The idea that land-use patterns can influence people’s behavior is popular in urban planning circles these days. Low-density development, single-use zoning, and cul-de-sacs are the targets of the attack against sprawl, auto-dependent travel, and even obesity. Compact development, mixed land-uses, and urban design improvements (e.g., sidewalks, street crossings, and smaller blocks) have all been put forth as ways to reduce drive-alone travel, spur transit use, and increase levels of physical activity.

In response, local, state, and regional governments have begun actively promoting more compact and pedestrian-friendly community designs, and citizens, political leaders, and land-use and transportation planners have fervently embraced these concepts in the hope that such benefits will come to fruition. In the Twin Cities metropolitan area, one would be hard pressed to find any community not striving to make their built environment less auto-reliant and more pedestrian-friendly. The popular designs flourishing around 50th Street and France Avenue in Edina and Minneapolis, or Excelsior Boulevard and Grand Way in St. Louis Park have become the gold standard of urban planning in the metro area. But is there sufficient evidence to suggest that altering land-use patterns can make people drive less and walk more? Will such planning affect traffic congestion levels?

Advocates quickly point to a flurry of studies that tell us with some certainty that households living in more urban and mixed-use communities tend to walk, use transit, or bicycle more than their suburban counterparts. Such findings are often flaunted in a manner akin to the mantra, “If you build more pedestrian-friendly neighborhoods, walkers will come.”

This enthusiasm is refreshing; most would agree it is critically important to support planning efforts that make walking easy, more attractive, and available to the diverse and increasing population in the Twin Cities region. However, one needs to be mindful of the potentially false expectations such planning initiatives create, particularly concerning the potential for...
land-use planning, by itself, to significantly influence people’s behavior. To help inform this discussion, this article examines the linkages between different dimensions of household decision making, including the types of travel residents engage in, the types of activities they tend to pursue, and factors affecting their choice of neighborhood. I analyze these and other phenomena in a synergistic manner to uncover what I refer to as different householder lifestyles. Recognizing how household decisions form together into different groups—not just knowing the impact of land use on travel—helps one better understand how relevant decisions relate to one another, the market segments of different populations, and subsequently the merits of various policy scenarios. The research upon which this article was based was supported by a grant from CURA’s Faculty Interactive Research Program.

Considerations in Building Pedestrian-Friendly Communities

The urban planning community is learning, not surprisingly, that encouraging walking and transit use, and reducing reliance on automobiles, are not as simple as building pedestrian-friendly neighborhoods. Analyzing a single policy or environmental change without fully capturing other important influences on behavior may lead to errant conclusions and even overstate outcomes about that policy or environmental change. This is particularly true with matters related to where people decide to live and work, what they consider pedestrian-friendly, and how they spend their time on a daily basis. How such critical dimensions of human behavior relate to one another is suggestive of a tightly spun web that incorporates many factors; trying to unravel that web by isolating and pulling out the land-use planning thread is a particularly complex endeavor.

Put another way, and as any good textbook on statistical analysis would tell us, correlation does not mean causation. It is important to distinguish between documenting correlations between community design and behavior, and claiming that it is intuitive that community design can affect behavior. It is increasingly clear that the majority of previous work on this subject has not adequately captured an important element: the broader issues that help guide a household’s series of behavioral decisions, including where to live. These issues include lifestyles, preferences, and long-term versus short-term decisions.

Residents (or families) often select locations for their homes to match their desires for certain behaviors such as walking or using transit; this is an amenity they prioritize in choosing their home location. This suggests that differences in mode or frequency of travel between households in locations with different neighborhood designs should not be credited to the neighborhood design alone; the differences should be attributed in some measure to self-selection. In other words, people who are likely to walk choose to live in a neighborhood where they have a better chance of engaging in active travel. Consequently, efforts to use urban design to induce unwilling auto-oriented households to walk or use transit may be futile for at least two reasons. First, their auto-using behavior is likely a function of their overall preference for a certain type of community design. These preferences are typically manifestations of the adults in the household because they are the driving (pun intended) forces behind decisions about neighborhoods and travel patterns, thereby leaving out the choices or preferences of children. To twist a popular adage, “You can take the family out of the suburbs, but you can’t take reliance on the Chevy Suburban out of the family.” This in turn suggests that the success of land-use planning to induce walking or transit use may be limited to the relatively small numbers of people who currently live in or would move to neighborhoods that are pedestrian friendly. The complex relationship between these issues is important for policy officials in the Twin Cities metro and other urban areas to understand, so as to guard against overstated or even unintended outcomes of land-use policy.

