THE EFFECTIVENESS OF LAND USE POLICIES AS A STRATEGY FOR REDUCING AUTOMOBILE DEPENDENCE: A STUDY OF AUSTIN NEIGHBORHOODS

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EXECUTIVE SUMMARY

Planners and urban designers are increasingly concerned with the question of how alternative forms of development affect travel patterns and with the more specific question of how development might be shaped so as to reduce automobile dependence. The nature of suburban development is seen as a cause of automobile dependence and so a change in the nature of suburban development is seen as a possible solution. Efforts to promote infill and mixed-use development and calls for neo-traditional forms of development are based on the assumption that these types of developments will help to reduce automobile dependence and increase walking, biking, and transit. However, the available empirical evidence is insufficient to either support or refute their claims and fails to reveal very much about how land use policies might be used to shape travel behavior more generally.

The work described in this report represents an effort to better understand the link between urban form and travel behavior and to evaluate the potential effectiveness of land use policies as a strategy for reducing automobile dependence. The objectives of the study were to:

(1) Determine the degree to which residents replace automobile trips with walk and other non-automobile trips in neighborhoods with different physical characteristics.

(2) Identify specific physical characteristics which influence the walking versus driving choice, as well the transit versus driving choice where applicable.

(3) Characterize and evaluate factors underlying the use of local commercial areas.

(4) Determine the relative influence of land use characteristics versus socio-economic and attitudinal characteristics on travel patterns.

(5) Quantify the potential effect of specific land use characteristics on travel patterns, including trip frequencies, trip distances, mode split, and total travel.

In addressing these objectives, the study focused on three types of non-work trips made in and around the neighborhood: walking trips, grocery shopping trips, and local shopping trips. These types of trips are potentially influenced by the physical characteristics of the neighborhood to a significant degree - certainly more so than work trips which are much less discretionary in nature. These three trip types also overlap in interesting and important ways. Residents may walk to a grocery store or to other local stores, or they may simply walk in the neighborhood. Residents may shop at a local grocery store, or may choose to shop at a more distant store. Residents may choose to shop at local stores other than grocery stores, and may walk or drive there. The degree of overlap between these three types of trips has significant implications for total automobile

travel: more walking may mean less driving because of fewer car trips, more local shopping may also mean less driving because of shorter car trips.

We studied six neighborhoods in Austin, TX to evaluate the potential effectiveness of land use policies as a strategy for reducing automobile dependence. Austin was chosen largely for convenience but also because it encompasses a suitable range of neighborhood types. The first step was to select case study neighborhoods based on their physical character, their location in the city, and the socio-demographic characteristics of their residents. The second step was to evaluate the physical characteristics of each neighborhood, focusing on key differences that might lead to differences in travel behavior. The third step was to develop an understanding of the travel choices of neighborhood residents, using a household travel survey followed by focus groups with neighborhood residents to explore both their choices and the motivations for their choices. The final step was to determine the extent to which differences in the physical character of the neighborhoods led to differences in travel choices of the residents.

We selected six neighborhoods in Austin: two "traditional" neighborhoods built early in the century and located near the center of the city; two "early-modern" neighborhoods built not long after World War II and also located near the center of the city; and two "late-modern" neighborhoods built in the last couple of decades and located at the expanding fringe of Austin. After selecting case study neighborhoods, we evaluated the urban form characteristics of each neighborhood, using a variety of techniques, including analysis of GIS databases, hardcopy maps, aerial photos, and data collected through site visits. The focus of this effort was on differentiating the neighborhoods and quantifying observable differences. In addition, factors suggested by the urban design literature as influencing the quality of the pedestrian environment were studied.

Data on travel choices were collected through a mail-out, mail-back survey administered in late May, 1995. The survey included sections on supermarket trips, walking trips, trips to local commercial areas, and socio-demographic characteristics, as well as questions on feelings about and perceptions of a variety of urban form characteristics, and was four pages in length. On the order of 1000 surveys were sent to a random sample of individuals in a random sample of households in each neighborhood. The response rate varied from 21% to 28% by neighborhood, resulting in a samples ranging from 192 to 281 per neighborhood and an overall sample of 1368. As a follow-up to the household survey, focus groups were conducted in each of the six neighborhoods in January and February 1997. The goal of these focus groups was to test the conclusions drawn from the travel survey and to explore in more depth the factors influencing decisions about local shopping and walking, the interplay between decisions about where to live and decisions about non-work travel, and residents' feelings about and sense of their own neighborhoods.

The results of the travel survey and the focus groups together provide an understanding of the role of urban form in influencing choices about walking, grocery shopping, local shopping, and residential location choice. In most cases the survey data were supported by the focus group discussion which provides a rich and detailed elaboration on survey responses. At times, the focus group discussion contradicts the survey findings or did not offer an explanation for them; these cases point to the complexity of travel behavior and the need for further research to better understand it. Together, the evidence suggests urban form directly and indirectly influences choices about nonwork travel, yet urban form is just one of many factors -- and not always an important one -- influencing these choices.

One of the important issues addressed by the analysis was the possibility that walks to the store might replace drives to the store. This question of substitution is a difficult one to test and one that cannot be fully resolved through observing differences in trip rates for different modes. In the survey used in this study, respondents were asked to think back to their last walking trip to a store. Then, for this trip, they were asked to speculate on what they would have done had they not been able to walk that day, for whatever reason. Most respondents in all neighborhoods indicated that they would have driven to that destination or another destination, rather than not making the trip, taking transit, or some other alternative. In other words, most of the walks to commercial areas did in fact appear to substitute for driving trips. This suggested that if residents are given the opportunity to walk to the store they will eliminate at least some of their driving trips. However, the results also showed that the savings in travel will not be great: optimistically, about 8 kilometers (4.8 miles) of driving are saved per resident per month. In addition, some respondents would have stayed at home rather than making a trip, suggesting that the opportunity to walk in some cases induces trips that would otherwise not be made. The focus group discussions also suggested this possibility. Residents often walk both for exercise and to get somewhere; in some cases, the former motive is the more important one and the destination is simply an excuse to walk.

The results of the analysis suggest two general conclusions. First, certain urban form characteristics which planners can encourage through land use policies and design guidelines make walking and shopping locally more attractive choices. The most important policy is to encourage commercial activity within walking distance of residential areas - a necessary but not sufficient condition for walking. Other policies that can help to encourage walking and local shopping include: requiring short setbacks and continuous street frontages for commercial buildings, minimizing parking requirements and encouraging parking on the side or rear of buildings, requiring continuous sidewalks between residential and commercial areas, providing ample street trees and other pedestrian amenities, discouraging through traffic in residential areas, enforcing leash laws, and so on. These policies will not mean a significant reduction in

automobile travel, but they will mean that the choice to walk or shop locally becomes more competitive with driving to more distant locations.

Second, most of what influences residents' choices about walking and local shopping is not anything that planners can do anything about. The fact that residents have so many choices -- not just the local supermarket but also the next one down the road or the health food store across town -- means that few of them will always choose the closest option, instead sometimes or always traveling farther to find the store that better meets their needs. This is a simple fact of life in metropolitan areas. Many of the characteristics that produce a comfortable and interesting walking environment depend not on neighborhood design but on how residents adapt and adapt to the neighborhood: gardening, house renovations, holiday decorations, even open curtains. The connection residents feel to their local businesses depends on the efforts those businesses make to foster those connections.

So can land use policies be an effective strategy for reducing automobile dependence? Yes and no. Land use policies are clearly important in determining whether residents have the choice to do something other than drive. In that sense they help to reduce the need to drive. But simply having an alternative to driving doesn't mean that residents will take advantage of it. This study shows that some people are more disposed to walk than others and that those who are more disposed to walk are more disposed to chose a neighborhood where walking is an option. Even where the environment is right to encourage walking as a substitute for driving, the savings in vehicle travel are likely to be small given the low frequency and short distance of such trips. And once residents are in their cars, they will often choose to bypass local destinations for more attractive ones farther away. Planners should focus on land use policies that will help to provide alternatives to driving, but they shouldn't expect such policies alone to control growing levels of travel.

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ABSTRACT

Planners and urban designers are increasingly concerned with the question of how alternative forms of development affect travel patterns and with the more specific question of how development might be shaped so as to reduce automobile dependence. The nature of suburban development is seen as a cause of automobile dependence and so a change in the nature of suburban development is seen as a possible solution. Efforts to promote infill and mixed-use development and calls for neo-traditional forms of development are based on the assumption that these types of developments will help to reduce automobile dependence and increase walking, biking, and transit.

The work described in this report represents an effort to better understand the link between urban form and travel behavior and to evaluate the potential effectiveness of land use policies as a strategy for reducing automobile dependence. This work builds on previous research in this area but attempts to go beyond it by exploring the motivations for travel as well as the patterns of travel. Travel surveys and focus groups were used to study the travel choices of residents of six case study neighborhoods in Austin, TX. The results suggest that the role urban form plays in travel behavior is not entirely straightforward, sometimes influencing travel choices directly, sometimes indirectly, sometimes influencing choices in the short term, sometimes the long term, and sometimes not having any measurable influence on choices at all. In the end, it appears that certain land use policies can help to provide alternatives to driving, but that the reduction in driving is likely to be small.

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CHAPTER 1. INTRODUCTION

Planners and urban designers are increasingly concerned with the question of how alternative forms of development affect travel patterns and with the more specific question of how development might be shaped so as to reduce automobile dependence. The nature of suburban development is seen as a cause of automobile dependence and so a change in the nature of suburban development is seen as a possible solution. Efforts to promote infill and mixed-use development and calls for neo-traditional forms of development are based on the assumption that these types of developments will help to reduce automobile dependence and increase walking, biking, and transit. However, the available empirical evidence is insufficient to either support or refute their claims and fails to reveal very much about how land use policies might be used to shape travel behavior more generally.

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BACKGROUND

The concept of neo-traditional development, now a part of the larger movement called "The New Urbanism," calls for a return to residential design principles of the pre-World War II era. In contrast to typical post-World War II neighborhoods, neo-traditional neighborhoods feature rectilinear street grids, narrower streets, shorter setbacks, alleys, front porches, detached garages with "granny flats", variations in housing design and materials, an integration of residential and commercial areas, and a focus on transit access, among other elements. Reflecting the growing interest in traditional design principles, a *Newsweek* article from 1995 outlined 15 ways to fix the suburbs, Including "bring back the corner store," "make the streets skinny," and "hide the garage."

Among other things, proponents claim that this approach to residential design will encourage the substitution of walking trips for driving trips. The Awahnee Principles of 1991,

developed by the founding members of the new urbanism movement, state that "community size should be designed so that housing, jobs, daily needs and other activities are within easy walking distance of each other" and mandate that "streets, pedestrian paths and bike paths should contribute to a system of fully-connected and interesting routes to all destinations" [11]. Because the pedestrian environment will be more pleasant and feel safer and because commercial activity will be within comfortable walking distance for most residents, they are likely to walk more and drive less than residents of typical suburban subdivisions, according to the proponents. The proximity of commercial activity and the efficiency of the rectilinear grid mean that even for the driving trips that remain, distances should be shorter. The net result, they claim, will be a reduction in vehicle miles traveled (VMT), especially for non-work travel.

The research that is used to support the claim that neo-traditional design will help to reduce automobile use falls into three categories, none of which is fully adequate to the task. In the first type, traditional transportation models are used to predict differences in total travel between typical neighborhoods and hypothetical neo-traditional neighborhoods. McNally and Ryan [31], for example, show that rectilinear networks should lead to shorter average trip lengths, all else equal. The results of these analyses, however, are highly dependent on the assumptions that go into the model and are too hypothetical and speculative to provide much support for neo-traditional policies.

In the second type, aggregate level data is used to compare average travel characteristics in cities of different sizes and densities. Examples include Newman and Kenworthy [32], whose work shows a strong correlation between density and gasoline use and which has been widely cited in support of policies to encourage higher densities. One of the many limitations of such research is that density itself has no direct causal relationship with travel behavior, rather it is correlated with better transit service, a greater mixing of land uses, higher levels of congestion and other factors that may lead to less automobile use.

In the third type, aggregate level data is used to compare average travel characteristics in neighborhoods of different types. Usually, high density, mixed-used neighborhoods are compared to low-density neighborhoods with segregated land uses; the higher densities neighborhoods have proven to have lower levels of VMT (ex. [10] [21]). This research, while seeming to directly support the claims of proponents of neo-traditional development, fails to isolate which aspects of the physical character of these communities affect travel behavior in what way. In addition, the role of socio-economic characteristics is often ignored.

Although these studies document clear differences in travel patterns between different kinds of neighborhoods, they provide little practical guidance for revising land use policies and even less basis for predicting the impact on travel of such policies. Two alternative research approaches have the potential to shed more light on how and to what degree the physical

characteristics of a neighborhood shape the choices residents make about travel, thus providing the depth of understanding needed to better evaluate the potential effectiveness of land use policies: qualitative research and travel choice modeling. This study focuses on qualitative approaches, in an exploratory effort to understand the link between neighborhood characteristics and travel choices.

OBJECTIVES OF STUDY

The objectives of the study were to:

(1) Determine the degree to which residents replace automobile trips with walk and other non-automobile trips in neighborhoods with different physical characteristics.

(2) Identify specific physical characteristics which influence the walking versus driving choice, as well the transit versus driving choice where applicable.

(3) Characterize and evaluate factors underlying the use of local commercial areas.

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(5) Quantify the potential effect of specific land use characteristics on travel patterns, including trip frequencies, trip distances, mode split, and total travel.

In addressing these objectives, the study focused on three types of non-work trips made in and around the neighborhood: walking trips, grocery shopping trips, and local shopping trips. These types of trips are potentially influenced by the physical characteristics of the neighborhood to a significant degree - certainly more so than work trips which are much less discretionary in nature. These three trip types also overlap in interesting and important ways (Figure 1-1). Residents may walk to a grocery store or to other local stores, or they may simply walk in the neighborhood. Residents may shop at a local grocery store, or may choose to shop at a more distant store. Residents may choose to shop at local stores other than grocery stores, and may walk or drive there. The degree of overlap between these three types of trips has significant implications for total automobile travel: more walking may mean less driving because of fewer car trips, more local shopping may also mean less driving because of shorter car trips.

ORGANIZATION OF THE REPORT

This report is organized as follows. Chapter 2 provides a literature review of the existing research on the link between urban form and travel behavior and includes an assessment of the issues that remain to be addressed. Chapter 3 describes the methodologies used in this study, including the selection of the six case study neighborhoods, the household survey methodology, and the focus group methodology. Chapter 4 presents a description of each of the

six neighborhoods as well as an analysis and comparison of the transportation systems, commercial activity, and design characteristics of the neighborhoods. Chapter 5 presents the results of the survey and the focus groups for walking trips, grocery shopping trips, and local shopping trips. Chapter 6 includes an analysis of the relative importance of urban form factors and socio-economic factors. Finally, Chapter 7 summarizes the key findings, distinguishing between urban form factors which can be controlled through land use policies and those which can't.

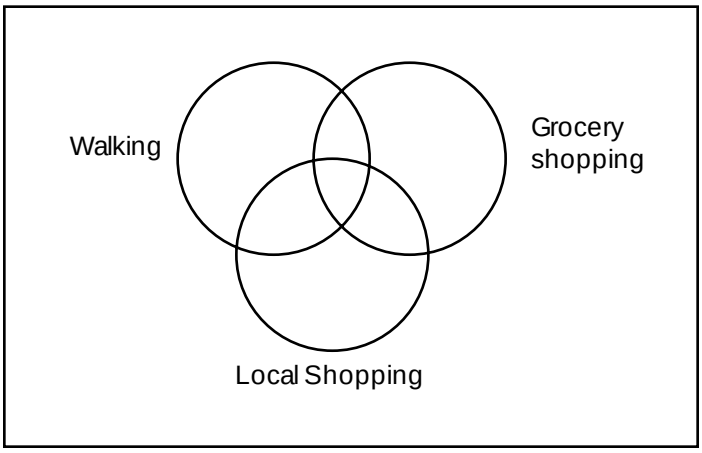

Figure 1-1. Overlapping Trip Types

CHAPTER 2. LITERATURE REVIEW

While the empirical evidence so far suggests that land use policies can have a significant impact on automobile dependence, closer examination of the evidence suggests the relationships are more complex and the answers are not as clear as they may at first seem. In this chapter, we review the research approaches and results of recent studies of the link between urban form and travel, and use discrete choice theory as a framework for identifying issues that the research in this area has not yet adequately addressed. These issues point to the need for alternative and more creative research approaches.

Before turning to the literature, a number of terms should be clarified. First, the term "urban form" is used as a broader concept than the more usual "land use"; land use patterns are one aspect of urban form, which also encompasses characteristics of the transportation system and urban design features more generally. Urban form is thus a composite of a multitude of characteristics. Researchers often evaluate urban form using one or two variables that may reflect or be correlated with sets of specific characteristics. The challenge is to understand what urban form characteristics are linked, individually or in combination, to travel.

Second, "aggregate" here refers to data or analysis at the zone, tract, neighborhood or city level, in contrast to "disaggregate," which refers to data or analysis at the level of the individual or household. Most data on household travel is collected at a disaggregate level, usually through household travel surveys, but researchers often analyze aggregate statistics rather than the individual records. Urban form is usually characterized on an aggregate level, say for a neighborhood as a whole. But certain elements of urban form may vary within a neighborhood and may thus be more appropriately measured at the household level; distance to local shopping, for example, is important in studies of walking trips.

Third, "travel patterns" refers to aggregate-level characteristics of travel, such as mode split or numbers of trips for a zone, in contrast to "travel behavior," which refers to the choices of individuals and households. Studies of travel patterns help to quantify the potential impact of urban form on overall travel, while studies of travel behavior contribute to an understanding of how and why urban form is linked to travel.

SUMMARY OF RESEARCH

Most of the recent research on the link between urban form and travel behavior that is used to support policies as a way of shaping travel behavior falls into three categories [14]. In the first type, traditional transportation models are used to predict differences in total travel between typical suburban neighborhoods and hypothetical neighborhoods of higher densities or more traditional design. In the second type, aggregate level data are used to compare average travel

characteristics in neighborhoods of different design or cities of different densities. In the third type, disaggregate data are used to test differences in individuals' travel choices between neighborhoods and the relative importance of a variety of urban form factors in those choices. Studies of the first two types generally show significantly lower levels of automobile use, due to fewer automobile trips and/or shorter trip distances, in areas of higher density or traditional design than in typical suburbs, but studies of the third type are less conclusive and often suggest that the results depend on various factors not accounted for in the first two approaches. Studies of both the second and third types suggest that the results depend on what characteristic of urban form and what aspect of travel are analyzed.

Simulation studies assume certain relationships between urban form and travel patterns and then use these assumed relationships to predict the implications for travel of alternative forms of development; they do not empirically test the relationship between urban form and travel behavior. In most cases, hypothetical cities or neighborhoods, or hypothetical changes in real cities or neighborhoods, are tested using a traditional transportation planning model. Two important limitations of this approach should thus be noted: the accuracy of the assumed relationships between urban form and travel behavior, and the appropriateness or generalizability of the assumed land use development. For the most part, these studies provide some general insights into the potential effect on travel patterns of different types of development but do not contribute to an understanding of the relationship between urban form and travel behavior.

Until recently, simulation studies tended to focus on the overall structure of a city or metropolitan area, in terms of the distribution of employment and residential activities and/or the structure of the transportation network (e.g., [29] [41] [28]). The well-known "Costs of Sprawl" study by the Real Estate Research Corporation [39] used this approach to test the implications for travel times, energy use, and air pollution in six different community development patterns. More recent studies have used this approach to test the impact of neotraditional development -- or certain aspects of it -- on travel. Douglas [7], for example, tested alternative future development patterns for the Middlesex-Somerset-Mercer, NJ, Region. In more limited studies, McNally and Ryan [31] and Rabiega and Howe [38] focus on the structure of the street network within a neighborhood.

A large segment of the research on the link between urban form and travel patterns, including many of the recent studies, falls into the category of aggregate analysis. This type of research characterizes both urban form and travel, for cities or neighborhoods or zones, using aggregate measures and tests the strength of the relationship using simple comparisons, correlations, or regression procedures. Many of these studies have shown significant relationships between density or other measures of urban form and trip frequency, average trip lengths, mode split, or total automobile travel. This approach has thus provided promising

evidence of the potential effectiveness of land use policies in reducing automobile dependence. But because of the focus on the relationship between urban form and aggregate patterns of travel, this approach on its own does not allow for an exploration of underlying factors and the mechanisms by which urban form influences individual decisions.

Of the studies that compare one city to another, Newman and Kenworthy's [32] study may be the most well known. More recently a number of studies have compared travel patterns in pre-WWII "traditional," gridded suburban communities and post-WWII "sprawling," curvilinear suburban communities. The intent of this work is, for the most part, to test claims that are made about the potential impact of new urbanism strategies on travel behavior. These studies together provide convincing evidence that automobile travel is lower in traditional-style neighborhoods, but only a limited understanding of the specific elements of characteristics of these neighborhoods that lead to these differences. However, this research has become more sophisticated over time in terms of increasingly comprehensive characterization of urban form. Examples include Holtzclaw [20] [21], Friedman et al. [10], Frank and Pivo [9], Cervero and Gorham [4], and the LUTRAQ study for Portland [35]. Cambridge Systematics' [3] study differs from these others in its focus on the effects of land-use-related demand management strategies at employment sites in the Los Angeles area, but is notable for its comprehensive approach to characterizing urban form at the work site.

In contrast to aggregate analyses, disaggregate analyses use individual and household socio-economic and travel characteristics, rather than zonal averages. Analysis-of-variance or regression models are estimated to test the strength of the relationship between socio-economic, urban form, and travel characteristics, but in this case for the individual or the household rather than for zonal averages, thus accounting for within-zone variations. Some of these studies also incorporate disaggregate measures of urban form into the analysis; although many aspects of urban form are most appropriately measured at an aggregate level, for the neighborhood as a whole, certain characteristics such as distance to nearby activities can vary significantly for households within the neighborhood. These studies show not only that travel differs between different types of communities, but also begin to reveal some of the complexities in behavior underlying these differences. These disaggregate studies, however, do not directly reflect theories of choice processes.

Hanson's study in Uppsala, Sweden, in the early 1980s is often cited in more recent studies of this type [18]. This study characterized urban form in terms of accessibility to various activities and found significant links between accessibility and certain aspects of travel behavior. Work by Frank and Pivo [9] and for the LUTRAQ study [35], which included disaggregate analysis along with aggregate analysis, show that urban form variables account for a significant portion of the variation in travel behavior. Ewing, et al. [8], Handy [17], Cervero and Radisch [6], Rutherford,

et al. [40], and Cervero and Kockelman [5] show that travel patterns differ more significantly between neighborhoods of different type than among residents within each neighborhood and begin to explore urban form characteristics that may lead to these differences. The study by Kitamura, et al. [26] is notable for its exploration of the role of attitudes in explaining travel behavior. This study showed that characteristics of urban form account for a significant portion of the variation in travel behavior, but that attitudes accounted for a larger portion of the variation.

THEORY AND ISSUES

The research-to-date on the link between urban form and travel behavior has contributed to a substantial base of knowledge, yet leaves a number of important issues unresolved. What we know is that there are significant differences in travel patterns between different types of communities. What we don't fully understand is the reasons for those differences and the importance of urban form relative to other factors in explaining those differences. Although some studies claim to show that some measure of urban form (density, for example) "explains" a certain portion of the variation in travel behavior, the explanation is a statistical one, not a behavioral one. To better understand the behavior and thus the causality underlying the differences in travel patterns that have been observed, it is important to take another look at travel behavior theory and the kinds of questions it raises about the ways in which urban form may influence travel behavior.

Despite its limitations, discrete choice theory provides a useful framework for thinking about the causal relationship between urban form and travel behavior [15]. In short, this theory says that the probability of an individual making a particular choice, out of some set of possible choices, depends on the utility of that choice relative to the utilities of all possible choices. The utility of any choice depends on the characteristics of that choice as well as the characteristics of the individual, since everyone evaluates choices in different ways. When applied to travel behavior, this theory suggests that three elements must be considered: the set of possible choices, the characteristics of those choices, and the characteristics of the individual.

Within this context, urban form is evaluated in terms of the sets of choices that it provides and the way it influences the characteristics and quality of those choices. Some elements of urban form determine what choices are available to an individual. Most basically, the pattern of land uses - what activities are located where - determines the set of possible destinations, which will be different for each activity, and the distances to them. Other elements of urban form determine the quality or characteristics of the choices that are available for destination and for mode: are there sidewalks, are they shaded, is the scenery interesting? is the store surrounded by parking or situated on the street? To understand the role that urban form plays in travel choices it is necessary to evaluate the ways in which urban form shapes the choice sets available and the characteristics of the choices within those sets. A closer look at these two elements - choice sets

and choice characteristics - suggests a number of issues with respect to urban form that need to be addressed, and these issues point to the need for different research approaches.

Choice Sets

The relevant choice set depends most fundamentally on the choice being made. Most studies have focused on trip frequency or mode choice or on total vehicle travel (a combination of frequency, mode choice, and distance as determined by destination choice), but it is widely recognized that different kinds of choices are not always independent. For example, the choice as to mode of travel may by tied to the choice of when to travel (e.g. go during the day and walk vs. go at night and drive), or the choice of how often to go may be tied to the choice of where to go (e.g. a closer store more often versus a farther store less often). Choices may be made simultaneously or sequentially or both. In any event, the structure of choices is more complex and more variable than most models reflect. As Heggie put it: "To characterize travel choices in terms of trip frequency, time of day, destination, mode and route is thus unduly simplistic. It ignores the wide range of substitutes actually available to the individual and the linkages which often cause an (expected) response to lead to another (unexpected) one" [19].

One issue that is important in understanding whether certain aspects of urban form can reduce automobile dependence is whether or not walking trips substitute for driving trips. The usual assumption is that the issue is one of mode choice: whether to walk or drive. In this case, a decision to walk would mean one less decision to drive and thus a reduction in total driving. It is also possible, however, that the choice is one of whether to take a walk or to stay at home. In this case, urban form can be said to "induce" trips, that is, enable or encourage trips that would not be made if walking were not an option. Traditional travel diary surveys show what choices have been made but do not provide a basis for understanding the set of alternatives considered in making that choice.

Similarly, the relationship between long term choices, such as residential and work location choice or automobile ownership, and day-to-day choices about travel must be considered: long-term decisions determine what choices are available on a day-to-day basis. Where one chooses to live, for example, will determine whether or not stores are within walking distance or whether transit service is available. This suggests another, indirect role for urban form in travel choice, in influencing these longer term decisions that determine the choice sets available in the shorter term. This relationship also raises the possibility of self-selection: that those individuals who want the option of walking or taking transit purposefully select a residential location where they will have that option. In this case, a correlation between urban form and travel does not reflect a day-to-day influence on travel behavior but rather an impact on the longer term decisions that determine day-to-day choice sets.

