	100	60	29	15	2	19
o. Work part-time instead of full-time	11	220	146	72	63	23	25
p. Start home-based business or put more effort into an existing one	16	145	96	28	83	27	15
q. Retire or stop working	19	36	24	6	9	1	4

These rankings, especially for adoption, closely match those found in the previous study using a similar list of strategies (Mokhtarian, *et al*., 1997). The minor differences in the rankings presented in the current study and those found previously can be attributed to differences in the survey sampling frames, differences in descriptions of the alternatives, and random variability.

[2] Travel-maintaining/increasing alternatives are lightly shaded, travel-reducing alternatives are not shaded and major lifestyle change alternatives are more heavily shaded. This shading convention will be used throughout Section 5 of this report.

[3] The most commonly cited reason for adopting each strategy is underlined.

[4] Note that missing data on m2 and n2 were not filled, so rather than 1,282 observations these are based on 1,046 and 1,102 observations respectively for adoption, throughout the rest of this report.

This pattern of adoption of travel-related alternatives based on cost and amount of lifestyle change has now emerged in two separate studies conducted at different times and places (within California).

Table 5—Frequencies and Rankings for Considering Adoption of Travel-related Alternatives (N = 1,282)

			Reasons for considering adopting[5]				
	Ranking	Num. considering adopting	Personal	Family related	Work related	Reducing or easing travel	Other
a. Buy a car stereo	12	188	137	21	10	76	17
b. Get a mobile phone	2	380	273	134	132	71	36
c. Get a better car	1	479	348	116	89	130	46
d. Get a fuel efficient car	3	365	251	70	80	81	51
e. Change work trip departure time	9	226	86	50	113	83	12
f. Hire someone to do house or yard work	5	297	226	84	37	13	28
g. Adopt flextime	11	193	120	58	78	57	6
h. Adopt compressed work week	14	152	88	46	58	41	11
i. Change from driving alone to work, to some other means	15	145	74	14	44	74	15
j. Change from some other means of getting to work, to driving alone	18	60	30	7	22	12	4
k. Buy equipment/services to help you work from home	4	305	176	62	201	76	17
l. Telecommute (part- or full-time)	6	264	136	66	145	93	14
m1. Change job closer to home	7	243	161	75	92	99	19
m2. Change job farther from home[6]	17	65	34	9	38	5	9
n1. Move your home closer to work	16	119	73	45	34	55	4
n2. Move your home farther from work[6]	19	46	35	14	9	2	8
o. Work part-time instead of full-time	9	226	157	82	46	30	15
p. Start home-based business or put more effort into an existing one	8	231	168	73	108	54	28
q. Retire or stop working	13	179	146	51	33	19	22

[5] The most commonly cited reason for consideration of each strategy is underlined.

[6] Note that missing data on m2 and n2 were not filled, so rather than 1,282 observations these are based on 1,132 and 1,153 observations respectively for consideration, throughout the rest of this report.

While the idea of tiers based upon cost and degree of lifestyle change holds well for the adoption of travel-related alternatives it is much weaker for the consideration variables. The telecommuting-related options (k and l), for example, rank much higher for frequency of consideration than for adoption, and "retire or stop working" is ranked much higher for considering than for adopted (although this latter result is an artifact of our restricting the sample to workers, few of whom would have adopted the stop-working strategy, and would only have been included in the sample if they had reversed that adoption at least in part). One of the least costly alternatives to ease the commute, "purchase a car stereo," ranks toward the top of the list in terms of adoption but closer to the bottom with respect to considering adoption, behind, among others, "work part-time instead of full-time" and "start a home-based business or put more effort into an existing one."

This may be due to the relatively unconstrained nature of "considering adoption," despite our efforts to focus respondents only on alternatives they were "seriously" considering (as shown in Figure 2). A respondent may be "considering" many options that in reality are not feasible given work and lifestyle constraints. As discussed below, adoption is strongly correlated with the respondent's socio-economic background whereas considering adoption appears to be less so.

Another possible explanation for this phenomenon could be that people are basing their consideration of adoption on what they have already adopted and therefore, the considering adoption list would be a function of, or at least correlated with, what the respondent has already adopted. This will be the subject of future research in which binary logit models will be used to test, among other things, the relationship between what has been adopted and what is being considered for adoption.

The reasons for adoption and consideration are also presented in Tables 4 and 5. As mentioned in Section 4, although each of these strategies has transportation implications, they may be adopted or considered for a variety of reasons, sometimes having nothing to do with travel. Tables 4 and 5 appear to confirm this, showing that "reducing or easing travel" is the most-commonly cited reason for only one strategy: change from driving alone to some other means of travel. It is the second most-commonly cited reason for four of the 19 strategies in terms of adoption, and five of the 19 with respect to consideration. However, it should be noted that while we deliberately avoided a response bias in favor of the travel reason by placing it fourth (just before "other") in the set of five reasons, there is in fact a response bias in the opposite direction. Although respondents were invited to check as many reasons as applied, many would have stopped after checking the first relevant reason. Even when they were willing to check multiple reasons, they may not always have realized the importance of transportation to their choices. For example, a respondent could have selected "family related" recalling that the alternative was adopted to allow more time with family, but not immediately recognizing that the additional time with family was obtained by reducing the amount of time spent driving. This logic holds true for many of the reasons selected, given that the list of travel-related alternatives was designed to comprise mostly strategies that could ease or reduce the impact of commuting. Thus, the role of transportation in these choices is most likely understated.

5.2. Variables Related to Adoption and Consideration

It is of interest to explore what other variables are significantly associated with the adoption and consideration of the study alternatives. Variables measured by discrete categories (specifically, demographic characteristics) are cross-tabulated with the adoption and consideration variables and chi-square tests of independence are performed. For variables measured on continuous or ordinal (treated as quasi-continuous) scales (specifically objective mobility, subjective mobility, relative desired mobility, travel liking, travel attitudes, and personality types/lifestyle preferences), t-tests were performed to see if the mean of the variables differed significantly by adoption or consideration status. The significant relationships identified in these tests are shown in Tables 6 through 17. A large number of relationships are being analyzed, and with a significance standard of $\alpha = 0.05$, about one in twenty relationships found significant at that level might in fact be due to chance alone. For this reason, we focus on general patterns and trends rather than on individual relationships.

5.2.1. Demographics

Eight demographic characteristics of the respondents were used in this analysis: gender, personal income, household income, employment status (for this analysis only those respondents who reported working full- or part-time were included), education, vehicle type (what type of vehicle the respondent drives most often), family status, and household employment. The first five variables were taken directly from survey questions and the last three were created based upon responses to one or more of the questions in the demographic section of the survey.

The vehicle type variable is included in this analysis to help determine if the types of vehicles people own tell us anything about their adoption and consideration of travel-related alternatives. Respondents were asked to provide the make, model, and year of the vehicle they drive most often. The vehicle type variable created from this question divided the respondents' vehicles into nine categories: small, compact, mid-sized, large, luxury, sports car, minivan/van, pickup truck, and sport utility vehicle (SUV)[7].

Several questions in the survey asked about the age distribution within the household (e.g. how many persons under 6 years old, how many persons 6-15 years old, . . . , how many persons 75 or older). The family status variable divided the respondents into four categories: single adult (no children), two or more adults (no children), one adult with children, and two or more adults with children. This variable is of interest for understanding how household composition influences the adoption and consideration of travel alternatives and is also useful for comparison with the previous study that had a similar variable (Mokhtarian, *et al*., 1997).

The household employment status variable is also a composite of several questions in the survey that asked about the number of workers, both full- and part-time, in the home. This variable divided the respondents into three categories: single worker, part-time worker with other workers in the home, and full-time worker with other workers in the home.

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[7] These correspond to the vehicle categories currently used in the *Consumer Reports* magazine, with some consolidation to reduce the number of groups.

Based on previous findings (Mokhtarian, *et al*., 1997), it was hypothesized that females would be more likely to have adopted and consider adopting the more costly, travel reducing and major lifestyle change alternatives. This was supported by our findings, as shown in Tables 6 and 7. Females were more likely to have adopted "change jobs closer to home" and "work part-time instead of full-time," both major lifestyle changes. They were also more likely to consider adopting "work part-time instead of full-time."

Table 6—Relationships between Demographic Variables and Adoption of Travel-related Alternatives[8] (N = 1,282)

	Gender	Personal income	Household income	Employment status	Education	Vehicle type	Family status	HH employment status
a. Buy a car stereo	Male	+	+	Full-time		*	*	*
b. Get a mobile phone		+	+	Full-time		*	*	*
c. Get a better car		+	+	Full-time		*	*	*
d. Get a fuel efficient car	Female	Middle income	*			*		
e. Change work trip departure time		+	+	Full-time	*			*
f. Hire someone to do house or yard work		+	+	Full-time	+	*	*	*
g. Adopt flextime		Middle income	+		+			
h. Adopt compressed work week		Middle income	+		+		*	
i. Change from driving alone to work, to some other means	Male							
j. Change from some other means of getting to work, to driving alone		*				*		
k. Buy equipment/services to help you work from home	Male	+	+		+	*	*	
l. Telecommute (part- or full-time)		+	+	Full-time	+			*
m1. Change job closer to home	Female	Middle income					*	
m2. Change job farther from home (n = 1,046)		*				*		
n1. Move your home closer to work								
n2. Move your home farther from work (n = 1,102)								
o. Work part-time instead of full-time	Female	-	-	Part-time		*		*
p. Start home-based business or put more effort into an existing one					*			
q. Retire or stop working				Part-time		*		

[8] In this table, "+" means that higher values of the column variables are associated with greater adoption of the row alternatives, and "-" means that lower values are associated with greater adoption. The "*" is used to denote significant relationships in which directionality either was not found or would not make sense (i.e. categorical variables). For the binary variables, labels such as "Female" or "Full-time" denote the category that was more likely to adopt the travel alternative. For income, "middle income" is used to label relationships in which the middle-income levels were most likely to adopt the travel alternative.

