

# Pedestrian Environments and Sense of Community

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Planning for an improved quality of life has become a very hot topic in fields such as community development, urban planning, environmental psychology, and urban design. While quality of life will obviously have different meanings for each individual, as well as each community, an increasingly common element in any plan with such a goal is “establishing a sense of community.” The importance of sense of community to the well-being of individuals and communities has been strongly embraced and advocated by the popular Neotraditional Development (NTD)—or New Urbanism—movement, which includes an enhanced sense of community as one of its primary goals (Bookout 1992; Calthorpe 1994). Underlying this goal is the belief that sprawling, homogeneous, automobile-oriented development—the standard for suburban development in America since the 1950s—has isolated people from their neighbors and their communities, detached people from their surroundings, and drained the sense of community that was so common in early-twentieth-century neighborhoods.

The NTD movement seeks to return to the design and social environment of these early “traditional” neighborhoods, characterized by higher densities, a diversity of housing types, a concentrated core of retail and employment, a pedestrian-oriented environment, dedicated public and open spaces, and connected street networks. By following these general design guidelines, it is anticipated that NTDs will develop a strong sense of community of place because people will be drawn out to their streets and other public and semipublic spaces, where they can interact with each other and their neighborhood. And through the creation of a unique, high-quality environment, NTDs are also expected to increase the level of attachment and pride that residents feel toward their neighborhood, also contributing to community of place.

Unfortunately, while a growing number of communities and regions are turning to NTDs as a tool for fostering America’s “lost sense of community” and creating more livable neighborhoods, research that evaluates the potential for developing sense of community through traditional-style neighborhood designs is limited. One problem is that NTD literature rarely provides a definition for sense of community, making it very difficult to evaluate an NTD’s success or failure in fostering this vaguely articulated concept. And while community psychologists and sociologists have put considerable effort over the past few decades toward defining community in the context of neighborhood, we are just beginning to understand what it is and how it can be measured. This is an area in need of further study—especially the connection between the built environment

## Abstract

A common claim made by New Urbanists is that a high-quality pedestrian environment will enhance sense of community by increasing opportunities for interaction among neighbors. This link between neighborhood design and community sentiment, however, has not been adequately researched. This study explores how objective and subjective qualities of the pedestrian environment influence residents’ sense of community, both directly and indirectly through their effects on pedestrian travel. Surveys conducted in one pedestrian-oriented neighborhood and one automobile-oriented neighborhood in Portland, Oregon, support the hypotheses that (1) sense of community will be greater in the traditional neighborhood and (2) pedestrian environment factors will significantly influence sense of community, controlling for various demographic influences.

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and community sentiment—if planners are to continue including the enhancement of social environments as a goal for their community.

A second difficulty that arises in researching the link between community and neotraditional designs is the relatively small number of NTDs that have been established. While there are a number of examples across the United States where NTD designs have been used in the development of new communities, few of them have been around long enough to justify evaluation efforts. Therefore, researchers often resort to the study of older, traditional neighborhoods (TNs) built up near the turn of the century, focusing on the strength of the theories behind the NTD movement and its long-term potential. Although there are drawbacks to this method, such as the fact that TNs benefit from a long history of development and residential growth that NTDs do not have, TNs do offer the most suitable research substitute until NTDs become more established. And so this is the approach taken here.

This study attempts to answer two basic questions that should be of great concern to planners and urban designers as they attempt to enhance sense of community within neighborhoods. The first is whether the pedestrian-oriented environment of TNs can actually be associated with a higher sense of community than the automobile-oriented environment of modern suburban neighborhoods (MSNs). If it turns out that this is not true, it may indicate problems with New Urbanism's underlying theory, which is based on the notion that traditional-style neighborhoods inherently have a higher sense of community because they are designed to foster social interaction and a "richer" social environment. The second question is one of design and implementation: what is it that actually influences sense of community? This study focuses on the influence of subjective and objective evaluations of the neighborhood pedestrian environment.