It is almost too obvious to state that different types of trips (work versus shopping, grocery shopping versus furniture shopping) will have different choice sets. Yet many of the urban form studies analyze total travel or focus on work trips or on nonwork trips. Jones points out the behavioral differences between work and nonwork travel behavior: "Non-work travel decisions are usually much more complex than their work journey counterparts, because of the wider range of real choice potentially available (including mode, timing, frequency, destination and route), the greater variability of travel behavior (across individuals and over time), and the diverse interrelationships between sub choices: for example, choice of mode predetermines the availability of routes, travel times and feasible destinations" [25]. But the difference in terms of flexibility and complexity between different types of nonwork trips may be as great as the difference between work and nonwork trips. It is important to understand differences in the structure of choices and the definition of choice sets for specific types of trips, and the different role that urban form plays for different types of trips.

As noted earlier, many recent studies focus on the influence of urban form within the neighborhood. This means that travel choices are evaluated within the context of the choices available within the neighborhood, but not beyond. Presumably the greater the number of destination choices available within the neighborhood, the more likely that a destination within the neighborhood will be selected. But it is also probable that the more choices available outside the neighborhood, the more likely that a destination outside the neighborhood will be selected. Limiting the evaluation of urban form to neighborhood boundaries is an artificial restriction from the stand point of travel behavior. In addition, many recent studies evaluate the choices available rather coarsely; for example, in terms of the amount of retail employment within the neighborhood. But if the neighborhood retail activity does not include a supermarket, the fact that the neighborhood has lots of retail activity will have no impact on grocery shopping trips. Both of these simplifications mean that the choices residents make are not being studied in the context of the true set of choices available.

It is also widely recognized that perceptions, attitudes, and preferences influence each individual's choice set, for both long-term and day-to-day choices about travel. Two neighbors may, objectively, have the exact same choice set in terms of possible destinations and travel modes, yet one may not be aware of one of the local shops while the other may not consider riding the bus an option. In addition, individual and household constraints vary: limited income, extra household responsibilities, or physical limitations may mean one neighbor has fewer options than the other. Thus it is important to understand not just how urban form objectively shapes choice sets (e.g. what destinations are located at what distance away), but also how perceptions about urban form moderate the choice sets that individuals perceive.

Choice Characteristics

Urban form also shapes the characteristics of the choices available, most directly for choices about mode and destination. As for choice sets, the role of urban form in influencing the characteristics of choices can most accurately be understood when specific types of trips are examined. Different aspects of urban form may matter to different degrees for different types of trips. For work trips, for example, the primary concern is generally speed, and design elements may have little influence on the choice of mode. For trips to the convenience store, design elements may be the critical difference between the choice to walk or the choice to drive.

Another important question is whether specific characteristics of urban form influence choices independently or whether sets of characteristics work together to influence travel choices and if so, what sets. Many of the studies have simply compared travel in one type of community to another. This leaves open the question of what it is about these communities that leads to the differences in travel. Another approach is to use very general measures of urban form - density for example. But two communities with the exact same density may be very different in other ways. The problem is not an easy one to resolve. As Parsons, et al. [36] conclude after testing the relative influence of density, land use mix, and urban design, "it is difficult to sort out the roles of land use mix and urban design in shaping travel behavior because of their strong correlation with density... collectively they have a clear impact. The difficulty lies in determining the effects of each separately." It may not be essential to determine the effect of each aspect of urban form separately, but some effort should be made to better understand what the important elements are, help to guide decisions about land use policies and urban design guidelines.

A more challenging issue is how characteristics of urban form should be measured. Urban form is most appropriately measured in terms of what matters to the individual. For example, does an individual consider the density of the neighborhood when deciding whether to take the bus or to walk? More likely, she considers how close the destination is, how close the bus stop is, how frequently the bus runs, how congested the roads are - all characteristics which are correlated with density. Does she consider whether the street network is a rectilinear grid? More likely, she considers how direct a route, whether a variety of routes are possible, how much traffic. In other words, elements of urban form should be translated into what they mean for residents and what kinds of choices they make available.

Taking the issue one step further, the choices that individuals make depend not on an objective evaluation of urban form but on their perceptions of and responses to urban form: "it is generally accepted that an individual's perception of an event or attribute is the appropriate dimension for explaining behavior" [13]. One neighbor may perceive the neighborhood to be a safe place to walk, the other may not. One neighbor may enjoy looking at houses and gardens on his walk, the other may be oblivious to her surroundings. Although researchers can objectively

observe different design elements, they can't so easily evaluate the different ways in which different individuals interpret and respond to those elements.

The urban design literature suggests ways in which urban form shapes the perceptions of the physical environment and how perceptions of the physical environment shape activity within that environment, including walking and "hanging out." This work provides guidance as to what elements of urban form may encourage or discourage walking. A common theme of this body of research is that better links between the private space of buildings and the public space of the street encourages more street activity and makes for a more interesting pedestrian environment. Schumacher [42], for example, found that the configuration of buildings in terms of street space and building volume influences street use; design characteristics such as front porches are important as a transition from public to private space. Gehl [12] defines several housing characteristics that prevent people from seeing and hearing each other: walls, long distances, different levels, orientation away from the street; the opposite characteristics allow for hearing and seeing. Appleyard [1] found that building types, in terms of height, continuity, and solidity, affect the amount of street life. Rappaport [37] emphasized the importance of "adequate complexity levels and adequate interest that may be supportive of the particular activity in question."

These researchers also suggest that characteristics of the street influence street activity and the choice to walk. Appleyard [1] found that street characteristics like slope, width and set-backs, vegetation, barriers, parking, services, and amenities (views, lighting) affect the amount of street life. Appleyard [1] and Gehl [12] both show that traffic flow is a particularly important factor, with greater traffic making for a less inviting street for pedestrians. Both researchers also discuss the importance of street scale, as determined by street width and the setbacks of surrounding buildings. Greater scale means that it is harder for a pedestrian to see what is happening on both sides of the street, making for a less rich experience, and results in perceived distances that are greater than actual distances. The amount of streetlife is itself an important characteristic of the street because it is self-enforcing: the greater the level of streetlife, the more streetlife is encouraged. This body of research points to numerous characteristics of urban form that may lead residents to perceive an inviting pedestrian environment and thus encourage them to choose walking.

Changes

Research in this area often makes the leap that differences in travel behavior in different types of analysis mean that a change in urban form will lead to a change in travel behavior. The error is one of assuming that cross-sectional studies demonstrate causality. Determining whether a change in urban form leads to a change in travel behavior requires evaluating how the change in urban form alters the choice equation, by expanding or contracting the choice set or by increasing

or decreasing the utility of difference choices. Whether or not an individual actually changes his or her decision depends on how the new or altered choice now stacks up versus other options. If, for example, the city were to provide sidewalks from a residential area to a new commercial development on an infill site, would residents now walk there? If a new local store opens up, will residents now shop there rather than farther away? Of course, even if the change leads to a better alternative, an individual may still not change his behavior. Travel behavior is to a large extent habitual, and it may be that the individual does not acquire the information about the change or even stop to reconsider his original decision; "most choices are only infrequently evaluated" [19].

ALTERNATIVE RESEARCH APPROACHES

Several promising research approaches have been underutilized in studies of the link between urban form and travel behavior. These approaches have the potential to provide a significantly better understanding of the ways in which urban form influences travel choices and to provide insights beyond those provided by the approaches most widely used.

Travel choice models, based on discrete choice theory, predict the probability of an individual choosing a particular alternative based on the utility of that alternative relative to others. In most cases, urban form is implicitly represented in the models, which include travel costs and destination attractiveness in the measurement of utility for mode or destination. In this way, these models demonstrate the importance of a limited set of urban form factors, given the influence of socio-economic characteristics. It is important to note, however, that the use of multinomial logit techniques does not necessarily equate with the development of a choice model; a true choice model reflects a sound theory about the contribution of the independent variables to the choice process. Thus, to build better travel choice models reflecting a greater range of urban form variables, researchers need to develop a better basic understanding of the ways in which urban form influences choice sets and the characteristics of the choices.

Activity-based analysis constitutes "a more exploratory methodology... in which the researchers attempted to start with open minds and to examine travel behavior in terms familiar to the traveler, in the wider context of his daily patterns of behavior" [24]; this approach "enables the researcher to escape the constraints of a highly structured, but possibly wrong, established theory and way of thinking." It involves an even more complex treatment of both socio-economic characteristics and travel characteristics and a focus on constraints placed on an individual by his or her characteristics, those of his or her household, and the environment. Activity-based analysis has been associated with a more holistic approach to evaluating socio-economic characteristics, by combining them to define "roles" and "life-cycle stages." Similarly, rather than focusing on particular travel characteristics or even a set of simultaneous decisions, activity-based analysis

often looks at the total pattern for an entire day. Relationships are not always tested statistically, but may be qualitatively evaluated. Unfortunately, few of the studies in this area have been designed to explore the role of urban form in travel behavior, although a series of studies by Hillman, et al. [20] in the U.K. may provide a useful model for further research of this type.

Many of the issues outlined above demand research approaches not commonly used in travel behavior research. Qualitative methods, although they do not provide the sort of statistical testing and generalizability of the studies mentioned here, can be used to explore questions about the structure of choices, appropriate measures of urban form, and the role of perception, among others. Techniques such as focus groups, structured interviews, and open-ended travel diaries may begin to provide explanations for the behavior underlying the differences in travel patterns that have been observed. Techniques from other disciplines, such as urban design, geography, and environmental psychology, might also contribute to the knowledge base. A strong dose of creativity would go a long way toward curing the shortcomings of research on the link between urban form and travel behavior.

CONCLUSIONS

What the research shows so far is that there are significant differences in travel behavior in different kinds of communities. But it also shows that the answers are not that simple, that the behavior underlying those differences is complex and variable and the role of urban form not always straightforward. What isn't known about the role of urban form in this behavior is due partly to data limitations (the problem of needing extensive data about urban form in an area for which extensive travel data are also available [14]), and it is also partly due to a limited understanding of travel behavior in general. Although each study in this area contributes to the body of knowledge, by confirming earlier work or revealing another aspect of the relationship or pointing to a new complexity, the next generation of research must consider more exploratory approaches to developing a deeper understanding of the behavior that underlies the observed link between urban form and travel patterns.

CHAPTER 3. METHODOLOGY

We studied six neighborhoods in Austin, TX to evaluate the potential effectiveness of land use policies as a strategy for reducing automobile dependence. Austin was chosen largely for convenience but also because it encompasses a suitable range of neighborhood types. The first step was to select case study neighborhoods based on their physical character, their location in the city, and the socio-demographic characteristics of their residents. The second step was to evaluate the physical characteristics of each neighborhood, focusing on key differences that might lead to differences in travel behavior. The third step was to develop an understanding of the travel choices of neighborhood residents, using a household travel survey followed by focus groups with neighborhood residents to explore both their choices and the motivations for their choices. The final step was to determine the extent to which differences in the physical character of the neighborhoods led to differences in travel choices of the residents.

CASE STUDY SELECTION

We first defined neighborhoods in Austin by compiling neighborhood association boundaries, Realtor association boundaries, city definitions of neighborhoods, and definitions from the American Automobile Association (AAA) street map (as summarized in Handy [16]). Census tract boundaries were also considered. Through this process we defined 18 relatively distinct neighborhoods in Austin.

Two basic criteria were then used to select specific neighborhoods for the case studies: the era of development and the location relative to the center of Austin. The era in which the neighborhood was developed generally determines its basic character. Pre-W.W.II neighborhoods are usually different from post-W.W.II neighborhoods in a variety of ways: rectilinear street grids, narrower streets, a greater mix of housing styles and sizes, occasionally neighborhood stores. Neighborhoods were classified as "traditional" (pre-W.W.II) and "modern" (post-W.W.II). The location of the neighborhood relative to the center of Austin is important because of its potential influence on travel behavior: a more central location might lead to shorter trips, while a more peripheral location could be associated with longer trips. "Inner" and "outer" neighborhoods were classified according to their location within or outside the loop roughly defined by Research Boulevard (183), Ben White (290), and 360. This loop represents about a 15 minute trip from downtown by car. Location relative to the center is correlated with the era of development: modern neighborhoods tend to be outer neighborhoods and traditional neighborhoods tend to be inner neighborhoods. A number of "inner-modern" neighborhoods were identified, but it is important to note that these neighborhoods are older than the "outer-

modern" neighborhoods; we thus distinguished between "early-modern" and "late-modern" neighborhoods.

From the original 18 neighborhoods, we selected six as case studies -- two each of traditional, early modern, and late modern neighborhoods. Old West Austin (sometimes also called Clarksville) and Travis Heights, traditional neighborhoods, were both developed in the early decades of the 1900s and are located close to downtown, Old West Austin just to the west of downtown and Travis Heights just across Town Lake to the south (Figures 3-1 and 3-2). The Cherrywood area and Zilker, early-modern neighborhoods, are both post-W.W.II communities, although they contain a mix of eras of housing (Figures 3-3 and 3-4). Cherrywood is a couple kilometers to the northeast of downtown while Zilker (sometimes called Barton Heights or Barton Hills) is a few kilometers to the southwest of downtown. Wells Branch and Tanglewood, late-modern neighborhoods, are more recent subdivisions located at the fringes of the city (Figures 3-5 and 3-6). Wells Branch was first developed in the 1980s and is about 24 kilometers (15 miles) north of downtown. Tanglewood includes a 1960s subdivision as well as the more recent subdivision from which it gets its name and is about 16 kilometers (10 miles) south of downtown. Thus, three pairs of similar neighborhoods were selected, with one neighborhood from each pair located north of Town Lake (which bi-sects the city just south of downtown) and the other south but both similar distances from downtown. These pairs allow for a testing of differences between types of neighborhoods and well as an analysis of variation between neighborhoods of the same type.

The neighborhoods were also selected so as to control as much as possible for average socio-economic characteristics. The 1990 Census data for these neighborhoods show similarities as well as notable differences (Table 3-1). The neighborhoods range in size from a population of just over 4,100 to 5,650. Median age is somewhat higher for the early-modern neighborhoods and somewhat lower for the late-modern neighborhoods. This is consistent with average length of time in the current housing unit, which is highest for the early-modern neighborhoods, and with average household size, which is highest for the late-modern neighborhoods. Residents in the late-modern neighborhoods are more likely to be young couples with children who have moved to the neighborhood relatively recently, while the early-modern neighborhoods have more long-time residents who may have reached the "empty nest" stage of life. Average incomes are notably higher in the late-modern neighborhoods. Vehicle ownership is also higher in these areas; although this can be partly explained by the larger average household size and higher average incomes, it may also be explained by characteristics of urban form, i.e. the dependence on a car for accessibility in the fringe areas.

Table 3-1. Neighborhood Population Characteristics -1990 Census Data

	Traditional		Early-Modern		Late-Modern	
	Old West Austin	Travis Heights	Cherry-wood	Zilker	Wells Branch	Tangle-wood
Population	4,311	5,666	4,137	4,741	5,005	5,650
% Male	52%	51%	50%	50%	50%	48%
% Female	48%	49%	50%	50%	50%	52%
Median Age	30.7	31.7	33.7	33.3	28.6	28.7
Avg Years in Unit	5.3	7.4	10.5	9.2	3.2	4.6
Avg Vehs/HH	1.4	41.5	1.5	1.4	1.9	1.9
Persons/HH	1.59	1.94	2.02	2.02	2.53	2.65
Median Income	$21,910	$24,551	$28,206	$25,359	$38,862	$34,873

CHARACTERIZATION OF URBAN FORM

After selecting case study neighborhoods, we evaluated the urban form characteristics of each neighborhood, using a variety of techniques, including analysis of GIS databases, hardcopy maps, aerial photos, and data collected through site visits. The focus of this effort was on differentiating the neighborhoods and quantifying observable differences. In addition, factors suggested by the urban design literature as influencing the quality of the pedestrian environment were studied. The methodology for this work built on research conducted at University of California at Berkeley by Handy [17] and by Owens [34]. The observational techniques drew from the urban design literature, particularly work by Lynch [30] and Jacobs [23]. The results of this evaluation are summarized in Chapter 4.

First, the neighborhood transportation systems were analyzed. We used street maps and GIS-databases, including the TIGER-line files and a streets and highways file from the City of Austin, to characterize the basic layout of the neighborhoods and to develop statistics on total street mileage and numbers and types of intersections, and numbers of cul-de-sacs. We used a map of the transit system overlaid on a subdivision map to determine the percentage of households within walking distance of a bus stop. The characteristics of selected residential streets within the neighborhoods were also analyzed. We selected two streets in each neighborhood that were typical of other residential streets in the neighborhood. Through site visits, we determined characteristics of the streets such as pavement widths, sidewalk locations and widths, building setbacks. In addition, we evaluated more qualitative characteristics such as the extent of shade provided by the tree canopy, the variation in housing designs, the location and prominence of driveways and garages -- all factors which may influence the quality of the

walking environment. We also obtained traffic count data from the City of Austin for the selected residential streets if available.

Second, neighborhood commercial areas were evaluated in terms of types of activities, location relative to residential areas, and design. Through site visits, we inventoried all commercial establishments in and immediately adjacent to the neighborhood, categorizing them by type (ex. supermarket, florist, gas station, etc.). We used land use maps overlaid on subdivision maps to determine the percentage of households within a quarter mile of a commercial area. We also evaluated the design of commercial areas through such factors as the setback of buildings from the street, the presence and quality of sidewalks and walkways within the commercial area and linking residential areas to commercial areas, and the location, size, and design of parking areas. We also obtained available traffic count data for the commercial streets.

TRAVEL SURVEY

Data on pedestrian choices were collected through a mail-out, mail-back survey administered in late May, 1995. The survey included sections on supermarket trips, walking trips, trips to local commercial areas, and socio-demographic characteristics, as well as questions on feelings about and perceptions of a variety of urban form characteristics, and was four pages in length (Appendix B). On the order of 1000 surveys were sent to a random sample of individuals in a random sample of households in each neighborhood; we purchased this sample with names and addresses from TRW, Inc. The survey was sent with a cover letter on University of Texas letterhead explaining the purpose of the survey and providing a phone number and contact person for questions and with an addressed business reply envelope.

Only one round of the survey was conducted, because of the concern that changes in weather over a period of time, especially the arrival of summer temperatures, would impact the results of the survey. In addition, the primary focus of the analysis was to compare neighborhoods rather than to determine absolute levels. As long as the non-response biases were relatively consistent across neighborhoods, which we believed they would be, the comparisons between neighborhoods should be valid. Finally, because data on socio-economic and attitudinal characteristics were also collected, it was possible to develop models that incorporate the influence of these variables. The overall response rate was 25%, a respectable result for a one-round mail survey, although significantly lower than the ideal.

The characteristics of the respondents are shown in Table 3-2 and can be compared to the characteristics of all neighborhood residents according to the 1990 Census data. One interesting result is that respondents are more likely to be female than the general population; this is true for all neighborhoods except Travis Heights (traditional). The median age for survey respondents is significantly higher than for the general population because the surveys were sent

to adult members of the household. The 1990 Census showed a shorter time on average in the housing unit than the survey for all neighborhoods; these statistics are consistent if many of the residents in 1990 stayed in their units through 1995. As in the Census data, residents in early-modern neighborhoods have lived in the neighborhood for the longest time on average. Persons per household is much higher in the survey than the Census for traditional and early-modern neighborhoods, suggesting a change over time or potential under-representation of smaller households in the survey. Vehicle ownership is somewhat higher among survey respondents, reflecting either an increase in vehicle ownership over the five year period or potential under-representation of households with no vehicles in the survey.

Table 3-2. Characteristics of Survey Respondents

	Traditional		Early-Modern		Late-Modern	
	Old West Austin	Travis Heights	Cherry-wood	Zilker	Wells Branch	Tangle-wood
Number	281	245	226	220	204	192
Response Rate	27%	27%	28%	24%	24%	21%
% Male	54%	50%	57%	58%	55%	55%
% Female	46%	50%	43%	42%	45%	45%
Median Age*	43.3	43.8	44.0	46.5	42.0	44.3
Avg Yrs in Unit	8.6	9.3	12.4	11.2	6.2	9.1
Avg Vehs/HH	1.6	1.8	1.6	1.8	1.9	2.4
Persons/HH	2.13	2.05	2.14	2.24	2.63	2.66
% HH w/ Kids<12	14%	17%	21%	16%	36%	29%
Mean Income**	$50,749	$53,377	$42,749	$48,469	$59,146	$69,889
% < $20,000	13%	8%	19%	10%	3%	3%
% > $100,000	10%	9%	4%	6%	4%	9%

* For Adults.
** Estimated based on reported income ranges.

Finally, incomes are significantly higher for survey respondents than the median reported in the 1990 Census -- a difference that cannot be explained by inflation alone. The traditional neighborhoods, which had lower median incomes in the Census than early-modern neighborhoods have higher mean incomes for the survey respondents; this may reflect the growing popularity -- and gentrification -- of these neighborhoods over this period. Interestingly, Old West Austin (traditional) has the second highest percentage of respondents with incomes less than $20,000 per year, but the highest percent with incomes more than $100,00 per year, suggesting greater economic diversity than other neighborhoods but also a transition from a lower- to an upper-income neighborhood.

NETWORK DISTANCES

The addresses of the survey respondents, area supermarkets and groceries, and local shopping areas for all neighborhoods except Zilker were assigned to their corresponding latitude and longitude coordinates using the address-matching capabilities of Atlas-GIS software. These points were then added as centroids to a TRANPLAN street network for Austin, provided by the Texas Department of Transportation and modified so as to include all streets within the case study neighborhoods. The distances and travel times along the street network from each residential location to each commercial area and supermarket were calculated using the network skim function in TRANPLAN. The accuracy of the estimated travel distances is limited by the inability of the address-matching process to precisely locate residences along a street and by imprecision in the representation of the local street network. The estimated travel times are likely to be less accurate than the estimated travel distances, because of our use of assumed congested speeds for each street rather than actual levels of congestion and the actual effects of stop signs and signals (neither of which are easily represented in TRANPLAN networks). Travel distances from homes to local commercial areas are generally overestimated, because commercial areas were represented as points in the network.

The distance data were imported into the survey data file. The distances to supermarkets allows for an analysis of the link between the choice of supermarket and the distance to that supermarket for individual survey respondents. In addition, the minimum distance to both supermarkets and commercial areas were identified for each respondent's household, a potentially important explanatory variable for the frequency of walking to commercial destinations. These minimum distances were also averaged for each neighborhood to arrive at an overall indicator of neighborhood distance to supermarkets and commercial areas.

FOCUS GROUPS

As a follow-up to the household survey, focus groups were conducted in each of the six neighborhoods. The goal of these focus groups was to test our conclusions from the travel survey and to explore in more depth the factors influencing decisions about local shopping and walking, the interplay between decisions about where to live and decisions about non-work travel, and residents' feelings about and sense of their own neighborhoods. The focus groups were completed in January and February 1997.

The starting point for identifying participants for the focus groups was the list of respondents to the household travel survey, conducted in May 1995. We focused on those respondents who had indicated they would be interesting in further participating in the study; this list contained over 600 names. The first step was to send a postcard to the names on this list,

explaining the purpose of the study and telling them that we were looking for participants for the focus groups and would be contacting them shortly. The second step was to contact each name on the list. In some cases, phone numbers had been changed or disconnected, in others we left messages on answering machines but never received a response to our message. As a result, we supplemented the initial list with a "snowball sample," by asking residents who had agreed to participate to suggest neighbors who might also be interested in participating. We welcomed any participant as long as they lived in the designated neighborhood. In all nearly 150 people responded to our calls and 65 participated in the focus group meetings.

Using the list of survey respondents and the snowball sample meant that the participants in the focus groups were not a random sample of residents and may differ in important ways from their neighbors. On the other hand, the same method was used for each of the neighborhoods so that the biases should be similar and the comparisons between the focus group participants in different neighborhoods should give a good indication of the differences between all residents of the neighborhoods. Our methodology had the advantage of identifying residents who are interested in neighborhood issues and who are likely to have thought about many of the issues we planned to ask about.

Three to four days before the meeting all focus group participants were sent a letter reminding them of the time, date, and meeting place. The letter also included more detailed information about the purpose of the focus group, who was sponsoring it, and what was expected from each participant. Again, a contact name and number was printed on the letter, this time asking people to please call if they would not be able to participate after all or if they had any questions. For those people who had a conflict because of child care we offered a baby-sitter at the meeting site for the duration of the meeting. We had a few people contact us at this point to indicate that they were no longer able to attend the focus group meeting. The day before each meeting we called each of the confirmed participants to remind them of the meeting time, date, and location. In some cases, participants asked if they could invite a spouse or friend to attend also.

Group Size

Our goal was to enlist 15-20 people in each neighborhood and achieve an actual turn out of 8-10. Krueger [27] recommends group sizes from 6-12: less than 6 does not lend itself to a lively and full conversation, and more than 12 people can be loud and difficult to control. Krueger notes that "group dynamics change when participants want but are not able to describe their experiences...if people do not have an opportunity to share experiences in the total group, they may lean over to the next person and whisper their concerns." In addition, Krueger suggests that "when dealing with knowledgeable participants...the ideal size of a focus group typically falls

between 6 and 9 participants." Because the participants in this study are experts on their own neighborhoods it was important to keep the groups rather small. We decided if we had more than 20 people interested in participating in a given neighborhood, we would break the group into two sections, so that every participant would have a chance to share his or her insights and observations.

Differences between the neighborhoods in the numbers of residents participating in the focus group and the share of those who had committed to attending who actually attended were striking - and potentially suggest differences in the attitudes and interests of the residents in the different neighborhoods. In two neighborhoods -- Cherrywood and Old West Austin -- we had enough participants to hold two separate discussions at the meeting. The attendance at these meetings was nearly 100 percent. In two other neighborhoods -- Travis Heights and Zilker -- we found enough participants for one group of 10 to 12 and attendance was also high. But in the last two neighborhoods -- the two late-modern neighborhoods, Wells Branch and Tanglewood -- less than 40% of the confirmed participants showed up, resulting in groups of 4 and 3, respectively. The low attendance was extremely disappointing and raises the possibility that these groups represent more narrow samples of the neighborhood than the groups in other neighborhoods. However, Krueger says groups of that size are acceptable and offer advantages as well as disadvantages: "mini-focus groups with 4 to 6 participants are becoming increasingly popular because the smaller groups are easier to...host and more comfortable for participants. The disadvantage of the mini-focus group is that it limits the total range of experiences simply because the group is smaller. Four people will have had fewer total experiences than a dozen...Smaller groups are preferable when the participants have a great deal to share about the topic."

