DOES DISSONANCE BETWEEN DESIRED AND CURRENT RESIDENTIAL NEIGHBOURHOOD TYPE AFFECT INDIVIDUAL TRAVEL BEHAVIOUR? AN EMPIRICAL ASSESSMENT FROM THE SAN FRANCISCO BAY AREA

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1. INTRODUCTION

In the USA and Europe land-use based solutions to transportation problems have rapidly gained in popularity over the past decade. It appears that the principles of New Urbanism (in the USA) or the Compact City (Europe) have found a solid place in the profession's thinking. This popularity is not least the result of numerous empirical studies demonstrating that living in higher-density, mixed-use neighbourhoods is associated with less car use compared to living in low-density, suburban environments (Frank and Pivo, 1994; Meurs and Haaijer, 2001; Naess *et al*., 1995; Sun *et al*., 1998).

The academic literature is, however, equivocal about the effect of neighbourhood characteristics on reducing car use. Several ambiguities and criticisms can be discerned. First, there is disagreement about the importance of land use characteristics in explaining variations in travel behaviour. Opinions differ about the role of urban form vis-à-vis other sets of variables. Some authors claim, for instance, that factors, such as land-use mixing or density, are more important than factors related to travellers' sociodemographic variables (Kockelman, 1997). Others are, however, more conservative and argue that sociodemographic variables explain a larger share of the variation in travel patterns than do land use characteristics (Crane and Crepeau, 1998; Snellen *et al*., 2001). Some studies claim that not only are sociodemographic variables more important than land use characteristics, but that this also applies to attitudes towards travelling, land use and the environment (Bagley and Mokhtarian, 2002; Kitamura *et al*., 1997). Part of the disagreement is no doubt attributable to differences in theoretical framework, research design, data, and geographical settings. However, the fact that the ambiguities persist calls for additional research.

Second, as several authors point out (Boarnet and Sarmiento, 1998; Cervero and Duncan, 2002; Handy, 1996a; Sermons and Seredich, 2001; Srinivasan and Ferreira, 2001), it is unclear whether residential location choice decisions are exogenous to the relationship between urban form and travel behaviour. They argue that a household with a predisposition towards a certain type of travel chooses a residential location enabling the pursuit of the preferred type of travel. For example, a household whose members prefer to travel by public transit chooses to reside for that very reason in a location providing easy access to transit infrastructure. If this is true, the commonly observed correlations between land use configuration and travel behaviour do not so much reflect direct causality but complex relationships of these factors with others, such as attitudes towards travelling.

The research reported in this paper seeks to enhance our understanding of the complex relationship between residential location choice and travel behaviour. Unlike studies that model location and travel choices simultaneously (Abraham and Hunt, 1997; Eliasson and Mattson, 2001; Sermons and Seredich, 2001), we compare the travel behaviour of individuals living in neighbourhoods matching their locational preferences with the travel patterns of those who reside in neighbourhoods that do not coincide with their preferences. For this, survey data are used from commuters in three neighbourhoods in the San Francisco Bay Area: the urban neighbourhood of North San Francisco and the (different types of) suburban neighbourhoods of Concord and Pleasant Hill. This paper scrutinises trip frequencies for available trip purposes other than commuting (whose frequency is assumed to be relatively impervious to land-use influences), namely work/school-related, grocery shopping, social/recreation/ entertainment, eating out, serving passenger and ‘other’ trips. When the differences between mismatched and well-matched respondents *within* neighbourhoods are larger than those *between* neighbourhoods, this suggests that residential self-selection is an important factor explaining travel behaviour, and should be accounted for when analysing the association between urban form and travel behaviour.

The relationship between residential neighbourhood mismatch and travel behaviour will be explored in more detail in the following section. The paper then proceeds to a description of the data available for this study, as well as definitions of the variables used in the empirical analysis. Section 5 presents descriptive results and section 6 ordered probit models. The paper concludes with a summary of the results.

2. BACKGROUND

The body of academic literature on the influence of urban form on travel behaviour has expanded considerably over the past 15 years. Previous studies have related several types of land-use factors at the neighbourhood level to travel behaviour (Cervero and Kockelman, 1997; Schwanen, 2003):

- *Density*: typically the number of inhabitants/households or dwellings per hectare are used.
- *Land-use mixing*: the proximity of different types of land use to each other.
- *Design*: the physical amenities of buildings and streets and the physical layout of streets, including the provision of sidewalks and parking places.

- *Proximity to transportation infrastructure*: access to public transit (bus, rail) and highways.

These urban form dimensions are strongly interdependent: densely populated neighbourhoods are usually characterised by high levels of land use mixing (presence of many shops, restaurants, etc.), connectivity of street networks and pedestrian friendliness. They are also often well served by public transit; the high population density enables the provision of more frequent transit services. Such urban neighbourhoods are usually contrasted with what is considered a typical suburban neighbourhood: a low-density, single-use development whose inhabitants are highly dependent on the private car for their daily travel.

While distance travelled and modal choice have received the lion's share of attention, there is considerable empirical evidence regarding a possible link between land use and trip frequency. Findings are, however, not consistent. Researchers have variously found the total number of trips to be higher in urban neighbourhoods (Kitamura *et al*., 1997), to rise with shopping accessibility but decline if parks/green/playgrounds are present (Meurs and Haaijer, 2001), to decrease with the percentage of developed land in a neighbourhood (Sermons and Seredich, 1997), or to be hardly affected by land-use characteristics (Sun *et al*., 1998). One of the reasons for this ambiguity – in addition to differences in theoretical and methodological frameworks or geographic setting – is that the impact of land use depends on the type of trip.

Stratification by purpose demonstrates the varying impacts of land use on trip frequency. Several authors have argued or shown that grocery shopping frequency is affected most by land use factors (Handy, 1992, 1996b; Meurs and Haaijer, 2001; Van and Senior, 2000). These studies suggest that good local access to commercial facilities – as is often provided in urban neighbourhoods – induces people to make more grocery shopping trips. A comparable relationship may exist for discretionary trip purposes, such as eating out and leisure trips. Thus, local availability of relevant facilities may stimulate travellers to make such trips more frequently.

However, it is not clear whether these relationships hold for different segments of the neighbourhood population. It may be true for individuals living in a neighbourhood matching their residential neighbourhood type preferences, but is it also applicable to persons whose actual and preferred type of neighbourhood differ? Does an urban neighbourhood dweller 'with a suburban heart' utilise local grocery shops as much as an urbanite-at-heart living in the city? Or does the suburbanite-at-heart's grocery shopping behaviour resemble that of a true suburbanite? In other words, what matters most to individual travel behaviour: the constraints imposed by the residential environment or travellers' preferences regarding the physical surroundings of the dwelling? The central hypothesis of this paper is that both factors are at work simultaneously. To test this conjecture, we have stratified urban and suburban residents on the basis of their preferences regarding the physical attributes of the neighbourhood into four classes:

- *true urbanites*: urban dwellers who prefer to live in a high-density environment;
- *dissonant* or *mismatched urbanites*: urban residents with a preference for lower-density living;
- *dissonant* or *mismatched suburbanites*: suburban dwellers who like to live in a high-density environment; and

- *true suburbanites*: suburban residents preferring to live in low-density settings.