### ► Past Literature

Although specific definitions vary, depending on one's research interests and disciplinary background, sense of community essentially represents the latent aspect of a community's social environment, such as sense of mutual aid (even if daily interaction is missing), neighborhood security, sense of belonging, shared values, and so forth (McMillan and Chavis 1986; Nasar and Julian 1995). It contributes to a wide array of beneficial personal and neighborhood conditions, such as neighboring and neighborhood cohesion (Buckner 1988; Unger and Wandersman 1982; Skjaeveland, Garling, and Maeland 1996), community organizing (Smith 1975; Sarason 1978; Heller 1989), community identity (Hummon 1990),

residential satisfaction (Fried 1982; O'Brien and Ayidaya 1991), overall quality of life (O'Brien and Ayidaya 1991), and personal well-being and mental health (Davidson and Cotter 1991; Hendryx and Ahern 1997). The question now shifts from why attempt to enhance sense of community to how this can be accomplished. And more specific to the topic at hand, why might residents of one neighborhood have this sense of local community while those of another do not?

A number of elements have been identified as contributing to sense of community, although there is certainly no consensus on the relative influence of each. These factors tend to fall into three broad categories: influences of the physical environment, influences of the social environment, and personal/sociodemographic influences. The influence of the social environment on sense of community and other latent forms of community has been particularly well researched, especially that of casual social interaction within the neighborhood (Granovetter 1973; Smith 1975; McMillan and Chavis 1986; Buckner 1988; Skjaeveland, Garling, and Maeland 1996).

In his classic article "The Strength of Weak Ties," Granovetter (1973) claims that weak interpersonal ties among neighbors—the type of ties characterized by casual, brief, low-intensity contact—enhance social cohesion by aiding the movement of information and ideas within the community and increasing access to resources and opportunities. While Granovetter's theory of weak ties has remained strong in the literature, his claim that stronger ties lead to a fragmented neighborhood (by creating clusters of individuals) has been strongly criticized (Greenbaum 1982), and further research has revealed that more intense forms of social interaction can in fact enhance sense of community. Common dimensions used to describe these strong ties include supportive relationships in the neighborhood and relationship patterns of residents (Glynn 1981; Nasar and Julian 1995), supportive acts of neighboring (Skjaeveland, Garling, and Maeland 1996), and number of close neighbor relations (Chavis, Hogge, and McMillan 1986). Level of involvement in the neighborhood, such as in neighborhood organizations or through the use of local facilities, was identified as a contributor to sense of community by Smith (1975); Unger and Wandersman (1982); Chavis, Hogge, and McMillan (1986); Chavis and Wandersman (1990); Nasar and Julian (1995); and Saegert and Winkel (1996).

Personal and sociodemographic influences on sense of community, either directly or indirectly through their impact on social interaction and acts of neighboring, have also been fairly well researched. Personal factors include individuals' attitudes toward their neighborhood, such as attraction to neighborhood (Buckner 1988), neighborhood identity (Smith 1975), attachment to place (Skjaeveland and Garling

1997), neighborhood satisfaction (Unger and Wandersman 1982), and neighborhood security (Nasar and Julian 1995). It also includes the influence of such variables as life stage and socioeconomic status. For instance, households with children (particularly young children) are more likely to develop a sense of community within their neighborhood (Riger and Lavrakas 1981; Unger and Wandersman 1982; Buckner 1988; Nasar and Julian 1995; Skjaeveland, Garling, and Maeland 1996), as are women (Unger and Wandersman 1982; Skjaeveland, Garling, and Maeland 1996), married couples (Nasar and Julian 1995), elderly (Skjaeveland, Garling, and Maeland 1996), home owners (Chavis, Hogge, and McMillan 1986), and households with a long length of residency in the neighborhood (Buckner 1988; Chavis, Hogge, and McMillan 1986; Skjaeveland, Garling, and Maeland 1996). Less clear is the influence of socioeconomic status. Research suggests, however, that while individuals in well-integrated groups (i.e., women, married couples, educated, high income) may have larger social networks within their neighborhood (Campbell and Lee 1992), individuals in less integrated groups (i.e., minority, low income, low education) have more intense social relations with their neighbors and a greater level of social cohesion (Riger and Lavrakas 1981; Buckner 1988; Campbell and Lee 1992). This is likely due to the latter groups' greater need for local support and social bonds.