Table 7—Relationships Between Demographic Variables and Consideration of Travel-related Alternatives[9] (N = 1,282)

	Gender	Personal income	Household income	Employment status	Education	Vehicle type	Family status	HH employment status
a. Buy a car stereo	Male							
b. Get a mobile phone								
c. Get a better car	Male					*		
d. Get a fuel efficient car			Middle			*		
e. Change work trip departure time				Full-time			*	
f. Hire someone to do house or yard work	Female	+	+			*	*	
g. Adopt flextime		Middle income		Full-time			*	
h. Adopt compressed work week		Middle income		Full-time				*
i. Change from driving alone to work, to some other means								
j. Change from some other means of getting to work, to driving alone								
k. Buy equipment/services to help you work from home	Male				+			
l. Telecommute (part- or full-time)		+	+	Full-time	+		*	*
m1. Change job closer to home								
m2. Change job farther from home (n = 1,132)							*	
n1. Move your home closer to work							*	
n2. Move your home farther from work (n = 1,153)		*						
o. Work part-time instead of full-time	Female	-		Part-time				
p. Start home-based business or put more effort into an existing one		Middle income						
q. Retire or stop working					*			

Both personal and household income were strongly positively related to the adoption of many of the strategies and, to a far lesser degree, to considering the adoption of some strategies. Not surprisingly, most of the strategies more likely to be adopted by higher income individuals are those involving the acquisition of goods and services (car, mobile phone, domestic help, home computer, etc.). Conversely, many of the higher-end strategies involving lifestyle changes are referred to as most "costly," but not purely in the sense of requiring more money. In fact income

[9] In this table, "+" means that higher values of the column variables are associated with greater adoption of the row alternatives, and "-" means that lower values are associated with greater adoption. The "*" is used to denote significant relationships in which directionality either was not found or would not make sense (i.e. categorical variables). For the binary variables, labels such as "Female" or "Full-time" denote the category that was more likely to adopt the travel alternative. For income, "middle income" is used to label relationships in which the middle-income levels were most likely to adopt the travel alternative.

is not significantly related to their adoption in most cases; rather they are costly in the generalized sense of having the biggest impact on the individual and the household.

The demographic variables as a whole had more of an impact on adoption than on considering adoption. Education, personal and household income, and employment status all follow this pattern, of having more significant relationships with the adoption variables than with the considering adoption variables. This may again be due to the unconstrained nature of "considering adoption." Respondents may consider a wide range of travel alternatives but because of constraints, in this case demographic constraints, those with higher incomes, higher levels of education, and full-time employment are more likely to actually have the ability to adopt these alternatives. This is discussed further under the demographic section of the bundle analysis (Section 6.3.1).

Vehicle type, family status and household employment status are unordered categorical variables for which it is not appropriate to talk about an overall positive or negative relationship with adoption or consideration. For the auto-oriented alternatives and getting a mobile phone (a through d) the respondents who drove a sport utility vehicle (SUV) were most likely to adopt or consider, with the exception of "get a fuel efficient car," on which the drivers of "small" cars ranked the highest. Luxury car owners followed a similar pattern to the SUV respondents: more likely than average to adopt or consider the first three alternatives, and less likely for the fourth, fuel-efficient car alternative.

For adoption, the vehicle type (what type of vehicle the respondent drove most often) may serve as a proxy indicator of personal or household income. Repeatedly the alternatives that have positive relationships with income also have significant relationships with vehicle types that represent income such as luxury, sport, and SUV. This relationship holds well for adoption but is much weaker and not as noticeable for the considering adoption variables.

When the family status variable has a significant relationship with a travel-related alternative it generally follows the pattern that adults living alone or in groups but without children are less likely to adopt or consider, and adults living with other adult(s) and children are more likely to adopt or consider. This suggests the unsurprising conclusion that living with others, especially children, is apt to generate the need for choices that increase time flexibility and help balance the competing lifestyle demands of work and family.

For household employment, where the relationship was significant, respondents working full-time with other workers in the home were more likely to adopt or consider the indicated travel-related alternatives. Notice that for the most part, these are travel-maintaining alternatives. As evidenced especially in Table 6, household employment status may often serve as a proxy indicator for income.

5.2.2. Objective and Subjective Mobility

Objective and subjective mobility are discussed together because of the degree of similarity in their relationships with the travel-related alternatives (when the overall pattern is positive or negative for one it tends to be similarly positive or negative for the other). Tables 8 and 9 show

that for the most part, the group adopting or considering a given alternative had significantly higher objective and subjective mobility indicators than did the other groups. That is, the more one travels (objective) and the more one feels that she travels (subjective), the more likely one is to adopt or consider adopting a wide range of travel-related alternatives.

Table 8—Relationships between Objective (OM) and Subjective (SM) Mobility and Adoption of the Travel-related Alternatives (N= 1,282)

	OM, SD, overall	OM, SD, commute	OM, SD, personal vehicle	OM, LD, total trips	OM, LD, total miles	OM, LD, Ln miles[10]	OM, LD, sum Ln miles[11]	SM, SD, overall	SM, SD, commute	SM, SD, personal vehicle	SM, LD, overall	SM, LD, work/school	SM, LD, personal vehicle
a. Buy a car stereo			+			+	+			-	+		+
b. Get a mobile phone	+	+	+	+	+	+	+	+	+	+	+	+	+
c. Get a better car	+	+	+					+		+	+	+	+
d. Get a fuel efficient car	+	+	+							+			+
e. Change work trip departure time	+	+	+			+		+	+	+	+	+	
f. Hire someone to do house or yard work			+	+	+	+	+			+	+	+	
g. Adopt flextime	+	+	+			+		+				+	
h. Adopt compressed work week												+	
i. Change from driving alone to work, to some other means		+	-						+	-			
j. Change from some other means of getting to work, to driving alone									+				
k. Buy equipment/services to help you work from home	+	+	+	+	+	+	+	+			+	+	
l. Telecommute (part- or full-time)	+	+	+	+	+	+	+	+	+		+	+	
m1. Change job closer to home	-	-	-					-	-				
m2. Change job farther from home (n = 1,046)	+	+	+					+	+	+			
n1. Move your home closer to work		-											
n2. Move your home farther from work (n = 1,102)	+	+						+	+				
o. Work part-time instead of full-time	-	-	-		-				-			-	
p. Start home-based business or put more effort into an existing one													
q. Retire or stop working													

SD = Short Distance, LD = Long Distance

[10] OM, LD, Ln miles= the natural log of the total miles; see Section 2.1 for additional explanation.

[11] OM, LD, sum Ln miles = the summation of the natural log of miles for each purpose/mode combination; see Section 2.1 for additional explanation.

Table 9—Relationships between Objective (OM) and Subjective (SM) Mobility and the Consideration of the Travel-related Alternatives (N = 1,282)

	OM, SD, overall	OM, SD, commute	OM, SD, personal vehicle	OM, LD, total trips	OM, LD, total miles	OM, LD, Ln miles[12]	OM, LD, sum Ln miles[13]	SM, SD, overall	SM, SD, commute	SM, SD, personal vehicle	SM, LD, overall	SM, LD, work/school	SM, LD, personal vehicle
a. Buy a car stereo										+			
b. Get a mobile phone			+					+	+	+			+
c. Get a better car													
d. Get a fuel efficient car													+
e. Change work trip departure time	+	+	+					+	+	+			
f. Hire someone to do house or yard work			+					+		+			
g. Adopt flextime		+						+	+				
h. Adopt compressed work week		+			-			+	+				
i. Change from driving alone to work, to some other means	+	+	+					+	+	+			
j. Change from some other means of getting to work, to driving alone									+				
k. Buy equipment/services to help you work from home				+	+	+	+					+	
l. Telecommute (part- or full-time)	+	+	+	+	+	+	+	+	+		+	+	
m1. Change job closer to home	+	+	+					+	+	+			
m2. Change job farther from home (n = 1,132)													
n1. Move your home closer to work	+	+	+					+	+				
n2. Move your home farther from work (n = 1,153)	-	-											
o. Work part-time instead of full-time	-	-	-				-					-	
p. Start home-based business or put more effort into an existing one													
q. Retire or stop working													

SD = Short Distance, LD = Long Distance

Different types of relationships may be at work in the case of adoption than in the case of consideration. A demographic variable such as gender predates both adoption and consideration of a strategy, and hence can be viewed as a cause or influence in either case. These mobility variables, by contrast, represent a state after the adoption of any strategy, but before the consideration of any. Thus, with respect to consideration, the significant mobility variables can reasonably be inferred to be causes. With respect to adoption, the situation is somewhat more

[12] OM, LD, Ln miles= the natural log of the total miles; see Section 2.1 for additional explanation.