In terms of the trip frequency for eating out, social/recreation/entertainment and grocery shopping purposes, we expect these four categories to be ordered from high to low. Trip frequencies will be highest for the true urbanites, followed first by the dissonant urbanites and then the mismatched suburbanites; they will be lowest among the true suburbanites.

In contrast, the number of trips for subsistence and maintenance activities (other than grocery shopping) will largely depend on the household activity agenda containing the activities household members need or prefer to perform during a certain time period, and the allocation of tasks to individual household members (Bhat and Koppelman, 1993). While the household activity agenda is unobservable from the researcher's point of view, sociodemographic and lifestyle characteristics of travellers provide much information about household needs and are thus expected to be systematically related to trip frequencies. Factors related to the actual and preferred types of neighbourhood will most likely provide little explanation of the trip-making propensity for work/school-related activities or serving passengers.

The argumentation so far is based on dichotomous situations; residents live in either an urban or a suburban neighbourhood, and are classified as either well-matched or mismatched. In reality, however, the situations is much more complicated. Our empirical analysis takes account of this complexity in two ways. First, the travel behaviour of residents of three neighbourhoods is studied: the urban neighbourhood of North San Francisco and the different suburban neighbourhoods of Concord and Pleasant Hill. Second, we employ a range of indicators of residential neighbourhood type, which are variously continuous or discrete in nature, and capable of accounting for the level of neighbourhood attachment.

3. DATA, DEFINITIONS, AND METHODS

3.1. Data

The data used for this study comprise responses to a fourteen-page questionnaire that collected information on a variety of travel and related issues. The survey was mailed in May 1998 to 8,000 residents of three neighbourhoods in the San Francisco Bay Area. Half were mailed to the urban neighbourhood of North San Francisco; the other half were split evenly between the contiguous suburbs of Concord and Pleasant Hill. A randomly selected adult member of the household was asked to complete the survey. About 2,000 surveys were returned, yielding a 25% response rate. The subset of 1,358 respondents identified as workers commuting at least once a month is used for the current analysis.

The three communities selected for the survey differ in terms of spatial layout and structure (Table 1). North San Francisco is a traditional neighbourhood characterised by high densities, a high level of mixing of residential and business locations, and good access to the public bus system. The neighbourhood is, however, not directly connected to the Bay Area Rapid Transit (BART) urban rail system. Homes and lots are relatively small and there is little parking space. Concord is more or less the reverse of this: building densities are low, the street pattern is radiating rather than grid-like, access to

BART is good but bus services are poor, houses and yards tend to be large and parking space is ample. Although Pleasant Hill is a suburban community characterised by cul-de-sac street patterns and is not pedestrian-friendly, it differs in several respects from Concord. Building densities are considerably higher, for instance. Bagley *et al*. (2002) show that Pleasant Hill is described by large distances to the nearest grocery store and park, implying low levels of land-use mixing.

In terms of travel patterns, the survey asked respondents among other things about their objective mobility. For short-distance trips (< 160 km), they were asked to indicate how often they travelled for commuting/school, work/school-related, grocery shopping, social/recreation/entertainment, eat meal, serve passengers and ‘other’ (mainly personal business and shopping for consumer goods) purposes. Ordinal response categories ranged from “never” to “five or more times per week”. Because of the low variation in the number of trips for commuting/travelling to school, this trip motive is left out of consideration in the remainder of this paper.

Information on a wide range of factors is available for the respondents, including personality traits, lifestyle orientation, travel- and land-use related attitudes, mobility constraints and sociodemographics. Regarding personality, respondents were asked to indicate how well each of 17 words/phrases applied to them on a five-point scale from “hardly at all” to “almost completely”. Through the application of factor analysis, these attributes were reduced to four underlying dimensions: the adventure seeker, organiser, loner and calm personality factor (Mokhtarian *et al*., 2001). The same procedure was followed for lifestyle. Eighteen Likert-type scale statements relating to work, family, money, status and the value of time were factor-analysed, yielding four lifestyle factors, measuring status-seeker, workaholic, family/community-oriented and frustration scales (Mokhtarian *et al*., 2001). Factor analysis was also applied to 32 attitudinal statements related to travel, land use and the environment. Respondents were asked to respond on five-point Likert-type scales ranging from “strongly agree” to “strongly disagree”. Six relatively uncorrelated underlying dimensions could be identified, using principal-axis factoring with oblique rotation: travel dislike, pro-environmental policy, commute benefit, travel freedom, pro-high density and travel stress factors (Mokhtarian *et al*., 2001). For the current study, the pro-high density dimension is particularly important (section 3.2). This attitudinal dimension is characterised by the following statements (pattern matrix loadings in parenthesis – see Mokhtarian *et al*., 2001 for details):

- *Living in a multiple family unit would not give me enough privacy* (-0.617);
- *I like living in a neighbourhood where there is a lot going on* (0.486);
- *Having shops and services within walking distance from my home is important to me* (0.401);
- *I like to have a large yard at my home* (-0.323).

The respondent’s (standardized) score on this pro-high density factor is assumed to reflect her preference structure regarding physical characteristics of the residential neighbourhood. A high score thus suggests a strong preference for high-density living.

Mobility constraints are defined as physical or psychological limits on travel. They have been measured by questions about the existence of physical or psychological conditions that limit travelling by certain modes at certain times of day, with ordinal response categories “no limitations”, “limits how often/long”, and “absolutely prevents”. Further, the questionnaire included an extensive list of questions on the respondents’ sociodemographic situation. On the basis of this information a household typology was created, distinguishing between single workers (one adult, no children); two-worker couples (two adults, each of whom is employed); one-worker couples (two adults, one of whom is employed); multiple-worker families (two or more working adults and one or more children aged 18 or less); one-worker families (one working and one non-working adult and one or more children aged 18 or less) multiple working adults (three or more adults at least two of whom are employed; no children aged 18 or less); ‘other’ households, (including among others single-parent families).

Table 2 indicates that sociodemographics, mobility limitations, personality and lifestyle and travel factors vary considerably between the neighbourhoods included in the survey. Some key differences can be detected. First, the largest differences can be noticed between urban North San Francisco and suburban Concord. Pleasant Hill usually takes an intermediate position; for most variables, however, Pleasant Hill residents resemble their counterparts in Concord more than North San Francisco inhabitants. Second, urban respondents tend to be younger and drawn from smaller households, often with two or more workers and less often with children. They are also less car-oriented than suburban respondents. Third, the neighbourhood-wide averages for the pro-high density factor clearly show that North San Francisco residents on average have much more positive attitudes towards urban living than do Pleasant Hill and especially Concord residents. Nevertheless, a sizeable portion of the respondents in each neighbourhood has preferences regarding the physical aspects of the residential neighbourhood that differ from the characteristics of their current neighbourhood type.