Of primary concern to planners and designers, however, is the role that physical environment plays in developing and enhancing neighborhood-based sense of community, either directly or indirectly by affecting nondesign influences such as social interaction. This is where the rationale behind New Urbanism's claim that a well-designed pedestrian environment can contribute to sense of community begins to show itself.

In the few instances where researchers have been able to study the social environment of neotraditional neighborhoods, the findings have supported the link between the overall design of these neighborhoods and enhanced levels of sense of community, social interaction, and neighborliness (Plas and Lewis 1996; Langdon 1997; Bothwell, Gindroz, and Lang 1998). In each case, the researcher attributed these social elements specifically to the physical design of the neighborhoods, including their pedestrian orientation. Additional studies have focused on specific elements of the neighborhood environment. Physical factors identified as contributing to sense of community at the neighborhood level include diverse, urban environments (Mann 1954; Haggerty 1982; Hummon 1990); the character, design, and architectural quality of the neighborhood (Mann 1954; Sarason 1978; Plas and Lewis 1996; Langdon 1997; Bothwell, Gindroz, and Lang 1998); the availability of structured public and semiprivate space (Plas and Lewis 1996; Skjaeveland and Garling 1997; Bothwell,

Gindroz, and Lang 1998); and the presence of local stores and neighborhood facilities (Smith 1975; Plas and Lewis 1996; Langdon 1997).

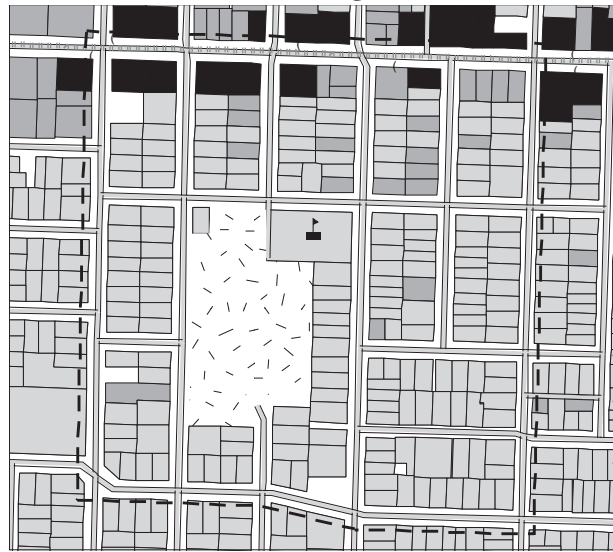
None of the literature in this area, however, has taken an in-depth look at how pedestrian travel and pedestrian friendly environments contribute—or if they contribute—to the development of a rich social environment. Thus far, pedestrian-specific research has remained in the realm of transportation benefits associated with traditional designs. Issues that have been addressed include the influence of urban design on pedestrian travel (Ewing, Haliyur, and Page 1995; Handy 1996; Shriver 1996; Hess et al. 1999), the likelihood of residents to walk to local shopping facilities (Steiner 1998), the relationship between perceptions of the local walking environment and pedestrian behavior (Handy 1992, 1996), and the relationship between people's personal attitudes and their pedestrian behavior (Kitamura, Mokhtarian, and Laidet 1997). They do not include the social benefits of walking or of designing neighborhoods for pedestrians.

As the theory of New Urbanism gains momentum, with more and more planners, urban designers, and architects promoting this direct and/or indirect link between pedestrian environments and sense of community as a means to developing stronger communities, it is critical that we give the topic more research attention. This study intends to begin moving us in this direction by testing the New Urbanism assumption that pedestrian-oriented TNs foster a greater sense of community than do their automobile-oriented counterparts and by investigating the relative contribution of objective and subjective evaluations of the pedestrian environment to sense of community, after controlling for select sociodemographic variables.

