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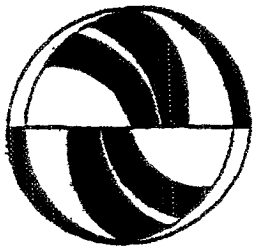

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Modeling individuals' consideration of strategies to cope with congestion

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Abstract

This study continues the examination of a variety of strategies an individual may consider or adopt in response to congestion It finds further evidence that individuals tend to progress from lower-cost, short-term strategies to higher-cost, longer-term ones as dissatisfaction persists or recurs There is also a weaker tendency to cycle back to lower-cost strategies, although generally just one tier lower than a previously adopted strategy Binary logit models of the consideration of each of 15 congestion-response strategies were estimated, as a function of work-, family-, leisure-, and travel-related attitudes, among other explanatory variables ρ^2 goodness-of-fit measures for these models ranged from 16 to 75 Analysis of the contribution of commute-related variables to the consideration of each strategy found that contribution to be significant in fewer than half of the cases (seven out of 15 strategies) With only one exception, the strategies for which commute variables were significant fell into the higher-cost tiers Commute variables never contributed more than 11% of a model's explanatory power, and generally much less While other explanatory variables may also be significant for transportation-related reasons, it is clear that individuals adopt and consider the strategies studied here for many reasons other than congestion relief Further, the transportation-related reasons for considering these strategies may be intertwined in complex ways with non-transportation reasons One implication of these findings is that policies designed to change transportation behavior may be less powerful than expected, because reactions are filtered through a variety of other motivations and constraints An improved understanding of the response to these policies must acknowledge and incor-

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porate the complexity of the choice situation facing the typical individual in modern society

Keywords Travel behavior, Congestion, Logit models

1. Introduction

Congestion is a major source of discontent for urban and suburban dwellers, as well as for city officials concerned with economic viability and the quality of the environment Both residents and governments are constantly seeking strategies to cope with congestion and its consequences However, congestion is a phenomenon in which the discrepancy between private and social costs often results in a "policy impasse" Many of the policy measures designed to curb congestion are not very effective, more promising policies are politically onerous, and users' behavioral responses are obviously motivated by personal interests and not by social objectives (e g , Baldassare, 1991, Tertoolen, Van Kreveld, & Verstraten, 1998, Vlek & Steg, 1996)

The gap between the assumptions underlying much of the policy-making in this area and the behavioral response to growing levels of congestion and to policy signals warrants a study of its implications for future policy-making When facing a restrictive environment, namely policies that infringe on personal preference, individuals seem to innovate in ways that evade the intended policy response This stands in contrast to situations in which supply-side policies that tend to expand the range of possibilities are offered

Salomon and Mokhtarian (1997) have addressed several issues related to this gap First, the choice set, namely the range of possible responses seen by the individual, is very different from that perceived by the policy maker The result is often that, when a new service is introduced, and policy makers expect it to be the likely choice of car users, there is limited response in the "desired" direction What is viewed by policy-makers as a significant contribution to the set of possible solutions to the problem may be perceived by users as an addition of one option to an already wide range of potential responses Thus, users demonstrate much less excitement about new rail services than do their leaders. who have invested major capital spending in such developments Moreover, in responding to increasing congestion, each of the possible strategies considered or adopted by the individual is likely to impose some costs on others, whether household members or the community Thus, the distributional effects of responses to congestion not only affect the considerations of the individual (which hence are different than the narrow perspective of the policy-makers), but may also have different social costs which are often overlooked

The dynamic nature of the individual's process of coping with congestion must also be understood in order to formulate policies that are likely to attain congestion reduction Individuals may engage in an iterative process in which they adopt a strategy that provides some benefits for a time, but those benefits are exhausted as congestion increases. Then, the individual must search for some other measures, given that some have already been used The time elapsed between the adoption of strategies depends, among other things, on the type of measures previously adopted and the individual's dissatisfaction associated with changes in the traffic environment

Salomon and Mokhtarian (1997) identified a variety of possible responses to congestion, as viewed from the individual's perspective In Mokhtarian, Raney, and Salomon (1997), empirical

data on individuals' adoption or consideration of a similar list of potential coping strategies were analyzed Using these data, the coping strategies were grouped into tiers using two different methods The first method was based on the rank-ordering of the strategies across the sample in terms of frequency of adoption and consideration This method identified three tiers, where the first tier includes responses that essentially maintain the amount of current travel, the second tier includes responses that reduce the amount of travel, and the third tier consists of major location and life-style changes These tiers incur successively higher costs when both expenses and transaction costs are considered, as well as costs transferred to others

The second method used factor analysis to group strategies by conceptual similarity (as perceived by the respondents) This method identified the six tiers shown in Table 1, which is the structure used in the analysis to follow (the letter associated with each strategy indicates the sequence and label of that response in the original survey) This structure also demonstrates successively higher costs and longer time frames of adoption in moving to higher-numbered tiers

In terms of the tier structure shown in Table 1 (as well as for the alternative three-tier structure), Mokhtarian et al (1997) have demonstrated that the tiers tend to be adopted in a hierarchical order, with lower-order tier measures being adopted first and higher-order tier measures tending to be adopted only after lower tiers have been Also, demographic variations in the

Table 1
Six-tier structure and description of coping strategies[a]

Tier description	Strategies	Cost[b]	Term
1 Auto improvement	A Buy a car stereo system B Acquire a cellular phone C Buy/lease a better car	Low	Short
2 Departure time	E Change work trip departure time to avoid congestion	Low–moderate	Short
3 Work schedule change	J Adopt flextime K Adopt compressed work week	Moderate	Short
4 Remote work	M Buy a home computer to be used for work N Buy other equipment/services to help me work from home O Telecommute from home P Telecommute from a local work center	Moderate–high	Medium
5 Relocation	Q Change to a new job closer to my current residence S Move my home closer to the job I have now	High	Long
6 Work/lifestyle change	T Work part-time instead of full-time V Start/enhance a home-based business W Retire or stop working by choice	High	Long

[a] *Source* Mokhtarian et al (1997)

[b] "Cost" refers not just to the monetary cost but to the total impact on the individual and the household Thus, for example, although a home computer is much less expensive monetarily than even the incremental cost of a new car, using the home computer for work entails a more substantial intrusion on the household's lifestyle

distribution of costs were identified, with (among other findings) women disproportionately adopting most strategies, but especially the more costly ones