3.2. Residential neighbourhood dissonance

In Schwanen and Mokhtarian (2004), we defined residential neighbourhood type dissonance as an incongruence in terms of land use patterns between the neighbourhood type where the individual is currently residing and the individual preference structure towards such characteristics of the residential environment. While the neighbourhood concept is broader and also includes the dwelling and the neighbours (Brower, 1996), we have limited ourselves to the physical structure of the neighbourhood, as this is the dimension believed most to affect individuals’ travel behaviour. A set of five indicators of neighbourhood dissonance has been developed. Although they differ in various respects, all are based on the same principle: the respondent’s score on the pro-high density factor reflecting her preferences regarding the physical neighbourhood is contrasted with her actual neighbourhood type (Schwanen and Mokhtarian, 2004).

The exact definition of each dissonance indicator together with descriptive statistics by neighbourhood are presented in Table 3. The first indicator, $MM1_i$, is a binary indicator with a value of one indicating that a respondent is mismatched. Roughly speaking, an urban dweller is classified as mismatched if she has a negative score on the pro-high density factor, and a suburban respondent when she has a score larger than zero. $MM1_i$ gives a straightforward albeit rather crude indication of the existence of mismatch. By this measure, about one quarter of the total sample can be considered mismatched.

Stratification by neighbourhood indicates that the extent of mismatch is lowest in Concord and highest in Pleasant Hill. A similar picture emerges for $MM2_i$. This measure is a continuous variable capable of reflecting subtle variations in the degree of dissonance. For the urban neighbourhood it is defined as the maximum score for that neighbourhood minus the traveller's real score on the pro-high density factor. Actually, we did not use the real maximum score but the 95th percentile score to make the indicator less sensitive to out-liers. Scores more extreme than that were set equal to the cut-off point. For the suburban neighbourhoods the definition is the converse (the real score minus the "maximum" for the suburbs); however, the 5th instead of the 95th percentile score was used. Thus, each respondent's score is by definition nonnegative, and increasing with the degree of mismatch.

Schwanen and Mokhtarian (2004) argued that interactions exist between neighbourhood type dissonance and neighbourhood attachment. Two additional indicators were therefore defined – $MM3_i$ and $MM4_i$ – consisting of interactions of $MM1_i$ and $MM2_i$ with an ordinal indicator of the level of attachment (1 = attached; 2 = somewhat attached; 3 = not attached). In other words, an absence of neighbourhood attachment exacerbates the level of residential neighbourhood type dissonance.

The fifth indicator, $MM5_i$, is an effort to account for the observation in Bagley *et al.* (2002) that the neighbourhoods surveyed are rather heterogeneous in terms of their internal physical structure. The higher score of Pleasant Hill on the first four mismatch indicators suggests that this may be especially valid for Pleasant Hill. To prevent misclassification as mismatched as much as possible, a second, more conservative binary dissonance indicator was defined. Urban respondents are considered dissonant if their score on the pro-high density factor is extremely low compared with the average for the urban neighbourhood. 'Extremely low' is defined here as a score that is lower than the neighbourhood-wide average minus one standard deviation. In contrast, suburban respondents are considered mismatched if their score on the pro-high density variable is higher than the neighbourhood-wide average plus one standard deviation. The effect of the application of this definition is that the share of mismatched respondents is about 16 percent for all neighbourhoods.

3.3. Model structure

For ordinal variables such as trip frequency, a specific type of discrete choice models has been developed – ordered response models. These models are based on an underlying continuous latent (unobserved) variable where it is assumed that the observed variable takes its discrete values as the latent variable crosses certain thresholds. These thresholds are unknown parameters to be estimated. In ordered response models the value of the continuous unobserved dependent variable is dependent on a set of observed predictor variables and a random variable representing the impact of all unobserved influences. When this random variable is assumed to be normally distributed, the resulting model is an ordered probit model:

$$y_i^* = \beta' x_i + \varepsilon_i$$

$$y_i = 0 \text{ if } y_i^* \leq \mu_0$$

$y_i = 1$ if $\mu_0 < y_i^* \leq \mu_1$
$y_i = 2$ if $\mu_1 < y_i^* \leq \mu_2$
$y_i = 3$ if $\mu_2 < y_i^* \leq \mu_3$
$y_i = 4$ if $\mu_3 < y_i^*$

where y_i^* and y_i are the latent and observed dependent variables, respectively; x_i represents a vector of predictor variables; and β' a vector of parameters to be estimated. y_i^* can be considered to represent a correspondence to the i^{th} respondent's true trip frequency, while y_i represents the category in which that true frequency falls. ε_i is a random variable, assumed to be normally distributed with a mean of zero and a variance of one. The μs are the threshold parameters to be estimated, with μ_0 commonly taken to be zero for convenience (shifting all μs by the same constant does not affect the result as long as the x_i vector includes a constant; the shift of the μs would simply shift the coefficient of the constant by the same amount). They represent the points on the latent continuous trip frequency scale that identify the bounds for each observed category, but have no behavioural significance.

5. DESCRIPTIVE RESULTS

With the exception of the number of trips for 'other' purposes, the existence and degree of neighbourhood type dissonance is associated with trip frequency for all trip motives analysed. Before discussing the results per purpose in more detail, we start with some general remarks. Whether differences between consonant and dissonant residents are statistically significant depends on the type of mismatch indicator applied. For reasons of brevity we do not show results for all five measures, although we discuss some of them in the text. We limit ourselves to presentation of findings for the binary indicator $MM1_i$ (Table 4) and the continuous $MM2_i$ (Figure 1), because these render the largest number of statistically significant results. Irrespective of the mismatch indicator, however, the impact of mismatch is strongest for North San Francisco, followed by Pleasant Hill. No statistically significant impact of neighbourhood type dissonance on trip-making propensity for any of the motives could be detected among Concord residents.

For grocery shopping, the general direction of the association between neighbourhood type and frequency of trips is unanticipated in the light of the literature discussed in section 2. Table 4 indicates that true urbanites make fewer trips for grocery shopping than true suburbanites. Several reasons can be put forward for this result. Workers in urban households might experience more temporal constraints than their suburban counterparts (Schwanen and Dijst, 2003; Ettema *et al*., 2003), which may force them to link grocery shopping to other activities or the commute. Consequently, respondents may not consider grocery shopping activities in these complex trip-chains as separate trips, and may not have registered them as such in the survey. In addition, urban households tend to be smaller than those in the suburbs. Given that larger households engage in grocery shopping more frequently (e.g. Robinson and Vickerman, 1976), this may imply a smaller need to engage in grocery shopping frequently among urban residents.

Nonetheless, the trip frequency for mismatched residents in North San Francisco falls in between that of true urbanites and suburbanites, at least for $MM1_i$. Similarly, mismatched Pleasant Hill residents tend to engage less in grocery shopping than the well-matched commuters in the same neighbourhood and more than consonant urbanites. In other words, while the relationship with neighbourhood type is reversed, we still find evidence of a consistent influence of neighbourhood type dissonance on grocery trip frequency. More or less the same results are obtained for $MM2_i$ (Figure 1a). This figure shows per trip frequency class the average score on the mismatch indicator, with a high score indicating that mismatched respondents are over-represented in that trip frequency category. An ANOVA finds that the differences for $MM2_i$ are statistically significant at the 5% level. Although Figure 1a suggests that trip frequency also varies with the level of dissonance for Pleasant Hill residents, no significant impact could be detected for this neighbourhood. Conclusions about grocery trips on the basis of $MM3_i$, $MM4_i$, and $MM5_i$ resemble those for $MM2_i$.