[13] OM, LD, sum Ln miles = the summation of the natural log of miles for each purpose/mode combination; see Section 2.1 for additional explanation.

complex. In some cases the mobility variables may be direct effects, as in the case of alternatives m2 and n2, where those who have increased the distance between home and work have greater short-distance travel than those who have not (and conversely those who have moved home and work closer together, alternatives m1 and n1, and those who have gone from full-time work to part-time work, alternative o, have less travel). In other cases however, particularly for the adoption of travel-reducing alternatives such as telecommuting, it is unlikely (although not impossible; Mokhtarian and Salomon, 2002; Mokhtarian, forthcoming) that the higher mobility is a consequence of adoption. Rather, it is likely that adopters traveled even greater amounts prior to adoption (which in fact may have been a motivation to adopt), and that with adoption this greater mobility was reduced compared to its previous levels but remained higher than that of non-adopters. In these cases then, the mobility variables, even though constituting a post-adoption state, indirectly represent causes rather than effects of adoption.

For the adoption of travel-maintaining strategies (the group for which the relationships to objective and subjective mobility are strongest), the direction of causality is most ambiguous. The scenario may be similar to the one just outlined for the travel-reducing strategies, but it may also be the case that the adoption itself is contributing to increasing travel by making travel more comfortable (alternatives a and c), productive (b), cheaper (d), faster or less stressful (e and g), or by buying time otherwise devoted to domestic duties (f). Whether these strategies are adopted because the respondent likes traveling more or because he must travel more is a question that will be pursued further when we combine the travel liking variables with these in a multivariate analysis.

Notice that, similar to the demographic variables, there are many fewer significant relationships for consideration than for adoption. This same pattern holds true for the demographic, objective mobility, subjective mobility, and relative desired mobility variables. The suggested implication is that consideration of various strategies is more diffusely spread across the population, but that those who do actually turn consideration into adoption are a more narrowly-defined group with certain tendencies in common.

5.2.3. Relative Desired Mobility

Relative desired mobility (RDM) is similar to objective and subjective mobility in terms of the temporal and causal nature of its relationship to adoption and consideration. It can logically be considered a cause of consideration. Our hypothesis was that those who want to increase their current travel are less likely to consider travel-reducing alternatives or major lifestyle changes that further limit travel, and this is precisely what Table 11 shows.

With respect to adoption, the situation is again more complex. Since the relative desired mobility measurement is taken after any adoptions occur, it may well be that the expressed desire is a consequence of the alternatives already adopted. Thus, for example, those who have gone from full-time to part-time work (alternative o) or started a home-based business (alternative p) may well feel somewhat travel-deprived compared to their previous commute activity, and thus express a higher RDM (as shown by the significant, positive relationships in Table 10). Similarly, it is not surprising that those who have moved home and work farther apart (m2 and

n2), or those who have changed commute modes to driving alone (j), want to reduce their travel (as shown by the negative relationships).

Table 10—Relationships between Relative Desired Mobility (RDM) and Adoption of the Travel-related Alternatives (N = 1,282)

	RDM, SD, overall	RDM, SD, commute	RDM, SD, work/school	RDM, SD, personal vehicle	RDM, LD, overall	RDM, LD, work/school	RDM, LD, personal vehicle
a. Buy a car stereo							
b. Get a mobile phone	-				-		-
c. Get a better car					-		
d. Get a fuel efficient car		-					
e. Change work trip departure time	-	-	-	-			
f. Hire someone to do house or yard work	-			-			
g. Adopt flextime	-	-				+	
h. Adopt compressed work week							
i. Change from driving alone to work, to some other means		-				+	
j. Change from some other means of getting to work, to driving alone	-	-		-			
k. Buy equipment/services to help you work from home	-	-		-			
l. Telecommute (part- or full-time)	-	-		-	-		-
m1. Change job closer to home		+					
m2. Change job farther from home (n = 1,046)	-	-		-			
n1. Move your home closer to work							
n2. Move your home farther from work (n = 1,102)	-	-	-				
o. Work part-time instead of full-time		+		+			+
p. Start home-based business or put more effort into an existing one			-	+			
q. Retire or stop working						-	

SD = Short Distance, LD = Long Distance

In some cases, however, the RDM rating is "in the same direction" as the change, suggesting that the adopted strategy supports but does not fully satisfy one's travel desires. For example, those who have adopted telecommuting or home-based work (l and k) want to reduce their travel more on average than those who have not (consistent with the observations in Table 8 that telecommuters still travel more than non-telecommuters). The same is true for the travel-maintaining strategies b, d, e, and g, suggesting that these strategies are often adopted for reasons other than wanting to maintain travel, but rather that the philosophy is, "as long as I have to travel this much, I may as well do what I can to make it more comfortable."

The results for both consideration and adoption have significant policy implications: there are people whose desire to increase travel may make them more resistant to (less likely to consider) travel-reducing strategies, but even those who desire to reduce their travel may settle on travel-maintaining strategies as a less-than-ideal choice that makes the best of a constrained situation. Future research will further explore the relationships between consideration, adoption, and relative desired mobility.

Table 11—Relationships between Relative Desired Mobility (RDM) and Consideration of the Travel-related Alternatives (N = 1,282)

	RDM, SD, overall	RDM, SD, commute	RDM, SD, work/school	RDM, SD, personal vehicle	RDM, LD, overall	RDM, LD, work/school	RDM, LD, personal vehicle
a. Buy a car stereo							
b. Get a mobile phone							
c. Get a better car				+			
d. Get a fuel efficient car							
e. Change work trip departure time	-	-	-	-			
f. Hire someone to do house or yard work							
g. Adopt flextime	-	-					
h. Adopt compressed work week		-			+		
i. Change from driving alone to work, to some other means	-	-	-	-			-
j. Change from some other means of getting to work, to driving alone			-				
k. Buy equipment/services to help you work from home							
l. Telecommute (part- or full-time)	-	-		-			-
m1. Change job closer to home	-	-		-			-
m2. Change job farther from home (n = 1,132)		+		+			
n1. Move your home closer to work	-	-					
n2. Move your home farther from work (n = 1,153)						+	
o. Work part-time instead of full-time							
p. Start home-based business or put more effort into an existing one		-					
q. Retire or stop working			-	+		-	

SD = Short Distance, LD = Long Distance

5.2.4. Travel Liking

It was hypothesized that the more an individual liked travel, the more likely he or she would be to adopt or consider travel-maintaining alternatives, and the less likely he or she would be to adopt or consider travel-reducing or major lifestyle changing alternatives. Our findings provide some support for this as shown in Tables 12 and 13. For example, those who like travel by

personal vehicle are more likely to have adopted and consider purchasing a better car (travel maintaining/increasing). Further, respondents who like travel were less likely to adopt or consider telecommuting (travel reducing), changing from driving alone to some other means (travel reducing), or to consider moving their job closer to home (major lifestyle change). One exception to the pattern is that respondents who reported liking short-distance commute travel were more likely to have adopted moving their job closer to home. It may be that greater enjoyment of commute travel is an effect of having reduced it to a more desirable length. Although this direction of causality (adoption affects travel liking) is possible for the other alternatives as well, the results in Table 12 appear most often to be consistent with the "travel liking affects adoption" direction of causality.

Table 12—Relationships between Travel Liking and Adoption of the Travel-related Alternatives (N=1,282)

	Travel Liking, SD, overall	Travel Liking, SD, commute	Travel Liking, SD, work/school	Travel Liking, SD, PV	Travel Liking, LD, overall	Travel Liking, LD, work/school	Travel Liking, LD, PV
a. Buy a car stereo						+	
b. Get a mobile phone		-					
c. Get a better car				+			+
d. Get a fuel efficient car							
e. Change work trip departure time		-			+	+	
f. Hire someone to do house or yard work	-						-
g. Adopt flextime		-					
h. Adopt compressed work week			-				
i. Change from driving alone to work, to some other means	-	-		-	+		
j. Change from some other means of getting to work, to driving alone	-	-					
k. Buy equipment/services to help you work from home	-			-		+	-
l. Telecommute (part- or full-time)	-	-	-	-	-		-
m1. Change job closer to home		+					
m2. Change job farther from home (n = 1,046)		-	-				
n1. Move your home closer to work							
n2. Move your home farther from work (n = 1,102		-					
o. Work part-time instead of full-time	+	+					+
p. Start home-based business or put more effort into an existing one							
q. Retire or stop working							+

SD = Short Distance, LD = Long Distance, PV = Personal Vehicle

Table 13—Relationships between Travel Liking and Consideration of the Travel-related Alternatives (N = 1,282)

	Travel Liking, SD, overall	Travel Liking, SD, commute	Travel Liking, SD, work/school	Travel Liking, SD, PV	Travel Liking, LD, overall	Travel Liking, LD, work/school	Travel Liking, LD, PV
a. Buy a car stereo							
b. Get a mobile phone							
c. Get a better car				+			+
d. Get a fuel efficient car					+		
e. Change work trip departure time		-	-				
f. Hire someone to do house or yard work				+			
g. Adopt flextime							
h. Adopt compressed work week		-					
i. Change from driving alone to work, to some other means		-		-			-
j. Change from some other means of getting to work, to driving alone							
k. Buy equipment/services to help you work from home							
l. Telecommute (part- or full-time)	-	-		-			-
m1. Change job closer to home	-	-	-	-			
m2. Change job farther from home (n = 1,132)				+			
n1. Move your home closer to work		-					
n2. Move your home farther from work (n = 1,153)							
o. Work part-time instead of full-time						-	
p. Start home-based business or put more effort into an existing one		-					
q. Retire or stop working				+		-	

SD = Short Distance, LD = Long Distance, PV = Personal Vehicle

5.2.5. Travel Attitudes

It was hypothesized that respondents with attitudes favoring travel (e.g. high scores on the "commute benefit," and "travel freedom" factors) would be more likely to adopt and consider adopting travel-maintaining strategies while those with attitudes not favoring travel (e.g. high scores on "travel stress," "travel dislike," "pro-environmental," or "pro-high density" factors) would be more likely to adopt and consider adopting travel-reducing and major lifestyle-changing strategies.