The current paper presents further empirical analysis following Mokhtarian et al (1997) and based on the conceptual discussion offered by Salomon and Mokhtarian (1997) The purpose of the present study is threefold First, we wish to explore further the dynamics of the relationships between the adoption and consideration of strategies Specifically, we examine the role that previous adoption of some strategies plays in the consideration of others, by estimating models of consideration of each tier, having the adoption of other tiers as explanatory variables

A second purpose is to develop behavioral models for the consideration of each strategy in turn, and examine any patterns that emerge across models We use "consideration" rather than adoption of a strategy as the dependent variable because of the cross-sectional nature of the available data As described further in Section 2, the survey used in this study obtained data on individuals' past adoption of strategies, current consideration of strategies, and the presence of motivations, constraints, and other variables expected to affect congestion response behavior However, current measures of motivations and constraints are not appropriate predictors of past adoption various factors are likely to have changed either directly as a consequence of adoption (I just moved to a house across the street from work, so I no longer have an incentive to reduce my commute), or independently since the adoption due to other circumstances Thus, using current motivations and constraints to explain past adoption could either inappropriately reverse the roles of cause and effect, or offer little explanatory power It *is* reasonable, however, to expect current motivations and constraints to help explain the likelihood of *considering* the adoption of various strategies

The third purpose of this paper is to explore the extent to which congestion contributes to the consideration of various coping strategies As we have noted elsewhere (Mokhtarian & Salomon, 1994), there are many reasons other than transportation-related ones to consider strategies such as adopting flextime or telecommuting (although all of the strategies studied here have transportation consequences) Hence, it is important to understand the role transportation considerations play in the individual's decision-making process To do this, we analyze the explanatory power of transportation-related variables in the models of consideration we develop

A number of authors (e g , Cervero, 1987–88, Giuliano & Small, 1995, Humphrey, 1990) have discussed a slate of options for dealing with congestion from the public policymaker's perspective Many others have analyzed one or a few responses to congestion (such as changing departure time or route) from the individual's perspective Researchers such as Stern (1998) and Mahmassani and Jou (1998) have studied the real-time or short-term reactions of drivers to congestion

It is relatively uncommon to analyze a large group of disparate responses to increasing congestion (as a general phenomenon rather than an occurrence of a particular day) from the individual's perspective, as we have done here However, Peng and Rajasekaran (1999) have taken an approach similar to ours Dowling and Colman (1995) have analyzed individuals' responses to hypothetical decreases as well as increases in travel times, but all the responses they considered (changing schedule, mode, frequency, destination, chaining) were short-term and oriented to specific trips rather than including some of the longer-term general strategies (telecommuting, flextime, relocation) that we have considered here Marshall and Banister (2000) both present a list of public policies for reducing travel and empirically analyze the aggregate response to specific applications of some of those policies

The rest of this paper is organized as follows Section 2 describes the research context and data used in this analysis Section 3 examines the role of previously adopted strategies in the current consideration of strategies Section 4 presents and analyzes models of consideration for each strategy Section 5 assesses the contribution of commute-related variables to the models of Section 4. Section 6 summarizes the key findings and discusses the policy implications of the results

2. Description of the research context and data

The survey data used in this study were collected as part of an earlier study of the individual's adoption of telecommuting Mokhtarian and Salomon (1994) presented a conceptual framework for the adoption process, which is generally applicable to the broad set of strategies considered here Variables important to adoption were classified either as motivations (factors driving the individual to want change), constraints (factors preventing the individual from adopting a change, or reducing the probability of doing so), and facilitators (factors making it easier for the individual to adopt a change) The same factor (such as cost) could be either a constraint or a facilitator, depending on whether it is present in a negative (e g , high cost) or positive (low cost) sense While both facilitators and motivations are positively associated with the probability of making a change, they differ conceptually in that the presence of facilitators (and absence of constraints) alone is not sufficient to induce a change, there must be an active desire to do so

Five types of motivations were identified as important specifically to an individual's consideration of change work, family, leisure/independence, ideology, and travel Facilitators/constraints were classified as either internal (psychosocial) or external (demographic or other characteristics) In the present context, the same variable can take on different roles for different strategies For example, the "status car user" attitudinal factor would represent a motivation for considering the travel-maintaining Tier 1 strategies, but an internal constraint on the consideration of the travel-reducing Tier 3 strategies "Technology constraints for home-based telecommuting" would be an external constraint on the home-based telecommuting and home-based business strategies, but acts as an external facilitator for the strategies of buying/leasing a better car and compressed work week (see Tables 3 and 4, discussed below)

Multiple measures of the motivations listed above and of internal constraints were created by factor-analyzing two sets of attitudinal statements in the survey (see Mokhtarian & Salomon, 1997, for a more detailed discussion of the factor analysis). One set of statements in particular was oriented toward the advantages and disadvantages of telecommuting We believe that these factors can be interpreted more broadly as measures of the basic motivation or constraint they represent For example, telecommuting advantages loading heavily on the "personal benefits" factor included having more time for oneself, expanding opportunities to pursue further education, having more independence, and saving money In this study, we interpret a high score on the personal benefits factor as representing these manifestations of the leisure/independence motivation, a drive which could influence consideration of other strategies besides telecommuting However, this use of variables developed for another purpose constitutes a limitation of the current data

Appendix A defines all explanatory variables found significant in any of the models These variables include (1) scores on the attitudinal factors mentioned above, (2) behavioral indicators

of motivations and constraints (such as job suitability of telecommuting, amount of overtime work, how an extra hour would be spent), and (3) demographic measures The dependent variables were developed from a section of the survey dealing with "telecommuting and other lifestyle choices" For each of the strategies listed in Table 1 (plus several others not analyzed here), respondents were asked to indicate whether they had "already done this", had been "considering this", or had "not seriously considered this" The respondents were not asked for the reasons (i e , transportation-related or otherwise) a given strategy was attractive

For this study, we analyzed 513 cases from the original data set (comprising employees of the City of San Diego, CA) that had complete data on the variables of current interest Key characteristics of the entire data set have been published elsewhere Briefly summarizing characteristics of the current sample 50 0% of the respondents are female, 37 1% have children living at home, 59 8% have professional/technical occupations and 12 5% are managers, the median annual household income category is US$ 55,000–74,999, and the median age category is 31–40 years Hence, similar to the entire data set, this particular sample is dominated by relatively affluent professional workers