Uncovering Different Household Lifestyles

The research reported here is intended to uncover the relationships between decisions about how an individual travels, where in the region they chose to live, and how they typically spend their time. Assessing the relative magnitude of each influence, however, does not do justice to the complex and mutually reinforcing phenomena at work. Each influence tends to reinforce and mutually inform the others, combining long-term decisions (e.g., where to live and associated neighborhood characteristics) with short-term decisions (e.g., daily travel and activity participation). These related phenomena can be thought of as a deftly spun and tangled web of preferences, constraints, and identity. Rather than unravel this web of household decision making, my research approaches such household decisions as a single, integrated phenomenon. By jointly analyzing household decisions related to type of residential neighborhood, travel characteristics, and activity choices, I discovered that decisions about these phenomena tend to tie together in different patterns of webs.

The particular pattern of the web represents different lifestyles. Although the term lifestyle is widely used in research on travel behavior, it is generally employed informally and with little analytical basis. Researchers use the term as a framework for describing clusters of long-term household choices about residential location, labor force activity, and auto ownership that predispose or condition patterns of daily activity and travel behavior. By examining combinations of decisions related to residential neighborhood type, travel characteristics, and daily activity participation, I found that these phenomena tend to cluster together to form different groups of populations. The combinations of various decisions produces the overall utility that a household derives from its lifestyle choices.

A lifestyle is not a rigid set of patterns that are followed every day, nor even over time. Under many conditions, a household’s chosen lifestyle serves to inform daily travel and activity behavior, as well as residential location decisions. Over time, individuals adapt to changing conditions and reassess their values, in some cases deferring current consumption or making strategic investments to realize a desired lifestyle in the future. From a transportation perspective, a battery of recent policies are aimed at increasing neighborhood accessibility, allowing residents to shop closer to home and drive fewer miles. But how do increased levels of neighborhood accessibility relate to how individuals complete daily errands? What is the potential of land-use planning, by itself, to reduce miles of vehicle travel?

Methodology

To help answer these questions, I compiled a relatively large data set from a variety of sources. Primary among them is the Travel Behavior Inventory (TBI) Home Interview Survey. This survey was administered by the Metropolitan Council to gather important information about the travel behavior
and sociodemographic characteristics of individuals and households within the seven-county Twin Cities metropolitan area. The data in the TBI were collected via 24-hour travel diaries and two subsequent household telephone interviews during the summer of 2001. Use of a stratified sampling design ensured an adequate representation of all households in the metro area with respect to household size and vehicle ownership.

Initially, almost 9,000 households were recruited to participate in the survey, and to provide both household and individual socioeconomic and demographic data. Subsequent to the demographic interview, households were assigned a travel day on which all household members at least five years of age were asked to complete 24-hour travel diaries. Participants were asked to record all travel behavior for a 24-hour period in which they documented each trip that was taken, including the origin and destination of the traveler, the mode of travel, the duration of the trip, and the primary activity at the destination (if one was involved). Household characteristics and household location were assigned to each individual in the survey. The reported data grouped people’s myriad daily activities into discrete categories, including going to work, attending school, attending to childcare activities, shopping, visiting friends or relatives, conducting personal business, eating a meal, or engaging in entertainment. In the interest of parsimony, I broke down the time people spent in these various activities into four general groups: work-related (which includes school), maintenance activities (i.e., purchase and consumption of convenience goods or personal services), discretionary activities (i.e., voluntary activities performed during free time), and time spent at home.

Using each individual’s home location, I then incorporated other data to measure the nature of the individual’s neighborhood. These measures included the amount of retail within walking distance of their home, the population density of the neighborhood, the quality of local schools, and the degree of regional accessibility. This last measure was computed using a standard gravity model, which considers both the employment size of two places (e.g., two retail centers) and the distance between them. This model provides a good measure of activity concentrations that have drawing power from various centers of the Twin Cities region. As a whole, these data do an exemplary job of capturing travel and sociodemographic characteristics of individuals and households across the seven-county metropolitan area, encompassing primarily the urbanized and suburbanized areas of the region. In sum, I was able to work with data for more than 10,000 individuals.