The Meetings

We chose meeting sites within each of the six neighborhoods so as to be as accessible and neutral as possible to the participants. The sites used included community centers, schools, and churches. In many cases, participants were able to walk to the meeting site. The meetings were scheduled from 6:30 to 8:00 on weeknights, and refreshments were served. The first fifteen minutes of the scheduled time were allotted for participants to complete a brief background survey, talk with the research staff, enjoy refreshments, and greet neighbors. The focus group discussions began around 6:45 and continued until 8:00, although some groups continued their discussions or stayed to talk with the research staff or neighbors.

The discussions were facilitated by students from the Alternative Dispute Resolution class in the Community and Regional Planning program at the University of Texas. The facilitators had some training in conducting focus groups but most had never actually conducted a discussion on their own before; participating in the study gave them an opportunity to develop

their skills. As planning students, they were familiar with the issues discussed in the focus groups, and the day before each focus group meeting we met with the facilitator to brief her on the neighborhood and review the purpose of the focus group questions.

The facilitator began the discussion with a brief introduction of the project, then asked participants to give their names and where they live in the neighborhood. Facilitators then used a list of 14 questions to guide the discussion and encouraged all participants to express their thoughts (Appendix B). Questions covered such issues as why the participants had chosen to live in that neighborhood, what they like and don't like about it, whether not they walk in the neighborhood and why, what local shops they use and what other kinds of shops they would like in the neighborhood, and what about the neighborhood leads to a sense of community. The questions were chosen to explore in more depth the topics included in the neighborhood survey, although more general questions about the neighborhood were also included to better understand neighborhood choice; we pretested the discussion guide with a group of students in the Community and Regional Planning Program at the University of Texas. We recorded the discussions both on video and audio tapes; the audiotapes were used to transcribe the discussion to paper, while the videotapes were used to link the participants to their comments for purposes of analysis (although participants are not identified by name in this report).

Several days after the meeting, we sent a letter of thanks to each participant. Also included was a coupon for $10 dollars off their next shoe purchase at a local running store -- perhaps an appropriate gift given the focus of much of the discussion on walking.

CHAPTER 4. NEIGHBORHOOD CHARACTERISTICS

Although we have classified the neighborhoods as traditional, early modern, and late modern, each neighborhood is unique in many ways. Although the traditional neighborhoods share many characteristics, for example, they are in some ways more like other types of neighborhoods than they are like each other. Thus it is important to consider both the ways in which the three types of neighborhoods differ, but also the ways in which neighborhoods of a particular type differ from each other. We evaluated the structure and character of neighborhoods on three dimensions: the street network, commercial establishments, and design. Together, these dimensions determine the choices available to residents for shops and services -- their accessibility-- and thus help to explain the travel choices that they make:

- Networks. In the discussion over neo-traditional development, residential street networks are almost invariably labeled "grid" or "curvilinear." These two basic types are easily identified in maps of metropolitan areas because their layouts are so different. The network type is also correlated with the era of development: pre-W.W.II developments tend to have grid networks, while post-W.W.II developments tend to have curvilinear networks. The structure of the network has important implications for travel distances and route choice.

- Commercial Establishments. The kinds of commercial establishments found in and around residential neighborhoods is an important determinant of non-work travel behavior. Having a supermarket within close proximity should reduce the average length of trips to supermarkets, for example. The pattern of commercial land uses can also influence the frequency with which trips are made and the mode of travel chosen by residents.

- Design. Travel behavior may also be influenced by the design of places. Characteristics such as street width, the presence of sidewalks and street trees, the depth of setbacks, the design and variation in housing types, the location and size of parking lots, the placement of building entrances, and the continuity of the sidewalk system, among others, may all influence the choice to walk, for example.

First we present an overview of each neighborhood, including its historical roots and current trends as well as an assessment of accessibility, as influenced by the structure of the street network, the types of commercial establishments, and both residential and commercial

design. We then present a more systematic and quantitative comparison of the street networks, commercial establishments, and design of the different types of neighborhoods.

NEIGHBORHOOD OVERVIEWS

Old West Austin - Traditional

Old West Austin (also sometimes called Clarksville) is one of the oldest neighborhoods in the city and one of the first residential neighborhoods outside of downtown. Although considered a central city neighborhood today, its first residents lived practically in the country, in estate homes on large lots. Many of the original homes still stand and have been renovated over the years; some have been converted to professional offices or bed-and-breakfasts. The eastern edge of the neighborhood, perched on what's called Castle Hill with views of downtown and the Capital, is some of the priciest property in town.

Over the years many of the larger Old West Austin properties were subdivided and developed with smaller homes on more affordable lots. In recent years, an increased interest in living near downtown and the charm of the neighborhood has brought an increase in demand for homes there. This demand has brought about several changes. The increase in property values which resulted may have been a blessing to some but it continues to displace many long time residents who can't afford the escalation in property taxes. This worries current residents because of the effect it is having on social and demographic diversity. Also, developers have answered the demand for more housing by building higher-density apartment buildings and condominiums, somewhat altering the character of the neighborhood.

Today's residents include young professionals, University of Texas students, families, retirees, and life-long residents. As of the 1990 Census, residents had lived in the neighborhood an average of 5 years or so -- shorter than residents of the early-modern neighborhoods but longer than residents of the late-modern neighborhoods. They had the smallest households of the six neighborhoods, at 1.6 persons per household. They also had the lowest median income, at $21,910, probably reflecting the relatively high percentage of students as well as smaller households; at the same time, the income distribution was greater, with a higher share of both lower and upper income households than the other neighborhoods. In our focus groups, residents called this kind of diversity one of the attractions of the neighborhood: "people just love the neighborhood because of its diversity, in people and architecture, and I think there's a strong sense of belonging here."

Accessibility Evaluation. Residents of the Old West Austin neighborhood have a wide variety of shops and services close at hand. The West Lynn area, in the heart of the neighborhood, includes two restaurants, an old-fashioned drug store that still lets neighbors buy

on credit, a nursery, a small grocery store, a dress shop, an antique store, a veterinarian's office, and a TV repair shop (Figure 4-1). West Sixth Street, on the south edge of the neighborhood, and Lamar, on the east edge, are lined with a variety of shops and services which draw customers from throughout the city; this area has traditionally been home to numerous auto-dealerships, but several of these lots have been converted to more neighborhood-serving uses. Many of the shops along West Sixth Street are in converted houses, retaining the scale of the neighborhood (residents are concerned, however, about the encroachment of commercial activity into residential areas and the traffic that this brings). In 1995, Whole Foods, the health food chain based in Austin, opened up a new flagship store at the corner of Sixth and Lamar, with Bookpeople, a large full-service bookstore and cafe, next door. Residents find a popular bakery, a popular ice cream shop, and a popular music store on West Sixth Street.

For grocery shopping, Old West Austin residents also have several choices, although the closest regular supermarket, Randall's, is a couple of miles away for most residents. Whole Foods is the largest food store in the neighborhood but may not appeal to all residents or serve their full range of needs. Fresh Plus, a small grocery store on West Lynn, is close for most residents but offers a more limited selection and higher prices than the supermarket. Central Market, one of Austin's newest tourist attractions, is three or so miles to the north.

Most households in the neighborhood are within walking distance of shopping, thanks especially to the West Lynn area in the center of the neighborhood but also because of the interconnected street network. From most parts of the neighborhood, residents can reach West Lynn or Sixth Street by relatively direct routes; some irregularities in the network, due to a park and to typography, tend to isolate the southwestern corner of the neighborhood. The neighborhood is in many ways an interesting and pleasant place to walk, with charming houses and gracious shade trees. But many of the streets lack sidewalks, and the interconnected network allows for cut-through traffic, making the narrow streets sometimes less than comfortable for pedestrians. Once in the shopping areas, however, pedestrians don't have to deal with large parking lots as many of the businesses rely on on-street parking. In fact, limited parking makes it easier for residents to walk rather than drive.

Travis Heights - Traditional

Travis Heights is also one of the older neighborhoods in the city, developed beginning in 1913 and located just to the south of downtown and across Town Lake, formed by the Longhorn Dam on Texas's Colorado River. The neighborhood is linked to downtown by South Congress Street, the old highway to San Antonio that now serves as a major commercial arterial with dramatic views of the Capitol to the north. The hilly terrain and the ancient oaks add to the charm of the neighborhood, which retains much of its original housing stock. As in Old West Austin, the largest

and oldest homes occupy the high ground overlooking the lake and downtown. Several large apartment complexes buffer the single-family streets from the Interstate freeway on the eastern boundary of the neighborhood. Several streets in the southern end of the neighborhood reflect post-World War II development. The neighborhood is bounded by Riverside Drive on the north, I-35 on the east, Oltorf Street on the south, and Congress Avenue on the west.

Travis Heights is now showing signs of gentrification; many homes are being renovated and expanded. Rising housing prices reflect the growing popularity of this neighborhood. South Congress for many years had a reputation for sleazy motels and illicit activity. Much of this activity is gone, although an adult movie theater remains and residents complain about prostitution in the area. Cut-through traffic has also been a concern, and speed- humps were installed on West Annie in 1994 to reduce the threat to residents. Residents express great pride in their neighborhood which they celebrate with an annual Fourth of July parade and picnic as well as "78704" (their zipcode) bumperstickers.

According to the 1990 Census, the residents of Travis Heights resembled those of Old West Austin more than residents of early-modern or late-modern neighborhoods, although the data some notable differences between the two traditional neighborhoods, probably due to a smaller student population in Travis Heights. On average, Travis Heights residents were slightly older, lived with more people, had a higher median income, and had lived in the neighborhood longer than residents of Old West Austin.

Accessibility Evaluation. Residents of Travis Heights have more limited shopping opportunities in and around the neighborhood than residents of Old West Austin. Most commercial activity is concentrated on South Congress, bordering the west side of the neighborhood (Figure 4-2). Like West Sixth Street, this shopping area reflects its development before the dominance of the car, at least for several blocks: shops abut the street and each other, creating a continuous commercial streetfront. Within this stretch are found restaurants, antique stores, clothing stores. To the north and south, the development reflects the historic roots of this street as a highway, with discontinuous buildings and ample parking lots; businesses in these stretches include motels, fast food places, auto repair shops, and used car lots. The development along Oltorf, at the southern end of the neighborhood, is more recent and includes a strip mall, a used car lot, and several fast food places.

For food shopping, Travis Heights residents have few choices. The closest supermarket is the HEB on South Congress and Oltorf, to the southwest of the neighborhood; in 1997, the company renovated and expanded this store, which serves several neighborhoods that surround it and has a reputation for crowds. More distant choices include the Albertson's and another HEB some distance to the east of the Interstate. Whole Foods is over three miles away and Central

market is over five miles away, on the other side of downtown from Travis Heights. A couple of convenience stores along South Congress on the west and a couple of others along the Interstate frontage road on the east give residents another option.

Given the lopsided distribution of commercial activity around the edges of the neighborhood, a smaller portion of residents are within walking distance of shops than in Old West Austin. Even those within a short distance, however, find obstacles to walking. Residents on the west side of Stacy Park live within a quarter mile of South Congress but must cross South Congress, a busy four-lane arterial, to get to most of the stores and businesses they use; the local fire station, a junior high school, a church, and an empty lot take up much of the street front on the east side. Within the neighborhood, the streets are pleasantly shaded and housing stock varied, creating an interesting walking environment, but the lack of sidewalks throughout most of the neighborhood means that even within the neighborhood walking is not always comfortable.

Cherrywood - Early-Modern

The Cherrywoood neighborhood, an early modern neighborhood, was first developed after World War II; Cherrywood's streets appeared on maps of the City as early as 1951. Sandwiched between Interstate 35 and Austin's Mueller Municipal Airport and bounded by Manor Road on the south, the neighborhood has been an island of residential development since the beginning. Some of the first residential structures in the area were built by the Air Force for housing families stationed at nearby Bergstrom Airforce Base (now closed and being converted to Austin's new international airport); graduate students from the University of Texas now occupy many of these duplexes. The small single-family homes in the neighborhood were built to be affordable and have remained relatively affordable as housing prices throughout Austin have boomed, although the neighborhood has also seen its share of gentrification. One focus group participant called it "the bargain neighborhood."

While residents express concern over gentrification and its impact on the character of the neighborhood, this problem is in many ways a welcome relief from other problems that residents have fought over the years. Of most concern were crime and drug problems in the area to the south of the neighborhood that sometimes spilled over to Cherrywood streets. Still, residents feel the local media overplayed many of these problems, perhaps contributing to the "bargain" housing prices. The projected 1999 closing of Mueller Airport, just to the east of the neighborhood, may further fuel the gentrification trend, especially as the City of Austin proceeds with its redevelopment of the airport site.

As of the 1990 Census, resident were somewhat older, had lived in their homes longer, and lived in slightly larger households on average than residents of the two traditional neighborhoods. What the data don't adequately highlight is the diversity of residents. Focus

group participants said that the mix of residents adds to their sense of community and sense of security. Said one resident, "It's racially mixed, it's mixed by interest and occupation and age and in every way I can think it's a mixed neighborhood. It just feels like a comfortable place."

Accessibility Evaluation. Cherrywood residents have a variety of commercial options nearby, although many of the businesses serve passing motorists as much as they do the local residents. A large strip center at the corner where 38 1/2 Street crosses Interstate 35 contains Fiesta, one of the largest supermarkets in the city, a Blockbuster video store, two music stores, and auto supply store, a clothing store, a beauty salon, a barber shop, and several other small shops (Figure 4-3). Next to this center along 38 1/2 Street are a Mexican restaurant, a cleaners, and a small convenience store. Manor Road, bordering the neighborhood on the south, is a hodge podge of local businesses and apartment buildings in various stages of disrepair. One of the most popular businesses in this stretch, drawing customers from throughout Austin, is the Eastside Cafe, located in what was originally a small house and offering fresh vegetables grown in its own garden behind the cafe. A couple of other restaurants have recently opened nearby. Businesses along the frontage road for the Interstate, bounding the neighborhood to the west, are even less oriented toward the neighborhood: medical offices, a Day's Inn, an auto glass shop, an adult book and video store, a photographer's shop, and an outdoor gear shop, among others.

For grocery shopping, Cherrywood residents seem to be well situated. Fiesta is within a half mile of most residents of the neighborhood, closer for many. To the west of the Interstate about a mile away is a large HEB and, another mile and a half beyond that, Central Market. Residents thus have a variety of types of supermarkets within a relatively short distance. In addition, Whole Foods is just under four miles away, and another health food store, Wheatsville Coop, is only tow and a half miles away. The convenience store on 38 1/2 Street gives residents one more option.

Given the commercial development along two sides of the neighborhood, most residences are within walking distance of some shops or services. With many of the residential streets connecting through to Manor Road and 38 1/2 Street, residents can get to most businesses by relatively direct routes. Within the neighborhood, the streets tend to be narrow and well shaded but, as in Travis Heights, often lack sidewalks. In the commercial areas, pedestrians fare less well. The parking lot at the Fiesta is extensive, with no links for pedestrians from the street to the store. Conditions on Manor aren't much better, despite the sidewalk: too many cars go by at uncomfortably fast speeds, and between every thriving business is another eyesore. The frontage road is even worse, a true no-man's land for pedestrians.

Zilker - Early-Modern

The Zilker neighborhood, the second of the early modern neighborhoods, was platted as early as 1941, although built mostly after World War II. The area on the southwest of the neighborhood, abutting the greenbelt along Barton Creek, was built in the 1960s. Although south of Town Lake, the neighborhood is still close to downtown and is the closest neighborhood to Zilker Park, the largest park within the central city and home to Barton Springs (a natural spring-fed pool, the pride and joy of Austin), botanical gardens, soccer fields, playgrounds, picnic areas, and greenbelt trails. The neighborhood is bounded by Barton Springs Road on the north, Lamar Boulevard on the East, and the Barton Creek greenbelt on the west and south.

Although dominated by single-family homes, several large apartment complexes popular with University of Texas students sit on the bluff above Barton Creek at the boundary between the older and newer parts of the neighborhood, and several low-income apartment complexes line South Lamar Boulevard, the eastern edge of the neighborhood. Neighborhood newsletters from the 1980s reflected a growing concern over multi-family apartment and condominium projects in the area. More recently, the restaurants along Barton Springs Road have been a concern for neighborhood residents. On weekends, the loud music can be heard by local residents, and they fear the drinking and driving of patrons. Parking sometimes spills over into the neighborhood, compounding their concerns. Still, some of the businesses have worked with the neighborhood association on these issues. The City of Austin is planning improvements for Barton Springs Road, and residents are hoping for a landscaped median to help slow traffic and continuous sidewalks for pedestrians.

As of the 1990 Census, the average resident of the Zilker Neighborhood resembled the average resident of Cherrywood, with a somewhat lower median income and a slightly shorter tenure in the neighborhood. Not surprisingly, residents of the older part of the Zilker neighborhood, where the homes are older and smaller, had a lower median household income than residents of the newer part of the neighborhood, where the homes are newer and larger. Like Cherrywood, however, Realtors consider both parts of the neighborhood relatively affordable for what they offer.

Accessibility Evaluation. Although Zilker residents have good access to a wide variety of shops and services, most of the businesses are oriented to a much larger customer base. Commercial activity for Zilker residents is concentrated along South Lamar, on the eastern border of the neighborhood (Figure 4-4). South Lamar is major north-south route through Austin -- 38,000 vehicles per day use this stretch-- and is lined with a mix of older and newer businesses, strip malls and big box stores, auto-related businesses (repair shops, auto parts stores, car washes and used car lots) and restaurants. Barton Springs Road, on the north edge of the

neighborhood, is home to a half dozen popular eateries which draw patrons from throughout Austin, especially on Friday and Saturday evenings. Residents can claim as their own two small stores located within the neighborhood: Bluebonnet Market, a small grocery store that has been in the neighborhood since its earliest years, and Barton Hills Market, located near the apartment complexes in the newer part of the neighborhood.

For grocery shopping, the closest choice is Cutrer's Market, a medium-sized store with relatively high prices on South Lamar. Farther afield, residents have the option of the HEB at Oltorf and south Congress, about two miles away on average, and the Whole Foods just to the north of the lake on Lamar, also about two miles away on average. Central Market is about five miles north on Lamar. The two small stores in the neighborhood provide an option for smaller purchases. In contrast to other neighborhoods, the nearby supermarket options are limited.

Given the distribution of commercial activity along two boundaries of the neighborhood, over half of the households are within walking distance of shops and services, although the differences between the older and newer parts of the neighborhood are stark. Residents of the older part of the neighborhood are nearly all within a half mile of stores and the interconnected network of streets means that residents have relatively direct paths to South Lamar Blvd. or to Barton Springs Road Streets in this area are narrow and well-shaded, although many lack sidewalks. In the newer part of the neighborhood, most residents are more than a half mile from South Lamar or Barton Springs Road, and the preponderance of cul-de-sacs and loop streets makes for round-about routes. Streets here are considerably wider and considerably sunnier than in the older part of the neighborhood. On the other hand, a number of paths link residents of this area directly to the Barton Creek hike and bike trail; residents of the older area are closer to Zilker Park, but can't easily and comfortably get there on foot; said a focus group participant, "One thing I don't like is that there are not sidewalks connecting us to the two places we're most likely to go." Neither South Lamar nor Barton Springs Road offer pedestrians a safe or attractive walking environment, dominated as they are by parking lots and driveways.

Wells Branch - Late-Modern

Wells Branch is one of several Municipal Utility Districts formed by developers outside the city limits beginning in the late 1970s and early 1980s after city voters defeated several bond proposals which were supposed to fund major extensions of utility lines and respond to the growing demand for housing [2]. The MUD was developed in 1980 and 1981 on a tract of land that had been in the family of Herman Fleischer for generations. An old log cabin, nicknamed the Homestead, and the park surrounding it are dedicated to the daughter of the original land owner. The developers also labeled the streets with family names such as Fleischer, Klattenhoff, and Margalene, presumably to retain some connection to the site's early history. Today the cabin and

park are the site of the annual Homestead Festival and signify the pioneering spirit of the first settlers.

Since its completion in the mid-1980s, the Wells Branch community has periodically considered and rejected the idea of annexation to the City of Austin. By remaining an independent MUD, residents feel they have more control over what happens in their community and enjoy many amenities the City would not be able to provide or maintain, including an extensive hike-bike trail system and a community center complete with soccer fields, basketball courts, a picnic area, a swimming pool, and a facility that can be used for meetings and parties. At the same time, residents have little say over the development that happens around Wells Branch. For the time being, the community is surrounded on the west, east, and north by relatively undeveloped land. Wells Branch Parkway, a four-lane, divided arterial, creates the southern edge of the community; several new apartment complexes have been developed along the Parkway since the start of this study.

As of 1990, residents of Wells Branch had the highest median income of any of the case study neighborhoods - close to double that of Old West Austin residents. The family-orientation of the community was reflected in the high average number of persons per household and share of households with young children. These households owned nearly two vehicles each, on average, suggesting a greater dependence on driving. Wells Branch residents had lived in the neighborhood a shorter period of time on average than residents of any other case study neighborhood, reflecting the relative newness of the community.

Accessibility Evaluation. Commercial activity in the Wells Branch area is concentrated in two strip centers along Wells Branch Parkway (Figure 4-5). Directly across the Parkway from the neighborhood, a smaller center, The Plaza, includes a pizza place, a sub shop, a dentist, a hair salon, a gas station and a convenience store. Next door, another small center, the Wells Branch Corporate Center, includes a Chinese restaurant, a cleaners, another dentist, a car wash, a "worship center," and several other businesses. The Market at Wells Branch, to the west of the neighborhood at the corner of Wells Branch Parkway and Ranch-to-Market Road (RM) 1325, includes a large Albertson's supermarket and twenty-five other businesses, including restaurants, a mail center, a cleaners, a pet store, a veterinarian, a hair salon, yet another dentist, and a video rental store.

For grocery shopping, residents have the choice of the Albertson's in the Market at Wells Branch (about a mile away on average), an HEB to the east of the neighborhood across Interstate 35 (about a mile and a half away), or another HEB to the south along RM 1325 (over three miles to the south). Central Market and Whole Foods are 15 miles to the south, back in central Austin. The only other nearby option is the convenience store on Wells Branch Parkway, at one of the

two entrances to the neighborhood. For supermarkets, Wells Branch residents have more choices than residents of the older neighborhoods, but they have fewer alternatives to supermarkets.

Only the households closest to Wells Branch Parkway are within walking distance of commercial activity, and a walk to the store always means having to cross the Parkway -- a deterrent to the most determined walkers but especially to children and the elderly. None of the centers has been designed for pedestrian access: sidewalks stop at the parking lot, leaving pedestrians to fend for themselves among the cars. A hike and bike trail along Wells Branch Parkway helps residents get near the Market at Wells Branch, but doesn't help them get to it. Within the neighborhood, however, pedestrians are well provided for. While many of the streets are relatively wide, especially the collector streets that bring most residents from their own streets out to the Parkway, every street has sidewalks on both sides. The street trees still provide limited shade, but the neighborhood is still young. The hike and bike trail running through the neighborhood provides for internal circulation separate from the street system.

Tanglewood - Late-Modern

The Tanglewood neighborhood lies at the southern edge of the City of Austin, at least for the moment. Bounded by Slaughter Lane to the south, Manchaca Road to the east, Davis Lane to the north, and Sugar Mill Road to the west, Tanglewood was developed in two parts. The older section, known to residents as Castlewood, lies in the center of the neighborhood and was built during the period between 1967 and 1970. The newer section, Tanglewood Forest, was developed as a Municipal Utility District but has since been annexed to the City of Austin. The first houses in the MUD were built in the early 1980s, and by 1985 the district contained 1,120 homes.

In the focus group, residents of the older section of Tanglewood expressed concern over the higher density and poorer construction quality of the newer section of the neighborhood. In the early days of the neighborhood, according to a long time resident, "It was wonderful. Every street dead-ended into some kind of pasture and it was quiet and out-of-the--way." The same can no longer be said. Rapid growth in the area in recent years has increased traffic and overloaded local services, including shopping areas. According to the 1990 Census, residents of the Tanglewood neighborhood most resemble those of the Wells Branch neighborhood, with relatively large households, a high median income, and a relatively short tenure in the neighborhood.

Accessibility Evaluation. As in Wells Branch, shops and services in Tanglewood are concentrated in two strip centers, both at the intersection of Slaughter Lane and Manchaca Road at the southeast corner of the neighborhood (Figure 4-6). The larger of the two, on the northwest

corner of the intersection contains a large HEB supermarket and 28 other shops, including everything from a Blockbuster video store to a jewelry store to a mail center to a dentist to a comic store. A smaller center on the southeast corner includes an Albertson's supermarket, a Japanese restaurant, a Pizza Hut, a Mexican restaurant, and a few other shops. Several new businesses have gone in on the other two corners of this intersection since the start of this study.

The HEB and the Albertson's, both at the corner of Slaughter and Manchaca, dominate the grocery shopping options in Tanglewood. These stores are about a mile a way on average for neighborhood residents. Otherwise, the options are limited. Whole Foods and Central Market are ten to twelve miles to the north, and a 7-11 is the only nearby convenience store.

Only residents in the southeast corner of the neighborhood are within walking distance of these centers. The street network, despite a number of cul-de-sacs and loop streets, provides residents with relatively direct routes to the shopping areas. But residents complain about the traffic at Manchaca and Slaughter and the challenge of getting in and out of the strip centers. Within the neighborhood, streets tend to be wide and street trees tend to be small, creating an environment potentially uncomfortable for pedestrians. Most streets have sidewalks on both sides, but the sidewalks stop when the reach the arterials, so that residents do not have a continuous sidewalk between home and shopping, making the option of walking to the store even less comfortable. The two strip centers both have large parking lots that lack pedestrian connections between the street and the shops. Relative to the other five neighborhoods, Tanglewood offers the least encouragement to pedestrians.

NEIGHBORHOOD COMPARISONS

Network Analysis

While the network types are clearly different in terms of their overall layout, a closer examination reveals surprising similarity in their characteristics. Planners and designers often make the generalization that grid networks have smaller blocks, more space devoted to roads, more intersections, a greater percentage of four-way intersections, fewer cul-de-sacs, and more access points to the neighborhood than curvilinear networks. Our analysis of the case study networks shows that this generalization is valid but is not absolutely true. The network statistics, presented in Table 4-1, do not differ significantly or consistently enough between the traditional and modern neighborhoods that one could not look at the statistics alone and be certain that the network was a grid or a curvilinear network.