3. The role of previous adoption in current consideration

As discussed in Section 1, previous work conducted on this dataset determined that coping strategies, in general, are adopted in an ordered pattern, from lower to successively higher cost That is, an individual who has adopted a low-cost option and still faces an unsatisfactory condition is likely to consider other, progressively higher-cost options, to further reduce dissatisfaction In this paper, we further analyze the relationships between past adoption and current consideration, at the tier level Specifically, we estimate binary logit models of the consideration of each of the six tiers shown in Table 1 The dependent variable for the Tier y model is equal to 1 if any alternative in Tier y is being considered, and zero otherwise In addition to a constant term, each model has six explanatory variables, where the variable for Tier x is defined as the number of strategies in Tier x previously adopted by the respondent, for $x = 1, 2, \quad , 6$ We note in passing that the *adoption* of the Tier 6 strategy of "quit work" will be underrepresented in this sample of currently-employed individuals, although it will be *considered* by some

Four types of dynamic relationships are possible between past adoption and current consideration: (1) given that lower-cost strategies have been adopted, the individual is *more* likely to consider a higher-cost tier, (2) given that lower-cost strategies have been adopted, the individual is *less* likely to consider a higher-cost tier, (3) given that higher-cost strategies have been adopted, the individual is *more* likely to consider a lower-cost tier, and (4) given that higher-cost strategies have been adopted, the individual is *less* likely to consider a lower-cost tier

Each of these relationships is plausible In Situation 1, an individual has adopted strategies in the lower-cost tiers and is progressing upward to higher-cost tiers – a reasonable process for people who continue to be dissatisfied with their condition In Situation 2, people who have adopted lower-level strategies are not considering a higher-cost tier, either because they are currently in a satisfied state and are not considering additional options or because internal or external constraints prohibit the consideration of that specific tier

In Situation 3, the individual has adopted a higher-cost tier and is now moving backwards to consider a lower-cost tier In this case, people may be considering a lower tier that was previously skipped, or it may be that the effects of the higher-cost change are depleted and people are starting over at lower-cost tiers For example, an individual moves her job closer to home, but when the costs of congestion keep rising she considers changing her work trip departure time It may also be that some other motivation or combination of motivations is now stimulating the consideration for change As described in Mokhtarian and Salomon (1994), there are many motivations (family, work, travel, independence and leisure, and ideology) that may spur a change to occur if an unsatisfactory condition exists It would be rare for an individual to be fully satisfied with all these aspects of life

Another possible explanation for Situations 1 and 3 is the consideration of change for its own sake – a novelty-seeking behavioral pattern In view of the transaction costs entailed by many of these strategies, however, this is not expected to be a major factor In Situation 4, an individual has adopted a higher-order strategy and is less likely to go back and consider lower-cost strategies This situation is similar to the second in that a person may be currently satisfied and hence not contemplating a change

It is also necessary to analyze consideration of a strategy in the *same* tier for which adoption has already occurred To the extent that the adopted strategy is a substitute for other strategies in the same tier, we would expect adoption of one strategy to reduce the probability of considering those other strategies. To the extent that the adopted strategy is complementary to the others, we would expect a positive relationship We expect strategies within Tiers 3 and 5 to be largely (although not exclusively) substitutes For example, in Tier 3, adopting a compressed work week may eliminate the tier from further consideration if the other strategy, flextime, is not simultaneously available to the individual Similarly, in Tier 5, if the individual has made a residential relocation that brought home and work closer together, he is less likely to consider a job relocation that accomplishes the same thing However, in some cases, there may be a synergy among strategies in the same tier, for example between buying a home computer and telecommuting from home in Tier 4

Table 2 presents the sign and level of significance of each of the six "adopted" variables in the six different models of consideration The principal diagonal of the matrix shows that the previous adoption of a strategy in Tiers 1, 3, or 5 decreases the probability of considering strategies in the same tier At least the latter two results were expected, in view of the arguments above The

Table 2
Signs and significance of "adopted" variables in models of consideration of each tier ($N = 513$)[a]

Adopted	Considering					
	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6
Tier 1 Auto improvement	---					
Tier 2 Departure time	+	N/A	++	+++	++	++
Tier 3 Work schedule change			---	++		+
Tier 4 Remote work			+++		++	
Tier 5 Relocation			+		-	+
Tier 6 Work/lifestyle change					+	

[a] + or − significant at $P \leqslant .1$, ++ or −− significant at $P \leqslant .05$, +++ or −−− significant at $P \leqslant .01$

adoption of a strategy in Tiers 4 or 6 has no significant effect on the probability of considering strategies in the same tier This is likely to be because strategies in each tier may be either substitutes or complements, and hence impacts in both directions may cancel out across the sample For example, in Tier 4, although buying a home computer and telecommuting from home are complementary as noted above, telecommuting from home and telecommuting from a center are generally substitutes In Tier 6, the work/lifestyle strategies listed may be considered either separately or in combination As for Tier 2, because it contained only one strategy, it was not appropriate to test the effect of the "adopted Tier 2" variable in the model for consideration of Tier 2 (as indicated in Section 2, adoption and consideration of a single given strategy represented two out of three mutually exclusive response options on the survey, so it was not possible to indicate considering the same previously adopted strategy)

In every case representing the impact of the adoption of one tier on the consideration of a *different* tier (i e the off-diagonal elements of Table 2), where the effect is significant it is positive This condition describes Cases 1 and 3 above – Cases 2 and 4 do not occur at all (i e , in a statistically significant way) in these data The most natural interpretation of this is that, in general, the sample is still in a dissatisfied state and searching ("high and low", so to speak) for solutions The extent to which this result is generalizable across time and location is an open, and interesting, question So also is the explanation of why the result appears, assuming it *is* generalizable Are people simply universally dissatisfied to some degree? Were the adopted strategies never completely effective? Or were they effective for a while but their potency declined as, for example, congestion grew worse, the novelty wore off, or some other abrupt or gradual change occurred? Unfortunately, the data analyzed here do not permit further exploration of these issues We speculate that a partial explanation of the results may be that, generally, people tend to expect supply-side solutions to congestion, and hence are dissatisfied when apparently insufficient efforts are made by the government to provide those solutions

It can also be observed that most of the significant off-diagonal relationships (eight out of 12) fall in the upper triangle of Table 2, meaning that Situation 1 dominates This is additional corroboration of the sequential pattern of adoption (higher-cost tiers tending to be adopted only after lower-cost tiers have been) documented in Mokhtarian et al (1997)

Three of the four Case 3 (i e , lower-triangle) relationships are immediately adjacent to the diagonal, suggesting that respondents tend to cycle back just one tier after having adopted a strategy in the next higher tier The most noteworthy Case 3 relationship is the strongly significant positive influence that adoption of a Tier 4 strategy has on the consideration of Tier 3 (the "+++" falling below the diagonal) Tier 3 (flexible work schedules) and Tier 4 (remote work) can be either substitutes or complements In some ways, both types of strategies offer temporal flexibility and the opportunity to reduce peak-period commuting, and hence may be viewed as substitutes On the other hand, those doing remote work may also want greater flexibility on the days when they are not telecommuting, meaning that the two strategies may be complementary In either case, it is plausible that adoption of a remote work option would stimulate consideration of flexible work schedules – either to enhance the remote work if it is successful, or to replace it if it is not There is also a positive effect in the opposite direction (adoption of flexible work schedules stimulates consideration of remote work), presumably for similar reasons.