As explained earlier, my approach in this research was to consider—in an integrated manner—various decisions that an individual faces about his or her travel characteristics, how to spend minutes in the day, and the characteristics of where they choose to live. I call this web of decision making a lifestyle, and define it by measuring variables that loosely fall into one of those three groups:

\[
\text{LIFESTYLE}_{\text{classification}} = f(\text{Travel Characteristics, Time in Activities, Neighborhood Characteristics})
\]
Using the data that I assembled for this project, my next step was to employ two statistical procedures—factor analysis and factor loading—to uncover the lifestyles of the individuals surveyed. I used factor analysis to learn how each of the measures from the data initially related to one another. Factor analysis (also called principal component analysis) is a statistical technique designed to extract a smaller number of factors from a larger set of intercorrelated variables. It is often used to study the patterns of relationships among many variables with the goal of discovering how the nature of the measured variables relate to one another. By doing so, researchers are able to better understand how specific elements of one variable (e.g., time spent in discretionary activity) relate to measures of another variable (e.g., number of walking trips). Uncovering such relationships helps identify possible interdependencies or interrelationships between these variables that might otherwise not be apparent.

The results of the factor analysis are shown in Table 1. After interpreting the data, I identified five key factors, which appear as the column headings. Individual cells in the table reveal what are referred to as factor loadings. Put simply, the nature of the factors must be deduced from seeing which of the variables in the left-hand column are most heavily "loaded" (that is, have the most impact) on which factors. For each factor, the variables with the highest factor loadings (above roughly 0.5 or below -0.5 in absolute value) are indicated in bold. For example, the first factor, amount of travel, shows a negative (low) value for the variable total minutes spent at home, suggesting that respondents who spend substantial amounts of time at home engage in less travel. Not surprisingly, the travel factor shows a positive (high) value for the variable total vehicle trips, suggesting that those who take more vehicle trips engage in more travel.

By examining the factor loadings, one can see the first factor represents total minutes spent in travel, the number of stops one makes each time they leave home, number of vehicle trips, and minutes spent at home. The second factor picks up neighborhood characteristics, including a measure of regional accessibility, how many shops are within one-half mile, household density, and the quality of the schools (measured by composite standardized test scores at the fifth-grade level).
third factor, at-home and maintenance activities, captures people who work few hours or don’t work at all (as detected by the high negative loadings on work minutes) and who tend to run errands (as detected by high positive factor loadings on minutes in maintenance activities). The fourth factor detects walking/transit use as measured by the number of each of these respective trips. The final factor picks up people who expend considerable discretionary time.

Using the above factors as a foundation, I then attempted to uncover how each of these factors combine to represent different household lifestyle choices. This involved asking two primary questions. First, do certain factors “cluster” together to reveal distinct household lifestyles? Second, to what extent do the results of the lifestyle analysis shed light on the potential for land-use and transportation planning initiatives to alter behavior?

I used a statistical technique known as cluster analysis to identify groupings of households with similar patterns of travel, activities, and neighborhood characteristics. Put simply, this technique assigns individuals to groups (clusters) based on shared characteristics. Because group members share certain properties in common, the resulting classification scheme provides insight into larger patterns of human behavior. Although all group members will not always share exactly the same characteristics, these general groupings form what I refer to here as different lifestyle clusters.

**Results**

The results of my analysis pointed to seven different lifestyle clusters based on the five factors identified above. Figure 1 shows the defining attributes of each lifestyle cluster, along with the percentage of individuals who were assigned to each cluster. The length and direction of the bar for each factor represents the value of the cluster center for the factor, which is analogous to a measure of the strength or intensity of that particular factor. The y-axis in Figure 1 therefore represents a value to be interpreted in relative terms to the other lifestyles.

The figure shows how patterns of factors representing different lifestyles emerge for each of the seven clusters. For example, spikes in high walking/transit use for Lifestyles 1, 2, and 3 indicate that individuals in each of these clusters have higher propensities for walking or using transit. Among these three lifestyles, there are also noticeable differences in other characteristics. For example, Lifestyle 1 represents people with relatively low levels of accessibility (indicated by the negative value for this factor)—most likely people living in suburban settings. This population is probably walking or using transit to get to or from their workplace or another destination. Lifestyles 2 and 3 are reasonably similar in nature, particularly because they live in areas with relatively high accessibility. These two lifestyles differ in two important respects, however. Lifestyle 2 tends to have more discretionary time, suggesting their walking may be related to social activities. Lifestyle 3 tends to have larger amounts of total travel, suggesting their walking may be done as part of daily travel.

The two spikes in factors for Lifestyle 5 suggest individuals who engage in a high amount of travel related to maintenance activities (e.g., grocery shopping or personal services); they also spend considerable amounts of time at home and not in work-related activities. Lifestyles 6 and 7—which represent almost two-thirds of the sample—share many of the same characteristics. A single feature differentiates them: neighborhood characteristics. Lifestyle 6 represents a population with lower levels of accessibility and higher school test scores, whereas Lifestyle 7 represents the reverse.