The findings shown in Tables 14 and 15 provide support for these hypotheses although that support is stronger (for the first time) for consideration than for adoption. In the adoption group,

the relationships of the commute benefit factor to the four m and n strategies may be unexpected, since we would hypothesize that those who find a positive utility to the commute would tend to have longer commutes. The fact that the opposite is true here suggests that (1) the commute benefit attitude may be an effect rather than a cause of the current commute conditions, and (2) those who see a benefit to the commute do not therefore want to increase that commute indefinitely—rather, the benefit is appreciated most when the commute is of moderate length instead of longer. Similar arguments can be applied to the positive relationship of the commute benefit variable to changing to part-time work. Among the consideration variables notice that the pro-environmental and pro-high density factors have positive relationships with all of the travel reducing variables, as hypothesized.

The number of significant relationships does not drop from adoption to considering adoption. This means that travel attitudes, unlike the previous variables, have just as much to do with what a respondent considers as they do with what the respondent has adopted.

Table 14—Relationships between Travel Attitudes and Adoption of the Travel-related Alternatives (N = 1,282)

	Travel Dislike	Pro-Environmental	Commute Benefit	Travel Freedom	Travel Stress	Pro-High Density
a. Buy a car stereo				+		-
b. Get a mobile phone	+	-	-	+	-	-
c. Get a better car		-		+		-
d. Get a fuel efficient car						
e. Change work trip departure time	-		-		-	
f. Hire someone to do house or yard work	+		-	+	-	
g. Adopt flextime						
h. Adopt compressed work week		-				-
i. Change from driving alone to work, to some other means		+		-		+
j. Change from some other means of getting to work, to driving alone		+				+
k. Buy equipment/services to help you work from home			-			
l. Telecommute (part- or full-time)	+	+	-			
m1. Change job closer to home			+			
m2. Change job farther from home (n = 1,046)			-			
n1. Move your home closer to work			+			
n2. Move your home farther from work (n = 1,102)			-			
o. Work part-time instead of full-time	-	+	+	-	+	
p. Start home-based business or put more effort into an existing one						
q. Retire or stop working						

Table 15—Relationships between Travel Attitudes and Consideration of the Travel-related Alternatives (N = 1,282)

	Travel Dislike	Pro-Environmental	Commute Benefit	Travel Freedom	Travel Stress	Pro-High Density
a. Buy a car stereo	-			+		
b. Get a mobile phone						
c. Get a better car		-				-
d. Get a fuel efficient car		+				
e. Change work trip departure time	-	+	-	+		
f. Hire someone to do house or yard work						-
g. Adopt flextime		+	-			
h. Adopt compressed work week		+	-			+
i. Change from driving alone to work, to some other means		+	-			+
j. Change from some other means of getting to work, to driving alone		+				+
k. Buy equipment/services to help you work from home	-	+				+
l. Telecommute (part- or full-time)		+	-			+
m1. Change job closer to home			-		+	
m2. Change job farther from home (n = 1,132)						
n1. Move your home closer to work		+	-			
n2. Move your home farther from work (n = 1,153)						
o. Work part-time instead of full-time	-	+			+	
p. Start home-based business or put more effort into an existing one	-	+			+	
q. Retire or stop working		-				-

5.2.6. Personality Types/Lifestyle Preferences

We hypothesized that personality types and lifestyle would play a role in the adoption and consideration of the travel-related alternatives. In particular, we expected that the "adventure seeker" along with the "workaholic" and the "status seeker" would be more likely to adopt travel maintaining/increasing alternatives while those with a "family/community oriented" lifestyle preference would be more likely to adopt and consider adopting travel reducing and perhaps major lifestyle changing alternatives. Our findings provide some support for these hypotheses, as shown in Tables 16 and 17.

This is the only group in which the number of significant relationships increased from adoption to considering adoption. The implication is that personality and lifestyle play more of a role in which alternatives are considered than in which ones are adopted.

The "family/community oriented" lifestyle was positively related to the adoption of changing modes (i and j) and the consideration of "change from driving alone to some other means" (i). Respondents who scored highly on this factor may need to have adopted and considered a variety of modes in order to meet the needs of the family, or fulfill community responsibilities. Surprisingly, the "adventure seeker" personality is more likely to adopt and consider both travel maintaining *and* travel reducing alternatives. This may be due, in part, to adventure seekers being more willing to try new things in general, and having less fear of change. Also, since many of these strategies focus on the commute trip, the adventure seeker may want to reduce routine commute travel so as to have more time for other travel and/or adventure activities.

Table 16—Relationships between Personality Types/Lifestyle Preference and Adoption of the Travel-related Alternatives (N = 1,282)

	Adventure Seeker	Organizer	Loner	Calm	Frustrated	Family/Community	Status Seeker	Workaholic
a. Buy a car stereo	+	+		-			+	+
b. Get a mobile phone	+	+	-	-			+	+
c. Get a better car		+	-			+	+	
d. Get a fuel efficient car						+		
e. Change work trip departure time	+			-		+		
f. Hire someone to do house or yard work		+		-		-		+
g. Adopt flextime	+				-			
h. Adopt compressed work week								
i. Change from driving alone to work, to some other means				+		+	-	
j. Change from some other means of getting to work, to driving alone	+	-				+		
k. Buy equipment/services to help you work from home	+			-				+
l. Telecommute (part- or full-time)	+			-				+
m1. Change job closer to home						+		-
m2. Change job farther from home (n = 1,046)		-						
n1. Move your home closer to work								
n2. Move your home farther from work (n = 1,102)								
o. Work part-time instead of full-time				+				-
p. Start home-based business or put more effort into an existing one	+							
q. Retire or stop working								

5.3. Summary of Individual Analysis

It appears that respondents' adoption of travel strategies is more tied to demographics, the amount they travel (objective mobility), the amount they feel that they travel (subjective mobility), how much they want to travel with respect to current travel (relative desired mobility),

and their level of travel liking. These variables also play a consistent role in considering adoption but that role is less robust. Travel attitudes, personality type, and lifestyle play a role in adoption but it is less significant and often less intuitive than the role they play in considering adoption.

When variable "x" is significantly associated with consideration of a travel-related alternative, it is generally reasonable to infer that x partly causes the consideration. When x is associated with adoption, however, the appropriate interpretation is often less clear. The adoption could cause x, or a previously even higher x could have caused adoption of a strategy that lowered x but still left it undesirably high. A further ambiguity exists with respect to whether, say, travel-maintaining strategies are adopted because the individual wants to maintain her travel, or because since she must maintain her travel for other reasons, she wants to do so as comfortably as possible.

Table 17—Relationships between Personality Types/Lifestyle Preference and Consideration of the Travel-related Alternatives (N = 1,282)

	Adventure Seeker	Organizer	Loner	Calm	Frustrated	Family/Community	Status Seeker	Workaholic
a. Buy a car stereo	+						+	
b. Get a mobile phone						+		
c. Get a better car			-		+		+	+
d. Get a fuel efficient car	+						-	
e. Change work trip departure time	+			-		+		+
f. Hire someone to do house or yard work				-			+	+
g. Adopt flextime	+					+		
h. Adopt compressed work week						+		
i. Change from driving alone to work, to some other means	+		-			+		
j. Change from some other means of getting to work, to driving alone	+	-			+			
k. Buy equipment/services to help you work from home	+			-				+
l. Telecommute (part- or full-time)	+			-				+
m1. Change job closer to home		-			+	+		
m2. Change job farther from home (n = 1,132)						+	+	
n1. Move your home closer to work		-			+			+
n2. Move your home farther from work (n = 1,153)					+			
o. Work part-time instead of full-time						+	-	-
p. Start home-based business or put more effort into an existing one	+			-	+	+		
q. Retire or stop working			-					

6. ANALYSIS OF BUNDLES OF RELATED STRATEGIES

6.1. Identification of Bundles

In order to better understand how these travel-related alternatives interact with travel attitudes, demographics and the other variables in our analysis it is useful to group them into bundles based on both conceptual and empirical similarities. We can then analyze the adoption and consideration of bundles, where a bundle is "adopted" if any alternative in it has been adopted, and similarly for consideration. We expect the focus on bundles to smooth out some of the variation across the individual travel-related alternatives, and thus perhaps to yield stronger and more interpretable results.