It is of additional interest that adoption of the Tier 2 strategy, "change work trip departure time to avoid congestion", is (positively) significant to the consideration of all other tiers This was

the most commonly adopted individual strategy of all, and this result may either reflect the low-cost, short implementation time of the strategy, or the fact that the effectiveness of changing work trip departure time is short-lived

4. Models of consideration of each strategy

Tables 3–6 present binary logit models for the consideration of each individual strategy Each dependent variable was defined as one if a respondent was considering that particular strategy and as zero if not The independent variables were drawn from those described in Section 2 Some experimentation with specification took place, to obtain "best" models which balanced interpretability with goodness-of-fit For economy of presentation, only the signs and significance categories of the explanatory variables are shown (where the significance categories have the same definitions as in Table 2). specific coefficient estimates and t-values are available from the corresponding author In the following paragraphs, we first make some observations about all the models together, then briefly discuss them tier by tier In Section 5, we analyze the collective contribution of commute-related variables to the models

4 1 Overview of the models

The ρ^2 values for both the market share and final models for each strategy are presented at the bottom of Tables 3–6 The proportion of total information explained by the models ranges from 16 to 75, with models for "telecommute from a center" and "move home closer to job" having the highest ρ^2 and those for "compressed work week" and "buy/lease a better car" having the lowest ρ^2 In most cases where the model ρ^2 is greater than .50, the corresponding market share ρ^2 is also very high, indicating heavily unbalanced shares (high proportions either considering or not considering the alternative) The incremental proportion of information explained by the model variables (model ρ^2 – market share ρ^2) ranges from 03 to 20 Because the ρ^2 for many of the market share models was quite high, the models were also estimated without the alternative specific constant to determine how much information is explained by the substantive variables in the absence of a constant In all but three cases (for "move job closer to home", "move home closer to job", and "retire/stop work"), the incremental proportion of information explained by the alternative-specific constant after all other variables were included was less than 10 This confirms the importance of the substantive variables to these models

In addition to studying the separate effect of the "previously adopted" variables on consideration in the six-tier structure (as discussed in Section 3), they were also included in each model of consideration for the individual strategies As can be seen in Tables 3–6, the results are very similar to those shown in Table 2, with any significant relationship along the diagonal being negative, and any significant off-diagonal relationship being positive.

In examining the models for individual strategies within a single given tier, it is noteworthy that they have relatively few variables in common, even though they have been grouped together as being conceptually similar and of comparable cost Evidently, as suggested earlier, even similar

Table 3
Consideration of strategies in Tier 1 ($N = 513$)

Explanatory variables	Variable type	Tier 1		
		A (buy a car stereo)	B (acquire a cell phone)	C (buy/lease a better car)
Work				
Disability/parental leave factor	Motivation	+		
Workaholic factor	Motivation		++	
Management visibility factor	External facilitator	+		
Job suitability for center-based telecommuting	External constraint	–		
Location independence of job	External facilitator			++
Technology constraints for home-based telecommuting	External facilitator			++
Unaware of telecommuting	External facilitator		+	
Workplace interaction factor	Internal constraint		---	
Family				
Children less than 6 years	Motivation	++		
Children 6–15 years and female	Motivation		+	
Female	External constraint		--	
Travel				
Status car user factor	Motivation	+++	++	+++
Commute stress factor	Motivation	++		
Proportion of commute spent driving alone	External facilitator	+	++	+
Independence and leisure				
Personal benefits factor	Motivation		+++	+++
Would spend an extra hour on self	Motivation			---
Ideology				
Would spend an extra hour on a cause	Motivation		++	
Socio-demographic factors				
Annual household income	Socio-demographic		+	
One-adult household	Socio-demographic	+++		
Number of strategies previously adopted in				
Tier 1		---		---
Tier 2			+	
Market share ρ^2		51	28	13
$\rho^2 = 1 - [LL(model)/LL(0)]$		65	37	22
Adjusted $\rho^2 = 1 - [LL(model) - K]/LL(0)$		62	34	20
ρ^2 (without alternative-specific constant)		60	27	21

strategies can be influenced by different factors in the decision making process However, the same general categories of explanatory variables (representing various motivations and constraints) tend to appear in most models

Table 4
Consideration of strategies in Tiers 2 and 3 ($N = 513$)

Explanatory variables	Variable type	Tier 2	Tier 3	
		E (change departure time)	J (flextime)	K (compressed work week)
Work				
Workaholic factor	Motivation	++	++	++
Work a conventional schedule	External facilitator	+++	+	
Location independence of job	External facilitator		+	++
Technology constraints for home-based telecommuting	External facilitator			+++
Office discipline factor	Internal facilitator	+		
Lack of discipline factor	Internal facilitator			+++
Family				
Children less than 6 years old	Motivation		++	
Travel				
Status car user factor	Internal constraint			–
Independence and leisure				
Personal benefits factor	Motivation		+++	+++
Control factor	Motivation	––		
Socio-demographic factors				
One-adult household	Socio-demographic	++		
Age	Socio-demographic	––		
Number of strategies previously adopted in				
Tier 2			+	+
Tier 3			–––	–––
Tier 4			+	+++
Tier 5			++	
Market share ρ^2		63	29	09
ρ^2		67	49	16
Adjusted ρ^2		65	46	14
ρ^2 (without alternative-specific constant)		66	46	13

4 2 *Models for Tier 1 (auto improvement) strategies*

Tier 1 contains three low-cost, travel-maintaining strategies. buy a car stereo system, acquire a cellular phone, and buy/lease a better car The status car user variable, a travel motivation, was strongly significant in all three models of this tier (P-values $\leqslant$ 01 in two cases and $\leqslant$ 05 in the other) The positive sign of the coefficient for this variable indicates that the more individuals value their car as a status symbol, the more likely they are to consider the travel-maintaining strategies of Tier 1 Additionally, another variable, indicating the proportion of commute trips spent driving alone, was significant for all the strategies of this tier, and only for these strategies The higher the share of drive-alone commuting, the more likely the individual is to consider these travel-maintaining strategies Both these results, specific to this tier, seem to reflect an enjoyment of driving (Salomon & Mokhtarian, 1998, Mokhtarian & Salomon, forthcoming)