The first part of this research identified relatively homogeneous groupings of individuals into distinct lifestyles.
Figure 2. Home Locations of Individuals in Lifestyles 1, 2, 6, and 7

Lifestyle 1: Commuters who are walkers or transit users

Lifestyle 2: Urbanites who are walkers or transit users

Lifestyle 6: Suburbanites

Lifestyle 7: Urbanites
on the basis of travel characteristics, time spent in activities, and neighborhood characteristics. The final step examines the co-variation that exists between each of the lifestyle clusters, a variety of sociodemographic characteristics, and their location within the Twin Cities metropolitan region. For example, Figure 2 shows distinct differences between the home locations of Lifestyles 1 and 2. Commuters who walk or use transit to get to work (Lifestyle 1) have a greater tendency to live in outlying areas than do urbanites who walk or use transit but are not necessarily working (Lifestyle 2).

In addition, I explored whether a variety of other factors—including geographic location of residence, income, sex, age, owner vs. renter status, household size, and number of vehicles owned—had any relationship to the distinct lifestyles revealed by cluster analysis. Three sociodemographic characteristics—age, household size, and location of residence (living in either Minneapolis or St. Paul as opposed to suburban areas)—revealed interesting and statistically significant findings. Figures 3, 4, and 5 show the distributions for these three sociodemographic characteristics, respectively, for each of the seven lifestyle clusters. Figure 3 shows that Lifestyle 5 is disproportionately represented among individuals 40 to 59 years old. Figure 4 shows that the majority of households with four or more individuals are located in suburban environments (characteristic of Lifestyles 4, 5, and 6), and that there is little difference between walkers/transit users (Lifestyles 1, 2, and 3) with respect to household size.

The largest noticeable differences appear when one examines the populations who live in either Minneapolis or St. Paul proper versus suburban communities. Figure 5 shows how this characteristic clearly differentiates Lifestyle 6 from Lifestyle 7 (a phenomenon that can also be observed in Figure 2). This is not to suggest that every household categorized as a certain lifestyle adheres to all characteristics of that lifestyle; the lifestyles are based on general trends. For example, a fraction of individuals classified as Lifestyle 6 (suburbanites) live in Minneapolis or St. Paul, but may otherwise align closely with suburban behaviors. Likewise, individuals classified as Lifestyle 2 largely share the neighborhood characteristic of high accessibility, even though they may not all live in Minneapolis or St. Paul. Also of note is that disproportionate numbers of individuals from Lifestyles 4 and 5 reside in areas with less accessibility.

By way of summary, Table 2 describes the distinguishing characteristics for each lifestyle that my analysis found to be statistically significant or otherwise notable.

**Conclusions and Policy Implications**

This research uncovered a series of lifestyles in an attempt to illuminate relationships among decisions about how an individual travels, where in the region they choose to live, and how they spend their time. My aim was to
take a traditionally qualitative topic and turn it into something that could be more readily measured quantitatively. The exploratory nature of this approach as applied to land-use and transportation planning suggests that cluster analysis is best used in conjunction with other data analysis techniques. It may be used effectively to initially explore the data, or as a means of confirming group membership based on the results from other techniques. My approach produced results that can help planners and policy makers understand the size of some of the lifestyle clusters, associate them with general characteristics, and then surmise about the policy implications.

The good news for many urban planners is that my investigation uncovered three distinct lifestyles that employ walking or transit services (Lifestyles 1, 2, and 3). These three populations behave differently, and the manner in which they differ depends on their other associated characteristics of time use and neighborhood characteristics. The not so good news is that the combined population represented by these three lifestyles accounts for less than 8% of the study sample—suggesting the overwhelming majority of the population does not subscribe to a lifestyle conducive to walking or using transit. The 8% is roughly equivalent to the portion of the population in the Twin Cities metro area who ride transit or walk. If spurring transit and walking is a primary goal of urban planning initiatives, it might be best to look elsewhere than strategies that exclusively rely on land-use and transportation planning. This finding further supports the theory that the populations that take advantage of these modes are relatively small in size, and that these populations likely self-select into neighborhoods conducive to walking or transit use.

From another perspective, almost one-fifth of the study sample falls into Lifestyle 5, which represents individuals who tend not to work and who run many errands. Not surprisingly, these individuals hail from relatively large families, live in suburban settings, and report the highest amount of overall travel. Will more transit-supportive designs affect the travel behavior of this 20% of the population? Not likely. Their decisions may largely be a reflection of the cost of housing, the quality of schools, and their preferences for consumer goods acquired via auto trips.