The size of blocks, which are defined by the street network, is important because large blocks may serve as barriers to travel, while small blocks would suggest more direct routes and a greater choice of transportation routes. We have calculated block density as the inverse of block size: blocks per square mile of area. On average, more blocks means smaller blocks, but we have

not evaluated the range of block size within case study neighborhoods. In general, the traditional neighborhoods have the greatest block density, early-modern neighborhoods have somewhat lower block density, and late-modern neighborhoods have the lowest block density. However, Wells Branch, with a relatively high 75 blocks per square mile, is something of an exception; it is the newest of the case study neighborhoods and may be indicative of a trend back toward smaller blocks.

Table 4-1. Neighborhood Transportation System Characteristics

	Traditional		Early Modern		Late Modern	
	Old West Austin	Travis Heights	Cherry-wood	Zilker	Wells Branch	Tangle-wood
Street System						
Land Area (sq. mi.)	0.75	0.99	0.50	0.82	0.64	1.00
Street Miles	17.7	22.9	11.7	18.8	14.5	17.6
Street Miles/Land Area	23.6	23.2	23.4	22.9	22.7	17.6
Est. Street Area (sq. mi.)	0.09	0.11	0.06	0.11	0.10	0.13
Street Area/Land Area	12%	11%	12%	13%	16%	13%
%T-Intersections	71%	77%	77%	69%	89%	76%
%4-Way Intersections	30%	23%	23%	31%	11%	15%
Intersections/Street Mile	9.2	7.0	13.2	7.5	10.6	6.2
Cul-de-sacs/Street Mile	1.2	0.8	1.2	0.6	1.8	2.1
Blocks/Land Area	94.7	98.5	82.0	89.0	75.0	45.0
Access Points/Land Area	41.3	27.3	42.0	31.7	7.8	16.0
Transit System						
No. Through-Routes	3	1	3	1	0	2
No. Edge-Routes	5	5	2	4	1	0
% HHs within Walking Distance	99%	100%	100%	100%	0%	85%

The amount of space devoted to roads in a neighborhood may have a substantial effect on its character. The density of roads, measured as street miles per square mile of area, varies from 17.6 in Tanglewood (late-modern neighborhood) to 23.2 in Travis Heights and 23.6 in Old West Austin (traditional neighborhoods). However, Wells Branch, a late-modern neighborhood, the ratio is nearly as high as it is in the traditional neighborhoods -- consistent with the relatively high density of blocks in this neighborhood. Intersection density, measured as intersections per street mile, also does not correlate with network type. Tanglewood has the lowest number of intersections per street mile (6.2), while Wells Branch and Cherrywood have the highest intersection density (10.6 and 13.2, respectively). This suggests that curvilinear networks vary

significantly with respect to intersection density. The grid networks in the older neighborhoods, on the other hand, all have moderate intersection density: 7.0 in Travis Heights and 9.2 in Old West Austin.

The types of intersections, in terms of the percent of intersections that are four-way rather than three-way (or "T"), are significantly different for the late-modern neighborhoods: in Tanglewood and Wells Branch, fewer than 15 percent of the intersections are four-way. The traditional and early-modern neighborhoods have much higher percentages of four-way intersections, ranging from 23% in Travis Heights and Cherrywood to 30% in Old West Austin and Zilker. Most notably, the percent of four-way intersections in the older neighborhoods is surprisingly low. This could be driven partly by topography: both Old West Austin and Travis Heights are hilly, and Travis Heights is bisected by a creekside park. This suggests that although the street networks in these neighborhoods are mostly rectlinear, in that the streets run in two directions and intersect at right angles, they also contain many discontinuities.

Curvilinear networks are frequently reviled by today's urban designers for their wide-spread use of cul-de-sacs. Tanglewood and Wells Branch (late modern neighborhoods) have the highest cul-de-sac density, measured as cul-de-sacs per street mile, at 2.1 and 1.8, respectively. No consistent pattern is discernible across the remaining neighborhoods. Old West Austin, an inner-older neighborhood, has a relatively high cul-de-sac density, at 1.2. What designers may be surprised to find is that older neighborhoods with grid networks do have cul-de-sacs; of course, they are more often labeled "dead ends" rather than cul-de-sacs. As with T-intersections, these dead ends represent discontinuities in the network that may increase the travel distances for residents of those streets.

Finally, the density of access points, measured as access points per square mile, gives some indication of the range of choice of travel routes and the degree to which traffic concentrates at key intersections: more access points should mean greater route choice and less traffic concentration. The late-modern neighborhoods also stand out on this measure with significantly lower access point densities, ranging from 7.8 in Wells Branch to 16 in Tanglewood. The other neighborhoods have much higher access point densities, but the patterns are not consistent across types. The high density of access points in Old West Austin and Cherrywood could be explained by the small size of these neighborhoods: a small neighborhood could have the same number of access points as a much larger neighborhood with a similar network, in which case it would have a much higher density of access points per kilometer of street.

All this suggests that the differences between grid and curvilinear networks are much less absolute than their appearance and than the rhetoric would suggest. For one thing, not all curvilinear networks are alike; the newest ones seem to differ from the older ones in many ways. For that matter, not all grid networks are alike; some are much more regular than others, and all

grids are influenced by topography, the placement of public facilities such as parks, and changes in traffic engineering practices, among other factors. Simply labeling a network "grid" or "curvilinear" does not adequately predict the specific characteristics of the network.

Commercial Inventory

The assumption about traditional and modern neighborhoods is not so much about the amount of commercial activity in and around the neighborhood as it is about the kind of establishments, the size of the establishments, the size of clusters of establishments, and their location with respect to residential areas. Traditional neighborhoods are assumed to have smaller, locally-oriented shops -- "Mom and Pops" -- within walking distance for many residents. Modern neighborhoods are assumed to have much larger establishments found in much larger clusters -- "super-supermarkets" in "strip centers" -- oriented toward automobile access.

Our inventory (Table 4-2) shows that the usual assumptions about traditional and modern neighborhoods do not always hold and that commercial activity is to a large degree a function of the location of the neighborhood within the metropolitan area. First, late-modern neighborhoods located at the fringes of the city -- Tanglewood and Wells Branch -- with few exceptions have fewer establishments per 1000 population than neighborhoods near the center of the city, whether traditional or early-modern. The density of activity of all kinds is simply not as great in these fringe areas as in the central areas. As population in fringe areas increases, however, greater concentrations of commercial activity are likely. Second, certain neighborhoods are located near commercial activity that attracts customers from much larger areas. Cherrywood, located just off of I-35 and between I-35 and Austin's airport, has substantially more commercial activity relative to its population than other neighborhoods. It is a small neighborhood wedged between major commercial streets. The situation is similar for the Zilker neighborhood, with South Lamar serving as a major commercial arterial for southwest Austin and with the restaurants along Barton Springs Road drawing from throughout the city.

Otherwise, we discern no clear pattern from the commercial inventory. Some neighborhoods have relatively high numbers of one type of establishment but low numbers of another type. Cherrywood has the most convenience stores per resident, but has no fast food or take-out places. Travis Heights has many cleaners, but no video rental store. These results suggest a "lumpiness" to the distribution of commercial establishments, which are clearly not spread evenly across residential areas. Partly this is due to historical chance, partly this is due to lags in the responsiveness of commercial establishments to market changes, and partly this is due to zoning practices which are themselves lumpy.

The differences between the older and newer neighborhoods are easier to see in the location of commercial activity, although even in this case the general assumption does not hold.

In the modern neighborhoods, commercial establishments are found exclusively on the arterials that bound the neighborhoods -- never within the neighborhood itself. In the traditional neighborhoods, commercial establishments may be found within the neighborhood, although no true stand-alone corner stores were found in either of the traditional neighborhoods. Old West Austin has the best example of neighborhood commercial activity, concentrated around the corner of West Lynn and 12th Street. In contrast, Travis Heights does not have commercial activity within the residential area itself.

Table 4-2. Number of Commercial Establishments per 10,000 Population

	Traditional		Early Modern		Late Modern	
	Old West Austin	Travis Heights	Cherry-wood	Zilker	Wells Branch	Tangle-wood
Supermarket	4.6	0.0	4.8	2.1	0.0	1.8
Convenience Store	7.0	7.1	21.8	12.7	6.0	8.8
Other Food	2.3	0.0	2.4	0.0	0.0	0.0
Restaurants	11.6	7.1	9.7	8.4	8.0	1.8
Take-out/Fast Food	4.6	5.3	0.0	4.2	6.0	5.3
Deli/Cafe	13.9	5.3	9.7	2.1	0.0	0.0
Video Rental	4.6	0.0	4.8	0.0	2.0	1.8
Cleaners/Laundromat	7.0	8.8	12.1	4.2	6.0	1.8
Beauty Salon/Barber	2.3	3.5	9.7	0.0	6.0	3.5
Drug Store/Pharmacy	2.3	1.8	4.8	2.1	0.0	0.0
Fitness/Health Club	4.6	3.5	4.8	0.0	2.0	0.0
Bank	4.6	1.8	7.3	0.0	0.0	1.8
Daycare	4.6	1.8	4.8	2.1	4.0	1.8
Other Commercial	46.4	67.1	67.7	35.9	12.0	30.1

One issue with the commercial inventory should be noted. It is not always clear where to draw the line between establishments within the neighborhood and those beyond it. All of these neighborhoods are bounded on at least one side -- and sometimes on all sides -- by commercial strips, i.e. busy arterials lined with commercial establishments. Although these establishments may serve the neighborhood, they are physically oriented toward the traffic along the street and probably serve a much larger clientele, although it is not always clear from simple observation who the primary clientele is. For this phase of research, we included establishments on the neighborhood-side of the street but excluded establishments across the street from the neighborhood in our inventory. This issue will be explored further using the results of the survey and focus groups to identify the local businesses that residents most often use.

Design Analysis

Design differs quite noticeably between the three types of neighborhoods. The traditional neighborhoods (Old West Austin, Travis Heights) tend to have narrower residential streets with shorter setbacks from street to house (Table 4-3). Street trees are generally larger and denser, not just because they are older but also because of the type of tree. The sidewalk system is not always continuous in these areas: there are many gaps and some streets lack sidewalks all together. Architectural style may vary from house to house, partly because of variation in the original houses in the neighborhood and partly because of changes over time (remodels or tear-downs and rebuilds). Porches and detached garages are common, reflecting the pre-W.W.II era of these neighborhoods. Multi-family housing is mixed with single-family housing, particularly in sections of Old West Austin, adding to the visual complexity of the neighborhood.

While these neighborhoods have more pedestrian-oriented commercial activity than other parts of the city, the dominance of the automobile is also clear here (Table 4-4). Old West Austin's West Lynn commercial district blends in with the surrounding residential. While many stores front onto parking lots, rather than the street itself, the lots are not large and do not become a barrier to pedestrians. Old West Austin's Sixth Street commercial district is also pedestrian-oriented. Although Sixth Street fronts onto a busy arterial, parking is mostly on the street and neighborhood residents can easily reach the area without fighting traffic. In other commercial areas in these neighborhoods, however, the automobile dominates. Even where commercial establishments are located at the street and an ample sidewalk is provided, traffic maybe so heavy that the environment becomes unpleasant and even unsafe for pedestrians -- especially South Congress in Travis Heights. The presence of the automobile-oriented areas in the traditional neighborhoods reflects the layering of development over time. These older neighborhoods were also influenced by the growing use of the automobile after W.W.II, although many of the original characteristics persist.

In the late-modern neighborhoods (Wells Branch, Tanglewood), residential streets tend to be wider and setbacks larger. Street trees provide much less of a canopy, leaving sidewalks exposed to the sun. Architectural styles are very homogeneous on any given street and may be relatively homogenous throughout the neighborhood, reflecting the practices of large-scale developers. Houses are dominated by garages, which are attached to the houses and may take up one-third to one-half of the facades. Front doors are generally oriented toward the driveway rather than the street. Multi-family housing is separate from single-family housing and is clustered around its own system of internal driveways and parking lots, rather than fronting onto the public street system. This separation and clustering creates sharp edges between areas within the neighborhood.

Table 4-3. Residential Street Characteristics

	Traditional				Early Modern				Late Modern			
	Old West Austin		Travis Heights		Cherry-wood		Zilker		Wells Branch		Tangle-Wood	
Measure(s)	10th	Lorraine	East Side	Alta Vista	Cherrywood	E. 37th	Hether	Jessie	Surrender	Margelene	Monarch	Curlew
Street Characteristics												
Street Width (feet)	26	26	26	26	26	26	30	30	40	36	36	40
Traffic Volume (veh/day)	n/a	n/a	400	n/a	700	n/a	3180	n/a	1930	n/a	2220	n/a
Level of Shade*	H	H	H	H	M	M	M	M	L	L	L	L
Share of Road w/Sidewalk	P/P	P/N	N/N	P/N	P/P	P/P	F/N	N/N	F/F	F/F	F/F	F/F
Buffer Width (feet)	8	0	n/a	10	0	0	2	n/a	6	0	4	3
Sidewalk Condition^	F	F	n/a	F	F	F	F	n/a	G	G	G	G
Housing Characteristics												
Avg. Front Door Setback (ft)	30	30	30	40	50	34	30	40	50	66	50	48
Avg. Garage Door Setback (ft)#	30+	alley	30+	40+	50+	34+	det.	alley	36	50	28	28
Garage/Total Facade (ft)#	det.	alley	det.	det.	det.	det.	n/a	n/a	3/4	3/4	1/2	3/4
% w/Front Porches		75%		75%		50%	50% - 75%		0% - 25%		0% - 25%	
Design variation*		H		H		M		M		L		L
Single/Multi-Fam.~		I		I		S		I		S		S

* High (H), medium (M), or low (L).
** Full (F), partial (P), or none (N) on each side of street, ex. F/F means full sidewalk on both sides.
^ Good (G), fair (F), or poor (P).
~ Separated (S) or integrated (I).
# "det." = detached garages

Commercial activity in these neighborhoods is entirely automobile-oriented. No commercial activity is found within the neighborhoods themselves but rather is concentrated on the arterials that surround the neighborhood and particularly at the intersections of major arterials. The establishments in these areas invariably front on to substantial parking lots. Sidewalks may be entirely absent from the commercial area, and rarely are sidewalks continuous between residential and commercial areas. This results in sharp edges between commercial and residential. For the most part, these commercial areas are a random mix of businesses with few physical connections between them. In some cases establishments are clustered in strip malls, but these malls are not connected to neighboring establishments. In addition, establishments are much larger on average than in the older neighborhoods, resulting in much coarser grain.

The early-modern neighborhoods (Cherrywood, Zilker) are similar to the late-modern neighborhoods in some ways but more like the traditional neighborhoods in others. Residential streets are often wider than in the late-modern neighborhoods, reflecting less of a concern over development costs, and setbacks tend to be greater. Architectural styles are homogeneous, but sometimes less so than in the late-modern neighborhoods. Commercial areas are automobile-oriented, although smaller establishments and more stand-alone establishments are found than in

the outer-newer neighborhoods. As a result, the edges between commercial and residential areas may be somewhat blurred.

For the most part, our qualitative analysis of residential and commercial design is consistent with assumptions about the differences between traditional and modern neighborhoods. However, we found some characteristics that tend to contradict, or at least moderate, the assumptions, e.g., relatively narrow street widths in the late-modern neighborhoods and automobile-oriented commercial activity in the traditional neighborhoods, resulting from the changing economics of residential development and from the changing realities of retailing, respectively. As our network analysis demonstrated, a quantification of specific characteristics helps to reveal more subtle variations and more objectively evaluates the differences between neighborhoods.

Table 4-4. Commercial Street Characteristics

	Traditional		Early Modern		Late Modern	
	Old West Austin	Travis Heights	Cherry-wood	Zilker	Wells Branch	Tangle-wood
Commercial Street	West Lynn/ 12th Street	South Congress	38 1/2 St.	S. Lamar	Wells Branch Pkwy	Slaughter/ Manchaca
% of hhs within walking distance of commercial	95%	60%	80%	60%	15%	15%
Location of parking - on or off street	On/Off	On (angle)	Off	Off	Off	Off
Buildings area:dedicated parking area	*	n/a	*	1:1.36	1:1.82	1:1.80
Location of entrances - pedestrian or auto	P	P	P/A	A	A	A
Average building setback - feet	20	10	20-500	100	200	500+
Continuity - continuous or discontinuous buildings	C/D	C/D	D	D	C/D	C/D
Street width - number of lanes	2	5	4	5	4 div.	4 div.
Traffic volume - vehicles per day	4,460	28,500	12,220	38,000	18,200	18,090
Share of road w/sidewalk - full/partial/none**	F/F	F/F	F/N	P/P	F/F	P/N
Width of sidewalk buffer - feet	4	0	0	0-10	0-50	8
Level of sidewalk shading - high, medium, low	H	H	M	M	L	L

* Can't be determined from available aerial photos.
** Full (F), partial (P) or none (N) on each side of road, ex. F/F means full sidewalks on both sides.

CHAPTER 5. ANALYSIS OF TRAVEL CHOICES

This chapter presents the analysis of travel choices in four sections: Walking, Grocery Shopping, Local Shopping, and Residential Location. The survey data are presented in conjunction with the focus group analysis. In most cases the survey data are supported by the focus group discussion which provides a rich and detailed elaboration on survey responses. At times, the focus group discussion contradicts the survey findings or did not offer an explanation for them; these cases point to the complexity of travel behavior and the need for further research to better understand it. Together, the evidence suggests urban form directly and indirectly influences choices about nonwork travel, yet urban form is just one of many factors -- and not always an important one -- influencing these choices.

WALKING

Residents make two basic types of walking trips, although the division between the two is not always clear. The first type, strolling trips, are not so much about getting somewhere as they are about simply walking. They may be motivated by a desire to get some exercise, to get out of the house, or to walk the dog. These pedestrians may set out with a particular destination in mind, but the primary activity is walking itself, rather than whatever might be done at the eventual destination. One focus group participant described strolling as "a slower pace and a different mindset...you just actually enjoy yourself." In the second type, walks to a destination, the primary motivation is to reach the destination, in order to engage in whatever activity is available there. The choice to walk rather than drive to the destination may be motivated by many of the same factors as strolling trips, but the pedestrian would probably not make the trip if the destination were not there. Of course, some trips cannot be defined as more one than the other, but are truly an equal mix of motivations. It is important to understand both types of trips: while many planners and urban designers pin hopes on the latter, the former is also important for their goal of fostering community, and, more fundamentally, an understanding of strolling trips contributes to an understanding of walks to destinations.

Strolling Trips

Residents were asked about the frequency with which they stroll around their neighborhood (Table 5-1). The frequencies are somewhat higher for the traditional neighborhoods than the late-modern neighborhoods, but the early-modern neighborhoods are a mix: Cherrywood has the second highest average frequency and Zilker the second lowest. The percentage of respondents saying they strolled at least once in the previous 30 days ranged from around 75% to around 85% (a statistically significant difference). Of those who strolled at least

once, the average frequencies ranged from just over 10 (once every three days) to just over 13 (nearly every other day). Although the differences are not statistically significant, these results suggest that either residents in the traditional neighborhoods may be somewhat more motivated to stroll or that the urban form of the neighborhood may be somewhat more encouraging of walking or both.

Table 5-1. Frequency of Walking Trips

	Traditional		Early-Modern		Late-Modern	
	Old West Austin	Travis Heights	Cherry-wood	Zilker	Wells Branch	Tangle-wood
Strolling Trips						
Average Trips/30 days For All Respondents	11.1	10.0	10.1	8.4	8.5	8.9
Percent Strolling at Least Once/30 days	84%	82%	77%	76%	83%	74%
Average Trips/30 days For Strollers	13.2	12.2	13.0	11.1	10.3	12.0
Walks to the Store						
Average Trips/30 days For All Respondents	6.4	2.1	2.1	1.7	0.7	0.9
Percent Walking at Least Once/30 days	79%	44%	48%	39%	22%	21%
Average Trips/30 days For Walkers	8.1	4.6	4.3	4.3	3.3	4.4

The reasons why respondents walk, as indicated in responses to an open-ended survey question, cover a wide range, although "exercise/health," "I like to/for pleasure," and "walk the dog" were the most common responses (Table 5-2). Old West Austin (traditional) respondents were least likely of all neighborhoods to indicate "exercise/health" and most likely to indicate "walk to store" and "walk to work" as reasons for walking, suggesting that for these residents the motivation to walk may create the demand for the activity at the destination, rather than vice versa. In Travis Heights, the other traditional neighborhood, respondents were most likely to indicate "I like to/for pleasure," suggesting different motivations than for Old West Austin. Two statistics for the late-modern neighborhoods stand out: Wells Branch residents were most likely to indicate "exercise/health," while Tanglewood residents were most likely to indicate "walk the dog." It is interesting to note that both Travis Heights and Wells Branch have parks with walking trails within their neighborhood boundaries. This may account, in part, for the high percentage of

respondents who walk for pleasure or exercise in these communities (82% and 83% respectively). Overall, the most important motivation for strolling appears to be the desire for exercise and concerns about health.

Table 5-2. Reasons for Walking and Not Walking

	Traditional		Early Modern		Late Modern	
	Old West Austin	Travis Heights	Cherry-wood	Zilker	Wells Branch	Tangle-wood
Reasons for Walking - Percent of Respondents Who Walk						
Exercise/Health	65%	71%	71%	73%	88%	78%
I Like To/For Pleasure	35%	44%	36%	34%	29%	27%
Walk the Dog	26%	30%	39%	30%	37%	41%
Get Outdoors/Fresh Air	12%	8%	15%	18%	20%	13%
Relaxation	11%	19%	12%	11%	6%	14%
Walk to Store	32%	13%	12%	13%	0%	3%
Walk to Work	6%	2%	3%	0%	0%	0%
Reasons for Not Walking - Percent of Respondents Who Don't Walk						
Walk Elsewhere	14%	19%	14%	25%	9%	3%
Get Other Exercise	31%	30%	7%	21%	9%	25%
Not Enough Time	25%	14%	19%	21%	48%	45%
Physical Limitations	19%	16%	21%	10%	13%	5%
Safety Concerns	6%	11%	17%	2%	9%	8%
Too Tired/Too Lazy	0%	3%	14%	8%	4%	3%
Don't Enjoy Walking	3%	0%	0%	6%	9%	5%

Variation between neighborhoods significantly greater than variation within neighborhoods for all reasons.

In the focus group discussion we were able to explore more in depth why people walk or don't walk in and around their neighborhood. Exercise was a common response to the "why walk" question, but residents also cited other reasons for enjoying walking; "I walk for meditation and exercise," said one Zilker resident; "I like to think while I walk... it works better," added another. While residents in every neighborhood said they like to walk, they gave different reasons for doing so. Residents in Old West Austin listed some of their reasons for walking: walking for leisure, walking to shopping, and walking the kids to school; one resident said "we walk to see neighbors." Consistent with the survey findings, they tend to combine walking for exercise with walks to a destination. One woman said, "If I have a destination that is good because I don't like to exercise. It's boring. But, if I am walking to get something...then it's okay." Another man said, "It may start out as exercise, but then I may think, 'oh yeah, while we're out let's get this or drop something in the mail.'" This suggests, first, that it is sometimes difficult to differentiate between walking to a destination and walking for pleasure or exercise, and, second, that the demand for walking sometimes creates the demand for the destination rather than vice versa.

This mixing of motivations was also apparent in the focus groups in other neighborhoods, although it did not show up to the same degree in the survey. A resident from Travis Heights said, "I walk from my house to Magnolia Cafe with a friend for breakfast...I walk Sunday morning to the 7-Eleven to get the paper." A woman from Cherrywood explained, "I walk at least 2-3 times a day. I walk my dog. I walk home from UT -- about 2 miles. I walk to the store and buy groceries, and to the convenience store to buy a paper." Another man added, "I walk or run about 3 times a week just for exercise and about once a week for some kind of errand or entertainment." Although the residents of Zilker do most of their walking for exercise, they also walk for purposes other than exercise. One participant stated, "I think we walk every day somewhere, whether it's to Zilker [Park] with the dog or up to Bluebonnet [neighborhood market] to get something we forgot at the supermarket." One woman added, "I walk a lot. My husband walks a lot; he walks to work. We walk to what used to be Food Land and pick up small items, not a major shop, and we walk around the neighborhood to deliver newsletters."

In contrast, residents of Wells Branch and Tanglewood (late-modern) tend to walk primarily for exercise, some every day and others just a few times a week; as in other neighborhoods, walking the dog is another important reason for walking. In Wells Branch, residents walk mostly along the hike-bike trail: "It's a nice area to walk and jog, and there's plenty of places with water to drink along the way." The reason residents don't walk to the store very often could be attributed to their perception that it is too far away. When asked if they walk to shopping areas one Tanglewood woman replied, "There aren't any within walking distance from where I live." Our analysis of urban form (Chapter 4) showed that residents of these neighborhoods are less likely to live within walking distance of stores, and, as noted below, residents are less likely to feel that they live within walking distance of stores (as discussed below). Not everyone felt this way, however: one woman said of her husband, "He walks down there a lot. He will walk to the HEB to pick up a few things... makes it part of his exercise." Again, the mixing of motives.

For respondents to the survey who don't walk in the neighborhood, the reasons why they don't cover a similar range (Table 5-2). In this case, the most common responses to the open-ended question included that they "walk elsewhere," that they get "other exercise," that they "don't have enough time," or that they have "physical limitations." The results show several interesting and not immediately explainable differences between neighborhoods. Zilker respondents are much more likely than respondents of other neighborhoods to state that they walk elsewhere, probably the Town Lake and Barton Creek hike-bike trails bordering their neighborhood to the north and west; in the focus group, one woman said, "I'm embarrassed to admit that most of the time if I'm doing the hike and bike trail I drive to it because I'm too pooped to walk home." Nearly half of non-walking respondents in the late-modern neighborhoods, Wells Branch and Tanglewood, indicated that they don't have enough time to walk, which may be

consistent with a higher portion of dual-wage earner households and households with children in these areas. Note that very few respondents indicated that characteristics of the neighborhood -- too much traffic, too many hills, no sidewalks -- were reasons why they didn't walk. Very few also indicated that they don't enjoy walking. These results suggest that most people would like to walk, all else being equal, and that personal limitations are more likely to limit their walking than characteristics of the neighborhoods.