Table 5
Consideration of strategies in Tiers 4 and 5 ($N = 513$)

Explanatory variables	Variable type	Tier 4				Tier 5	
		M (home computer)	N (other equip / services)	O (telecom-mute from home)	P (telecom-mute from center)	Q (move job closer to home)	S (move home closer to job)
Work							
Workaholic factor	Motivation	+++			+		
Stress factor	Motivation		+++	+++			++
Overtime	Motivation		+				
Would spend an extra hour on work	Motivation	+					
Work a conventional schedule	External facilitator						++
Location independence of job	External facilitator	+		++			
Lack of manager support for home-based telecommuting	External facilitator				++	+	
Clerical occupation	External facil / constraint			–		+++	
Office discipline factor	Internal constraint		––	–––			
Lack of discipline factor	Internal facil / constraint			++		––	
Workplace interaction factor	Internal constraint	–––					
Family							
Family factor	Motivation					+	
Children less than 6 years old	Motivation	+++					
Female	External facilitator	++	+++				

Travel							
Commute stress factor	Motivation				+++	+++	
Commute time	Motivation			++			
Commute benefits factor	Internal facilitator		+				++
Independence and leisure							
Control factor	Motivation					−−−	
Internal control factor	Motivation				−−		
Would spend an extra hour on self	Motivation				−−		
Ideology							
Would spend an extra hour on a cause	Motivation			+++			
Socio-demographic factors							
Annual household income	Socio-demographic	++			−−−		−
One-adult household	Socio-demographic		−		−		
Age	Socio-demographic				++		
Number of strategies previously adopted in							
Tier 1							++
Tier 2			++	++			+
Tier 4		−−−	−−−				
Tier 5		+++					
Market share ρ^2		23	33	17	66	47	67
ρ^2		33	41	27	75	58	70
Adjusted ρ^2		31	39	24	72	56	68
ρ^2 (without alternative-specific constant)		30	31	18	68	26	56

Table 6
Consideration of strategies in Tier 6 ($N = 513$)

Explanatory variables	Variable type	Tier 6		
		T (go full-time to part-time)	V (start/enhance a home business)	W (retire/ stop work)
Work				
Location independence of job	External facilitator		+	
Technology constraints for home-based telecommuting	External constraint		−−	
Unaware of telecommuting	External facilitator		+	
Professional occupation	External constraint	−	−	−−
Office discipline factor	Internal facilitator			+++
Household interaction a concern for home-based telecommuters	Internal facilitator	+		
Workplace interaction factor	Internal constraint	−−		−−−
Family				
Children less than 6 years old	Motivation		+	
Children between 6 and 15 years old	External constraint			−−
Children less than 6 years and female	Motivation	+++		
Travel				
Commute stress factor	Motivation		+++	
Independence and leisure				
Personal benefits factor	Motivation	+++	+++	++
Control factor	Motivation			−−−
Ideology				
Would spend an extra hour on a cause	Motivation		++	
Socio-demographic factors				
Vehicle availability	Socio-demographic	+++	++	++
Age	Socio-demographic	++	−	+++
Number of strategies previously adopted in				
Tier 2			++	++
Tier 3		+		
Tier 5				++
Tier 6		−−	−−	
Market share ρ^2		56	29	46
ρ^2		63	38	61
Adjusted ρ^2		61	35	58
ρ^2 (without alternative-specific constant)		56	32	46

Those considering buying a car stereo system tended to be from either single-adult households or from households containing children less than 6 years of age This seems reasonable given the benefits of a car stereo when driving either alone or with small children

Additionally, those considering buying a car stereo were more likely to have higher levels of commute stress

Annual household income and the desire to spend an extra hour per week on a "cause" (such as environment, charity, or religion) were positively associated with the consideration of acquiring a cellular phone Those considering a cell phone also tended to score high on the workaholic factor (meaning that they tended to agree with statements such as "I am pretty much a workaholic" and "I would like to spend more time on work") and place lower emphasis on the social and professional interaction of the workplace, and were less likely to be female At the time the data were collected for this study (1990), cellular phones were not in widespread use, so their adoption by higher-income and male respondents (who would be more likely to have the executive and sales positions held by many early adopters) is not surprising One of the benefits of a cellular phone is the ability to conduct work while away from the office, which explains the connection to workaholics and the lack of emphasis on workplace interaction Similarly, the association of this strategy with the desire to spend time on a cause is natural, given the usefulness of a cellular phone in coordinating volunteer activities while traveling and integrating these activities into a complex lifestyle

4 3 Model for the Tier 2 (departure time) strategy

Tier 2 contains solely the short-term, low- to moderate-cost strategy, change work trip departure time to avoid congestion Six variables were significant for the model of consideration for this strategy Three of these were work-related variables that indicated that the more likely an individual is to be a workaholic, work a conventional schedule, and/or value working at the main office, the more likely he or she would be to consider changing work trip departure time The last three significant variables indicated that respondents considering this strategy are less likely to see themselves as having control over their lives and are more likely to live in single-adult households and to be younger The survey question for this strategy did not specify whether the considered change in work trip departure time was earlier or later. It is quite plausible, therefore, that work-driven, young, single adults would consider changing their work trip departure time, especially if it provides more time overall at the workplace We expected, but did not find any, significant family-related variables that would have reflected the benefits of changing work trip departure time to working-parent households

4 4 Models for Tier 3 (work schedule change) strategies

Tier 3 contains two strategies related to making work schedule changes adopt flextime and adopt a compressed work week Explanatory variables for this tier are dominated by work-related motivations and facilitators. The workaholic factor and job location independence variables were positively significant to both strategies. Working a conventional schedule, technology constraints for home-based telecommuting and the lack of discipline factor were also significant variables As would be expected, the current working conditions and attitudes of individuals were important indicators or motivations for considering work schedule changes

The personal benefits factor was also strongly significant (P-value $\leqslant$ 01) for both strategies in this tier, which is to be expected Somewhat unexpected, however, is that only one family-related

motivation (presence of children less than 6 years) was significant, and no socio-demographic factors were significant It is likely that the advantages of changing one's work schedule – more time for family or self – are represented by the personal benefits factor

4 5 Models for Tier 4 (remote work) strategies

Tier 4 contains four strategies related to working remotely buy a home computer to be used for work, buy other equipment/services to support work from home, telecommute from home, and telecommute from a local work center These are moderate- to high-cost, medium-term, travel-reducing strategies Like the models for the work schedule change strategies of Tier 3, the models for Tier 4 also contain a large number of work-related variables These variables reflect the attitudes and current working conditions of respondents, but also reflect some constraints on working remotely, such as being in a clerical position or the loss of discipline and social/professional interaction provided by the work place