For social/recreation/entertainment trips, the impact of neighbourhood dissonance type is only statistically significant for North San Francisco. This holds true for all dissonance indicators. Table 4 and Figure 1b reveal that mismatched urban residents make fewer trips for social/recreational/entertainment activities. A similar effect of dissonance is found for eat out trips: true urbanites make more such trips than suburbanite-at-heart urban residents. The use of $MM3_i$ yields similar results, but no statistically significant differences (at the 5% level) are detected for $MM4_i$. For $MM5_i$, only a statistically significant impact can be established for Pleasant Hill, showing that mismatched residents of this community make more eat out trips than consonant respondents. These results are consistent with expectations.

Somewhat unexpectedly, the analysis of $MM2_i$ and $MM4_i$ suggests that the number of work/school-related trips varies statistically significantly with the level of neighbourhood type dissonance for North San Francisco, Pleasant Hill and the two suburban communities pooled together. No unambiguous differences between consonant and dissonant respondents emerge, however, from Figure 1d, suggesting that neighbourhood type dissonance may not be the direct determinant of trip frequency or that the relationship is a complex, non-linear one.

For serve passenger trips, statistically significant differences exists between consonant and dissonant residents in North San Francisco ($MM1_i$; $MM2_i$; $MM3_i$) and Pleasant Hill ($MM1_i$; $MM2_i$). True urbanites make fewer trips for this purpose than mismatched urban dwellers, whereas well-matched Pleasant Hill respondents make more trips than their urbanite-at-heart counterparts. Again, the question is raised whether neighbourhood type mismatch is the 'true' factor explaining these differences.

In short, the impact of neighbourhood type dissonance depends on the trip purpose considered. Although we do not find evidence for a strong influence of the extent and level of mismatch among suburban respondents, the analysis has revealed that for suburban-oriented urban dwellers the frequencies of trips for social/recreation/ entertainment activities and eating out are lower than for true urbanites, which is consistent with our hypotheses. The results for grocery shopping, work/school-related and serving passengers are not completely as expected.

6. ORDERED PROBIT ANALYSIS

While the descriptive analysis in the preceding section is informative, it probably confounds the effects of multiple variables. To the extent that the dissonant residents of a given neighborhood differ from the consonant ones on demographic, attitudinal, and other characteristics, the observed differences in frequency may be insignificant once those other factors are controlled for. In this section we therefore present several ordered probit models to assess whether the conclusions from the descriptive analysis hold after account is taken of the impact of sociodemographic, personality, lifestyle, and travel-related attitudinal factors. Mobility limitations were also allowed to enter the models, but none was statistically significantly associated with trip frequency. They are therefore left out of consideration here. The final model specifications are presented in Tables 5 and 6. The variables included were selected after an extensive screening procedure based on χ^2- and *t*- tests and conceptual plausibility.

The three models in Table 5 differ from those in 6 in that neighbourhood dissonance variables are included in the former case. For grocery shopping, social/recreation/ entertainment activities, and eating out, trip-making propensity is affected by the level of mismatch after account is taken of other explanatory variables. The coefficient for North San Francisco residents indicates that urbanites make fewer grocery shopping trips than suburban residents. The fact that several (indirect) indicators of household size are incorporated in the model suggests that the first explanation in the previous section, pertaining to differences in time constraints among urban and suburban households, may be better than the one related to household size. The sign of the $MM2_i$ indicator is positive for urban dwellers, indicating that as the level of mismatch increases, their number of shopping trips becomes more similar to that of true suburbanites. This is again consistent with the descriptive results. A comparison of the estimated coefficients suggests that a score of 2.21 on $MM2_i$ is needed to compensate the depressing effect of living in North San Francisco. However, the number of North San Francisco respondents in the sample with such a score on this dissonance measure is very small, with only 14 out of 671 (2.2%). All else equal, the predicted number of grocery trips is smaller for almost all urban residents than for suburban respondents.

The model for social/recreation/entertainment trips contains four neighbourhood indicators. For this type of travel it is not the urban neighbourhood that deviates from the suburbs. Rather, the suburban communities differ from one another. More specifically, the negative coefficient for Concord suggests that Pleasant Hill residents now resemble North San Franciscans rather than inhabitants of the contiguous community of Concord. However, the negative sign for $MM2_i$ when living in Pleasant Hill is not in line with our hypotheses. Recall that it is Pleasant Hill residents with a preference for urban land use patterns that are classified as mismatched. These persons were hypothesised to make more trips for social/recreational/entertainment activities than true suburbanites. Perhaps the negative sign represents a residual effect due to an improper classification of many Pleasant Hill residents as not being able to find a residential neighbourhood that matches their land use-related preferences. This belief is supported by the fact that the coefficient of the $MM5_i$ indicator, which was specifically designed to prevent misclassification of travellers as mismatched as much as possible, is not statistically significantly associated with the number of trips for Pleasant Hill residents. Yet, we do present the model with the unexpected sign, because this is statistically superior to the one without a mismatch indicator, and to draw attention to the complex interrelations between neighbourhood type dissonance and sociodemographic, personality, lifestyle, and attitudinal factors.

Nonetheless, the negative coefficient for $MM1_i$ for North San Francisco residents is consistent with expectations and the negative sign for living in Concord. Thus, suburbanites-at-heart living in the city are less likely to make social/recreation/ entertainment trips than true urbanites. A comparison of the estimated coefficient with that for residing in Concord suggests that a sizeable portion – about a quarter – of the urban population is highly comparable to the average Concord resident in terms of the number of social/recreation/entertainment trips.

The frequency of eat meal trips does not differ significantly among the three neighbourhoods investigated. Nevertheless, two dissonance indicators are included in the final model. The negative coefficient for $MM4_i$ Pleasant Hill residents suggests that persons with a preference for a higher-density neighbourhood and little attachment to their current neighbourhood make fewer eat meal trips. Likewise, North San Francisco respondents with a preference for a lower-density environment also engage less frequently in trips for eating out. In light of the descriptive analysis, we believe the latter effect to be the more plausible of the two. As in the case of social/recreation/ entertainment trips, the coefficient for Pleasant Hill might reflect a possible misclassification of mismatched residents, only showing up after differences in sociodemographics, personality, lifestyle, and travel attitudes are considered. Again, inclusion of $MM5_i$ did not yield statistically significant results, supporting this interpretation of the effect of $MM4_i$.

While the descriptive analysis revealed that statistically significant differences between well-matched and mismatched respondents exist in terms of the number of work/shopping related and serve passenger trips, the ordered probit models do not show such an effect after the other explanatory variables are included. It thus appears that the direct determinants of those differences are the sociodemographic variables and to a lesser degree the personality and lifestyle differences and travel-related attitudes found in the models. One neighbourhood indicator is included in the model for ‘other’ trip motives, showing that North San Francisco residents make fewer such trips than suburbanites. This type of travel further depends on personality and lifestyle variations. No sociodemographic variables are included.