Similar to Mokhtarian, *et al*., (1997), two methods were used to develop bundles of travel-related alternatives, with the results shown in Table 18. First, as mentioned at the beginning of Section 5, variables were grouped conceptually into three bundles based on the generalized cost and the amount of lifestyle change associated with each travel alternative. Group one includes low cost, travel-maintaining/increasing strategies such as getting a more comfortable car or purchasing a mobile phone. Group two includes more costly, travel-reducing alternatives such as adopting a compressed workweek or telecommuting. The third group consists of major lifestyle changes such as quitting work, working part-time instead of full-time and moving home or work closer to the other.

In the second method, factor analysis of the responses was performed to identify bundle groupings. Factor analysis identifies patterns of common variation among a group of variables (the binary adoption and consideration variables, in this case), and as such groups our alternatives based on the empirical affinities in responses to them. The bundles developed in this analysis are a composite of the results of 36 different factor analyses. Factor analysis was conducted for 3, 4, 5, and 6 factor solutions across the following groups: adoption, adoption for commuters and full-time workers only, adoption (excluding m2 and n2), adoption for commuters and full-time workers (excluding m2 and n2), consideration, consideration for commuters and full-time workers only, consideration (excluding m2 and n2), consideration for commuters and full-time workers (excluding m2 and n2), and one factor analysis that combined adoption and consideration in the same four groupings. The factor-based bundles that appear in Table 18 were the groupings that most commonly appeared across all 36 factor analyses and conceptually made the most sense. In view of the large amounts of missing data on strategies m2 and n2, however, they were omitted from this portion of the analysis (for both sets of bundles).

Eight bundles were identified from this process. Note that bundles two and four consist of only one alternative each. In the previous study (Mokhtarian, *et al.*, 1997) the "get a mobile phone" alternative was grouped with the auto improvement alternatives. For this analysis it remains independent based on factor loadings and the conceptual argument that mobile phones represent a unique alternative in comparison to the purely auto-oriented solutions (get a better car, get a more fuel efficient car and buy a car stereo). Bundle four, "hire someone to do house or yard work," emerged as an independent factor in the earlier study, and remains independent in this analysis for lack of conceptual (or strong empirical) linkage with the other bundles in the study.

Table 18—Conceptual and Factor-based Bundles of the Travel-related Alternatives[14]

Conceptual Bundles	
Group 1. Travel maintaining/increasing	a. Buy a car stereo system b. Get a mobile phone c. Get a better car d. Get a more fuel efficient car e. Change work trip departure time f. Hire someone to do house or yard work g. Adopt flextime j. Change from another means of getting to work to driving alone
Group 2. Travel reducing	h. Adopt compressed work week (such as a "9/80" schedule) i. Change from driving alone to work to some other means k. Buy equipment/services to help you work from home l. Telecommute (part- or full-time)
Group 3. Major location/lifestyle change	m. Change jobs closer to home n. Move your home closer to work o. Work part-time instead of full-time p. Start home-based business or put more effort into an existing one q. Retire or stop working
Factor-based Bundles	
Group 1. Auto improvement	a. Buy a car stereo system c. Get a better car d. Get a more fuel efficient car
Group 2. Mobile phone	b. Get a mobile phone
Group 3. Work-schedule changes	e. Change work trip departure time g. Adopt flextime h. Adopt compressed work week (such as a "9/80" schedule)
Group 4. Hire someone to do house or yard work	f. Hire someone to do house or yard work
Group 5. Mode change	i. Change from driving alone to work to some other means j. Change from some other means of getting to work to driving alone
Group 6. Home-based work	k. Buy equipment/services to help you work from home l. Telecommute (part- or full-time) p. Start home-based business or put more effort into an existing one
Group 7. Residential/employment relocation	m. Change jobs closer to home n. Move your home closer to work
Group 8. Alter employment status	o. Work part-time instead of full-time q. Retire or stop working

[14] Recall from Section 3 that m2 and n2 are excluded from this portion of the analysis due to the disproportionately large amount of missing data on these variables.

6.2. Frequency Analysis

As with the individual strategies, we tabulated the frequency of adoption and consideration of each bundle of alternatives. We expected the frequency distribution to roughly inversely correspond to the generalized cost of each bundle. The results, shown in Tables 19 and 20 (where the bundles are listed in approximate order of increasing generalized cost), did not correspond well with our expectations. The conceptual bundle rankings were approximately consistent with our hypothesis, with the second- and third-most frequently adopted/considered bundles nearly tied in both cases. The rankings for the factor-based bundles, however, exhibited substantial variations from the hypothesized order, with, for example, the residential/job change bundle being adopted/considered more frequently than the mode change bundle. It may be that

Table 19—Frequencies and Rankings for Adoption of Travel-related Alternative Bundles (N = 1,282)

Strategy bundle		Adoption frequency	Percent	Frequency rank
Conceptual Groupings	1. Travel maintaining/increasing	1,183	92.28%	1
	2. Travel reducing	619	48.28%	3
	3. Major location/lifestyle change	640	49.92%	2
Factor-based Groupings	1. Auto improvement	1,047	81.67%	1
	2. Mobile phone	527	41.11%	3
	3. Work-schedule change	656	51.17%	2
	4. Hire someone to do house or yard work	392	30.58%	6
	5. Mode change	331	25.82%	7
	6. Home-based work	474	36.97%	4
	7. Residential/employment relocation	448	34.95%	5
	8. Alter employment status	239	18.64%	8

Table 20— Frequencies and Rankings for Consideration of Travel-related Alternative Bundles (N=1,282)

Strategy bundle		Consideration frequency	Percent	Frequency rank
Conceptual Groupings	1. Travel maintaining/increasing	926	72.23%	1
	2. Travel reducing	503	39.24%	3
	3. Major location/lifestyle change	588	45.87%	2
Factor-based Groupings	1. Auto improvement	613	47.82%	1
	2. Mobile phone	380	29.64%	3
	3. Work-schedule change	369	28.78%	4
	4. Hire someone to do house or yard work	297	23.17%	6
	5. Mode change	180	14.04%	8
	6. Home-based work	471	36.74%	2
	7. Residential/employment relocation	297	23.17%	6
	8. Alter employment status	333	25.98%	5

one reason for this result is the "infinite" time window allowed for the change—over a lifetime, very many respondents will have changed job or residence in a way that reduced the commute, whereas (in American society) changing one's commute mode away from driving alone would be more rare. The rankings are likely to be different if, e.g., a two-year window were imposed on each strategy—i.e. if "adoption" were defined as adoption within the past two years.

6.3. Chi-square and T-tests

The two sets of alternative bundles were analyzed for significant relationships with demographic characteristics, objective mobility indicators, subjective mobility indicators, relative desired mobility, travel liking, travel attitudes, personality types and lifestyle preferences. Chi-square tests (alpha = 0.05) were performed for the demographic variables, and independent samples t-tests (alpha = 0.05) were performed for the remaining groups of variables.

6.3.1. Demographics

With respect to the demographic variables, the same pattern can be seen in the bundles as was seen in the individual analysis (see Tables 21 and 22; note that the same labeling scheme as for Tables 6 and 7 is used). Adoption of the travel-related alternative bundles is linked more to demographics, particularly the income variables, than is the consideration of adoption. People from all income groups were equally likely to indicate consideration of many of the travel alternative bundles but typically those of the higher income groups reported actually adopting them.

Table 21—Relationships between Demographic Variables and Bundle Adoption (N = 1,282)

Conceptual bundles	Gender	Personal income	Household income	Employment status	Education	Vehicle type	Family status	HH employment status
Group 1. Travel maintaining/increasing		+	+	Full-time		*	*	
Group 2. Travel reducing	Male	+	+	Full-time	+			*
Group 3. Major location/lifestyle change	Female	-		Part-time	Middle			*
Factor-based bundles								
Group 1. Auto improvement		+	+	Full-time	*	*	*	*
Group 2. Mobile phone		+	+	Full-time		*	*	*
Group 3. Work-schedule changes		+	+	Full-time	Middle		*	*
Group 4. Hire someone to do house or yard work		+	+	Full-time	+	*	*	*
Group 5. Mode change				Full-time		*	*	
Group 6. Home-based work		+	+		*		*	
Group 7. Residential/employment relocation	Female							
Group 8. Alter employment status	Female	-	-	Part-time		*		*

In both the three- and eight-bundle groupings for adoption and the eight-bundle grouping for consideration, females were more likely to have adopted and considered adopting the more costly travel-related alternatives. This provides additional evidence for previous claims that women are disproportionately represented in the higher, more costly tiers of travel-related alternatives (Mokhtarian, *et al*., 1997).