Participants in the focus groups also suggested that one of the reasons for not walking in their neighborhood is the perception that it is not safe, either because of traffic or because of crime. In the traditional and early-modern neighborhoods, residents said that they feel that traffic is too heavy and moves too fast on their streets and that this affects their comfort as pedestrians. One Old West Austin woman said, "On my street traffic is bad. People are going 40-50 mph down the street and it's frightening." Drivers are likely to speed even on narrow streets, making the problem worse. Another resident added, "I live on 13th Street. People take it as a short-cut from the highway and it's a problem because it's a narrow street and people drive 50 mph. Lots of small children play there"; concern over the safety of children was expressed by residents of several neighborhoods. Interestingly, residents of the late-modern neighborhoods, where streets are significantly wider then in the traditional neighborhoods, did not express concern over traffic; this suggests that the layout of the neighborhood, designed to discourage through traffic, may be helping to minimize the traffic problem. In fact, one Tanglewood resident said that she likes "the nice wide streets."

This difference was also seen in the survey, when respondents were asked to indicate whether they agreed or disagreed (on a five-point Likert scale) with a series of statements about the walking environment; the intent of this question was to test residents' perceptions about the walking environment in the neighborhood (Table 5-3). The results of these questions give some indication of factors that may encourage or discourage walking in the neighborhood. Few large differences can be seen across neighborhoods (although the variation between neighborhoods is statistically greater than the variation within neighborhoods). Interestingly, respondents in the traditional neighborhoods, which tend to have higher average frequencies of strolling, are also more likely to agree that there is too much traffic in the neighborhood; either they walk despite higher traffic or they notice the traffic more because they walk more or both. Traffic does not seem to be a deterrent to walking, but it does seem to influence where people walk and how they feel about walking. On the other hand, respondents in late-modern neighborhoods were least likely to agree that they felt comfortable walking where there are not sidewalks, consistent perhaps with the greater widths of the streets and thus higher average speeds in these areas, even if traffic is lighter. In the focus groups, residents of Old West Austin and Travis Heights confirmed that they were usually comfortable walking on streets without sidewalks, at least on the streets with less

traffic: "But the places we walk in that don't have sidewalks aren't as heavily traveled traffic-wise so it doesn't really matter to us." Participants from several neighborhoods said they avoid streets with heavy traffic that lack sidewalks.

Table 5-3. Perceptions About Walking in the Neighborhood

	Traditional		Early-Modern		Late-Modern	
	Old West Austin	Travis Heights	Cherry-wood	Zilker	Wells Branch	Tangle-wood
Mean Score on a 5-Point Scale*						
I feel safe walking during the day	4.8	4.6	4.4	4.7	4.6	4.6
I feel safe walking at night	4.0	3.6	3.4	4.0	3.8	3.8
Trees provide ample shade	4.1	4.3	4.3	4.2	2.9	3.6
I'm comfortable walking in hot weather	3.1	3.1	2.9	2.9	2.5	2.9
There are interesting houses	4.5	4.5	4.0	3.9	3.1	3.4
I like to look at houses when I walk	4.5	4.4	4.4	4.1	3.7	3.9
There's too much traffic in neighborhood	3.5	3.3	3.2	3.0	2.8	2.9
I'm comfortable walking without sidewalks	3.0	3.1	3.2	3.3	2.5	2.8
I see neighbors when walking	3.3	3.3	3.5	3.2	2.9	3.1
I see other people when walking	4.0	3.9	3.8	3.7	3.8	3.7
I like to see people when I walk	3.9	4.0	3.7	3.8	3.7	3.7

* 5 = strongly agree; 1 = strongly disagree
Differences between neighborhoods significant at 1% level for all questions.

Wells Branch (late-modern) respondents, followed by Tanglewood (late-modern) respondents, agreed less than respondents in other neighborhoods with the statement that "trees provide ample shade," a factor which may discourage walking in hot weather; respondents in traditional neighborhoods, where the tree canopy is the most extensive, were more likely to agree with that they feel comfortable walking in hot weather. Trees and shade were clearly important to residents of all neighborhoods. In the focus group, a Zilker resident said, "I really love walking in the neighborhood because it's shady, for one thing." In Cherrywood: "Really full, shaded places are the most beautiful places." In Travis Heights: "I choose the shaded streets," and "I love to look at the trees. We have many, many varieties. I find myself sometimes walking along and looking up when I should be watching where I'm going."

Scenery is also an important factor in residents' enjoyment of walking. Respondents in traditional neighborhoods were more likely to agree that the neighborhood has interesting houses to look at than late-modern respondents, but late-modern respondents were less likely to agree that they like to look at houses when they walk, perhaps because the houses are less

interesting to look at or because in Wells Branch residents mostly walk on the hike-bike trail that runs behind houses. A Zilker resident said, "The different kinds of houses are fun to look at. The way people do their landscaping is wonderful"; another said "I also enjoy looking a everybody's houses and seeing people out in the yards or on their porches." An Old West Austin resident said, "The architecture is not cookie cutter." In Travis Heights: "The variety is one of the really pleasant things about walking around here.," and "The houses are mostly well-kept and there are so many different kinds of houses... it's beautiful." The residents of the late-modern neighborhoods were more ambivalent. Tanglewood residents like the variety in house design but aren't otherwise enthusiastic. One resident said, "It's just nice not to look at the same dang house every three houses," and another, "I enjoy looking at the different types of houses and the way they are decorated and the landscaping and that kind of thing, but other than that, it's just a neighborhood." Another resident complained about the "trashy yards" of neighbors. A Wells Branch resident said, "It's pretty much tract houses. Not much architectural difference... Most of the time you drive down the street and see the big garage door." Comments about upkeep suggest that what neighbors do with their houses is also important in creating scenery. Variations on this point included the following: "Someone is always doing something to their house," and "I love to walk at Christmas time because people do such bizarre things."

Respondents in all neighborhoods agreed, on average, that they like to see people when they're out walking, although respondents from the traditional neighborhoods agreed somewhat more strongly. Participants in the focus groups confirmed the importance of seeing other people. Some residents emphasized the sense of community that seeing people helps to foster. A Cherrywood resident said, "People feel comfortable enough to leave their house, go out in the neighborhood. You meet people working in their yard. You get to talk to them." A resident of Old West Austin said, "That was one of the really great things about our previous house We'd just sit on the porch swing and talk to people or go out to the yard - there was always some kind of interaction." Others suggested that they feel more secure because they see people. A Tanglewood resident said, "There are a lot of retired people in the neighborhood and there's always people around walking and I like that." In Old West Austin: "Pretty much anytime you go out and walk around the block you'll meet friendly people. That makes you feel secure." In Travis Heights: "It's a security thing... every time you go there's lots of people out walking." A woman from Old West Austin noted, "I'll be safe walking home tonight after this meeting and it's in part because I'm not going to be the only person out on the street." This helps to explain why survey respondents in all neighborhoods agreed that they feel safe walking during the day and, although less strongly, during the night. In the focus groups, several participants noted the lack of adequate lighting, which leads them to feel less safe walking at night and influences the routes they choose.

A couple of factors came up in the focus group that weren't included in the survey questions. First, residents in the Tanglewood, Old West Austin, Travis Heights, and Zilker neighborhoods said that they like hills and varied topography when they walk, some because it's better exercise, some because it makes for a more interesting walk. "I like the topography a lot," said a Zilker resident; "I like walking my neighborhood because it's hilly," said a Travis Heights resident. There's a limit, however; one hill in Zilker was described as "a killer." Second, several focus group participants were concerned about dogs. In Zilker, one resident said "Sometimes loose dogs is a bit of a problem," and was echoed by a Wells Branch resident, "What I don't like is the loose dogs." In Tanglewood, the problem seems to have been solved: "There's dogs, but they're not running out around and you don't have to worry about them nipping at your heels as you go by. I really like that." Dogs can also be a positive, though. Besides giving many residents a reason to walk, they can help to promote a sense of community: "I know more dog names than I do people," said a resident of Travis Heights, where residents have access to a dog park.

Wells Branch, with its internal hike-bike trail, sheds some light on other characteristics of the walking environment that can be important. As noted earlier, residents generally prefer to walk on the hike-bike trail rather than on residential streets in the neighborhood; when they do walk on the streets, it is usually on their way to the trail. Participants in the focus group mentioned several characteristics of the trail that make it a more attractive place for them to walk: it has greenery, wildlife, and a softer surface, it is quiet and away from traffic, and it has mileage markers.

Table 5-4. Correlations Between Strolling Frequency and Perceptions About Walkingin Neighborhood

	Correlation Coefficient
I feel safe walking at night.	0.16 *
I often see neighbors I know when walking.	0.16 *
I feel safe walking during the say.	0.14 *
The trees provide ample shade.	0.14 *
I feel comfrotable walking when it is hot.	0.12 *
There are interesting house to look at.	0.12 *
I like to see other people when I walk.	0.12 *
I feel comfortable waling without sidewalks.	0.11 *
I like to look at interesting houses.	0.05
I often see people I don't know when walking.	0.01
There is too much car traffic in my neighborhood.	-0.01

*Significant 1% level.

In the survey results, correlations between responses to the attitudinal questions and the reported frequency of strolling trips, however, are relatively weak even if statistically significant (Table 5-4). Feeling safe walking at night and seeing neighbors when walking had the highest correlations with strolling frequency. Other answers to attitudinal questions also had weak but significant correlations with strolling frequency, with the exception of whether the respondent likes to look at interesting houses, whether the respondent sees people they don't know when walking, and whether there is too much traffic in the neighborhood. The low level of correlations suggests that factors other than attitudes and perceptions about the walking environment are more significant contributors to the decision to stroll. This result suggests that individual motivations and limitations are the primary determinants of the choice to walk and that urban form factors may encourage or discourage walking given motivations and the absence of limitations.

Walks to the Store

Residents were also asked about the frequency with which they walk to a local store or commercial area (Table 5-1). Here, the differences between the neighborhoods are dramatic. Respondents in late-modern neighborhoods walk to a store less than once per month on average. Respondents in Zilker (early modern) average about 1.7 times per month and respondents in Cherrywood (early modern) and Travis Heights (traditional) average about 2 times per month. Respondents in Old West Austin (traditional), in contrast, average over 6 times per month or more than once per week, and nearly 80% of respondents indicated that they walked to a store at least once in the last 30 days. Old West Austin differs significantly from the other traditional neighborhood, Travis Heights, in this respect. The differences can be explained at least partly by differences in urban form: more households in Old West Austin are within walking distance of commercial areas, the commercial areas in Old West Austin are more neighborhood-oriented in terms of the types of establishments, and the quality of the pedestrian environment in the commercial areas is better in Old West Austin. It is striking that the results are so similar for Travis Heights, a traditional neighborhood, and for Cherrywood, an early-modern neighborhood; this may be explained by the similar portions of these neighborhoods within walking distance of commercial as well as the attitudes and preferences of their residents.

We explored the factors behind these differences -- and similarities -- through a series of attitudinal questions about local commercial areas (Table 5-5). These results show how residents perceive their local shopping areas -- which may differ from what a non-resident would perceive. Perceptions about three factors play a role in a resident's decision to walk to a local store: perceptions about the types and quality of stores, perceptions about walking distance , and perceptions about the quality of the walking environment. The first two are necessary but not sufficient conditions: residents will not walk to the store if they do not perceive stores to be within

walking distance or if they do not feel that the local store offers what they are looking for. Given desirable stores within walking distance, the quality of the walking environment may encourage or discourage residents from choosing to walk.

Table 5-5. Perceptions about Local Commercial Areas

	Traditional		Early-Modern		Late-Modern	
	Old West Austin	Travis Heights	Cherry-wood	Zilker	Wells Branch	Tangle-wood
Mean Score on a 5-Point Scale*						
The closest store is a reasonable walking distance	4.5	3.4	4.1	3.4	3.0	3.5
Local stores meet my needs	4.0	3.4	3.7	2.4	3.6	4.1
The quality of local stores is high	4.2	3.0	3.4	2.4	3.5	4.0
I feel safe walking from my house to local stores	4.5	3.7	3.7	3.8	3.5	3.4
It is hard to park at local stores	2.4	2.8	2.7	2.2	2.6	2.6
I have to walk along busy streets to access local stores	3.0	3.9	3.8	3.1	3.8	3.7
I have to cross a busy street to access local stores	3.0	4.2	4.1	3.0	4.1	2.8
I am comfortable walking around local shopping areas	4.3	3.6	3.7	3.6	3.9	3.9

* 5 = strongly agree; 1 = strongly disagree

Not surprisingly, respondents from Old West Austin were most likely to agree that stores are within walking distance. But both Old West Austin and Tanglewood respondents agreed more strongly than respondents from other neighborhoods that local stores meet their needs and that the quality of local stores is high; residents of both neighborhoods seem to be satisfied with local shopping opportunities. However, Tanglewood residents did not strongly agree that the closest store is within a reasonable walking distance, and their low frequency of walking to stores reflects this perception. The reverse was true in Cherrywood, where residents tended to agree that the closest store is within a reasonable walking distance but expressed relative dissatisfaction with both the types and quality of stores found locally. Travis Heights residents were also relatively dissatisfied with local stores; said one focus group participant of the stores along South Congress, "There's not a lot to do there."

Old West Austin respondents seem to a perceive a more comfortable environment for pedestrians in their local shopping areas than respondents in other neighborhoods. They were more likely to agree that: "I feel comfortable walking around local shopping areas" and "I feel safe walking from my house to local stores" and less likely to agree that "I have to walk along a busy

street to get there." Travis Heights respondents, in contrast, were among the least likely to agree on the positive statements about local shopping areas and among the most likely to agree with the negative statements. All of these results can help to explain the higher frequency of walks to a store in Old West Austin and suggest that urban form factors -- those related to commercial areas and the links between commercial and residential areas -- play a significant role in encouraging walks to destinations.

It is interesting to compare the perceptions of distance to commercial areas with actual distances. Over 70 percent of respondents in Old West Austin strongly agree that the closest shop is within a reasonable walking distance; the average score for the neighborhood was 4.5 on the 5-point scale. In Travis Heights only one third of respondents strongly agreed that the closest shop is within a reasonable walking distance and nearly a third said the disagreed or strongly disagreed. This mirrors the estimated average minimum distance to commercial activity for survey respondents in the two neighborhoods: 0.37 miles for Old West Austin and 0.48 miles for Travis Heights. Respondents from Cherrywood also felt strongly that stores are within an reasonable walking distance (average score of 4.1) -- more strongly than residents of Travis Heights although the estimated average distance is only slightly lower, at 0.44 miles, suggesting that differences in the design of the neighborhoods and their commercial areas may lead to differences in the perception of distance. Respondents from Wells Branch, on the other hand, are less likely to agree that the nearest store is within walking distance, consistent with the average minimum distance to commercial areas of 0.75 miles. Survey respondents from Tanglewood indicate that they feel more strongly than Wells Branch respondents that the closest store is within a reasonable walking distance, despite being farther on average from the closest stores (0.93 miles). The fact that Travis Heights and Wells Branch respondents tend to evaluate distances differently than respondents in other similar neighborhoods may be related to the fact that major arterials separate their residences from their commercial areas.

Results of the focus groups confirmed that the location of stores across or even along busy arterial roads may be a deterrent to pedestrians. Travis Heights residents like to walk to the shops in their neighborhood but cited Congress as a dangerous obstacle and expressed their desire for more pedestrian-friendly elements such as a traffic island or a longer light at the crosswalks. Said one Travis Heights resident: "Getting back and forth across Congress is not a simple thing any more"; several residents expressed dismay at seeing children crossing this busy arterial. Old West Austin residents expressed similar concerns. Although residents can walk to many shops and restaurants without crossing a major arterial, Lamar Boulevard and Sixth Street separate them from Whole Foods market and the Bookpeople bookstore and other popular destinations. Residents described the problem: "You can't go across Lamar. You can't go across Sixth Street. I mean you can, but you're taking your life into your hands." One resident's strategy

for crossing the street is to "run like hell." The signals don't seem to help pedestrians, instead making them feel more vulnerable; a common strategy is to jaywalk instead. Several residents said they simply don't cross these streets, sticking instead to businesses on their own side of the street.

In Cherrywood half of the residents have to cross 38 1/2 Street to get to the local shopping center, and focus group residents said it is not safe for people on foot, especially given the lack of sidewalks: "there's really only one good crosswalk and that's at Cherrywood. That's far away from me. You really have to dodge traffic." Another resident said, "I would never want to cross 38th with dogs and groceries" (however, another resident said, "It's almost harder to get a car across 38th than it is to run or dash across, " leading to laughter among the rest of the group). The lack of infrastructure for pedestrians at the retail center also deters pedestrians. One Cherrywood resident said, "When you get there, there's no place for pedestrians. It's all parking lot." Another added, "I usually drive. The fact is, the only real concentration of retail we have is an automobile-oriented shopping center." A third complained that "there's no back way into it."

Zilker neighborhood residents have direct access to the Lamar Center shopping area from the neighborhood and many focus group participants said they walk there now that the direct connection has been added. With the exception of this center, residents say most of the shops and services along Lamar Boulevard are not geared to their needs and they are deterred from walking by the heavy traffic and the large number of commercial driveways. Residents said they don't feel safe walking along Lamar for these reasons, despite the sidewalk: "You've got the car speeding past on one side... and if you want to get to the business, you have to walk through the parking lot where the cars are milling around." The unattractive environment also makes a difference: "Lamar Boulevard just an ugly street and it's really busy...it's really hard for people to walk," one Zilker resident said. "I'll [walk to the store] just to walk, but it isn't really a pleasant walk," said another.

In Wells Branch (late-modern) the parkway separates the residents from the local shopping area. Residents say they don't mind walking along the parkway, but they don't usually consider crossing it to get to the shopping center. This may be due to the fact that Wells Branch residents wouldn't opt to walk, even if the distance were short, or because the traffic along the parkway moves very fast and they don't feel safe crossing it, or because they have little need for the businesses in the center. The amount and speed of the traffic along the parkway may also be a factor in their perception of the distance to the stores. Finally, once they cross the parkway, they are still faced with crossing a large and often busy parking lot to get to the store. In the focus group, a resident explained, "When my husband and I first moved here we saw the dollar theater and how close we were, we said we would walk all the time. While I walk to Wells Branch Parkway for a walk just to get out, I have never actually walked to go to the theater yet." Still, focus group

participants said that they like the idea of having a convenience store and restaurants within walking distance, even if they always end up driving there. In Tanglewood, residents tend to stay off of the arterials altogether. Said one resident, "Jimminy Christmas, I have a hard enough time driving it, let alone walking with two dogs." Another resident said that while she's comfortable on neighborhood streets -- "There's none that I would avoid" -- she wouldn't walk on the arterial -- "I never walk along Manchaca Road. I avoid the traffic and the noise."

Thus it appears that the design of commercial areas and the presence of busy arterials influences both whether residents perceive these destinations to be within walking distance and whether they feel safe and comfortable walking there. In most neighborhoods, only the hardiest of walkers overlooks the negatives. Among our neighborhoods, Old West Austin was the only exception. In the focus groups, Old West Austin residents discussed design elements that make it easier to walk: "everything is geared toward pedestrians...you can walk to the store. It's a small scale grid [the street layout]"; "I like it if they [local businesses] don't have huge parking lots, because you don't want to be walking across that asphalt...Most of them [local businesses] are really street oriented. You don't have to walk through a parking lot to get to the door." One person in Old West Austin said, "I feel comfortable walking to any of the businesses in the neighborhood."

Comments by Wells Branch and Tanglewood residents suggest that walking to the store is not generally something they even consider, whether because of distance or design or preferences. Said one women in Tanglewood: "I guess I never even thought about it. I just jump in the car." A Wells Branch resident said, "I usually drive [to the convenience store] but it's not more than a block to a block and a half away. Usually I stop on the way back from somewhere else." A Wells Branch resident described it this way: "I don't know. I guess you are so attuned to just get into our vehicle and drive to your destination as quickly as possible and get back. If you are actually going out for a walk or some exercise, you are at a slower pace and a different mindset. You just actually enjoy yourself."

In the survey results, correlations between answers to the attitudinal questions and the frequency of walks to the store were higher than for strolling trips (Table 5-6). Not surprisingly, "stores within walking distance" had the highest correlation, followed by "I feel safe walking within local shopping areas." Only "difficulty parking at local stores" had an insignificant correlation with frequency of walks to stores. This suggests that residents in these neighborhoods choose to walk to the store not because it is more convenient than driving (as it is in central cities, for example) but because it is otherwise desirable. As for strolling trips, however, the correlations are relatively weak, suggesting that other factors influence the choice to walk to a store.

Table 5-6. Correlations Between Walk-to-Store Frequency and Perceptions About Local Commerical areas

	Correlation Coefficient
Stores are within walking distance.	0.32 *
I feel safe walking to local shopping areas.	0.25 *
The quality of local stores is high.	0.22 *
Local stores meet many of my needs.	0.21 *
I feel comfortable walking in local shopping areas.	0.17 *
It is hard to park at local stores.	-0.03
I have to cross a busy street to get there.	-0.06
I have to walk along busy streets to get there.	-0.10 *

*Significant 1% level.

Substitution

A question of great interest and little empirical testing in the discussion over neo-traditional development and the New Urbanism concept is the possibility that walks to the store might replace drives to the store. This question of substitution is a difficult one to test and one that cannot be fully resolved through observing differences in trip rates for different modes. In the survey used in this study, respondents were asked to think back to their last walking trip to a store. Then, for this trip, they were asked to speculate on what they would have done had they not been able to walk that day, for whatever reason.

The difference in when residents last walked to a store mirror the differences reported above in the frequency with which residents said they walk to stores. Over half of the Old West Austin respondents said they had last walked to the store within the last week and another 23 percent in the last few weeks (Table 5-7). In Travis Heights and Cherrywood, a quarter of respondents had last walked to a store in the past week, while an almost equal share couldn't remember the last time they walked to the store. In the two late-modern neighborhoods, Wells Branch and Tanglewood, over half of the respondents couldn't remember the last time they walked to a store. Of those who could remember, supermarkets and grocery stores were high on the list of destinations, as were convenience stores and restaurants. Drug store, video rental store, bakery, and cleaners were also popular destinations in some neighborhoods, in a pattern consistent with the particular establishments found in and around the neighborhoods (as described in Chapter 4).

Table 5-7. Last Time Walked to Business and Businesses Visited

	Traditional		Early-Modern		Late-Modern	
	Old West Austin	Travis Heights	Cherry-wood	Zilker	Wells Branch	Tangle-wood
Last Time Walked to Business*						
WIthin last week	56%	26%	25%	22%	8%	11%
Within last few weeks	23%	21%	26%	22%	13%	8%
More than one month ago	6%	17%	15%	11%	11%	13%
More than six months ago	7%	9%	15%	13%	18%	18%
Can't remember	9%	27%	21%	32%	51%	50%
Businesses Visited*						
Supermarket	38%	15%	55%	33%	16%	42%
Small grocery	49%	11%	11%	16%	3%	7%
Restaurant	44%	47%	33%	28%	15%	19%
Convenience store	31%	38%	32%	27%	48%	26%
Bank	7%	8%	9%	3%	3%	8%
Video store	20%	6%	23%	4%	10%	11%
Post office	5%	9%	8%	4%	12%	8%
Cleaners	4%	13%	11%	6%	7%	5%
Bakery	35%	26%	10%	11%	1%	2%

*Differences between neighborhoods significant for both questions.

Most respondents in all neighborhoods indicated that they would have driven to that destination or another destination, rather than not making the trip, taking transit, or some other alternative (Table 5-8). In other words, most of the walks to commercial areas do in fact appear to substitute for driving trips. This suggests that if residents are given the opportunity to walk to the store they will eliminate at least some of their driving trips. Of course, even under the most optimistic of assumptions, the savings in vehicle-miles will not be great: 77% of 6.29 trips per month, in Old West Austin, at, optimistically, 1.7 kilometers (1 mile) per trip means that about 8 kilometers (4.8 miles) of driving are saved per resident per month (of course, if the 13% of trips that would have been made to other destinations would have been made to much farther destinations, the totals could be greater). This is better than nothing, but is clearly not a cure-all to problems of automobile dependence. In addition, note that 13% of respondents would have stayed at home rather than making a trip, suggesting that the opportunity to walk in some cases induces trips that would otherwise not be made.

Participants in the focus groups made several comments that suggest this possibility. As discussed earlier, residents often walk both for exercise and to get somewhere. In some cases, the former motive is the more important one and the destination is simply an excuse to walk. Said one Travis Heights resident, "Often I will opt to walk just for the sake of walking and people-watching up and down Congress" -- not likely that this resident would drive to Congress on these occasions if he weren't able to walk. As a woman in Tanglewood said of her husband, "He walks down there a lot. He will walk to the HEB to pick up a few things... Makes it part of his exercise." In these cases, walking trips are not a substitute for driving. In other cases, the motive of getting to the destination is the more important one and provides an opportunity to walk. If that Tanglewood husband really needed something at the store but wasn't able to walk, he would drive there instead. The bottom line is that it is often difficult to separate the motivations and know whether walking leads to less driving.

Table 5-8. Alternatives to Last Walk to Store

	Traditional		Early-Modern		Late-Modern	
	Old West Austin	Travis Heights	Cherry-wood	Zilker	Wells Branch	Tangle-wood
If unable to walk, percent of respondents who would have...						
Driven to same place	64%	67%	63%	58%	68%	67%
Driven to different place	8%	6%	12%	10%	9%	2%
Stayed at home	13%	11%	13%	12%	14%	15%
Taken transit	2%	2%	2%	3%	0%	3%
Other	2%	6%	2%	4%	4%	4%
Not sure	10%	9%	10%	13%	6%	8%

Differences between neighborhoods not significant.

GROCERY SHOPPING

Grocery shopping is one of the most frequent and nondiscretionary types of nonwork trips. With grocery shopping classified as "convenience shopping," the usual assumption is that shoppers tend to minimize the distance they travel although other factors such as price and quality may influence their choice of where to shop. To better understand choices about grocery shopping, we asked survey respondents about the frequency of their grocery shopping trips, their usual mode of travel, their choice of stores, and the reasons for their choice of stores. The results are reported for the 90 percent of respondents who said they conduct half or more of their household's grocery shopping. Interesting differences between neighborhoods emerge from

the survey, driven primarily by differences in the grocery shopping options available. As we expected, distance has a negative correlation with both frequency and share of walking: longer distances mean fewer trips and less walking. But the focus groups, and to a lesser degree the survey, highlight the idiosyncratic behavior of grocery shoppers.