A considerable number of control variables is included in the models (with the exception of that for ‘other’ trip purposes). These variables will hence be discussed briefly here. Because sociodemographics were assumed to contain much information about the household and individual activity agenda, they were anticipated to influence trip frequencies in many respects. A quick look at Tables 5 and 6 confirms this conjecture. Closer inspection shows that it is mainly role-related factors, many of which have a direct affiliation to gender, that are included in the models. Consider grocery shopping, for instance. The main effect of gender has a negative coefficient, which might be counterintuitive. Recall, however, that only commuters are included in the sample. In households with working females the allocation of shopping tasks to individuals may be arranged differently from households with more traditional role divisions (Scott and Kanaroglou, 2002; Ettema *et al*., 2003). Further, the two occupation variables included in the model also reflect gender differences: persons employed in clerical administrative jobs are mostly women, whereas occupations in production/construction/crafts are more typical for men. Women in multiple-worker families, however, make more grocery shopping trips than other working females. The latter suggests that grocery trip making propensity is positively correlated with household size. This is also borne out in the coefficients for one-worker family and single worker households.

For the social/recreation/entertainment and eat meal categories, household structure and role within the household also play an important role. Single workers are more likely to engage in either trip type. Lacking such opportunities within their households, singles presumably use these discretionary trips to interact socially with other people. Family households on the other hand, tend to engage less in such trips; they are to a larger degree oriented towards their own household and in-home activities. A clear exception is the frequency of social/recreation/entertainment trips for one-worker families in which the female is the breadwinner. Women in these households engage more frequently in social/recreation/ entertainment trips.

For no trip purpose is the effect of household structure and role-related variables as large as for the serve-passenger category. The estimated coefficients unambiguously indicate that in households with children the number of trips for this motive is much higher than in households consisting only of adults. In addition, the coefficient for female in multiple-worker families indicates that it is the female who is primarily responsible for such trips when there are two or more workers in the household. This suggests that, although women have increasingly become engaged in the labour force, traditional role patterns have to a certain extent persisted (Kwan, 2000; Schwanen and Dijst, 2003). All else equal, however, women in one-person and two-worker couple households make fewer trips for picking up/dropping off passengers.

While numerous studies on trip making propensity have reported comparable conclusions about the impact of household structure and role-related variables, the current data also allow an investigation of the impact of personality, lifestyle and travel attitudinal differences on trip frequencies. As expected, adventure seekers are more likely to engage in social/recreation/entertainment activities, which seem to be particularly capable of satisfying a need for variety seeking and curiosity. Such needs may also be fulfilled through the browsing, comparing and evaluating of consumer goods. This may explain the positive coefficient for other trip motives. Also in line with expectations are the negative effects of the organiser and calm factors on the number of trips for eating out and social/recreation/entertainment (organiser only). Travellers with a high score on the calm factor may prefer to have meals at home, which is usually more restful and secluded. Organisers may be able to plan their activity patterns in such a way that enough time remains for the preparation of meals at home. Alternatively, they may combine this activity with other activities (visiting a friend, for instance), implying that these trips are not recorded separately in the travel survey. Because the organiser factor is positively correlated with age and the presence of children, it is no surprise to see it appear with a negative sign in the model for social/recreation/entertainment trips.

Regarding lifestyle, a high score on the frustration factor is associated with more grocery but fewer work/school-related, social/recreation/entertainment and eat meal trips. The effects for social/recreation/entertainment and eat out trips are as expected, given that this factor is positively correlated with dissatisfaction with one's life and little time availability due to work and family obligations (Mokhtarian *et al*., 2001). In the case of grocery shopping the direction of the causality appears to be two-sided; the positive score might indicate that travellers feel frustrated because they have to perform an excessive number of household chores such as grocery shopping. Workaholics, however, make fewer trips for grocery shopping, presumably because they (prefer to) spend so much time on work that they limit their grocery shopping frequency or transfer these duties to other household members. Logically, their focus on working also results in fewer leisure but more work-related trips. In contrast, travellers with a strong orientation towards their family and community engage more often in social/recreation/ entertainment and eat out trips. Their dedication to the family also seems to result in more willingness to take others where they have to go. With the exception of grocery shopping, trip frequency is higher as the score on the status seeker increases. Several statements having a strong, positive loading on this factor can explain these results, in particular those about the car functioning as a status symbol, and the one arguing that "*a lot of the fun of having something is showing it off*" (Mokhtarian *et al*., 2001, page 368). While engaging in a trip often incurs disutility to travellers, this may be less so for auto-oriented, status-seeking travellers. Trip making (by auto) for them offers the opportunity to enhance their reputation and self-esteem.

The interpretation that the perception of travelling not being associated with discomfort and inconvenience induces more trips is also and especially applicable to the travel freedom factor. Hence, the score on this factor is positively associated with trip rates for grocery shopping, social/recreation/entertainment, eat meal and serve passenger trips. Further, a high score on the pro-environmental policy factor is associated with more grocery shopping trips. Given that a statement about the importance of having shops and services within walking distance from the home location has a moderately high loading on this factor (Mokhtarian *et al*., 2001), this is hardly surprising.

As already indicated in section 3.3, the threshold parameters in Tables 5 and 6 do not bear any behavioural significance. Unfortunately, no commonly accepted goodness of fit measures are available for ordered probit models. Hence, the explanatory power of the different models cannot be compared. Note, however, that χ^2 for the model for serve passenger trips is much higher than the rest. Apparently, the impact of the included sociodemographic variables, reflecting the household and individual activity agenda, are especially important to this type of trip.

7. CONCLUSIONS

This paper has sought to enhance our understanding of the complicated relationship between residential location and travel behaviour. In particular, we have investigated to what extent trip frequencies differ not only by residential neighbourhood but also by the extent and level of mismatch between a traveller's current and preferred type of neighbourhood. The analysis of data from residents of three communities in the San Francisco Bay Area provides mixed results regarding the hypothesized systematic ordering in terms of trip frequencies for discretionary and grocery shopping purposes, with high frequencies for consonant urbanites, lower frequencies for dissonant urban, even lower frequencies for suburban residents, to the lowest ones for consonant suburbanites.

The descriptive analysis has demonstrated that the number of social/recreation/entertainment and eat out trips is lower, and the frequency of serve passenger and work-related trips higher, among dissonant than among consonant urban residents. An impact of dissonance has also been detected for grocery shopping trips; however, in this case we found the number of trips to be lower in urban North San Francisco than in the suburban communities investigated. Further, we have found hardly any statistically significant differences for the suburban neighbourhoods. Only the number of work/school-related and serve passenger trips vary statistically significantly among well and poorly matched travellers in Pleasant Hill (and hence for the suburban communities pooled for the serve passenger motive). The results do not suggest a linear or direct impact of neighbourhood type and neighbourhood type dissonance for these purposes.