One interesting finding from this research is that almost two-thirds of the study sample, represented by Lifestyles 6 and 7, behave in remarkably similar ways. The only differentiating feature of these lifestyles are the neighborhood characteristics, which fall closely along the lines of city versus suburb. This analysis suggests that for a majority of the urban and suburban population, there are few differences in terms of how such individuals spend their time or travel on a daily basis. Again, any planning improvements intended to mitigate travel solely through land-use planning would appear to have limited value because they are essentially directed at the behavior of the roughly one-third of the population that does not fall into Lifestyle 6 or 7.

The issues at the heart of this study have direct policy significance. Policy

<table>
<thead>
<tr>
<th>Lifestyle</th>
<th>Predominant behavioral, sociodemographic/economic, and geographic characteristics</th>
<th>Percentage of households</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Commuters who are walkers or transit users:</strong> People who tend to spend more time at work and who are walkers or transit users (possibly to travel to and from work or at their work location). Tend to be dispersed geographically throughout the region and have little discretionary time.</td>
<td>2.6%</td>
</tr>
<tr>
<td>2</td>
<td><strong>Urbanites who are walkers or transit users:</strong> People who walk or use transit (not necessarily for work), but who engage in relatively low levels of travel overall. Strong presence within the central cities.</td>
<td>4.3%</td>
</tr>
<tr>
<td>3</td>
<td><strong>Urbanite travelers with high walking/transit use:</strong> Individuals with notably high rates of walking and transit use, and high rates of overall travel. Tend to hail from households that are small in size and to live in urban settings.</td>
<td>0.7%</td>
</tr>
<tr>
<td>4</td>
<td><strong>Suburbanites with high discretionary time:</strong> People with high levels of discretionary time, but with average characteristics otherwise. Disproportionate share of individuals under 18 years of age. Tend to live in suburban residences.</td>
<td>6.8%</td>
</tr>
<tr>
<td>5</td>
<td><strong>Suburbanite stay-at-home maintenance runners:</strong> People who engage in high amounts of travel for maintenance activities, but otherwise spend large amounts of time at home and engage in little work activity outside the home. A high population of 40 and 50 year olds. Tend to live in suburban residences.</td>
<td>20.4%</td>
</tr>
<tr>
<td>6</td>
<td><strong>Suburbanites:</strong> People who live in suburban areas, with high household size, relatively lower levels of overall travel, and average characteristics otherwise.</td>
<td>47.3%</td>
</tr>
<tr>
<td>7</td>
<td><strong>Urbanites:</strong> Concentrated within the Interstate 494/694 beltway. Tend to shy away from walking or transit use.</td>
<td>18.0%</td>
</tr>
</tbody>
</table>
officials are able to better surmise the potential impact of various policy options by knowing the size of potential markets. Take, for example, the Smart Commute Mortgage Program in the Twin Cities, which aims to encourage lower income families to purchase homes in transit-accessible neighborhoods. The 8% of the study sample who walk or use transit would be a prime market to target. Alternatively, constructing light-rail systems, beltways, or higher-density neighborhoods may influence decisions about daily activities, travel, and residential and workplace location. But the populations who may take advantage of higher density neighborhoods are largely of two types. The first are people who would switch their behavior for such types of neighborhood. The research I’ve presented here is unable to shed light on this population. The second are households who already take advantage of such opportunities, which I have shown is a reasonably small percentage of the total population.

Providing people with more discretionary time and access to pedestrian-friendly neighborhoods and destinations might influence their health. They could more easily walk more often. But the impact of any such changes must not be overstated; an increase in walking is not necessarily synonymous with a reduction in auto dependence. People may still drive to run errands, pick up children, and buy groceries. They may just walk in addition to engaging in such auto-centered activities. Acknowledging that policies might more realistically achieve some goals than others (e.g., increasing physical activity versus lowering automobile use) is one matter. Suggesting that some of these goals may be more effectively reached through land-use planning strategies based on the lifestyle clusters I have identified here is a more complex endeavor. The bottom line is that, based on the results of this study, I would be remiss to conclude that mixed-use or higher density development would trigger noticeable changes in travel, time use, or even residential location decisions. There appears to be a relatively large and stable population in the Twin Cities metro who subscribe to Lifestyle 6 and who behave in reasonably homogenous ways that would be hard to modify by using urban design levers alone.

The approach presented here can help policy makers better understand how various phenomena interact within the context of household lifestyle choices. Continued research and more careful attention to how these decisions unfold, as well as to the role that attitudinal preferences play in such decisions, may help transportation planners better design land-use and transportation initiatives to achieve their objectives. A more thorough understanding of the complex relationships involved in household lifestyle choices will ultimately assist policy makers to construct better informed policies about the built environment.

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