Frequency and Mode

The average number of weekly trips to the supermarket and the usual mode of travel to the supermarket are clearly related to the average minimum distance to the nearest supermarket or grocery (Table 5-9). Residents of Old West Austin, a traditional neighborhood with a small grocery (Fresh Plus) located in the center of the neighborhood and a supermarket (Whole Foods) on the perimeter, make more trips to the grocery store each week (2.7 per week) than the other neighborhoods. In addition, this neighborhood has the highest number of respondents who walk to the supermarket with almost 20% reporting that walking is their usual mode of travel to the supermarket -- surprising given the challenge of carrying groceries; no other neighborhood comes close. Their tendency to make more trips and their tendency to walk seems to be related to their proximity to local food stores; the average minimum distance to a food store in Old West Austin is only 0.4 miles (0.6 km), comparatively lower than that for other neighborhoods. However, the greater likelihood of walking is offset by the greater frequency of trips, so that the average number of driving trips to supermarkets (2.1 per week) is not significantly different from other neighborhoods. So, despite the large number of walkers, there are no net savings in the number of driving trips for grocery shopping.

The high frequency of grocery shopping trips and the high tendency to walk among Old West Austin residents appears to be a function of choice rather than necessity. One focus group participant from Old West Austin noted, "I like that option, to buy food daily and not have to stock up a week ahead of time. You can be more spontaneous, you can respond to 'what am I hungry for today?' and just go get it and cook it." Another resident commented on his choice to walk to the nearby grocery store even if prices are higher, "With Whole Foods located on the edge of the neighborhood, even if the prices are a little higher, I think it's great. So, I can live without driving in my neighborhood. I can get everything I need by foot." Another resident says, "I always walk to the grocery store, and if I have too many groceries I just take a cab, " instead of driving herself to begin with.

Cherrywood residents are the next closest, on average, to a supermarket, at 0.6 miles (1.0 km), and they food shop almost as frequently as Old West Austin residents, at 2.4 trips per week. Although they are much less likely to say that they usually walk to the supermarket, almost ten percent of Cherrywood residents report using an alternate mode of travel for supermarket trips: 4.8% reported usually walking, 3.8% reported usually biking, and 1.4% reported usually

riding transit. The higher number of cyclists relative to other neighborhoods may be explained partly by the relatively flat topography, partly by a generally higher propensity to bicycle among residents. A number of Cherrywood focus group participants mentioned bicycling to the supermarket and other locations in the neighborhood; the topic of bicycling rarely came up in the other neighborhoods. One cyclist noted that he rides his bike to the grocery store to avoid parking, "I have to deal with parking once I get there. The bicycle's so much easier". Another biker said, "It's a way of getting there. It's a lot quicker than walking."

Table 5-9. Frequency of Supermarket Trips and Usual Mode of Travel

	Traditional		Early-Modern		Late-Modern	
	Old West Austin	Travis Heights	Cherry-wood	Zilker	Wells Branch	Tangle-wood
Average times per week*	2.7	2.2	2.4	2.2	2.1	2.5
Usual Mode*						
Drive	80%	96%	89%	94%	100%	98%
Walk	19%	2%	5%	3%	0%	2%
Bike	0%	1%	4%	2%	0%	1%
Bus	0%	0%	1%	1%	0%	0%
Other	0%	1%	2%	1%	0%	0%
Avgerage driving trips per week	2.1	2.1	2.1	2.1	2.1	2.4
Avg. minimum distance to supermarket (miles)*	0.4	0.9	0.6	N/A	0.9	0.9
Avg. distance to usual supermarket (miles)	1.7	1.8	1.7	N/A	2.0	1.3

* Differences between neighborhoods significant at the 1% level.

In contrast, few survey participants from the other neighborhoods indicated that they usually do anything but drive to the supermarket. One Wells Branch resident defended his choice to drive, "It is too far to walk, and then I would have to carry something heavy back." A parent in Travis Heights explained that "One of the reasons we don't walk to HEB is that our children eat far too much food to carry it back" and later added that "we have such a limited time." Then there's the practical matter of carrying groceries home. A resident of Zilker said "I like to walk to bookstores... but I don't walk for groceries." Sometimes, however, the decision to drive has more to do with the decision to shop at a supermarket other than the one within walking distance. One focus group member talked about his decision to drive, "I think the only thing we don't walk to

is the supermarket because there's not really a good one within walking distance." Another participant added, "We desperately need another store...the prices aren't competitive at the one we have within walking distance...I would really like to see another store go in so we could make a choice." Having a supermarket within walking distance is not enough to ensure that residents will choose to walk there, let alone shop there. Given an alternative, residents will often choose an alternative.

Supermarket Choice

To better understand the range of factors influencing the choice of supermarket, we asked survey respondents to indicate whether a list of factors potentially influencing their choice of supermarket were important or not important in their choice (using a five-point scale; Table 5-10). Residents in all neighborhoods gave proximity to home a high rating, consistent with the assumption that shoppers will tend to minimize distance, but respondents also indicated that other factors were important to their choice. The focus group discussions provided further elaboration of the complexity of factors influencing the choice of supermarket.

Convenience is often at odds with other factors, such as low prices or quality products, but wins out for many residents. For example, a number of focus group participants in the Old West Austin (traditional) neighborhood said they were willing to pay higher prices for the convenience of a local grocer. One resident in the neighborhood said, "Well, and even if they're a little more expensive, I don't mind paying that just to keep them there." One resident of Travis Heights uses his local supermarket despite the fact that he is not satisfied with it, "I don't like it very much, but it's the closest big supermarket, so it's convenient." Another Travis Heights resident added, "We go to the closest supermarket because we can get everything we need at once. We'd rather be able to go to Whole Foods or Central Market, but with the limited time and the kids it is too inconvenient for us to do that." A Wells Branch residents said, "The closest supermarket is much more limited, but you can pop in after work. On my way home from work I can just drive straight in, grab a few things and go home. It's much more convenient for me. You don't have all the congestion to deal with...in and out in 20 minutes."

Still, the supermarket that survey respondents named as their "usual" supermarket was not always the closest one (Table 5-11). Just over one-third of Old West Austin respondents usually shop at the closest food store, probably because the closest stores are either Fresh Plus, a small market, or Whole Foods, a health food supermarket. Only 22 percent of Cherrywood respondents usually shop at the closest supermarket, reflecting the mixed feelings residents have about Fiesta. "I will go to HEB before I got to Fiesta," said one resident; "I have never had a good experience at Fiesta," said another. Complaints included the quality of products, higher prices, limited variety, and lack of services. Another resident from Cherrywood said, "I don't shop

in the neighborhood at all because I don't find the products at all or the amounts. I don't buy in big quantities. I find it more convenient to go farther." This comment raises the point that convenience is not simply a matter of distances. The highest share is in Tanglewood, where 81 percent of respondents usually shop at the closest supermarket.

Table 5-10. Factors Influencing Choice of Usual Supermarket

	Traditional		Early-Modern		Late-Modern	
	Old West Austin	Travis Heights	Cherry-wood	Zilker	Wells Branch	Tangle-wood
Mean Score on a 5-Point Scale*						
Best Quality Products	4.1	3.8	4.0	4.1	4.0	4.1
Closest to Home	3.9	4.0	3.9	3.7	4.1	4.3
Pleasant Atmosphere	3.9	3.5	3.7	3.7	3.9	4.0
Widest Selection	3.6	3.5	3.9	3.7	3.7	3.8
Fewest Crowds	3.5	3.1	3.2	3.2	3.6	3.6
Shortest Lines	3.5	3.1	3.3	3.2	3.6	3.7
It's on the way home from work/school	3.1	2.9	3.2	2.8	3.3	3.6
Best Prices	3.1	3.4	3.8	3.3	3.9	4.0
Easiest Parking	3.0	3.0	3.1	2.9	3.4	3.6

* 5 = extremely important; 1 = not at all important.
Differences between neighborhoods significant for all factors.

A variety of other factors may lure shoppers to more distance supermarkets. Prices and ease of parking were more important in the choice of supermarket to residents of the late-modern neighborhoods than to the other neighborhoods. Since residents of these neighborhoods are also more likely to drive, it is not surprising that ease of parking influences supermarket choice; a resident explained her choice of supermarket by saying, "That parking lot is more user friendly." Pricing may also be related to their mode choice since drivers may not mind going an extra distance for a better bargain. The residents of the late-modern neighborhoods also favor fewer crowds and shorter lines, according to the survey results; a person from the Tanglewood focus group said, "There's hardly anybody in there and that's why I like it." The importance of atmosphere should also not be discounted. In the focus group discussion, one Wells Branch resident asserted, "My wife uses our supermarket because she says it has personality." Tanglewood residents responded similarly, "Our supermarket is much less like a warehouse... I would rather pay an extra nickel for that ambiance." Another resident added, "My supermarket plays better music!" It is interesting to note the sense of ownership these comments reflect.

Residents may take advantage of being in elsewhere in Austin to shop at different supermarkets. A resident of Travis Heights said that where he shops "depends what part of town I'm in." In this case, shopping at a more distance supermarket doesn't add significantly to a resident's total travel for grocery shopping. Other times, residents make an excuse to shop at a more distant supermarket or take advantage of shopping at a more distant supermarket to do other things in that part of town. A resident of Tanglewood explained that "we like that Randall's over there a lot. We'll drive over there a lot of times to get groceries but we generally combine several things at once when we go out there." In this case, shopping at a more distant supermarket can be blamed for increasing a resident's total travel for grocery shopping. Differences in the relative importance of these factors leads to different choices for the usual supermarket (Table 5-11).

But the usual supermarket is not the only supermarket at which residents shop. On average, respondents said they shopped at 2.3 different supermarkets within the last month, ranging from 1.8 different supermarkets on average in Travis Heights to 2.8 different supermarkets in Old West Austin, where 45 percent of respondents shopped at three different supermarkets and another 21 percent shopped at four different supermarkets in a period of a month (Table 5-12). The question is whether residents are shopping at more than one store out of necessity or out of choice, although it may be hard to distinguish between the two. It may be that residents shop at certain stores for products for which quality is important and at other stores for products for which price is important. Convenience may matter more on some occasions than others. It appears that having more than one choice is something that residents value; one Tanglewood focus group participant said, "I do all my grocery shopping at either one of the two supermarkets, and I am glad we have a choice." In contrast, Travis Heights residents complained about the lack of choice and their dislike of the one choice they have. "HEB really seems to have a monopoly," said one resident, blaming the lack of competition for a crowded, unpleasant store. One resident says he drives to a more distant HEB because he dislikes the nearby HEB so much.

The fact that the usual supermarket is not always closest supermarket for all residents and that most residents sometimes shop at supermarkets other than the usual one means that on average residents are traveling more than, in theory, they need to. For example, respondents from Wells Branch make 2.1 trips to supermarkets per week. If they were to shop only at the closest store, which is on average 0.9 miles away, their total (one-way) distance to supermarkets would be 1.9 miles per week, or about 8 miles per month. But because they also choose to shop at more distant stores, they average almost 18 miles per month - almost 10 extra miles a month to get to more distant stores and another 10 miles a month to get back home. In Tanglewood, the difference is even more extreme: 9.7 miles per month one-way if respondents shopped at the closest store only, versus 23 miles because they also shop at more distant stores. Note that

Table 5-11. Usual Choice of Supermarket

	Percent Naming as Usual Store	Average Distance to Store (miles)
Traditional		
Old West Austin		
Fresh Plus - West Lynn	36%	0.5
Randalls - Lake Austin	25%	1.6
Whole Foods - Lamar	12%	0.9
Central Market - Lamar	7%	3.1
HEB - Hancock	5%	4.1
Randalls - Bee Cave	2%	3.2
Travis Heights		
HEB - Oltorf	61%	0.9
Albertsons - Pleasant Valley	9%	2.5
Central Market - Lamar	5%	5.3
HEB - Riverside	3%	2.2
Randalls - Bee Caves	3%	4.6
Randalls - Lake Austin	2%	N/A
Early-Modern		
Zilker		
HEB - Oltorf	21%	N/A
Foodland - Lamar	17%	N/A
Randalls - Bee Cave	14%	N/A
Whole Foods - Lamar	10%	N/A
Randalls - Lake Austin	8%	N/A
Randalls - Manchaca	7%	N/A
Cherrywood		
HEB - Hancock	51%	0.9
Fiesta - 38 1/2	22%	0.7
Central Market - Lamar	11%	2.4
Wheatsville Coop - Guadalupe	4%	2.4
HEB - Riverside	2%	4.9
Late-Modern		
Tanglewood		
HEB - Slaughter	81%	0.9
Albertsons - Slaughter	16%	1.2
Central Market	1%	12.4
Wells Branch		
Albertsons - Wells Branch	46%	1.0
HEB - Wells Branch	30%	1.7
HEB - Pfluggerville	9%	N/A
Whole Foods - Lamar	2%	15.2
Fiesta - 38 1/2	1%	11.5
HEB - Parmer	1%	N/A

because respondents may sometimes shop at more distant stores as a part of a trip to or from other destinations (such as work), this analysis most likely over-estimates the impact of shopping at more distant store. Still, if the estimate is even twice the actual impact, the impact is significant.

Table 5-12. Use of Multiple Supermarkets

	Traditional		Early-Modern		Late-Modern	
	Old West Austin	Travis Heights	Cherry-wood	Zilker	Wells Branch	Tangle-wood
Average no. of supermarkets visited in 30 days*	2.8	1.8	2.6	2.3	2.1	1.9
Percent visiting...*						
1 supermarket/30 days	11%	36%	12%	16%	27%	36%
2 supermarkets/30 days	24%	40%	39%	37%	44%	42%
3 supermarkets/30 days	45%	19%	27%	32%	20%	17%
4 supermarkets/30 days	21%	1%	21%	11%	9%	4%
Avg. total distance to super-markets in 30 days*	15.5	11.0	14.3	N/A	17.9	23.0

* Differences between neighborhoods significant at the 1% level.

Supermarket Alternatives

Given the option, residents will also sometimes shop at stores other than typical supermarkets for groceries. What alternatives they use depends on what alternatives are close by, including small grocery stores or convenience stores, as well as regional options, including discount warehouse stores or specialized supermarkets such as Whole Foods and Central Market. In the survey we asked about the frequency with which residents shopped at these alternatives, but not about the amounts purchased at each type of store. Thus, we can analyze the relative frequency of trips to the different alternatives but not relative importance in terms of overall food purchases.

The respondents who live in Old West Austin do more than half of their grocery shopping at stores other than supermarkets (Table 5-13). They report frequenting small grocery stores 4.3 times per month. Since a small local grocery (Fresh Plus) is located in the center of this traditional neighborhood, the responses are not surprising. In addition, residents indicate that they make 3.6 trips per month to Whole Foods and 2.0 trips per month to Central Market. Comments by the focus group participants in this neighborhood suggest that many consider Whole Foods the equivalent of a supermarket rather than a specialty food store; "I buy everything at Whole Foods. For me, it's one stop," said one resident. Respondents from the other traditional neighborhood,

Travis Heights, tend to use convenience stores frequently (2.2 times per month), perhaps because they don't have a small grocery alternative close by. Like residents of Old West Austin, they also frequent Whole Foods (2.5 times per month) and Central Market (1.3); "I'm a real sucker for Central Market. I love it," said one Travis Heights resident.

Table 5-13. Frequency of Trips to Alternative Food Stores

	Traditional		Early-Modern		Late-Modern	
	Old West Austin	Travis Heights	Cherry-wood	Zilker	Wells Branch	Tangle-wood
Average Trips/ 30 days*						
Small Grocery Store	4.0	0.7	1.3	1.4	0.5	0.9
Convenience Store	1.4	2.1	1.0	1.1	1.3	1.9
Discount Warehouse	0.3	0.3	0.2	0.4	0.7	0.6
Central Market	1.9	1.2	1.8	1.2	0.5	0.5
Whole Foods	3.5	2.4	1.6	2.1	0.7	0.6
Total Trips to Alternatives/ 30 days*	11.1	6.6	5.9	6.2	3.7	4.4
Total Food Trips/30 days*	15.2	14.4	17.1	14.6	13.5	17.4

* Differences between neighborhoods significant at the 1% level.

Residents of the early-modern neighborhoods also use Central Market and Whole Foods as an alternative to their usual supermarket, although less frequently than the residents of the traditional neighborhoods. The differences cannot be explained by distance alone: residents of Travis Heights are farther from Whole Foods than residents of Zilker but shop there more frequently. Cherrywood respondents shop at Central Market and Whole Foods almost two times per month on average, while Zilker shoppers frequent Whole Foods slightly more often, perhaps because it is closer.

The residents of the late-modern neighborhoods use stores other than supermarkets for about one third of their food shopping trips. Although they shop at Whole Foods and Central Market much less frequently than residents of the traditional and early-modern neighborhoods, a finding easily explained by their greater distance from these stores, they make more frequent trips to discount warehouses for food purchases. The bulk shopping that discount warehouses offer tends to favor the automobile since the large number and bulk of purchases would be difficult to transport home using any other mode of travel. Buying food at discount warehouse stores does

not seem to reduce the number of trips these residents make to supermarkets, however. The more limited use of other kinds of alternatives with about the same use of supermarkets means that residents of the late-modern neighborhoods make the fewest food shopping trips on average.

Still, the fact that residents of these neighborhoods travel as far as they do to shop at Whole Foods and Central Market as often as they do is striking. Whole Foods is 15.2 miles (24.3 km) from Wells Branch and 8.8 miles (14.1 km) from Tanglewood; Central Market is 12.6 (20.2 km) from Wells Branch and 12.4 miles (19.8 km) from Tanglewood. These trips add considerably to the total amount of traveling for food shopping that residents do. At an average frequency of a trip to Central Market every other month, residents are driving, on average, an extra 12 miles per month round trip. Even if these trips replace a trip to the regular supermarket, the extra travel will be significant. Of course, if the trips to Central Market are made in conjunction with trips to other central destinations (whether work downtown or shopping elsewhere or some other activity), it is possible that shopping at Central Market does not generate additional travel; a more detailed travel survey would be needed to test this.

In all neighborhoods, participants talked about how they use different supermarkets and other kinds of stores to fill their different grocery shopping needs. An example from the Old West Austin neighborhood: "There are little fill-ins, just grab something for dinner or whatever, just hit the Fresh Plus, no big deal. For the big weekly load and all the basics, it would be Randall's on Exposition, or if we are really going all out, the one over on Bee Caves, the big one. Then if we are going to get some produce, nice meats or what have you, Whole Foods or Central Market." The story was the same in the Zilker neighborhood, "I go to Whole Foods for fresh vegetables, meat and stuff like that. For packaged goods I go to either Foodland or HEB. Sometimes I go to Sun Harvest or Wheatsville Coop, where I am a member." A Travis Heights participant described his grocery shopping as follows, "We shop mainly at Whole Foods because I work nearby there and we like to buy organic vegetables. We go to HEB maybe once a week for an emergency or to pick up laundry soap, paper products, and stuff like that where it's obviously cheaper than going to Whole Foods." Having choices gives people the option to use different stores for different needs.

There can be downsides, too, though. Old West Austin residents like having Whole Foods nearby, but some residents described the downside of having a specialty store in the neighborhood. One resident said," I'm sorry everyone else found out about Whole Foods. Too many cars." Another resident said, "The other side of having a lot of amenities in the neighborhood is that it creates more traffic. As much as I like having Whole Foods there, it has been a magnet for traffic." They weren't entirely pleased with all their options, either. Several residents said that they never use the convenience store on Lamar: "This is the one place that

scares me. I never go there," said one; "It's a scary place. I don't like the clientele there," said the other. With Fresh Plus nearby, the convenience store is easy enough to avoid.

LOCAL SHOPPING

The types of shops and services found locally, as well as their quality, determine the degree to which residents shop locally rather than at more distant locations. Not surprisingly, the businesses that residents in each neighborhood say they use most frequently reflect differences in the businesses found in each neighborhood (Table 5-14). While the businesses topping the list are similar for each neighborhood, the frequency with which they are named varies across neighborhoods. Supermarkets, or in the case of Old West Austin a grocery store, are the businesses named most frequently by residents of all neighborhoods. Other businesses making most of the lists include restaurants, Laundromat/cleaners, and discount stores. Video stores made three of the lists, as did bakeries. Interestingly, only in Wells Branch did gas stations or fast food places make the list, although other neighborhoods also have these businesses. Few types of businesses besides food stores, however, are named as the business they use most frequently by more than a quarter of the residents of any neighborhood.

The usual mode of travel to local stores reflects the distance to local stores: neighborhoods with a higher average minimum distance to get to a commercial area, a smaller proportion of residents say they usually walk there (Table 5-15). In the traditional neighborhoods, 42% of the Old West Austin respondents indicate that they usually walk to local shops and stores compared to only 15% of Travis Heights respondents; in the focus group, an Old West Austin resident said, "It makes a lot of sense not to have to get into a car and go park someplace." This finding is consistent with the higher average frequency of walking trips to the store as reported by Old West Austin residents in a separate question, discussed earlier. The difference in usual mode may be due to two factors: not all of the businesses around the Travis Heights neighborhood are ones residents are likely to use, and most of the ones they are likely to use are across South Congress. In both early-modern neighborhoods somewhat more than 15% of respondents indicate that they usually walk or bike to local shops. As with grocery shopping trips, a notable share of Cherrywood respondents (4.3%) bike to local shopping destinations. In the late-modern neighborhoods, neither walking nor biking is prevalent with over 97% of respondents indicating that they usually drive to local commercial areas. "There aren't any within walking distance to where I live," said one Tanglewood focus group participant when asked if she feels comfortable walking to local shopping areas. Note that almost no respondents said they usually take the bus to local stores, reflecting the design of the bus system to serve regional rather than local trips. Attitudes clearly have a lot to do with whether someone drives to the store

or finds alternatives. For example, one focus group participant said, "I try to avoid getting into my car unless I absolutely have to," while another one said, "I am NOT going to ride the bus. Period."

Table 5-14. Local Businesses Used Most Frequently

Type of Business	Percent Using	Type of Business	Percent Using
Traditional			
Old West Austin		Travis Heights	
Grocery	44%	Supermarket	32%
Supermarket	24%	Restaurants	28%
Drug Store	21%	Grocery	20%
Restaurants	11%	Bakery	17%
Cafe/Coffee Shop	10%	Convenience Store	15%
Laundromat/Cleaners	10%	Drug Store	14%
Convenience Store	8%	Discount Store	11%
Bakery	8%	Laundromat/Cleaners	7%
Early-Modern			
Cherrywood		Zilker	
Supermarket	46%	Supermarket	31%
Discount Store	22%	Grocery	25%
Grocery	21%	Discount Store	20%
Video Store	13%	Restaurant	17%
Department Store	12%	Convenience Store	8%
Restaurant	10%	Health Food Store	6%
Convenience Store	10%	Bakery	5%
Laundromat/Cleaners	5%	Department Store	5%
Late-Modern			
Wells Branch		Tanglewood	
Supermarket	44%	Supermarket	55%
Grocery	19%	Hardware	22%
Convenience Store	17%	Grocery	20%
Restaurant	14%	Discount	12%
Discount Store	13%	Laundromat/Cleaners	9%
Laundromat/Cleaners	11%	Department Store	6%
Gas Station	9%	Video Store	6%
Fast Food	7%	Restaurant	6%

In all the neighborhoods, focus group participants clearly valued their local businesses, not only for the convenience they provide but also for the personalized service and for the character they bring to the neighborhood. A Travis Heights resident said, "I think you get more personalized service. If you go into them any length of time, they get to recognize you when you walk in...I go to Twin Oaks Hardware quite a bit because I walk in and say, 'Harry I need a thing-a-ma-jig that does this' and he knows what I am talking about and he will get it." Another said that at the local cleaners, "you don't have to go in and tell them who you are to get your clothes, they have them ready when they see you coming." Other Travis Heights residents commented on the character of their local businesses: "That's the key word, personality," and "I like [the local shops] because they are diverse and they're kind of funky." Old West Austin residents also like the familiarity they have with local business owners and workers, who often know their regular customers by name, and sometimes their order as well: "I know Mike at Nau's [drugstore], and the other Mike at Fresh Plus [grocery store]...it makes a lot of difference to me. I am not just a number," said one resident, who added, "It is, in part, the merchants that make the sense of community almost as much as the next-door-neighbors." Similar stories were told in Wells Branch, where one woman said she can write a check without being asked for her ID at the local convenience store and another resident said the restaurant he frequents has let him pay the next day when he forgot his checkbook on several occasions. Perhaps one of the most important benefits of local stores is simply the option of not having to drive: "I love it when it's freezing and you can't get in your car and you can walk to the market to get what you need," said a Zilker resident.

A number of participants expressed a commitment to patronizing local businesses to help ensure that they stay in business. A focus group participant from Cherrywood said, "Something I've started doing is making myself patronize more of the businesses that are around my neighborhood. I know I'm not going to make a difference whether [a business] succeeds or fails, but I hope enough people will patronize it and that it will survive." A resident of Travis Heights noted the mutual benefit of patronizing local stores: "I can get it a lot faster and easier, and...I'm supporting somebody in the neighborhood." On the other hand, a Zilker resident complained about a local business that relocated to another neighborhood: "Our neighborhood supported it for 10 years and then they left," leaving local residents feeling betrayed and abandoned.

As noted earlier (Table 5-5), survey respondents had mixed feelings about whether local stores met their needs and whether the quality of local stores was high; Old West Austin and Tanglewood residents felt most positive about their local stores, Cherrywood residents felt least positive. In order to get a better sense causes of dissatisfaction, we asked survey respondents what local businesses they would most like to see open up the neighborhood (Table 5-16). Restaurants were a popular choice among all neighborhoods, and hardware stores and book

stores were requested by residents of most of the study areas. Supermarkets and/or grocery stores appeared on all of the lists despite the fact that all of the neighborhoods are, on average, within a mile of such services. A notable share of residents in the two suburban neighborhoods would like to see discount stores and clothing stores open up in their area, although not all residents feel this way: one resident of Tanglewood said in the focus group, "I am really glad we don't have a WalMart because they generate so much traffic... I am happy to have to go away for those things because I would rather not have them close to me." Residents want things close, but not too close.

Table 5-15. Usual Mode of Travel to Local Shopping Areas

	Traditional		Early-Modern		Late-Modern	
	Old West Austin	Travis Heights	Cherry-wood	Zilker	Wells Branch	Tanglewood
Usual Mode*						
Drive	57%	83%	82%	83%	98%	97%
Walk	42%	15%	12%	16%	2%	3%
Bike	1%	1%	4%	0%	0%	0%
Bus	1%	1%	0%	1%	0%	0%
Other	0%	1%	1%	1%	0%	0%
Avg. minimum distance to local stores (miles)*	0.4	0.4	0.5	N/A	0.8	0.9

* Differences between neighborhoods significant at the 1% level.