The ordered probit analysis has indicated that the variations for the suburban neighbourhoods observed in the descriptive analysis are accounted for by factors associated with sociodemographic position, personality, lifestyle, and travel–related attitudes. What remains in several instances for Pleasant Hill residents is a residual effect, resulting from the potential incorrect classification of travellers as mismatched. Nonetheless, the impact of dissonance persists in the probit analysis for the frequency of grocery shopping, social/recreation/entertainment, and eat out trips of North San Francisco residents. Based on the above results, we believe that, at least for trip frequency by purpose, the conditioning influence of the environment prevails over travellers' preferences regarding the environment in the suburban neighbourhoods. In the urban neighbourhood, on the other hand, the relative contributions that preferences towards and constraints imposed by the physical structure of the neighbourhood make to the explanation of travel patterns are more balanced.

Given the differences in the frequency of social/recreation/entertainment and eat out trips between consonant and dissonant travellers *within* North San Francisco, we believe that residential self-selection processes play a role in the explanation of travel patterns. In other words, residential location choice is not completely exogenous to the relationship between travel behaviour and land-use factors. Nevertheless, neighbourhood structure appears to have an autonomous influence, because neighbourhood dummy indicators show up in the models for the frequency of grocery shopping, social/recreation/entertainment, and 'other' trips after predisposition towards travelling, and personality and lifestyle differences have been taken into account.

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Table 1.
Summary of spatial structure indicators for the communities surveyed

	North San Francisco	Pleasant Hill	Concord
Density	High	Intermediate	Low
Business locations	Throughout the neighbourhood	Central near BART and Freeway	Western end of the neighbourhood
Distance to San Francisco Central Business District	5 km	41 km	46 km
Street pattern	Grid	Fragmented	Radiating
Topography	Hills	Flat	Flat
Freeway access	I-80 1.5 km east	I-680 transects the community	I-680 on the western side; Hwy 24 transects the community
BART access	None	Southeast of neighbourhood	West side of the neighbourhood
Bus lines	21 bus routes	3 bus routes	3 bus routes
Sidewalks	Wide	Discontinuous	Discontinuous, missing
Walking	Common	Hazardous	Hazardous

Source: After Kitamura *et al.* (1997)

Table 2.
Descriptive statistics by residential neighbourhood

	North San Francisco			Pleasant Hill			Concord		
	Mean	SD	N cases	Mean	SD	N cases	Mean	SD	N cases
Sociodemographics									
Ratio of vehicles to valid driver's licenses	0.82	0.47	642	1.11	0.41	357	1.14	0.51	307
Household income ($1,000) [a]	69.9	30.7	656	75.3	37.0	354	69.6	27.1	311
Respondent's age (years) [a]	40.6	11.7	670	46.4	11.6	369	46.4	10.6	317
Mobility limitations									
Driving during the day	1.03	0.18	669	1.01	0.14	369	1.01	0.08	317
Driving at night	1.06	0.28	669	1.04	0.20	369	1.04	0.19	317
Driving on the freeway	1.05	0.25	669	1.03	0.20	369	1.01	0.14	317
Using public transit	1.04	0.22	669	1.04	0.22	369	1.03	0.22	317
Riding a bicycle	1.09	0.37	669	1.11	0.36	369	1.09	0.35	317
Walking	1.03	0.19	669	1.06	0.27	369	1.03	0.19	317
Personality traits									
Adventure seeker factor	0.18	0.86	671	-0.03	0.96	369	-0.11	0.96	318
Organiser factor	-0.05	0.82	671	0.09	0.78	369	0.08	0.80	318
Loner factor	0.19	0.89	671	-0.05	0.90	369	-0.05	0.93	318
Calm factor	-0.08	0.81	671	-0.04	0.86	369	0.04	0.76	318
Lifestyles									
Frustration factor	0.01	0.84	671	0.07	0.80	369	0.07	0.85	318
Family/community orientation factor	0.05	0.72	671	0.04	0.73	369	0.05	0.72	318
Status seeker factor	0.10	0.79	671	0.01	0.79	369	0.10	0.79	318
Workaholic factor	0.04	0.80	671	0.00	0.72	369	0.04	0.80	318
Travel & land use-related attitudes									
Travel freedom factor	-0.04	0.78	671	0.07	0.68	369	0.03	0.71	318
Pro-environmental policy factor	0.34	0.84	671	-0.31	0.77	369	-0.34	0.72	318
Pro-high density factor	0.47	0.66	671	-0.38	0.69	369	-0.54	0.64	318

	North San Francisco		Pleasant Hill		Concord	
	N cases	Percentage	N cases	Percentage	N cases	Percentage
Sociodemographics						
Household type						
Single worker	212	31.6	73	19.8	39	12.3
Two worker couple	212	31.6	115	31.2	71	22.3
One worker couple	29	4.3	26	7.0	34	10.7
Multiple worker family	89	13.3	89	24.1	114	35.8
One worker family	22	3.3	29	7.9	19	6.0
Multiple working adults	61	9.1	19	5.1	16	5.0
'Other' household	28	4.8	14	3.8	18	5.7
Gender						
Female	329	49.4	199	53.9	163	51.6
Occupation type						
Service/repair	29	4.3	24	6.5	20	6.3
Sales	55	8.2	35	9.5	31	9.7
Production/ construction/crafts	18	2.7	9	2.4	23	7.2
Manager/administrator	148	21.6	90	24.4	60	18.9
Clerical/administrative Support	66	9.9	50	13.6	33	10.4
Professional/technical	348	52.2	157	42.5	143	45.0
'Other' occupation	7	1.0	4	0.8	8	2.5

[a] Mean category midpoint is used as estimate of the true value

Table 3.
Residential neighbourhood type dissonance indicators and scores by neighbourhood

		North San Francisco						Pleasant Hill						Concord					
		0 (%)	1 (%)	2 (%)	3 (%)	Av.	SD	0 (%)	1 (%)	2 (%)	3 (%)	Av.	SD	0 (%)	1 (%)	2 (%)	3 (%)	Av.	SD
$MM1_i$	1 if $ProHidens_i$ < 0 if NSF=1 1 if $ProHidens_i$ > 0 if PH=1 or CON=1 0 otherwise	76.1	23.9					72.9	27.1					81.1	18.9				
$MM2_i$	$ProHiDens_{max}$ – min($ProHiDens_{max}$, $ProHiDens_i$) if NSF=1 max($ProHiDens_i$, $ProHiDens_{min}$) – $ProHiDens_{min}$ if PH=1 or CON=1					0.88	0.63					0.98	0.64					0.82	0.59
$MM3_i$	$MM1_i$ * ATTACH [1 = attached; 2 = somewhat attached; 3 = not attached]	76.6	12.9	8.5	2.1			72.8	12.6	11.3	3.3			81.1	8.2	8.5	2.2		
$MM4_i$	$MM2_i$ * ATTACH [1 = attached; 2 = somewhat attached; 3 = not attached]					1.36	1.24					1.56	1.27					1.37	1.20
$MM5_i$	1 if $ProHidens_i$ < -0.192 if NSF=1 1 if $ProHidens_i$ > 0.307 if PH=1 1 if $ProHidens_i$ > 0.098 if CON=1 0 otherwise	84.6	15.6					84.6	15.4					83.3	16.7				