Table 22—Relationships between Demographic Variables and Bundle Consideration (N = 1,282)

Conceptual bundles	Gender	Personal income	Household income	Employment status	Education	Vehicle type	Family status	HH employment status
Group 1. Travel maintaining/increasing								
Group 2. Travel reducing				Full-time	+			*
Group 3. Major location/lifestyle change				Part-time				
Factor-based bundles								
Group 1. Auto improvement	Male					*		
Group 2. Mobile phone								
Group 3. Work-schedule changes				Full-time			*	
Group 4. Hire someone to do house or yard work	Female	+	+			*	*	
Group 5. Mode change						*		
Group 6. Home-based work	Male				+		*	
Group 7. Residential/employment relocation								
Group 8. Alter employment status	Female			Part-time				*

The vehicle type variable shown in Tables 21 and 22 is identical to the one used and explained in Section 5.2.1 of this report. It presents relationships between the type of vehicle the respondent owns/drives and the adoption or consideration of the travel-related bundles. The drivers of small cars and sports cars were most likely to have adopted the mode change bundle, for example, while the drivers of large cars, luxury cars, and minivans were the least likely to have adopted the mode change bundle. The alter employment status bundle was least adopted by the owners of sports cars, pickup trucks, and sport utility vehicles (SUVs) and most likely to be adopted by the owners of large or luxury vehicles. Consideration generally follows a similar trend.

When the family status variable (see Section 5.2.1 for previous explanation of this variable) has a significant relationship with the travel-related bundles, the two or more adults with children category is typically the most likely to adopt or consider. The presence of children is also typically associated with adoption and consideration. It may be that single adults with children or two or more adults with children have a greater need to utilize a wide range of travel strategies.

Generally, single worker households (obtained from the household employment status variable, see Section 5.2.1 for description) were less likely to adopt the travel-reducing, major lifestyle change, or auto-oriented bundles and more likely to adopt or consider bundles that increase flexibility (e.g. work schedule change). Respondents from single worker households were also more likely to consider travel-reducing bundles than were respondents from households with multiple workers.

6.3.2. Objective Mobility

Table 23 shows that, as expected, long distance travel does not have as much of an impact on the adoption of the travel alternative bundles as short distance travel does. Most of the travel alternatives that comprise these bundles are focused on short distance, commute trips. All three short distance travel measures are positively related to both travel maintaining and travel reducing bundles and negatively related to the major lifestyle change bundles in both the three and eight bundle groupings. One notable exception is the mode change bundle (group 5) in the eight-bundle grouping, for which only one significant relationship appears (P-value = 0.026).

Table 23—Relationships between Objective Mobility (OM) Indicators and Bundle Adoption (N=1,282)

Conceptual bundles	OM, SD, overall	OM, SD, commute	OM, SD, personal vehicle	OM, LD, total trips	OM, LD, total miles	OM, LD, Ln miles[15]	OM, LD, sum Ln miles[16]
Group 1. Travel maintaining/increasing	+	+	+	+			+
Group 2. Travel reducing	+	+	+	+	+	+	+
Group 3. Major location/lifestyle change	-	-	-				
Factor-based bundles							
Group 1. Auto improvement	+	+	+		+		+
Group 2. Mobile phone	+	+	+	+	+	+	+
Group 3. Work-schedule changes	+	+	+			+	
Group 4. Hire someone to do house or yard work			+	+	+	+	+
Group 5. Mode change			-			+	
Group 6. Home-based work	+	+	+	+	+	+	+
Group 7. Residential/employment relocation	-	-	-				
Group 8. Alter employment status	-	-	-				

SD = Short Distance, LD = Long Distance

[15] OM, LD, Ln miles= the natural log of the total miles; see Section 2.1 for additional explanation.

[16] OM, LD, sum Ln miles = the summation of the natural log of miles for each purpose/mode combination; see Section 2.1 for additional explanation.

The more short distance travel by private automobile, the less likely the respondent is to have switched modes of travel. The positive relationship of short distance travel to both the travel-maintaining and travel-reducing bundles reflects the same complex causal relationships as were seen for the individual strategies: higher objective mobility may be a cause of adopting the travel-reducing and an effect of adopting the travel-maintaining alternatives.

Long distance travel is consistently, positively related to the adoption of the travel-reducing bundle in the conceptual, three-bundle grouping and the home-based work, mobile phone, and hiring house or yard work bundles in the factor-derived, eight-bundle grouping. These bundles may represent strategies for coping with above-average amounts of long distance travel. For example, home-based work may allow the frequent traveler to spend more time with family when she is in town, and a mobile phone may be indispensable for coordinating life "on the road" or in the air.

Table 24 shows that the directions of the relationships remain fairly consistent between adoption and considering adoption, with two major exceptions. The signs for the major lifestyle change

Table 24—Relationships between Objective Mobility (OM) Indicators and Bundle Consideration (N=1,282)

Conceptual bundles	OM, SD, overall	OM, SD, commute	OM, SD, personal vehicle	OM, LD, total trips	OM, LD, total miles	OM, LD, Ln miles[17]	OM, LD, sum Ln miles[18]
Group 1. Travel maintaining/increasing	+		+				
Group 2. Travel reducing	+	+	+	+	+	+	+
Group 3. Major location/lifestyle change	+	+					
Factor-based bundles							
Group 1. Auto improvement							
Group 2. Mobile phone			+				
Group 3. Work-schedule changes	+	+	+				
Group 4. Hire someone to do house or yard work			+				
Group 5. Mode change		+	+				
Group 6. Home-based work	+			+	+	+	+
Group 7. Residential/employment relocation	+	+	+				
Group 8. Alter employment status	-	-			-		-

SD = Short Distance, LD = Long Distance

[17] OM, LD, Ln miles= the natural log of the total miles; see Section 2.1 for additional explanation.

[18] OM, LD, sum Ln miles = the summation of the natural log of miles for each purpose/mode combination; see Section 2.1 for additional explanation.

group (group 3) in the conceptual grouping and moving house or job closer to each other (group 7) in the factor-based grouping both change from negative in the adoption table to positive for considering adoption. That is, the more a respondent travels (short distance), the less likely he or she is to have adopted these bundles but the more likely he or she is to consider adopting them—certainly a natural result. Notice that there are no significant relationships between objective mobility and considering the auto-oriented bundle in the eight-bundle grouping. Perhaps the relative ease of adopting these strategies means that those whose mobility would prompt them to consider adopting them have already done so (supported by the several positive relationships for the same bundle in Table 23).

6.3.3. Subjective Mobility

The signs of the significant relationships for the subjective mobility variables (see Tables 25 and 26) are completely consistent with those for the objective mobility variables. In the conceptual grouping, subjective mobility is positively related to both the travel maintaining/increasing bundle and the travel-reducing bundle. The more a person feels she travels the more likely she is both to have adopted and to consider adopting both travel maintaining and travel reducing strategies. Similar to objective mobility, the more a person feels that he travels the less likely he is to have adopted major lifestyle changes but the more likely he is to consider adopting them. Apparently this perception of "a lot" of travel is enough to make the respondent consider major lifestyle changes that he or she has not adopted in the past.

Table 25—Relationships between Subjective Mobility (SM) Indicators and Bundle Adoption (N=1,282)

Conceptual bundles	SM, SD, overall	SM, SD, commute	SM, SD, personal vehicle	SM, LD, overall	SM, LD, work/school	SM, LD, personal vehicle
Group 1. Travel maintaining/increasing			+	+	+	+
Group 2. Travel reducing	+	+		+	+	
Group 3. Major location/lifestyle change		-				
Factor-based bundles						
Group 1. Auto improvement			+	+	+	+
Group 2. Mobile phone	+	+	+	+	+	+
Group 3. Work-schedule changes	+	+	+	+	+	
Group 4. Hire someone to do house or yard work			+	+	+	
Group 5. Mode change		+				-
Group 6. Home-based work	+	+	+	+	+	
Group 7. Residential/employment relocation		-				
Group 8. Alter employment status		-			-	

SD = Short Distance, LD = Long Distance

In the eight-bundle grouping a similar pattern can be seen. The more individuals perceive they are traveling, the more likely they are to have adopted the travel maintaining and travel reducing strategies found in bundles 1 to 6, and the more likely they are to consider relocation changes, which they were less likely to have adopted in the past.

Table 26—Relationships between Subjective Mobility (SM) Indicators and Bundle Consideration (N=1,282)

Conceptual bundles	SM, SD, overall	SM, SD, commute	SM, SD, personal vehicle	SM, LD, overall	SM, LD, work/school	SM, LD, personal vehicle
Group 1. Travel maintaining/increasing	+	+	+			+
Group 2. Travel reducing	+	+			+	
Group 3. Major location/lifestyle change	+	+				
Factor-based bundles						
Group 1. Auto improvement			+			+
Group 2. Mobile phone	+	+	+			+
Group 3. Work-schedule changes	+	+	+			
Group 4. Hire someone to do house or yard work	+		+			
Group 5. Mode change	+	+	+			
Group 6. Home-based work	+				+	
Group 7. Residential/employment relocation	+	+	+			
Group 8. Alter employment status					-	

SD = Short Distance, LD = Long Distance

6.3.4. Relative Desired Mobility

In the bundle analysis, relative desired mobility (RDM) did not have as many or as strong relationships as some of the other variables tested (see Tables 27 and 28). It was hypothesized that the more a person wanted to travel compared to her current situation, the more likely she would be to consider travel-maintaining/increasing bundles and the less likely she would be to consider travel-reducing or major lifestyle changing bundles. This hypothesis is essentially supported by the significant relationships in Table 28. (However, the absence of a number of significant relationships should also be noted, which, while at least not contradicting the hypothesis, do not support it either).