In the focus groups, residents of Old West Austin expressed the most satisfaction with their local businesses. Said one resident, "My world is this neighborhood as much as I can make it because it's all here... it's just all here." Another said, "I like being close to, well, virtually everything I'm interested in doing except for the occasional movies." A third said, "I love being so close that I can either walk or drive very quickly to just about everything I want to do." At the same time, residents expressed concern about the encroachment of commercial activity into residential areas, especially as homes are converted to offices and shops, suggesting that they are close to having too much of a good thing. In addition, they complained about some of the kinds of new businesses coming into the area -- a public storage facility, for example -- suggesting that not just any commercial activity will do. Participants in both of the Old West Austin focus groups expressed a desire for a movie theater and a hardware store.

Focus group participants in almost all of the neighborhoods discussed the need for a local gathering place -- a corner "pub" or bar or coffee shop, preferably in the neighborhood. In Wells

Branch, "the community has those kind a enterprises that make it possible to go just around the corner, have a margarita with the wife, go dancing, and run into friends everywhere...not strangers in a place across town." One Zilker resident is looking for "a place where you go and sit, just walk down the street at night and have a beer with the neighbors, " another wanted "a community place." Ironically, a neighborhood coffee shop recently went out of business and residents complained that existing bars bordering the neighborhood don't do the job. An Old West Austin resident said, "I'd like to see a small, smoke-free, quiet, pet-accepting bar." In Cherrywood, "One thing I would like to see is a bar or tavern... If I just want to go have a drink or meet someone outside of my house, there's not really a place to go." Other Cherrywood residents wished for a coffee house like the one found in the neighborhood to the west of theirs. The frequency with which restaurants were mentioned in by survey respondents in all neighborhoods may also reflect the desire for more local places to socialize rather than just shop; Wells Branch residents expressed happiness with their local restaurants, and one resident said, "It makes our neighborhood special."

One challenge for local businesses is that residents sometimes overlook them. In the Tanglewood focus group, one participant first expressed dismay over the lack of local shops and services: "There's just not much there... There's two grocery stores and there's other things there, but I just don't shop there for some reason." Another participant than started listing off the variety of different shops found in the local strip mall: a fabric shop, cleaners, gift shop, card shop, mail services, a discount store. Soon the group agreed that they really did have most of the kinds of businesses they needed: "So now I can't think of anything either except maybe a better restaurant or two." This is consistent with the results of the survey where Tanglewood residents agreed that local businesses met their needs - with the exception of restaurants. One focus group participant said, "We have just about everything except good restaurants." Another added, "I can only eat at the same restaurant so many times a week, so we drive all over town for variety." A third woman agreed, "It would be nice to have a nice restaurant. We have a lot of fast food stuff down here."

Table 5-16. New Local Businesses Most Desired

Type of Business	Percent Desiring	Type of Business	Percent Desiring
Traditional			
Old West Austin		Travis Heights	
Restaurants	26%	Grocery	30%
Hardware Store	16%	Book Store	13%
Book Store	9%	Restaurants	14%
Post Office	9%	Health Food Store	11%
Supermarket	7%	Supermarket	9%
Grocery	6%	Cafe/Coffee Shop	7%
Bank	6%		
Early-Modern			
Cherrywood		Zilker	
Resturants	34%	Grocery	42%
Bookstore	16%	Supermarket	35%
Bakery	16%	Video Store	8%
Cafe/Coffee Shops	13%	Health Food Store	8%
Grocery	8%	Hardware Store	6%
Hardware	6%	Restaurant	6%
Laundromat/Cleaners	6%		
Late-Modern			
Wells Branch		Tanglewood	
Restaurants	32%	Restaurants	42%
Discount Stores	12%	Discount Store	11%
Clothing Stores	10%	Fast Food	10%
Book Stores	9%	Department Stores	7%
Auto Repair Store	7%	Health Food Stores	6%
Hardware Store	6%	Clothing Stores	6%

RESIDENTIAL LOCATION

An interesting and important question in this discussion is whether residents who want good local shopping within walking distance seek neighborhoods that offer this. If so, their behavior once living there may not be representative of other people or other places. We asked survey respondents about the relative importance of a variety of factors potentially influencing their choice of neighborhood (Table 5-17). Having local stores within walking distance was not the top factor, on average, in any of the neighborhoods, but it was significantly higher for residents of Old West Austin than residents of any other neighborhood. Some of the comments of focus group participants explaining why they had chosen that neighborhood support this finding. One person in Old West Austin said, "we went to a real estate agent and said 'we want to be central, we want to have access to everything, we don't want to deal with traffic.'" Another said, "I wanted to have a place in a village where I could do what I need to do without being in the car for a long time." A third resident in the neighborhood said, "One of the primary reasons my wife and I enjoy this neighborhood and pay dearly for it, I might add, is that we take great pleasure in being able to walk to almost every conceivable kind of service or place of entertainment or anything else that we need easily." A fourth person added, "I am reminded how fortunate I am, how rarely I have to get into the morass of Austin traffic, which has turned into such a horrid nightmare. The more you can do as a pedestrian, the more pleasurable it is to live in Austin." It appears, then, that Old West Austin residents are, to some degree, self-selected for walking to stores.

Of course, respondents in other neighborhoods may have wanted to find a house in a neighborhood where they could walk to a store but were unsuccessful (and so report walking distance to stores as not important in their final decision). This may be particularly true for Cherrywood residents, who walk to the store relatively frequently despite their negative feelings about local stores. However, respondents in late-modern neighborhoods were much more likely than residents in other neighborhoods to indicate that quality of schools and investment potential were important factors in their decision, suggesting different priorities than residents of either the traditional or the early-modern neighborhoods. This means that unless older, pedestrian-oriented neighborhoods can provide these benefits (and many of them cannot), a segment of the population is unlikely to choose that alternative.

In the focus groups, it was clear that residents of all neighborhoods were concerned about accessibility but that different neighborhoods had different priorities for accessibility. Residents of Old West Austin, Travis Heights, Cherrywood, and Zilker all said that being near downtown was an important consideration in their location decision. Several residents in these neighborhood also noted the importance of being near the University of Texas, just to the north of downtown. Although residents of these neighborhoods would most likely have eliminated Wells Branch and Tanglewood as being too inaccessible to downtown, the residents of the two

late-modern neighborhoods didn't see it that way. Said one Tanglewood resident, "[The neighborhood] was fairly close to downtown," at least compared to comparable neighborhoods she had considered on the north side of Austin. Another resident echoed this point, noting that getting to work downtown would be faster from there than if he had chosen to live to the north. A Wells Branch residents talked about the importance of good access to I-35 and to the MoPac freeway in his choice of neighborhood. Residents in these neighborhoods were not unconcerned about access to downtown but were willing to accept a greater distance from downtown in exchange for other benefits of these outer neighborhoods. Said one Wells Branch resident, "We looked for a planned community that could offer a few amenities" -- rarely found in the center of town.

Table 5-17. Factors Influencing Residential Location Choice

	Traditional		Early-Modern		Late-Modern	
	Old West Austin	Travis Heights	Cherry-wood	Zilker	Wells Branch	Tangle wood
Mean Score on a 5-Point Scale*						
Affordability of living unit	4.1	4.2	4.6	4.3	4.4	4.3
Quality of living unit	4.3	4.4	4.3	4.3	4.5	4.4
Quality of schools	2.2	2.2	2.2	2.6	3.6	3.3
Investment potential	2.5	2.8	2.6	2.9	3.6	3.4
Stores within walking distance	3.5	2.5	2.7	2.5	2.4	2.4
Neighborhood attractiveness	4.3	4.4	4.1	4.2	4.2	4.3
Level of upkeep in neighborhood	3.9	4.2	3.8	4.0	4.3	4.4
Close to work	3.8	3.5	3.6	3.4	3.0	2.8
Close to friends or family	2.9	2.8	2.6	2.8	2.5	2.5

* 5 = extremely important; 1 = not at all important.
Differences between neighborhoods significant at the 1% level for all factors.

The focus groups revealed some interesting facets of residential location choice. A number of participants, including many of the Travis Heights participants, said that they had picked the house, not the neighborhood, and then discovered the qualities of the neighborhood once they were there. "I didn't know what I was getting into. I didn't really appreciate [the neighborhood] but now I do because of accessibility to everything," said one. "I kind of tripped over the neighborhood," said another. "After looking for a year I found a house I loved and I could afford. Then I realized I was in this neighborhood," said a third. Some Old West Austin residents told a similar story. One resident had moved in there because of the cheap rent, "and then there

were all these wonderful things when I moved here." A Zilker resident said, "We kinda lucked into it." The neighborhood was not a conscious choice for many. This may explain some of the differences in walking frequency: Travis Heights residents, for example, who did not consider having stores within walking distance an important factor in their location decision might be less likely to take advantage of the opportunity.

As suggested by the survey results and confirmed by the focus groups, neighborhood attractiveness was an important consideration, although different focus group participants defined this different ways. Several mentioned trees: "I was looking for a new house, but I wanted lots of trees around it" (Old West Austin), "I was looking for a neighborhood with trees and individual looking houses" (Tanglewood), "We wanted a place where the trees were already big" (Zilker). A resident of Travis Heights talked about the importance of cats: "With as many beautiful cats as Travis Heights has, it's bound to be a good neighborhood." A few participants expressed concern over ensuring neighborhood upkeep. Said a Tanglewood resident, "I didn't want some guy with an RV as a neighbor with his trailer parked in the front yard. I wanted a place that had covenants and restrictions that would prevent that kind of thing to keep the curb appeal up." For a few, the attractiveness of the neighborhood had more to do with their potential neighbors than the physical design; explained a Zilker resident, "It was a naturally integrated neighborhood so we didn't have to worry about our kids being in a segregated environment."

From their comments, it appears that Old West Austin residents do have different preferences and attitudes than residents of other neighborhoods, at least of the late-modern neighborhoods. Several residents said they chose the neighborhood to be near downtown and UT but also to be near "everything." One resident noted that "You may pay a little more in property taxes but you don't need as much gasoline." Many focus group participants said they had previously lived in neighborhoods in other cities where they walked to commercial areas. Whether or not they are different from residents of other neighborhoods, they seem to see themselves as somehow different. One participant talked about "shared values," explaining that although the neighborhood is demographically diverse, the residents share many attitudes and concerns.

CHAPTER 6. ANALYSIS OF URBAN FORM FACTORS

In order to better understand the relative importance of different characteristics of urban form and the importance of urban form relative to socio-economic characteristics in explaining the travel choices residents make, we undertook further analysis of the travel survey data. Our focus for this analysis was on the decision to walk, either to stroll or to walk to the store. First, we tested the correlation between distance to the store, a basic characteristic of urban form, and the frequency of walking to the store. Although distance has some role in explaining walking frequency, it is clearly not the only factor. Thus we next conducted a factor analysis on the urban form factors included in the travel survey to condense these factors into a more manageable but meaningful list. Then we estimated a variety of regression models to test the relative importance of different urban form factors and socio-economic factors in explaining the frequency of strolling and of walking to the store. The results suggest that certain elements of urban form do play a significant role in the decision to walk but that much of the variation in walking frequency between individuals cannot be explained by simple measures of urban form or socio-economic status.

THE DISTANCE FACTOR

Distance is one of the strongest predictors of travel behavior, particularly the choice of destination. The choice of mode can also be highly sensitive to distance, especially the choice to walk or bike. A commonly-held assumption is that, on average, residents will not walk much more than a quarter of a mile, maybe a half of a mile, to get to a destination such as a store. We expected, then, to see a strong correlation between the frequency of walking to the store and the distance from home to store, with a significant drop-off in frequency for residents who live beyond a quarter of a mile from the nearest commercial area.

As shown in Table 6-1 and Figure 6-1, the frequency of walks to the store dropped off significantly after a quarter of a mile, as expected: residents living within a quarter of a mile of the nearest commercial area walked to the store an average of 8.1 times in 30 days, while those living a quarter to a half of a mile away walked to the store an average of only 2.7 times in 30 days. Note, however, that although the frequency of walking drops off, it does not drop to zero after a quarter of a mile or even a half of a mile; even at these distances, some residents will sometimes walk to the store.

Because the average distance to the store differs significantly by neighborhood, with residents of Old West Austin living closer to a store than residents of any of the other neighborhoods, the significant correlation between distance and frequency of walking to the store may reflect other differences in urban form between neighborhoods, or differences in the kinds of people who live in the neighborhoods and their propensity to walk, or both. As shown in

Table 6-2, Old West Austin residents walk to the store more frequently at almost every distance than residents of any of the other neighborhoods, suggesting that there is something different about this neighborhood or about the people who live there when it comes to walking to the store - something more than just the fact that more of the residents live closer to stores.

Table 6-1. Distance to Store vs. Frequency of Walk to Store

Distance to Nearest Commercial Area	Average Walks to Store/30 Days	Percent of Respondents
< 0.25 miles	8.1	9.5%
0.25 to 0.5 miles	2.7	27.4%
0.5 to 0.75 miles	2.1	20.0%
0.75 to 1.0 miles	1.1	7.3%
1.0 to 1.5 miles	0.4	8.1%
> 1.5 miles	0	0.7%

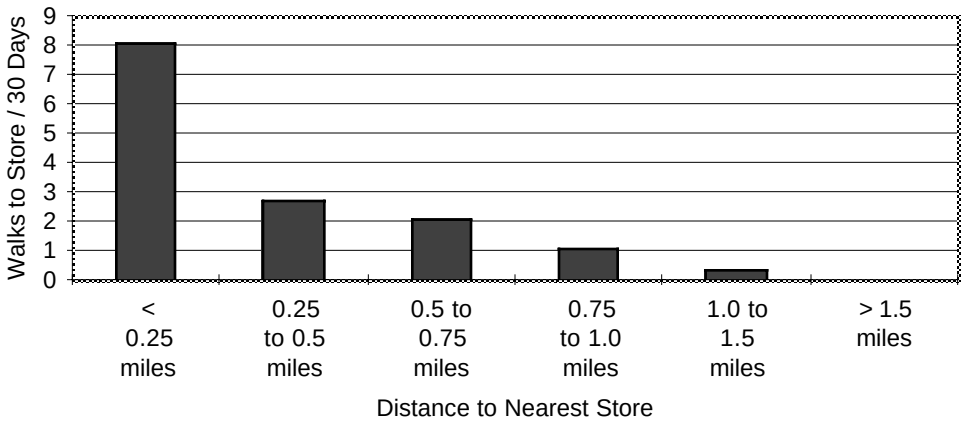

Figure 6-1. Frequency of Walks to Store by Distance to Store

Table 6-2. Frequency of Walk to Store by Distance and Neighborhood

Distance to Nearest Commercial Area	Old West Austin	Travis Heights	Cherry-wood	Wells Branch	Tangle-wood
< 0.25 miles	11.2	4.8	2.2	n/a	9.3
0.25 to 0.5 miles	4.4	2.4	1.4	0.8	2.3
0.5 to 0.75 miles	5.7	1.3	2.9	0.5	0.6
0.75 to 1.0 miles	1.0	0.4	0.9	1.3	1.2
1.0 to 1.5 miles	n/a	n/a	n/a	0.5	0.4

URBAN FORM FACTORS

The neighborhood travel survey (described in Chapter 3 and included in Appendix B) included a series of questions asking residents both about their evaluation of the neighborhood on several characteristics of urban form and the importance of these characteristics to them. To simplify the analysis of the importance of these factors in explaining travel choices, we grouped the survey questions into six factors describing physical qualities within the neighborhood and three describing the physical qualities of local commercial areas (Table 6-3). We based these groupings on the results of a formal factor analysis as well as the results of the focus group discussions described in Chapter 5. The measures for each factor are an average of responses on a five-point scale to the appropriate survey questions and were structured so that the correlations between the factors and the frequency of walking were expected to be positive. These factors represent the feelings and perceptions of the residents about the physical qualities of their neighborhood and should be more closely tied to choices about travel than an objective assessment of these qualities.

The six design factors for characteristics within the neighborhood included: "safety," "shade," "houses," "scenery," "traffic," and "people." The safety factor reflects residents' perception of their safety when walking during the day and at night. The shade factor reflects residents' perception of the adequacy of the shade provided by the tree canopy and residents' level of comfort walking in hot weather. The houses factor reflects a specific but potentially important part of the scenery - the houses in the neighborhood; as defined, the houses factor reflects both residents' assessment of how interesting the houses are and how much they like to look at them. The scenery factor overlaps with the previous two and includes residents' assessment of both tree canopy and house appearance. The traffic factor reflects residents' level of comfort walking where there are not sidewalks and their perceptions about the level of traffic in the neighborhood; their response to the statement "There's too much traffic in the

Table 6-3. Design Factor Definitions

Factor	Perceptions
Within the Neighborhood	
Safety	I feel safe walking during the day I feel safe walking at night
Shade	Trees provide ample shade I'm comfortable walking in hot weather
Houses	There are interesting houses I like to look at houses when I walk
Scenery	Trees provide ample shade There are interesting houses
Traffic	I'm comfortable walking without sidewalks (There's too much traffic in neighborhood)
People	I see neighbors when walking I see other people when walking I like to see people when I walk
Local commercial Areas	
Stores	Local stores meet my needs The quality of local stores is high
Walk Advantage	The closest store is a reasonable walking distance (It is hard to park at local stores)
Walk Comfort	(I have to walk along busy streets to access local stores) (I have to cross a busy street to access local stores) I am comfortable walking around local shopping areas I feel safe walking from my house to local stores

Note: parentheses indicate inverse of perception used.

neighborhood" was inverted so that the factor would have a positive rather than negative correlation with walking frequency. Finally, the people factor reflects residents' perceptions of how frequently they see people when walking in the neighborhood and whether or not they like to see people; residents who both see people and like to see people had the highest scores on this factor. We expected that these factors would influence both the frequency of strolling within

the neighborhood as well as the frequency of walking to the store, since residents walk through the neighborhood to get to the store.

The three design factors for local commercial areas included: "stores," "walk advantage," and "walk comfort." The stores factor reflects residents' feelings about how well local stores meet their needs and the quality of local stores; this factor is not so much an urban form factor as a market factor. The walk advantage factor reflects residents' assessment of the ease of walking, in terms of the perceived reasonableness of the distance to the store, and the advantage over driving, in terms of the ease of parking at local shopping areas. The walk comfort factor reflects residents' perceptions about traffic between home and store, their level of comfort walking within the local shopping areas, and their feelings of safety walking from home to store; this factor thus reflects conflicts between cars and pedestrians but also other elements that contribute to comfort and perceived safety. We expected that these factors would influence the frequency of walking to the store.

The average factor scores varied more significantly between neighborhoods than between residents within each neighborhood, suggesting that residents of the different neighborhoods have different perceptions about the physical qualities of their neighborhood and local commercial areas (Table 6-4). However, the pattern of variation did not directly correspond with neighborhood type. Old West Austin (traditional) and Zilker (early-modern) residents had the highest scores on the safety factor, for example, and Old West Austin (traditional) and Tanglewood (late-modern) residents had the highest scores on the store factor. In addition, the

Table 6-4. Factor Scores by Neighborhood

	Traditional		Early-Modern		Late-Modern	
	Old West Austin	Travis Heights	Cherry-wood	Zilker	Wells Branch	Tangle-wood
Safety	4.4	4.1	3.9	4.4	4.2	4.1
Shade	3.6	3.7	3.6	3.6	2.7	3.2
Houses	4.5	4.5	4.2	4.0	3.4	3.7
Scenery	4.3	4.4	4.2	4.1	3.0	3.5
Traffic	2.3	2.4	2.5	2.7	2.3	2.5
People	3.8	3.7	3.7	3.6	3.4	3.5
Stores	4.1	3.2	3.6	2.6	3.6	4.1
Wallk Advantage	3.5	3.1	3.4	2.8	2.8	3.0
Walk Comfort	3.2	2.3	2.4	2.9	2.4	2.7

Between neighborhood variation significantly greater than within neighborhood variation for all factors.

variation among residents within each neighborhood is still important and may reflect both location within the neighborhood and variations in attitudes and experiences among neighbors. A disaggregate analysis of individual choices about walking helps to account for these variations.

FREQUENCY MODELS

In order to assess the relative importance of these urban form factors in choices about walking, we estimated several regression models using urban form factors and socio-economic characteristics to explain the frequency of strolling and the frequency of walking to the store. Our initial models included all variables hypothesized to influence walking frequency. We then eliminated those variables found to play an insignificant role and included only those most important in predicting walking frequency.

The models for strolling frequency are summarized in Table 6-5. Model 1 includes all five socio-economic characteristics: age, worker status (1 if full-time or part-time worker; 0 otherwise), kids under 5 years of age (1 if yes, 0 if no), female, and income (by category). In addition, we included a walk-the-pet variable, set to 1 for those households reporting ownership of a pet that needs to be walked. This model also includes all six within-neighborhood urban form factors. In Model 2, we include only those variables that are significant at the 5-percent level: age, worker status, pet to walk, safety, shade, and people. The model suggests that older people, people who don't work, and people with pets walk more frequently. In addition, those that feel safer, feel the neighborhood has enough shade, and see and enjoy seeing people when they walk also walk more frequently. Interestingly, the appearance of houses, the scenery, and traffic levels don't seem to have a significant impact on the frequency of strolling.

To test the relative importance of the pet-to-walk variable, we removed this variable from Model 3. The R-square value dropped by half, suggesting that the pet-to-walk variable is the single most important variable in Model 2, accounting for most of the explanatory power of the model. In other words, having a pet to walk is a better predictor of strolling frequency than socio-economic characteristics or urban form characteristics. This finding is not entirely surprising.

Even with the pet-to-walk variable, Model 2 explains a small fraction of the variation in the frequency of strolling. Because the urban form factors defined for this analysis may miss some of the important physical qualities of the neighborhood, we tested models that also included dummy variables for neighborhood. The variable for Old West Austin proved significant (Model 4), suggesting that qualities of this neighborhood beyond those captured in the urban form factors help to explain variations in strolling frequency. Of course, an alternative explanation is that qualities of the residents of this neighborhood beyond those captured by the socio-economic variables may also help to explain variations in strolling frequency. In other words, something else

about Old West Austin - either its physical characteristics or the characteristics of its residents - leads to higher strolling frequencies.

Table 6-5. Strolling Frequency Models

	Model 1		Model 2		Model 3		Model 4	
Variable	Coef.	t signif.	Coef.	t signif.	Coef.	t signif.	Coef.	t signif.
Age	0.07	0.03	0.05	0.05	0.03	0.22	0.05	0.05
Worker	-2.71	0.00	-2.81	0.00	-2.50	0.00	-2.82	0.00
Kids < 5 yrs	3.05	0.03	-	-	-	-	-	-
Female	0.49	0.49	-	-	-	-	-	-
Income	0.00	0.97	-	-	-	-	-	-
Pet to walk	7.24	0.00	7.41	0.00	-	-	7.54	0.00
Safety	2.45	0.00	2.67	0.00	3.24	0.00	2.57	0.00
Shade	0.90	0.02	1.14	0.00	1.17	0.00	1.09	0.00
Houses	-0.36	0.56	-	-	-	-	-	-
Scnery	0.60	0.38	-	-	-	-	-	-
Traffic	0.40	0.26	-	-	-	-	-	-
People	2.04	0.00	1.47	0.00	1.60	0.00	1.42	0.00
Old West Austin	-	-	-	-	-	-	1.58	0.05
Constant	-12.72	0.00	-9.12	0.00	-8.72	0.00	-8.89	0.00
R-square		0.16		0.14		0.07		0.15

The models for frequency of walking to the store are summarized in Table 6-6. For these models, we included socio-economic variables, urban form factors for within the neighborhood, urban form factors for commercial areas, miles from home to the nearest store, and strolling frequency. This last variable was included to reflect the basic propensity of the survey respondent to walk; correlation coefficients showed a positive relationship between frequency of strolling trips and frequency of walking to the store, suggesting that some residents choose to walk more for whatever purpose than others. As shown in Model 2, most of the socio-economic variables were significant: older residents, those with kids under age 5, women, and those with higher incomes walked to the store less frequently than others. Distance to the store was highly significant; the coefficient suggests that each quarter mile means almost one fewer walks to the store each month. Each of the urban form factors for commercial areas proved significant, but, somewhat surprisingly, none of the urban form factors for within the neighborhood did. In other words, the character of the commercial area is more important in the decision to walk than the character of the neighborhood itself. Finally, as expected, those who strolled more frequently

also walked to the store more frequently, suggesting that a residents' propensity to walk is not explained by socio-economic characteristics alone.

Although this model explains more of the variation in frequency of walks to the store than any of the models for strolling frequency, it still explains only a small share of the variation. We thus included dummy variables for neighborhood and found that the variable for Old West Austin was a significant predictor of frequency of walking to the store, even with the socio-economic and urban form factors in the model. The inclusion of the Old West Austin variable in Model 3 reduced the significance of two variables in Model 2: kids under 5 years and walking comfort. The significance of the Old West Austin variable suggests something different about this neighborhood or its residents beyond the differences reflected in the other variables in the model.

Table 6-6. Walks to the Store Frequency Models

	Model 1		Model 2		Model 3		Model 4	
Variable	Coef.	t signif.	Coef.	t signif.	Coef.	t signif.	Coef.	t signif.
Age	-0.04	0.00	-0.04	0.00	-0.04	0.00	-	-
Worker	-0.28	0.53	-	-	-	-	-	-
Kids < 5 yrs	-1.21	0.02	-1.00	0.04	-0.83	0.07	-	-
Female	-0.68	0.07	-0.77	0.02	-0.87	0.01	-	-
Income	-0.26	0.06	-0.32	0.01	-0.33	0.01	-	-
Miles to Store	-3.92	0.00	-3.81	0.00	-2.42	0.00	-2.89	0.00
Stores	0.76	0.00	0.76	0.00	0.61	0.00	-	-
Walking Incentive	0.57	0.01	0.54	0.01	0.47	0.01	-	-
Walking Comfort	0.99	0.00	0.91	0.00	0.35	0.10	-	-
Safety	-0.11	0.75	-	-	-	-	-	-
Shade	0.18	0.32	-	-	-	-	-	-
Houses	0.67	0.04	-	-	-	-	-	-
Scenery	-0.86	0.01	-	-	-	-	-	-
Traffic	-0.10	0.60	-	-	-	-	-	-
People	-0.05	0.86	-	-	-	-	-	-
Strolling Freq.	0.12	0.00	0.11	0.00	0.11	0.00	0.12	0.00
Old West Austin	-	-	-	-	3.25	0.00	3.99	0.00
Constant	0.64	0.72	0.23	0.86	0.94	0.45	2.24	0.00
R square		0.25		0.24		0.29		0.25

In Model 4, we included only the most significant variables: miles to the store, Old West Austin, and strolling frequency. This simple model explains nearly as much variation as the more complex Model 3. This Model suggests that the three most important variables in explaining the frequency of walking to the store are land use patterns, which determine the distance from home to the store, walking disposition, as indicated by strolling frequency, and whatever attitudes and preferences go along with the choice to live in Old West Austin.