Females were more likely than males to consider the strategies of "buying a home computer" and "buying other equipment/services" to work from home Additionally, the presence of young children was a very significant variable ($P \leqslant 01$) for the "buy a home computer" strategy Both these results indicate that family motivations play a role in the consideration of these remote work strategies

The variable indicating the desire to spend an extra hour on a cause was the most significant for the "telecommute from home" strategy Telecommuting may give these respondents more time and flexibility to spend on a cause The commute stress factor and commute time were significant to the consideration of telecommuting from a center and from home, respectively The contribution of the commute variables is discussed in greater detail in Section 5

It is natural to look for similarities between the model for strategy "O", telecommuting from home, and telecommuting models previously estimated on the same dataset In particular, one might expect the model for the preference of home-based telecommuting (Mokhtarian & Salomon, 1997) to resemble the current model for the consideration of home-based telecommuting This does not turn out to be the case, due to differences in the definition of consideration and preference (which were based on different questions in the survey) In particular, those who are already telecommuting are classified among the "preferring telecommuting" group in the earlier study, but in the "not considering telecommuting" group in the current study Hence, a direct comparison of the two models cannot be made, and in fact, except for variables related to stress and commute time the models are different, albeit both interpretable

4 6 Models for Tier 5 (relocation) strategies

Tier 5 contains two high-cost, long-term relocation strategies change to a new job closer to home, and move one's home closer to the job However, although these two strategies are bundled together based on their similar implementation time and cost, their similar travel reduction effect, and the fact that both involve relocation, they are in fact very different Residential relocation is generally a much costlier change, involving significant impacts on all household members This is especially true for two-worker households.

Hence, it is not surprising that although each of these models has six significant variables, only one is common to both strategies Those individuals considering moving their *job* closer to their home are more likely to lack manager support for telecommuting, work in clerical occupations, have a significant amount of commute stress, and lack control in their lives These findings are consistent with previous studies (Madden, 1981, Semyonov & Lewin-Epstein, 1991) linking gender differences in commute length (women's being shorter on average) to occupational and income disparities On the other hand, individuals considering moving their *home* closer to their job are more likely to be under stress, work a conventional schedule, enjoy the benefits of their commute, and have lower household income One possible factor in both sets of results is that other options (e g , telecommuting for the clerical workers considering job relocation, and flex-time/work schedule changes for those conventional-schedule workers considering residential relocation) may not be open to individuals or desired by them

4 7 Models for Tier 6 (work/lifestyle change strategies)

Tier 6 contains three high-cost, long-term strategies related to making major work or lifestyle changes, work part-time instead of full-time, start/enhance a home-based business, and retire or stop working by choice All the models in this tier had three significant variables in common having a professional occupation (negatively associated), receiving personal benefits, and having a high vehicle availability It is plausible that those in professional occupations are less likely than those in lower-income clerical occupations to consider switching to part-time work, and less likely than those in more senior managerial occupations to consider retiring or quitting work It may also be that in two-income households, the individual with the lower-income (non-professional) job is more likely to consider altering or stopping work, or working from home Mokhtarian et al (1997) found that females in two-adult households with children were 1 4 times as likely as males in the same group to consider the strategies of this tier The significance of the personal benefits factor (and the corresponding significance of several family-, travel-, independence and leisure-, and ideology-related variables) demonstrates the benefits of these strategies and their variety Cross-tabulations indicate that the vehicle availability variable is at least in part acting as an indicator for higher age

Work-related motivation variables are conspicuously absent from the models in this tier That is not surprising for strategies "T" and "W", which involve limiting or eliminating work altogether, and even strategy "V" can suggest adjusting or redirecting work-related energy

Individuals considering going from full-time to part-time work were less likely to value workplace interaction, more likely to be female and have young children, and more likely to be older This suggests that a strong family motivation is in effect for many of these individuals

Those considering starting or enhancing a home-based business were more likely to have indicated wanting to allocate an extra hour to a cause they believe in It may be that small-business owners are more involved in the community and/or more likely to be asked to participate in "charitable" events, or that starting/enhancing a home-based business is one way to "buy" the flexibility to work on desired causes The home-based business may actually relate to the cause – combining ideological interests with earning income

Those contemplating retiring or quitting work tended to have lower scores on the "control" factor This means that they tended to agree with survey statements that it was hard to be fully

productive in the workplace, that work and family don't leave enough time for themselves, and that they often don't feel in control of their lives These are all reasonable causes for considering this strategy

5. The role of commute-related factors in considering each strategy

Since the strategies analyzed here were all selected on the basis of being potential responses to a congested commute, it is plausible to expect individuals' commute characteristics to be significant to some degree to their consideration of these strategies On the other hand, as acknowledged earlier, most of these strategies can also be adopted for reasons having nothing to do with congestion From a transportation policy standpoint, it is of interest to assess the extent to which consideration of each strategy is a function of congestion

In this section, we examine the contribution of three variables to the consideration of each strategy the "objective" (although still self-reported and hence subjective in that sense) measure of commute time, and the subjective factor scores for commute stress and commute benefit Two other travel-related variables, the status car user factor score and the proportion of commute trips driven alone, were considered to be indicators of an underlying propensity to drive a car more than functions of congestion, and hence were not included with the three variables listed above Also, the objective variables commute speed and commute distance were tested for inclusion in each model and would have been included with the other three, but were never found to be significant

As can be seen by reviewing Tables 3–6, only seven of the 15 strategies even had any of these commute variables significant to their consideration "buy a car stereo system", "buy other equipment/services to help me work from home", "telecommute from home", "telecommute from a local work center", "change to a new job closer to my current residence", "move my home closer to the job I have now", and "start/enhance a home-based business" It is striking that, with the logical exception of strategy "A", "buy a car stereo system", these are the higher-cost strategies of Tiers 4, 5, and 6. This suggests that commute characteristics do not play a strong role in the consideration of the lower-cost strategies of Tiers 1, 2, and 3 As an individual's commute characteristics worsen, or as previously adopted strategies do not sufficiently ameliorate the impacts of a congested commute, the commute variables seem to play a stronger role in the decision-making process