The situation for adoption is more complex: a number of significant relationships in Table 27 are opposite to their counterparts in Table 28, while some are the same, and others are significant in one case but not the other. Both opposite and same signs are plausible, as discussed earlier, since relative desired mobility is likely to be a cause of considering various strategies, but either a

Table 27—Relationships between Relative Desired Mobility (RDM) Indicators and Bundle Adoption (N = 1,282)

Conceptual bundles	RDM, SD, overall	RDM, SD, commute	RDM, SD, work/school	RDM, SD, personal vehicle	RDM, LD, overall	RDM, LD, work/school	RDM, LD, personal vehicle
Group 1. Travel maintaining/increasing					-	-	
Group 2. Travel reducing	-	-					
Group 3. Major location/lifestyle change		+			+		
Factor-based bundles							
Group 1. Auto improvement					-		
Group 2. Mobile phone	-				-		-
Group 3. Work-schedule changes	-	-		-			
Group 4. Hire someone to do house or yard work	-			-			
Group 5. Mode change		-					
Group 6. Home-based work	-	-		-			-
Group 7. Residential/employment relocation		+					
Group 8. Alter employment status		+		+			+

SD = Short Distance, LD = Long Distance

prior cause or an effect of having adopted them. For example, consider the association between RDM and the adoption of telecommuting. An individual may want to travel more (have a higher RDM, and hence consider adopting travel-maintaining/increasing strategies) because adopting telecommuting for other reasons has dropped his travel below a desired threshold, or an individual may have adopted telecommuting because of wanting to travel less (having a lower RDM to start with), with telecommuting indeed reducing his travel some, but not enough to completely satisfy (causing him to maintain a lower RDM even after adoption, and perhaps to consider additional travel reducing alternatives). Given these counteracting tendencies, the changes in sign and significance for adoption compared to consideration are not surprising.

Table 28—Relationships between Relative Desired Mobility (RDM) Indicators and Bundle Consideration (N = 1,282)

Conceptual bundles	RDM, SD, overall	RDM, SD, commute	RDM, SD, work/school	RDM, SD, personal vehicle	RDM, LD, overall	RDM, LD, work/school	RDM, LD, personal vehicle
Group 1. Travel maintaining/increasing							+
Group 2. Travel reducing		-		-			
Group 3. Major location/lifestyle change	-	-	-				
Factor-based bundles							
Group 1. Auto improvement				+			+
Group 2. Mobile phone							
Group 3. Work-schedule changes	-	-		-			
Group 4. Hire someone to do house or yard work							
Group 5. Mode change	-	-	-	-			
Group 6. Home-based work							
Group 7. Residential/employment relocation	-	-	-	-			-
Group 8. Alter employment status			-			-	

SD = Short Distance, LD = Long Distance

6.3.5. Travel Liking

The relationships between travel liking and adoption/consideration are shown in Tables 29 and 30. It was hypothesized that a respondent's affinity for travel would be positively correlated with the consideration of travel-maintaining/increasing bundles and negatively associated with considering travel-reducing or major lifestyle changing bundles. Table 30 essentially supports this hypothesis (although it should be noted that groups 3 and 5 of the factor-based bundles contain both travel maintaining/increasing and travel reducing alternatives).

As usual, the situation for adoption differs somewhat from that for consideration. We do find evidence that those who like travel are less likely to have adopted travel reducing strategies and mode-change strategies (which for most people would imply a change away from the private auto). We also find evidence of some relationships between short and long distance travel: those who like long distance travel are more likely to adopt mode change or home-based work (perhaps to reduce the stress of the less desired form of travel, the local commute, in favor of expanding the more desired form). It may initially appear harder to explain why those who like commute travel are more likely to have adopted major location/lifestyle changes that tend to reduce commuting, but as discussed in Section 5.2.4 with respect to the individual strategy analysis, individuals may report now liking their commute travel precisely because they have been able to reduce the commute to the optimum desired level.

Table 29—Relationships between Travel Liking and Bundle Adoption (N = 1,282)

Conceptual bundles	Travel Liking, SD, overall	Travel Liking, SD, commute	Travel Liking, SD, work/school	Travel Liking, SD, personal vehicle	Travel Liking, LD, overall	Travel Liking, LD, work/school	Travel Liking, LD, personal vehicle
Group 1. Travel maintaining/increasing							
Group 2. Travel reducing	-	-	-	-			-
Group 3. Major location/lifestyle change		+					
Factor-based bundles							
Group 1. Auto improvement				+			
Group 2. Mobile phone		-					
Group 3. Work-schedule changes		-			+		
Group 4. Hire someone to do house or yard work	-						-
Group 5. Mode change	-	-	-	-			
Group 6. Home-based work				-		+	-
Group 7. Residential/employment relocation		+					
Group 8. Alter employment status		+					+

SD = Short Distance, LD = Long Distance

6.3.6. Travel Attitudes

With respect to adoption (see Table 31), the relationships to travel attitudes follow our hypotheses much more closely than in the individual travel-related alternative analysis. For example, "pro-environmental" was negatively associated with the auto-oriented and travel-maintaining bundles for adoption, and positively associated with the travel-reducing and major lifestyle changing bundles for both adoption and consideration. The positive relationship of the "commute benefit" attitude to the adoption of the major location/lifestyle changing alternatives has the same explanation as for the individual strategies discussed in Section 5.2.5. Our hypotheses also find some support with respect to considering adoption (see Table 32).

Table 30—Relationships between Travel Liking and Bundle Consideration (N = 1,282)

Conceptual bundles	Travel Liking, SD, overall	Travel Liking, SD, commute	Travel Liking, SD, work/school	Travel Liking, SD, personal vehicle	Travel Liking, LD, overall	Travel Liking, LD, work/school	Travel Liking, LD, personal vehicle
Group 1. Travel maintaining/increasing				+	+		+
Group 2. Travel reducing		-		-			-
Group 3. Major location/lifestyle change		-					
Factor-based bundles							
Group 1. Auto improvement				+	+		+
Group 2. Mobile phone							
Group 3. Work-schedule changes		-					
Group 4. Hire someone to do house or yard work				+			
Group 5. Mode change		-		-			-
Group 6. Home-based work		-					
Group 7. Residential/employment relocation	-	-	-	-			
Group 8. Alter employment status						-	

SD = Short Distance, LD = Long Distance

6.3.7. Personality/Lifestyle

The relationships of the personality and lifestyle variables to adoption and consideration are shown in Tables 33 and 34. The adventure seeker personality type is more likely to adopt and consider adopting a variety of alternatives that could be used to create flexibility in travel, including (counter to expectation) those that reduce as well as those that potentially increase the amount of travel. They are more likely to consider the auto-oriented solutions but not to have adopted them.

Not surprisingly, organizers are more likely to have adopted the time management tools of mobile phone and domestic hired help. Perhaps because of their efficient time management and the adoption of auto improvement strategies, they feel little need to consider commute mode changes or residential or employment relocation.

Interestingly, the calm personality type is less likely to have adopted, or to consider, many of the bundles. Perhaps by nature such a person is less stressed by external pressures of work and family, and therefore less in need of finding solutions.

Table 31—Relationships between Travel Attitudes and Bundle Adoption (N = 1,282)

Conceptual bundles	Travel dislike	Pro-environmental	Commute benefit	Travel freedom	Travel stress	Pro-high density
Group 1. Travel maintaining/increasing		-	-	+		-
Group 2. Travel reducing		+	-			+
Group 3. Major location/lifestyle change	-	+	+			
Factor-based bundles						
Group 1. Auto improvement		-		+	-	-
Group 2. Mobile phone	+	-	-	+	-	-
Group 3. Work-schedule changes			-	+		
Group 4. Hire someone to do house or yard work	+		-	+	-	
Group 5. Mode change	-	+		-		+
Group 6. Home-based work				+		
Group 7. Residential/employment relocation			+			
Group 8. Alter employment status	-	+	+	-	+	

Table 32—Relationships between Travel Attitudes and Bundle Consideration (N = 1,282)

Conceptual bundles	Travel dislike	Pro-environmental	Commute benefit	Travel freedom	Travel stress	Pro-high density
Group 1. Travel maintaining/increasing				+		
Group 2. Travel reducing	-	+	-			+
Group 3. Major location/lifestyle change	-	+	-			
Factor-based bundles						
Group 1. Auto improvement				+		-
Group 2. Mobile phone						
Group 3. Work-schedule changes		+	-			
Group 4. Hire someone to do house or yard work						-
Group 5. Mode change		+	-			+
Group 6. Home-based work	-	+				+
Group 7. Residential/employment relocation		+	-		+	
Group 8. Alter employment status						

Table 33—Relationships between Personality Types/Lifestyle Preferences and Bundle Adoption (N = 1,282)