CHAPTER 7. CONCLUSIONS

These results suggest two general conclusions. First, certain urban form characteristics which planners can encourage through land use policies and design guidelines make walking and shopping locally more attractive choices. The most important policy is to encourage commercial activity within walking distance of residential areas - a necessary but not sufficient condition for walking. Other policies that can help to encourage walking and local shopping include: requiring short setbacks and continuous street frontages for commercial buildings, minimizing parking requirements and encouraging parking on the side or rear of buildings, requiring continuous sidewalks between residential and commercial areas, providing ample street trees and other pedestrian amenities, discouraging through traffic in residential areas, enforcing leash laws, and so on. These policies will not mean a significant reduction in automobile travel, but they will mean that the choice to walk or shop locally becomes more competitive with driving to more distant locations.

Second, most of what influences residents' choices about walking and local shopping is not anything that planners can do anything about. The fact that residents have so many choices -- not just the local supermarket but also the next one down the road or the health food store across town -- means that few of them will always choose the closest option, instead sometimes or always traveling farther to find the store that better meets their needs. This is a simple fact of life in metropolitan areas. Many of the characteristics that produce a comfortable and interesting walking environment depend not on neighborhood design but on how residents adapt and adapt to the neighborhood: gardening, house renovations, holiday decorations, even open curtains. The connection residents feel to their local businesses depends on the efforts those businesses make to foster those connections.

So can land use policies be an effective strategy for reducing automobile dependence? Yes and no. Land use policies are clearly important in determining whether residents have the choice to do something other than drive. In that sense they help to reduce the need to drive. But simply having an alternative to driving doesn't mean that residents will take advantage of it. This study shows that some people are more disposed to walk than others and that those who are more disposed to walk are more disposed to chose a neighborhood where walking is an option. Even where the environment is right to encourage walking as a substitute for driving, the savings in vehicle travel are likely to be small given the low frequency and short distance of such trips. And once residents are in their cars, they will often choose to bypass local destinations for more attractive ones farther away. Planners should focus on land use policies that will help to provide alternatives to driving, but they shouldn't expect such policies alone to control growing levels of travel.

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APPENDIX A. PERCEIVED NEIGHBORHOOD BOUNDARIES

Analysis and write-up by Jim Regan-Vienop

Although we had used a variety of techniques for defining specific neighborhoods in Austin, including neighborhood association boundaries and designations on city maps, we were interested in testing whether residents of the case study neighborhoods defined their neighborhood by the same boundaries we used. At the focus group meetings, we asked each participant to draw on a map the area they think of as their neighborhood. With just a cursory examination of the focus groups' boundary maps it quickly became obvious that each individual was using different criteria to define the boundary of their neighborhood; some people drew (or described) geometric shapes, others traced physical features, and others used some combination of these methods. These maps were then analyzed using a Geographic Information System to determine the degree of agreement and disagreement --- and the areas of agreement and disagreement. Jim Regan-Vienop, a student in the Community and Regional Planning Program at the University of Texas, development the methodology, carried out the analysis, and provided the discussion that follows, including the methods used, issues and problems encountered, neighborhood results, and suggestions for better and/or additional ways to incorporate GIS into this kinds of study. Another purpose of this analysis was to examine the feasibility of including some of the qualitative data provided by the respondents in a useful GIS analysis.

METHODOLOGY

Boundary maps were collected from focus group participants in the four neighborhoods; in one neighborhood, participants were asked to indicate in words the boundaries of their neighborhood; in the sixth neighborhood, we unfortunately forgot to ask about neighborhood boundaries all together (our only excuse is that this was not a critical element of the study). Once all of the individual response maps had been reproduced in electronic form, as described below, each of the neighborhoods was "defined" by adding together all of the individual maps from each focus group. By shading the included areas in a graduated color scheme it was possible to see the neighborhood core (area of most agreement -- the darkest shades), outlying parts of the neighborhood (areas with less agreement -- lighter shades), and the non-neighborhood (area outside of the neighborhood -- white). The composite map of each neighborhood shows the collective representation of what the respondents considered "inside" and "outside" of their neighborhood. As expected, there is a great deal of variation among the respondents about what should and should not be included in the neighborhood.

For each “map” drawn by a respondent of the focus group process, a boundary map was copied as a polygon in ArcView 3.0 (tm) on a networked Windows NT personal computer. Included in the focus group “drawn maps” are the boundary descriptions, which can be thought of here as “mental maps.” All of the individual maps were reproduced electronically as polygons using a mouse as the polygon draw tool. Each of these vector polygons was then converted into a raster grid. The raster grids were then reclassified to make the area (grid cells) inside the boundary a value of one and the outside area cells a value of zero. Finally, using the map calculator all of the raster grids for a neighborhood area were added together. For the new theme (composite neighborhood), the theme was reclassified to include one level of shading for each of the original maps plus one for the area outside the neighborhood. By graduating the color scheme for the summed values (zero being white, 1 being a light pink, to the highest number being a dark red) it became possible to see where most and least agreements occurred.

Additionally, the database used to keep track of responses from the focus group surveys was address matched to the street theme to produce a point layer of respondents. This respondent point layer allowed a visual comparison of where the respondents live to the neighborhood boundaries they defined.

ISSUES, CONCERNS, AND PROBLEMS

Interpretation

The first and probably most problematic issue faced concerned interpretation of intent. What did the respondent intend when s/he did thus? For example, in some cases the respondent carefully traced streets as the boundary, except for one small area where a corner of two boundary streets was cut off. Rather than try to interpret intent, the boundaries were followed as exactly as possible (given the limitations of using a mouse as the polygon draw method). This proved simple to do for many, but not all of the maps. Where the respondent had used a “fine” tip pen and drawn only one line tracing was easy. When the respondent made more than one line interpreting intent became an issue again. It was decided to be as inclusive as possible. Where people had drawn several lines (e.g. when they made several passes at a circle) the outermost lines were chosen as the boundary. Finally, in many cases a fine tip pen was not used. A large felt tip marker left a large (considering the scale) discrepancy in intent for the boundary. The width of the marker could easily cover an entire city block. Again, to be most inclusive the outer edge of the marker line was used as the guide for drawing the polygon.

One of the next major issues faced was similar to, but slightly different from the issue discussed above. Several of the maps given to the respondents were not inclusive enough. The respondent drew a boundary without closure that ended at the edge of the map given. They had obviously wanted to include something beyond the edge of the given map. Not wanting to try and

interpret intent, straight lines were drawn across the gaps. This likely gives a false boundary and therefore erroneous composite picture; however, it seemed more appropriate than guessing at intent. Similarly, several of the boundary maps drawn by the respondents had incomplete polygons (i.e. the respondent left gaps between lines). Again, straight lines were drawn across the gaps instead of trying to interpret intent.

A different interpretation issue came up in a single case. The participant had put a single dot on the map. It seems likely that the participant misunderstood the purpose of the map exercise; however, to again avoid the interpretation issue a very small polygon was drawn to represent that dot.

In all but one of the cases where the participants were asked to describe their neighborhood boundaries physical features, such as city streets, were used. In the one exception, a description of two gates leading into a subdivision were described as the only boundaries to the neighborhood. Rather than leave this response out of the study, a circle centered over and including only the subdivision was drawn.

Survey

One major issue involves the different methods of collecting boundary definitions from the different neighborhood focus groups. In four of the six neighborhoods photo copies of a city street map were given to the participants to draw their neighborhood boundaries. In one of the focus groups the photo copy maps were forgotten and participants were asked to describe the boundaries of their neighborhood. In the last focus group neither maps nor descriptions were collected.

This brings up the question of how the different methodologies affect the study. Each method has its likely consequences. Giving a participant a map to draw boundaries on allows people to be more vague (as with the people who drew several circles) and/or lazier (drawing a circle so they don't have to think of specific boundaries). Asking people to describe their neighborhood boundaries forces them to be more specific. However, this raises the question of what people would do (did) if they don't think of their neighborhood as having specific boundaries. While most of the participants used streets as boundaries for at least part of their definition, many of these same people used other geographic features for part of their definition. For example many people used parks and lakes as part of their boundary definition when given a map to draw on. All of the people asked to describe their neighborhood boundaries used only streets as boundary markers. Both methods influence the participants and this needs to be considered when looking at the results.

Another problem encountered that could cause problems for later GIS analysis involved a lack of identification on some of the boundary maps. Most of the boundary maps had names

attached to them which allowed matching of specific polygons with specific boundary maps. In one neighborhood none of the maps had identifying names. Two other neighborhoods included several maps that did not have names attached. This was not a problem for this phase of the GIS analysis. The unknowns were named as A....N and were included in the composites. This allowed for the input to be used in this phase of the analysis. However, doing additional GIS analysis will be hindered by this lack of identification.

Software

One software limitation that became apparent in doing this analysis relates directly to the focus group process. There were differing numbers of people participating in each of the focus groups. One group had 18 participants draw boundary maps, while another had 4 participants. This range of participation makes comparisons between the neighborhoods very difficult. In trying to use a graduated color scheme to show the range from core to outside the neighborhood, ArcView proved to be of limited use.

During the map calculation process for each neighborhood each grid cell was given a value based on the number of times the cell was included as part of someone's neighborhood. Therefore, in one neighborhood where there were 18 responses the maximum cell value could have been 18. In a neighborhood with 4 responses, that maximum cell value would have been 4.

Using different colors for each of the 19 possible cell values (the maximum value plus zero for outside the neighborhood) mentioned in the first case proved impossible to read and interpret. Using a graduated color scheme (various shades of red) proved to be more conducive to interpreting patterns. However, ArcView (tm) limits a user to 5 shades of a given color when manually choosing to assign a color to a themes' grid values. This limits the theme to either 5 categories or to using more than one color for more than 5 categories. This was obviously a problem for the neighborhood with the 19 possible grid cell values.

ArcView (tm) does however allow a computer-defined, graduated scale. The user defines (reclassifies) the number of shades to use and the general color (such as red or gray). This method would have been satisfactory if all the sample sizes had been the same. However, given the differing number of samples in each neighborhood not being able to control the shading more concretely proved to be a limitation on the ability to present the results.

In one neighborhood, the computer chose 19 shades of red ranging from white to a dark, reddish black. One of the other neighborhoods had 12 shades of red ranging from white to a dark, reddish black. The other neighborhoods had 3, 5, and 12 red shades, again ranging from white to dark, reddish black. This gives each of the neighborhood a "core" area of the same dark red. It also means that grid cells with the same value, such as 2, frequently have different shades of color. Therefore, either the darkest shade has to vary, or the steps between shades has to vary.

RESULTS

By converting the vector polygons into grids a “fuzzy” image of the neighborhood area is created which better reflects the qualitative nature of the data than a series of vector overlays would likely produce. These “fuzzy” composite neighborhood boundary images also reveal interesting patterns and point to additional areas of inquiry. This results discussion will first describe each of the neighborhoods individually and then collectively.

Old West Austin/Clarksville

Participation in this focus group was higher than for any of the other neighborhoods. There were 18 boundary maps to redraw and then convert to grids. Yet despite the larger sample group the neighborhood exhibits some strong agreement in defining the core area (Figure A-1). While the area of complete agreement is fairly small relative to the largest definitions of the neighborhood, the area of general agreement is almost as large as that of the Travis Heights neighborhood. This is interesting in that the Travis Heights neighborhood boundary definitions were generally much larger than those of this neighborhood.

In addition, there are three boundaries that appear frequently enough in these maps to be considered important boundaries. These boundaries are mainly along major arterials, including Lamar Blvd., MoPac Freeway, and Enfield Road. This is consistent with the definition of the neighborhood used in the study.

Travis Heights

Of the three neighborhoods with more than 10 participants, the Travis Heights neighborhood provides perhaps the most interesting patterns (Figure A-2). While the Travis Heights neighborhood showed the smallest core of complete agreement (the area of overlap that *all* participants agreed was part of the neighborhood), it also showed one of the largest cores of general agreement (areas that at least half the participants included as part of the neighborhood).

The focus group participants frequently drew relatively large neighborhoods as compared to the other neighborhood areas. However, the overlap of these larger neighborhoods did not seem to be as great as in some of the neighborhoods (e.g. Old West Austin/Clarksville). It is in part these relatively large neighborhood definitions that account for the large area of general agreement. Having a large area of general agreement, a small area of complete agreement, and relatively lesser degree of definition overlap seems to indicate a more diverse (or less cohesive) conception of what constitutes the neighborhood core. This idea should be explored further with people of the neighborhood.

Cherrywood

As with all of the neighborhoods included in this study, the residents of the Cherrywood area have differing views on what constitutes their neighborhood (Figure A-3). Two major roads are commonly used as the boundaries for the south and west edges of the neighborhood. These roads include Manor Road and Interstate Highway 35 (IH-35). Airport Road was frequently used for the north and east boundary. However there is considerable internal disagreement with even these roads as boundaries. There were several people who considered the areas west of IH-35 and south of Manor Road as being in their neighborhood (note that they were not included in the neighborhood definition used for the study).

Even within the area of general agreement (where at least half of the participants included an area) there are variations in level of inclusiveness. It is interesting to note that in this neighborhood, there is a division in perception revolving around 38 1/2 Street. There is a definite difference in the shading levels north of the street from the shading levels south of the street. This implies that 38 1/2 Street is a barrier to some residents of the area, and not for others. Additional study should ask what it is about 38 1/2 Street that causes a barrier in some peoples' minds and not in others'.

One interesting item was that several participants included large areas west of IH-35 as being included in their neighborhood. All of the respondents live east of the highway. This implies that IH-35 is not a major barrier for these people. This is surprising in that the highway is commonly thought of as a major barrier between east and west Austin. Additional information would have to be gathered and analyzed before any generalized inferences could be made. One supposition is that given the pattern and area covered by several of the participant responses these people could be students at the universities they included within their neighborhood polygon. Both universities are west of IH-35.

Wells Branch

In the Wells Branch neighborhood focus group, there were four participants. None of the participants identified the maps they drew. Thus all of the polygons were attributed to unknown sources. Some attempt was made to try and link focus group survey forms with map forms based on pen type and color, but this proved not to be a workable solution. It appeared that all the participants had been supplied with the same type of pens by the UT facilitators. While this did not hinder the grid addition process or the pattern analysis it could hinder further GIS work planned as part of this study.

In some ways, this was one of the more difficult neighborhoods to analyze for patterns/commonalties. With just four respondents there is a chance that the data gathered is not really reflective of the more general neighborhood. However, there seems to be an area emerging

as a core of the neighborhood (Figure A-4). It needs to be emphasized that with additional information this core area could shift and change greatly.

Within the larger area of less agreement, some interesting patterns emerged. However, there is no immediate way to interpret those patterns given the small sample size and irregular boundary definitions given by the participants. The irregular shapes of the polygons drawn by the participants leaves the question of why such irregular shapes were used to define the neighborhood. What features of the area were in the minds of the participants when they drew their boundaries? Gathering additional information in the Wells Branch area could shed some light on the reasons behind the irregular shapes given as the boundaries.

Tanglewood

The Tanglewood neighborhood focus group had just three participants. In addition, this focus group was asked to describe their neighborhood boundaries rather than draw them. Finally, as described above, one respondent described only two gates as the only boundaries she recognized for her subdivision. By “interpreting” her intents and including the entire subdivision described in a polygon, the results of this neighborhood grid analysis are very uncertain.

Two interesting items stand out in the grid patterns revealed by the grid methodology used (Figure A-5). The first is that one of the participants described a neighborhood much larger in area than was the case in any of the other neighborhoods. The second is that this is the only neighborhood where there is a case of no overlap. Two of the respondents used the same street as a southern boundary while the third respondent’s subdivision (the “interpreted” subdivision) is located in an area south of that southern boundary street. These two items taken together suggest that there might be less agreement or less cohesion in what the residents of the area consider “their” neighborhood. Again, given the small sample this is very uncertain. Additional work would have to be done to confirm or deny this speculation.

SUGGESTIONS

The following suggestions are mainly about integrating a GIS analysis into a similar study in the future. Design the GIS analysis into the study from the very beginning. It should not be a late addition. In the case of this neighborhood travel study, having had a consistent methodology for collecting boundary maps, as well as having collected them from all areas in the study, could have made the analysis more meaningful. Comparisons across the neighborhoods might have been possible had all neighborhoods had similar numbers of respondents and/or similar methodologies of data collection.

Data was collected from the various focus groups regarding habits on where people grocery shop, go for entertainment, go for recreation, go for shopping other than groceries, and

where people work. Much of this information was collected through people placing sticky dots on the various locations using different colors for the different activities. There was one activity map per neighborhood. Some of this same type of information is also on the focus group survey forms. The information from the survey forms was entered into a database. This database was usable for the grid analysis after some modification. It would take a lot more modification for the database to be useable for an analysis of the participants' habits (e.g. comparing where a person lives, works, shops, and recreates with how they have defined their neighborhood). If the database had been designed with a GIS analysis in mind much less restructuring of the database would be needed to include the GIS analysis. Much more analysis work could have been done for the time that went into restructuring the database.

APPENDIX B.
NEIGHBORHOOD SURVEY AND FOCUS GROUP QUESTIONS

NEIGHBORHOOD TRAVEL SURVEY

We are doing an important study of travel within neighborhoods--trips to the grocery store, walks around the block, etc. The results of our study will help the city to improve the quality of neighborhoods and reduce the amount of car traffic.

We are interested in the factors that influence your decisions about travel within your neighborhood. Your answers on this survey are very important to our study. All of your answers will be strictly confidential.

I. Supermarket Choice

1. What portion of your household's food shopping do you do? (Check one)
   - ☐ Almost all of it
   - ☐ About three-fourths of it
   - ☐ About half of it
   - ☐ About a quarter of it
   - ☐ None or almost none of it (Skip to Section II.)

2. About how many times per week do you usually shop at a supermarket? _____Times per week

3. At what supermarket do you most frequently shop?

Name of store_____, Street location_____

4. How do you usually get there? (Check one)
   ☐ Drive ☐ Walk ☐ Bike ☐ Bus ☐ Other_____

5. How important are the following factors in your choice of this particular supermarket?
   (Circle the appropriate number after each factor.)

	Not at all Important				Extremely Important
Best prices	1	2	3	4	5
Closest to home	1	2	3	4	5
Easiest parking	1	2	3	4	5
Widest selection	1	2	3	4	5
Best quality products	1	2	3	4	5
Pleasant atmosphere	1	2	3	4	5
Fewest crowds	1	2	3	4	5
Shortest lines	1	2	3	4	5
It's on the way home from work/school	1	2	3	4	5

6. How many times in the LAST 30 DAYS did you shop at the following supermarkets?

H-E-B (Slaughter/Manchaca)	_____Times in the last 30 days
Albertson's (Slaughter/Manchaca)	_____Times in the last 30 days
Other_____	_____Times in the last 30 days
Other_____	_____Times in the last 30 days

7. How many times in the LAST 30 DAYS did you buy FOOD at any of these locations?

Any small grocery store?	_____Times in the last 30 days
Any convenience store, such as 7-11, Circle-K, etc.?	_____Times in the last 30 days
Any discount warehouse, such as Sam's Club, etc.?	_____Times in the last 30 days
Central Market (38th & Lamar)?	_____Times in the last 30 days
Whole Foods or any health food store?	_____Times in the last 30 days

II. Walking Trips

1. How many times in the LAST 30 DAYS did you take a walk or a stroll around your neighborhood, for example to get exercise or to walk the dog? _____Times in the last 30 days

2a. If you DO walk or stroll around your neighborhood, please tell us why:

_____
_____
_____

2b. If you DO NOT walk or stroll around your neighborhood, please tell us why:

_____
_____
_____

3. Does your household have a pet that needs regular walks? ☐Yes ☐No

4. Please indicate if you agree or disagree with the following statements about walking or strolling in your neighborhood by circling the appropriate number after each statement:

	Strongly Disagree		Neutral		Strongly Agree
I feel safe walking in my neighborhood during the day.	1	2	3	4	5
I feel safe walking in my neighborhood in the evening.	1	2	3	4	5
The trees in my neighborhood provide enough shade.	1	2	3	4	5
I feel comfortable walking when it is hot.	1	2	3	4	5
The houses in my neighborhood are interesting.	1	2	3	4	5
I like to look at interesting houses when I walk.	1	2	3	4	5
I often see neighbors I know when I walk.	1	2	3	4	5
I often see people I don't know when I walk.	1	2	3	4	5
I like to see other people when I walk.	1	2	3	4	5
There is too much car traffic in my neighborhood.	1	2	3	4	5
I feel comfortable walking in the street where there are no sidewalks in my neighborhood.	1	2	3	4	5

5. How many times in the LAST 30 DAYS did you WALK from your HOME to a local store or shopping area? _____ Times in last 30 days

6. Think about the last time you walked to a store or business and answer the following questions:

a. How long ago was this? (Check one)
☐With the last week ☐Within the last few weeks
☐More than a month ago ☐More than 6 months ago
☐Can't remember the last time (Skip to Section III.)

b. What kind of business or businesses did you visit? Check ALL that apply.

☐Supermarket	☐Convenience store	☐Post office	☐Other: _____
☐Small grocery store	☐Bank	☐Cleaners	☐Other: _____
☐Restaurant	☐Video rental shop	☐Bakery	☐Other: _____

c. If for some reason you had not been able to walk that day, would you have (Check one):

☐Driven to that same place? ☐Driven to a different place?
☐Taken transit? ☐Stayed at home--not gone out at that time?
☐Other: _____ ☐Not sure

III. Local Stores and Businesses

1. Please indicate if you agree or disagree with the following statements about stores and businesses in or around your neighborhood by circling the appropriate number after each statement:

	Strongly Disagree		Neutral		Strongly Agree
The closest store is within a reasonable walking distance.	1	2	3	4	5
Local stores meet many of my needs.	1	2	3	4	5
The quality of local stores is high.	1	2	3	4	5
I feel safe walking from my house to local stores.	1	2	3	4	5
It is hard to park at local stores.	1	2	3	4	5
Ihave to walk along busy streets to get to local stores.	1	2	3	4	5
I have to cross a busy street to get to local stores.	1	2	3	4	5
I feel comfortable walking around local shopping areas.	1	2	3	4	5

2. What local stores or businesses do you visit most? How do you usually get there?

_____

_____

3. What kind of business would you most like to see open up in your neighborhood?

_____

_____

III. Respondent and Household Characteristics

In order to analyze responses it is important that we know something about you and your household. All responses are, of course, confidential.

1. What is your gender? ☐Female ☐Male

2. What is your age? _____ Years

3. What is your current work status? (Check one.)

☐Full-time (> 20 hours per week), ☐Part-time (< 20 hours per week), ☐Not working at this time

4. Do you own or rent the unit you live in? ☐Own ☐Rent

5. How long have you lived in this unit? _____ Years In this neighborhood? _____ Years

6. How important were the following factors in your decision to live in your current neighborhood? (Circle the appropriate number after each factor.)

	Not at all Important				Extremely Important
Affordability of living unit	1	2	3	4	5
Quality of living unit	1	2	3	4	5
Quality of schools	1	2	3	4	5
Investment potential	1	2	3	4	5
Stores within walking distance	1	2	3	4	5
Attractiveness of neighborhood	1	2	3	4	5
Level of upkeep in neighborhood	1	2	3	4	5
Close to work	1	2	3	4	5
Close to friends or family	1	2	3	4	5
Other: _____	1	2	3	4	5
Other: _____	1	2	3	4	5

7. How many running vehicles (not including motorcycles, mopeds or RVs) does your household have? ____Vehicles

8. How many people, including you and children, live in your household? _____ People

9. What are the relationships to you, the ages, and the work status (full-time, part-time, or not applicable) of the other people who live in your household?

	relationship to you (Check one):					work status (Check one):		
	parent	spouse/ partner	son/ daughter	other	age:	ft	pt	n/a
Person 1	☐	☐	☐	☐	_____	☐	☐	☐
Person 2	☐	☐	☐	☐	_____	☐	☐	☐
Person 3	☐	☐	☐	☐	_____	☐	☐	☐
Person 4	☐	☐	☐	☐	_____	☐	☐	☐
Person 5	☐	☐	☐	☐	_____	☐	☐	☐
Person 6	☐	☐	☐	☐	_____	☐	☐	☐

10. To understand travel choices and for statistical purposes, we need an idea of your TOTAL HOUSEHOLD income. Please indicate the approximate range of your total household income (Check one):

☐Less than $20,000
☐$20,000 to $39,000
☐$40,000 to $59,000
☐$60,000 to $79,000
☐$80,000 to $99,000
☐$100,000 or more

11. To help the city plan for better neighborhoods, would you be willing to provide us with more detailed information about your daily travel at some time in the future? (Check one) ☐Yes ☐Maybe ☐No

THANK YOU FOR YOUR HELP! The results of this survey will be used to help decision-makers improve neighborhood quality and reduce car traffic. All of your answers are, of course, anonymous.

Please feel free to add any additional comments here:

Please return this survey in the enclosed postage-paid envelope to:
Neighborhood Travel Survey/SOA
The University of Texas at Austin
P.O. Box 7727
Austin, Texas 78713

NEIGHBORHOOD TRANSPORTATION STUDY
FOCUS GROUP INTERVIEW GUIDE

I. General Feelings About Neighborhood:

1. What were the most important reasons you chose to live in _____?

2. What **do** you like and what **don't** you like about living in this neighborhood?

II. Walking in Neighborhood:

Some of you have mentioned walking...

3. How often do you stroll or walk around the neighborhood? For those of you who **do** walk, why? For those of you who **don't** walk, why not?

4. What are some of the characteristics of the neighborhood that you **like** when you walk - or that you **don't** like?

Potential probes:

No one has mentioned _____.
What difference do /does _____ make, if any?
How about _____?

- sidewalks
- traffic
- seeing other people
- trees
- shade
- design of houses

5. Do you feel safe walking in your neighborhood, even at night? What makes you feel this way?

6. Do you feel comfortable walking **to** local shopping areas? What makes you feel this way?

7. Do you feel comfortable walking **once you get to** your local shopping area? What makes you feel this way?

8. What **do** you like about your local shopping areas, and what **don't** you like?

9. In the survey we asked what kind of business or service you would most like to see open up in your area. What did you pick, and why is it at the top of your list?

10. Where do you usually grocery shop, and why do you shop at that store?

III. More General Feelings About Neighborhood:

We'd like to end with a couple of more general questions about the neighborhood...

11. Do you think your neighborhood has a strong sense of community? What makes you feel that way?

12. If you could change one thing about your neighborhood, what would it be?

If time:
When Austin was closed down for the ice storm last week, were you able to get out of the house, and if so, what did you do?