It is noteworthy that, even for the Tier 2 strategy, "change work trip departure time to avoid congestion", no congestion-related variables were significant, while the variables that *were* significant (predominantly work-related) accounted for 67% of the information in the data This suggests that, despite the deliberately-worded description of the strategy, *and* the presence of another strategy (not analyzed here) described as "change work trip departure time for personal reasons", respondents may have not read the question carefully It may also be that congestion- and work-related reasons for considering this strategy are heavily confounded and hence difficult to identify separately in a behavioral model

The contribution of these three commute variables to the consideration of each strategy (for which they were significant) was quantified through their stepwise inclusion (as a block) in each model in the forward direction and stepwise (block) exclusion in the backward direction, with the

Table 7
Contribution of commute variables in models of consideration

Dependent variable (strategy) (col 1)	Market share model (ρ^2) (col 2)	Model with constant and commute variables (ρ^2) (col 3)	Model without commute variables (ρ^2) (col 4)	Full model (ρ^2) (col 5)	Percent contribution of commute variables[a,b] (col 6)	Percent of model-explained info attributed to commute variables[a,b,c] (col 7)
A car stereo	509	510	637	645	*1*–**.8**	*16*–**1.2**
N home equipment	334	335	409	414	*1*–**.5**	*24*–**1.2**
O home-based telecommuting	171	181	253	262	**.9**–*1 0*	**3.4**–*3 8*
P center-based telecommuting	663	692	723	745	**2.2**–*2 9*	**3.0**–*3 9*
Q move job	474	534	543	569	**2.6**–*6 0*	**4.6**–*10 6*
S move home	671	674	698	703	*3*–**.5**	*43*–**.7**
V home business	288	312	363	378	**1.5**–*2 4*	**4.0**–*6 3*

[a] Bold numbers obtained by backward exclusion ρ^2 (full model) − ρ^2 (model w/o commute vars) = contribution of commute vars [(col 5 − col 4) × 100%]
[b] Italic numbers obtained by forward inclusion ρ^2 (model w/ constant and commute vars) − ρ^2 (market share model) = contribution of commute vars [(col 3 − col 2) × 100%]
[c] Values in this column are equal to [col 6/col 5]

results shown in Table 7 In the backward direction, the ρ^2 for a full model (including the commute variables, col 5) was compared to that for a reduced model (without the commute variables, col. 4) In the forward direction, just the commute variables were added to the market share model (cols 3 and 2, respectively) The differences between the higher and lower ρ^2s in the two methods result in upper and lower bounds on the proportion of total information explained by the commute variables A priori, we expected the backward stepwise approach (shown in bold in cols 6 and 7) to provide the lower bound (since the variables remaining after the exclusion of the commute measures could be somewhat correlated with the excluded variables and hence assume some of the explanatory power of those variables) and the forward stepwise approach (shown in italics) to provide the upper bound (since having only the commute variables in the model should allow them to carry some of the explanatory power of excluded variables with which they are correlated) However, that was true in only four of the seven cases

Column 6 of Table 7 expresses the range of the contribution of the commute variables in terms of the percentage of total information in the data (using the information-theoretic interpretation of ρ^2 given by Hauser, 1978) Column 7 expresses the same range as a percentage of the total information *explained by each model*, obtained by dividing each number in col 6 by the corresponding ρ^2 for the full model (col 5) The results indicate that the strongest contribution of the commute variables was to the "move job closer to home" strategy, explaining a maximum of 10 6% of the model's information Commute variables contributed at most 6 3% of the model's information for the "start or expand a home business" strategy, and at most 4% for the two telecommuting strategies It is noteworthy that commute variables contributed less than 1% of the model's information for the consideration of moving home closer to work This is consistent with the findings of some researchers (e g , Giuliano, 1989, Raux & Andan, 1997) that, contrary to classical economic location theory, travel-related issues play at best a small role in residential location decisions today

6. Summary and conclusions

This study presents empirical evidence supporting a previously developed conceptual structure (Salomon & Mokhtarian, 1997), in which a hierarchy of user-level strategies for coping with congestion was identified There is evidence that individuals tend to progress from lower-cost, short-term strategies to higher-cost, longer-term ones as dissatisfaction persists or recurs There is also a weaker tendency to cycle back to lower-cost strategies, although generally just one tier lower than a previously adopted strategy

Binary logit models of the consideration of each of 15 congestion-response strategies were estimated, as a function of work-, family-, leisure-, and travel-related attitudes among other explanatory variables ρ^2 goodness-of-fit measures for these models ranged from 16 to 75 Strategies in the same tier had few specific explanatory variables in common, suggesting that, even though they may be similar in cost and in transportation-related outcomes, they are influenced by different factors in the individual's choice process However, the same categories of variables (representing various motivations and constraints) tended to appear in each model

Analysis of the contribution of commute-related variables (including distance, time, stress, and benefit) to the consideration of each strategy found that contribution to be significant in fewer than half of the cases (seven out of 15 strategies) With only one exception, the strategies for which commute variables were significant fell into the higher-cost Tiers 4, 5, and 6, indicating that commute considerations do not play a major role in the consideration of the lower-cost strategies of the first three tiers Commute variables never contributed more than 11% of a model's explanatory power, and generally much less.

It is important to realize, however, that the impact of even non-transportation variables can be transportation-based For example, the significance of the personal benefits factor to the consideration of changing departure time may be due to the increased time for oneself that results from reducing time in congested traffic Thus, the quantitative contribution of the overtly commute-related variables to the consideration of each strategy is only a lower bound on the extent of transportation-based causes for that consideration.

Nevertheless, as stressed throughout this paper, individuals adopt and consider the strategies studied here for many reasons other than congestion relief, although (by design) all the strategies examined in this study have transportation impacts In reality, transportation-related motivations for considering an option may be intertwined in complex ways with non-transportation reasons For example, an individual may take a job that reduces the commute length in order to alleviate commute stress, but part of that stress may be due to the fact that the longer commute had been robbing the family of time together Is the motivation for the job change travel-based, or family-based? Both, obviously

An important implication of these findings is that policies designed to change transportation behavior may be less powerful than expected, because reactions are filtered through a variety of other motivations and constraints An improved understanding of the response to these policies must acknowledge and incorporate the complexity of the choice situation facing the typical individual in modern society