Conceptual bundles	Adventure seeker	Organizer	Loner	Calm	Frustrated	Family/community	Status seeker	Workaholic
Group 1. Travel maintaining/increasing				-		+	+	
Group 2. Travel reducing	+			-				+
Group 3. Major location/lifestyle change						+		-
Factor-based bundles								
Group 1. Auto improvement		+	-				+	
Group 2. Mobile phone	+	+	-	-			+	+
Group 3. Work-schedule changes	+		+	-		+		
Group 4. Hire someone to do house or yard work		+		-		-		+
Group 5. Mode change						+	-	
Group 6. Home-based work	+			-				+
Group 7. Residential/employment relocation								-
Group 8. Alter employment status				+	-			-

Table 34—Relationships between Personality Types/Lifestyle Preferences and Bundle Consideration (N = 1,282)

Conceptual bundles	Adventure seeker	Organizer	Loner	Calm	Frustrated	Family/community	Status seeker	Workaholic
Group 1. Travel maintaining/increasing	+			-		+	+	
Group 2. Travel reducing	+			-		+		+
Group 3. Major location/lifestyle change					+	+		
Factor-based bundles								
Group 1. Auto improvement	+				+		+	+
Group 2. Mobile phone						+		
Group 3. Work-schedule changes	+				+	+		+
Group 4. Hire someone to do house or yard work				-			+	+
Group 5. Mode change	+	-				+		
Group 6. Home-based work	+			-		+		+
Group 7. Residential/employment relocation		-			+	+		
Group 8. Alter employment status				+		+		-

The family/community oriented lifestyle preference is positively associated with adopting both the auto-oriented and major lifestyle change bundles (in the three bundle grouping) and work schedule and travel mode flexibility in the eight-bundle grouping. Interestingly, it is not associated with adopting the travel-reducing bundle. It is also interesting that the family/community oriented lifestyle was not significantly associated with adopting the smaller, factor based bundles (groups 4 through 6) that essentially comprise the major location/lifestyle change bundle in the conceptual grouping, whereas it was significantly associated with adopting the latter bundle. Apparently the overall tendency is weak enough that it only emerges when several related strategies are analyzed as a group.

For considering adoption the family/community oriented lifestyle preference is positively associated with all three bundles in the first grouping and six of the eight bundles in the second grouping. Respondents with a high score on this factor are likely to consider adopting nearly every type of travel-related alternative including the travel-reduction strategies that were absent from the significant relationships for adoption.

It is natural that the status-seeker is more likely to have adopted the consumption-oriented auto-improvement and mobile phone bundles, as well as the travel-maintaining bundle that facilitates displaying a status automobile. By the same logic, it is also natural that she is less likely to have adopted the mode change strategy, which, as Table 4 shows, is dominated by those who changed from driving alone to some other mode. Status seekers are also more likely to consider hiring domestic help, which can be a symbol of status as well as a "time purchasing" approach.

In general, workaholics have adopted, or are considering, strategies that will enable them to work better or more: the travel-reducing bundles (more time for work), mobile phone (work from anywhere, efficiency/productivity tool), work-schedule changes (can support time for work), domestic help (more time for work), and home-based work (facilitates overtime). Conversely, they are less likely to have adopted, or to consider, altering their employment status (work part-time or quitting), and to have changed residential or job location (especially the latter suggesting a commitment to a particular job, and/or a disinclination to change jobs frequently). All of these relationships are expected.

6.4. Summary of Bundle Analysis

As expected, the creation of travel alternative bundles provides more definitive relationships that are based on a class of alternatives rather than on individual ones. Relationships become stronger and more obvious. Evidence has been presented in support of the majority of our hypotheses. Future analysis will treat the adoption and consideration of these bundles as the dependent variables in binary logistic models, with multiple explanatory variables to control for correlations of individual influences with other variables in the data set.

7. SUMMARY AND CONCLUSIONS

While metropolitan congestion continues to be an important social issue, comparatively little research exists in the area of individual traveler responses to congestion. The key purpose of this study has been to empirically examine the role of travel-related attitudes, preferences, personality

and lifestyle traits, among other variables, in the adoption and consideration of various possible responses to congestion (travel-related alternatives).

The data analyzed in this study come from a fourteen-page self-administered survey mailed in May 1998 to 8,000 randomly selected households in three neighborhoods of the San Francisco Bay Area. These data were analyzed in several ways. First, descriptive information was obtained and presented. Next, using chi-square and t-tests, individual relationships were explored between the adoption/consideration of travel-related alternatives and the respondents' demographics, objective mobility, subjective mobility, relative desired mobility, travel liking, travel-related attitudes, and personality and lifestyle preferences. The final set of analyses dealt with the travel-related alternatives as bundles rather than as individual measures.

Two types of travel-related bundles are analyzed in this report. The first set consists of three bundles (travel maintaining/increasing, travel reducing, and major location/lifestyle change) that were created based on conceptual similarities between the alternatives' generalized costs and amount of lifestyle change associated with adopting them. The second set of bundles was created using factor analysis of the responses to identify groupings having a similar empirical pattern of responses. Eight bundles emerged from this second method.

We hypothesized that people with a strong positive attitude toward travel, and who want to travel more than they are currently doing, are less likely to adopt or consider alternatives that will reduce or restrict their travel (and conversely for those with a strong negative attitude toward travel, and who want to travel less). This report presents evidence in support of these hypotheses. A more detailed listing of some of our initial hypotheses and results is included in Table 35.

In general the results were consistent with prior hypotheses, but a few unexpected relationships emerged. For example, adventure seekers and the family/community oriented appeared inclined to try the full range of travel-related alternatives, not just those supporting travel (in the former case) or reducing it (in the latter case). Ambiguous directions of causality were likely responsible for some unexpected results. While a given variable could generally be viewed as antecedent to consideration (and hence plausible as a cause), it could often be viewed as a cause or an effect in the case of adoption.

While further research is needed to clarify many of the complex relationships discussed in this report, the results presented here are useful in that they identify pairwise relationships between the respondents' characteristics (amount of travel, perception of travel, desire for travel, demographics, attitudes, liking of travel, and personality and lifestyle preferences) and the travel-related strategies that they have adopted and are considering.

Future analysis will treat the adoption and consideration of the travel-related alternatives and bundles as the dependent variables in binary logit models, with multiple explanatory variables to control for correlations of individual influences with other variables in the data set.

Table 35—Summary of Hypotheses and Results

Variable type	General hypotheses	Results
Demographics (Sections 5.2.1 and 6.3.1)	(1) Females are disproportionately represented among the most costly/travel-reducing alternatives. (2) Those in upper income and education categories are more able and therefore more likely to adopt and consider a wide range of alternatives.	(1) Our findings support this hypothesis. (2) Our findings provide support for this; however, income appears to be related to the adoption and consideration of more alternatives and bundles than is education. Further, both income and education play more of a role in the adoption of alternatives and bundles than in the consideration of alternatives and bundles.
Objective mobility (Sections 5.2.2 and 6.3.2)	(1) The more respondents travel the more likely they will be to adopt and consider travel alternatives.	(1) Our findings support this hypothesis. Both travel maintaining and travel reducing alternatives are involved, for different reasons.
Subjective mobility (Sections 5.2.2 and 6.3.3)	(1) The more respondents feel that they travel the more likely they will be to adopt and consider travel-related alternatives/bundles.	(1) Our findings support this hypothesis, similarly to objective mobility.
Relative desired mobility (Sections 5.2.3 and 6.3.4)	(1) The more respondents want to travel the less likely they will be to consider travel-reducing or major lifestyle change alternatives/bundles and the more likely they will be to consider travel-maintaining/ increasing alternatives/bundles.	(1) Our findings generally support this hypothesis, for the relationships that are significant.
Travel liking (Sections 5.2.4 and 6.3.5)	(1)The more respondents like to travel the less likely they will be to adopt or consider travel-reducing or major lifestyle change alternatives/bundles and (2) the more likely they will be to adopt and consider travel-maintaining/increasing alternatives and bundles.	(1) Our findings offer mixed support for this hypothesis. (2) Our findings provide some support for this, however, this hypothesis holds much better for consideration than for adoption.
Travel attitudes (Sections 5.2.5 and 6.3.6)	(1) Respondents with attitudes favoring travel would be more likely to adopt and consider travel-maintaining strategies while (2) those with attitudes not favoring travel would be more likely to adopt and consider travel-reducing and major lifestyle change strategies.	(1)(2) Our findings provide support for these hypotheses although that support is stronger for consideration than for adoption.
Personality types/lifestyle preference (Sections 5.2.6 and 6.3.7)	(1) The "adventure seeker" along with the "workaholic" and the "status seeker" would be more likely to adopt and consider travel maintaining/increasing alternatives while (2) those with a "family/community oriented" lifestyle preference would be more likely to adopt and consider adopting travel reducing and perhaps major lifestyle changing alternatives.	(1) Our findings provide some support for this hypothesis. Adventure-seekers were also more likely to adopt/consider travel reducing strategies, however. (2) Our findings provide some support for this hypothesis. However, they also adopt/consider travel-maintaining strategies.

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