Interpretation of discrete scores: 0 = consonant; 1 = dissonant; 2 = more dissonant; 3 = most dissonant
"$ProHiDens_{max}$" = 95th percentile factor score for urban dwellers; "$ProHiDens_{min}$" = 5th percentile factor score for suburban dwellers.
Source: after Schwanen and Mokhtarian (2004)

Table 4.
Trip frequency percentages by purpose, residential neighbourhood type dissonance ($MM1_i$) and residential neighbourhood [a]

		< 1x per month[b]	1-3x per month	1-2x per week	3-4x per week	> 4x per week	χ^2 [c]
Grocery shopping							
North San Francisco	Consonant (*n* = 510)	7.6	34.1	44.3	12.7	1.2	12.562
	Dissonant (*n* = 160)	7.5	25.0	50.0	12.5	5.0	(0.014)
Pleasant Hill	Consonant (*n* = 269)	2.2	23.0	52.0	19.0	3.7	11.126
	Dissonant (*n* = 100)	5.0	21.0	64.0	10.0	0.0	(0.025)
Concord	Consonant (*n* = 258)	5.0	22.1	55.4	13.2	4.3	2.297
	Dissonant (*n* = 60)	3.3	28.3	46.7	16.7	5.0	(0.681)
Suburban pooled	Consonant (*n* = 527)	3.6	22.6	53.7	16.1	4.0	3.212
	Dissonant (*n* = 160)	4.4	23.8	58.0	13.0	1.9	(0.512)
Social/recreation/entertainment							
North San Francisco	Consonant (*n* = 510)	2.9	18.6	45.7	24.3	8.4	34.782
	Dissonant (*n* = 160)	8.1	35.0	40.0	10.6	6.3	(0.000)
Pleasant Hill	Consonant (*n* = 269)	5.6	30.9	42.0	15.2	6.3	3.152
	Dissonant (*n* = 100)	4.0	31.0	39.0	22.0	4.0	(0.533)
Concord	Consonant (*n* = 258)	10.1	34.9	36.4	16.3	2.3	1.308
	Dissonant (*n* = 60)	10.0	35.0	35.0	15.0	5.0	(0.860)
Suburban pooled	Consonant (*n* = 527)	7.8	32.8	39.3	115.7	4.4	1.463
	Dissonant (*n* = 160)	6.3	32.5	37.5	19.4	4.4	(0.833)
Eat meal							
North San Francisco	Consonant (*n* = 510)	5.7	21.4	46.3	20.4	6.3	19.641
	Dissonant (*n* = 160)	11.3	32.5	37.5	11.3	7.5	(0.001)
Pleasant Hill	Consonant (*n* = 269)	8.9	27.5	46.8	11.5	5.2	4.143
	Dissonant (*n* = 100)	11.0	24.0	40.0	18.0	7.0	(0.387)
Concord	Consonant (*n* = 258)	10.9	29.5	43.4	1.0	4.3	5.805
	Dissonant (*n* = 60)	5.0	43.3	410.0	10.0	1.7	(0.214)
Suburban pooled	Consonant (*n* = 527)	9.9	28.5	45.2	11.8	4.7	2.274
	Dissonant (*n* = 160)	8.8	31.3	40.0	15.0	5.0	(0.686)

		Never	< 1x per month	1-3x per month	1-2x per week	3-4x per week	> 4x per week	χ^2 [c]
Work/school-related								
North San Francisco	Consonant (*n* = 510)	12.0	22.5	27.1	19.2	11.0	8.2	18.372
	Dissonant (*n* = 160)	13.8	10.6	26.3	23.8	9.4	16.3	(0.003)
Pleasant Hill	Consonant (*n* = 269)	8.9	22.7	30.5	13.4	13.4	11.2	14.877
	Dissonant (*n* = 100)	17.0	26.0	17.0	15.0	7.0	18.0	(0.011)
Concord	Consonant (*n* = 258)	10.5	19.0	24.8	19.0	10.5	16.3	3.844
	Dissonant (*n* = 60)	15.0	21.7	20.0	11.7	10.0	21.7	(0.572)
Suburban pooled	Consonant (*n* = 527)	9.7	20.9	27.7	16.1	12.0	13.7	14.590
	Dissonant (*n* = 160)	16.3	24.4	18.2	13.7	8.1	19.4	(0.012)
Serve passengers								
North San Francisco	Consonant (*n* = 510)	23.9	31.0	25.9	10.8	3.9	4.5	17.509
	Dissonant (*n* = 160)	12.5	31.3	25.6	16.3	9.4	5.0	(0.004)
Pleasant Hill	Consonant (*n* = 269)	12.6	26.8	20.8	17.1	12.6	10.0	13.765
	Dissonant (*n* = 100)	13.0	36.0	28.0	15.0	2.0	6.0	(0.017)
Concord	Consonant (*n* = 258)	12.4	18.2	22.1	24.4	9.3	13.6	5.195
	Dissonant (*n* = 60)	15.0	21.7	20.0	23.3	15.0	5.0	(0.392)
Suburban pooled	Consonant (*n* = 527)	12.5	22.6	21.4	20.7	11.0	11.8	11.051
	Dissonant (*n* = 160)	13.8	30.6	25.0	18.1	6.9	5.6	(0.050)

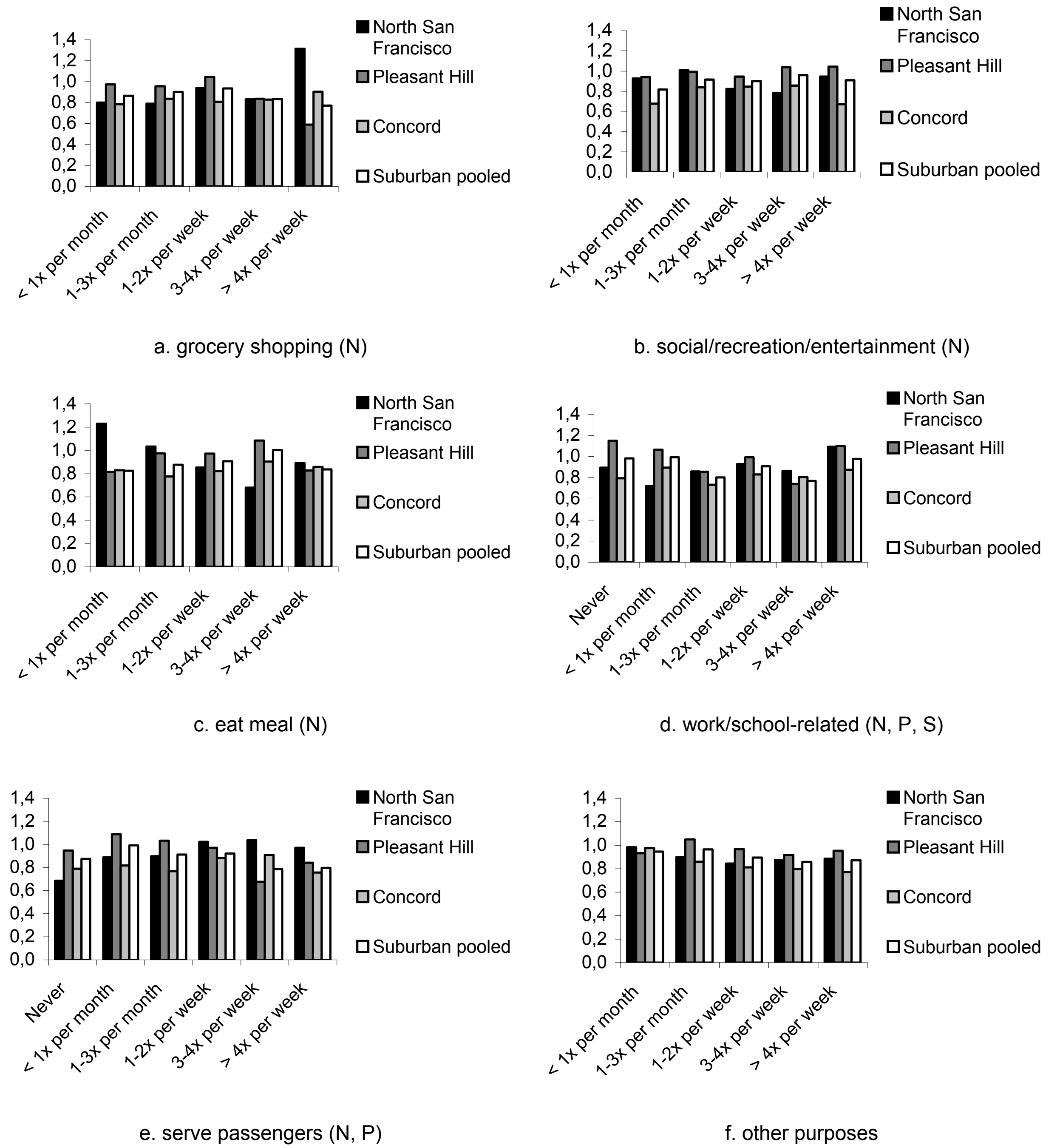
[a] Because no statistically significant differences were detected for ‘other’ trip purposes, this category is omitted from the Table
[b] Includes workers who never travel for a given trip purpose
[c] Significance given in parentheses