On the other hand, the conclusions of this study are limited by the available data, which were originally collected for another purpose It would be desirable to collect new data tailored specifically to the study of individuals' congestion response strategies The current study has identified several important improvements that should be made to the data collection instrument First, the respondent should be allowed to indicate considering a strategy that has previously been adopted Second, the time since the most recent adoption of each strategy should be obtained, which is important to understanding the dynamic of a reduction in dissatisfaction upon adopting a strategy, followed by an increase in dissatisfaction over time as the effects of the previous adoption are attenuated Third, respondents should be explicitly asked to indicate the reason(s) for adopting or considering a strategy (personal, family-related, work-related, reducing or easing travel, or other), which will identify the extent to which *they* perceive a given strategy to address travel-related problems Finally, the set of strategies should be refined and expanded For example, in addition to "move home closer to work", the respondent should be able to indicate "move home farther from work", and similarly for "change to a new job closer to home" One strategy which was not analyzed here due to its ambiguity, "change means of travel to work", should be divided into two strategies "change from driving alone to work, to some other means" and "change from another means of getting to work, to driving alone". The collection and analysis of new data along these lines can be expected to offer additional insight into the individual's response to congestion

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Appendix A

Table A1
Definitions of significant variables

Explanatory variable	Variable type	Definition
Work		
Disability/parental leave factor	Motivation	Telecommuting-oriented factor score based on the advantages of being able to work while temporarily or permanently disabled, or instead of taking parental leave
Workaholic factor	Motivation	General factor score based on statements such as "I am pretty much a workaholic" and "I would like to spend more time on work"
Stress factor	Motivation	Telecommuting-oriented factor score based on advantages such as reducing the stress of commuting, getting more work done, reducing office stress, and having more control over one's physical working environment
Overtime	Motivation	Number of hours of overtime worked in a two-week period
Would spend an extra hour on work	Motivation	Binary variable equal to one if answered "work" to a question of how an extra hour would be spent
Management visibility factor	External facilitator	Telecommuting-oriented factor score based mainly on the disadvantages of concern about opportunities for career advancement and the risk of being viewed negatively by management
Job suitability for center-based telecommuting	External constraint	Binary variable equal to one if job permits telecommuting from a center at all
Work a conventional schedule	External facilitator	Binary variable equal to one if respondent works $7\frac{1}{2}$–8 h a day, with a start time between 8 and 9 A M
Location independence of job	External facilitator	Index taking on a higher value the more time respondent spends in working alone or with others remotely
Lack of manager support for home-based telecommuting	External facilitator	Binary variable equal to one if manager would not allow telecommuting from home
Technology constraints for home-based telecommuting	External facilitator (strategies C, K), constraint (strategy V)	Number of items (out of 7) needed before respondent could work from home effectively
Unaware of telecommuting	External facilitator	Binary variable equal to one if respondent had never heard of telecommuting before receiving the survey or never thought about it before

Table A1 (Continued)

Explanatory variable	Variable type	Definition
Clerical occupation	External constraint (strategy O), facilitator (strategy Q)	Binary variable equal to one if respondent's occupation was clerical/administrative support
Professional occupation	External constraint	Binary variable equal to one if respondent's occupation was professional/technical
Office discipline factor	Internal facilitator (strategies E, W), constraint (strategies N, O)	Telecommuting-oriented factor score based on the disadvantages that it is "harder to get motivated to work, away from the main office', "it's too much trouble to remember what to take back and forth between work locations", and "the main office is nicer/better equipped"
Lack of discipline factor	Internal facilitator (strategies K O), constraint (strategy Q)	General factor score based on statements such as "I have to admit that I m not very self-disciplined" and (negatively loading) "I'm basically a pretty organized person"
Household interaction a concern for home-based telecommuters	Internal facilitator	Binary variable equal to one if respondent indicated that distractions from other household members would be a concern if working from home
Workplace interaction factor	Internal constraint	Telecommuting-oriented factor score based on the disadvantages of preferring the social and professional interaction of the conventional workplace
Family		
Family factor	Motivation	Telecommuting-oriented factor score based on the advantages of being able to work instead of taking parental leave, making it easier to handle dependent care, and being able to spend more time with family
Children less than 6 years old	Motivation	Binary variable equal to one if there are any children less than 6 years old living at home
Children between 6 and 15 years old	External constraint	Binary variable equal to one if there are any children 6–15 years old living at home
Children less than 6 and female	Motivation	Binary variable equal to one if there are any children less than 6 years old living at home and the respondent is female
Children 6–15 years old and female	Motivation	Binary variable equal to one if there are any children 6–15 years old living at home and the respondent is female
Female	External constraint (strategy B), facilitator (strategies M, N)	Binary variable equal to one if respondent is female
Travel		
Status car user factor	Motivation (strategies A, B C), internal constraint (strategy K)	General factor score based on statements that "I have to admit that, for me, a car is a status symbol" and (loading negatively) "to me, a car is nothing more than a convenient way to get around"
Commute stress factor	Motivation	General factor score based on statements such as "my commute is a big hassle" and "I'd usually rather have someone else do the driving"

Table A1 (Continued)

Explanatory variable	Variable type	Definition
Commute time	Motivation	Round-trip commute time in minutes
Commute benefits factor	Internal facilitator	Telecommuting-oriented factor score based on disadvantages such as "my commute trip is a useful transition between home and work", "I use my commute time productively", "my commute trip allows me to do errands on the way to or from work", and "working at home may increase family conflicts"
Proportion of commute spent driving alone	External facilitator	Proportion of commute trips that are drive alone (multimodal trips are classified based on the mode used for the longest distance)
Independence and leisure		
Personal benefits factor	Motivation	Telecommuting-oriented factor score based on advantages such as having more independence, making it easier to pursue educational or personal interests, increasing flexibility, having more time for oneself, saving money, increasing control over the work environment, and reducing office stress
Control factor	Motivation	General factor score based on statements such as "I often feel like I don't have much control over my life", "it's hard to be fully productive in the place where I work" and "work and family do not leave me enough time for myself" Factor was reversed so that high scores signify a high degree of control
Internal control factor	Motivation	General factor score based on attributes such as "my family and friends are more important to me than my work" "I'm basically a pretty organized person", "I generally try to spend some time each week just on myself", and "I am generally satisfied with my life"
Would spend an extra hour on self	Motivation	Binary variable equal to one if answered "myself" to a question of how an extra hour would be spent
Ideology		
Would spend an extra hour on a cause	Motivation	Binary variable equal to one if answered "a 'cause' I believe in (such as environment, charity religion)" to a question of how an extra hour would be spent
Socio-demographic factors		
Annual household income	Socio-demographic	Ordinal variable with five categories (less than US$ 35,000 to US$ 95,000 or more) representing annual household income before taxes
Vehicle availability	Socio-demographic	Binary variable equal to one if vehicles per licensed driver is less than 1
One-adult household	Socio-demographic	Binary variable equal to one if respondent is the only adult in the household
Age	Socio-demographic	Ordinal variable with six categories (20 or younger to over 60)

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