Table 5.
Ordered probit models of grocery shopping, social/recreation/entertainment, and eat meal trip frequency

	Grocery shopping		Social/recr./entertainment		Eat meal	
	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.
Constant	1.270	9.848	2.360	20.034	1.929	16.287
Sociodemographics						
Age	0.012	4.462	-0.012	-4.780	-0.013	-4.954
Single worker	-0.165	-2.794	0.243	4.121	0.202	3.495
Two-worker couple					0.149	2.726
Multiple-worker family					-0.112	-1.881
One-worker family	0.152	2.478	-0.229	-3.882	-0.224	-2.373
Female	-0.013	-4.275	0.014	4.800	0.014	4.945
Female in one-worker couple			-0.424	-3.105		
Female in multiple-worker family	0.013	4.304			-0.0137	-4.772
Female in one-worker family			0.411	3.006		
Full-time employed			0.148	1.849		
Occupation in production/construction/crafts	-0.221	-2.825			-0.177	-2.848
Occupation in clerical/administrative support	0.220	2.820				
Occupation as manager/administrator					0.177	2.848
Personality types						
Adventure seeker factor	-0.071	-1.976	0.219	6.088		
Organiser factor			-0.093	-2.469	-0.132	-3.493
Calm factor					-0.158	-4.056
Lifestyle types						
Frustration factor	0.097	2.379	-0.174	-3.955	-0.087	-2.298
Workaholic factor	-0.096	-2.190	-0.096	-2.079		
Family/community orientation factor			0.096	2.245	0.081	1.976
Status seeker factor			0.191	4.955	0.162	4.142
Travel-related attitudes						
Pro-environmental policy factor	0.098	2.457				
Travel freedom factor	0.076	1.784	0.140	3.230	0.170	4.073
Neighbourhood indicators						
North San Francisco resident	-0.374	-3.715				
Concord resident			-0.357	-4.678		
$MM1_i$ for North San Francisco resident			-0.387	-4.057	-0.173	-1.915
$MM2_i$ for North San Francisco resident	0.169	2.315				
$MM2_i$ for Pleasant Hill resident			-0.104	-1.822		
$MM4_i$ for Pleasant Hill resident					-0.010	-1.993
Threshold parameters						
μ_1	1.189	31.059	1.269	33.041	1.058	29.378
μ_2	2.642	61.878	2.495	63.427	2.323	58.401
μ_3	3.617	50.710	3.452	59.625	3.148	54.625
Model statistics						
Log Likelihood at constant	-1682.3		-1863.4		-1862.4	
Log likelihood at convergence	-1639.6		-1736.1		-1788.0	
χ^2	85.5		254.6		148.8	

Table 6.
Ordered probit models of work/school-related, serve passenger, and 'other' trip frequency

	Work/school-related		Serve passenger		Other	
	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.
Constant	1.342	35.964	0.849	7.193	0.639	14.904
Sociodemographics						
Age			0.011	4.459		
Single worker	-0.229	-3.895	-0.714	-9.047		
Two-worker couple	-0.289	-5.220	-0.478	-6.327		
One-worker couple	-0.173	-1.828	-0.421	-4.223		
Multiple-worker family	0.241	3.954	0.915	11.023		
One-worker family	0.450	4.351	0.870	7.974		
Multiple-working adults			-0.185	-1.937		
Female			-0.013	-4.568		
Single working female			-0.195	-2.003		
Female in two-worker couple	-0.009	-1.928	-0.166	-1.826		
Female in one-worker couple						
Female in multiple-worker family			0.371	3.773		
Occupation in clerical/administrative support	-0.246	-3.797				
Occupation in sales	0.246	3.794				
Household income ($ 1,000)	-0.003	-1.832				
Personality types						
Adventure seeker factor	0.119	3.612			0.164	4.899
Loner factor					0.099	2.993
Lifestyle types						
Frustration factor	-0.106	-2.644				
Workaholic factor	0.213	4.953				
Family/community orientation factor			0.085	2.091		
Status seeker factor	0.069	1.894	0.085	2.376	0.148	4.050
Travel-related attitudes						
Travel freedom factor			0.113	2.855		
Neighbourhood indicators						
North San Francisco resident					-0.200	-3.323
Threshold parameters						
μ_1	0.771	24.359	0.976	28.018	1.048	31.329
μ_2	1.489	43.776	1.793	45.558	1.745	39.893
μ_3	2.026	53.490	2.570	53.058		
μ_4	2.471	54.455	3.153	50.335		
Model statistics						
Log Likelihood at constant	-2288.8		-2288.1		-1757.3	
Log likelihood at convergence	-2361.5		-1982.6		1726.2	
χ^2	145.5		611.0		62.1	



N = statistically significant (α = 0.05) effect for $MM2_i$ in ANOVA for North San Francisco; P = statistically significant (α = 0.05) effect for $MM2_i$ in ANOVA for Pleasant Hill; S = statistically significant (α = 0.05) effect for $MM2_i$ in ANOVA for suburban neighbourhoods pooled.

Figure 1.
Residential neighbourhood type dissonance ($MM2_i$) and trip frequency by purpose and residential neighbourhood