## ► Method

To examine the effects of neighborhood design on sense of community, this study compares one TN with one early MSN in Portland, Oregon, through the use of household surveys. The relationship between neighborhood design and pedestrian travel was also addressed in this study but will be discussed here only where relevant to sense of community. The direction of causality presented in this study's hypotheses is based on the claims being made by New Urbanism—that the built environment will increase the likelihood of community-oriented behaviors, such as walking, and these behaviors will in turn enhance community-oriented attitudes, such as neighborhood attachment. The first hypothesis is that TN residents will have a higher sense of community than those of the MSN. The second is that the objective and subjective qualities of the

## The Traditional Neighborhood.



## The Modern Suburb.



- |                          |                        |
|--------------------------|------------------------|
| Single-family residences | Elementary school      |
| Multi-family residences  | Bus routes             |
| Commercial uses          | Bus stops              |
| Parks                    | Appropriate study area |

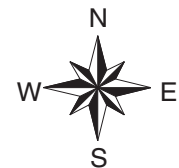


Figure 1. Layout and land use of selected neighborhoods.

neighborhood's pedestrian environment will significantly contribute to residents' sense of community.

### Neighborhood Selection

Selection of the two neighborhoods controlled, to the extent possible, median household income, access to a local shopping district, access to highway(s) and transit, and topography. Differences in the two neighborhoods represent the objective quality of the pedestrian environment. Urban design factors considered include era of development, street and sidewalk connectivity, housing mix, housing setbacks, lot size, presence of front porches, pedestrian amenities, and the overall pedestrian orientation of the local commercial area (pedestrian access, storefronts on sidewalks, etc.).

Data used in selecting sites were collected from the 1996 American Community Survey for Multnomah County, Oregon; the Metropolitan Service District Regional Land Information System geographical information system database; and site surveys. The first step in neighborhood selection was to

identify neighborhoods built up in the two eras of interest to this study: traditional-era neighborhoods built up prior to 1945 and modern-era suburbs built up between 1950 and 1985. These neighborhoods were then matched appropriately based on the control variables. The final selection was made based on a visual evaluation of each neighborhood's urban design factors. See Figures 1 and 2 for overall layouts and photographs of the selected neighborhoods.

*The TN.* An inner-city neighborhood on Portland's east side was selected for the traditional-style neighborhood. Built up during the early 1900s, the neighborhood is characterized by small, narrow lots and a gridiron street pattern with short blocks (200 feet), narrow streets, and a continuous network of sidewalks (see Figure 1). Most streets are lined with trees, offering shade to walkers. The majority of houses have a front porch and are set relatively close to the streets, with the garage set back toward the rear of the house. The neighborhood shopping district is within one-half mile of all the housing units (see Figure 1) and is not separated from the residential areas by busy streets or large parking lots. The shopping district is also





**Figure 2.** Representative photographs of the study area.

pedestrian oriented; buildings are connected, store entrances are located on the sidewalks, storefronts are windowed and interesting to look at, and the sidewalks are well maintained. The businesses located within the shopping district include a major grocery store, a selection of restaurants, cafes and coffee shops, banks, and various retail shops and neighborhood services, such as book and music stores and a dry cleaner.

*The MSN.* The modern-style suburban neighborhood was built up predominantly during the post–World War II era. This neighborhood has larger lots and a disconnected, curvilinear street pattern (see Figure 1) characterized by cul-de-sacs, long blocks, and wide traffic lanes. Most streets do not have sidewalks. There are very few street trees, although many homes do have landscaped yards with large trees that provide some shade on the streets. Housing setbacks are large, garages are highly visible, and housing design consists predominantly of modernist-style architecture. The neighborhood commercial area is located along the northern border of the site. It is within one-half mile of all the housing units but is designed for the automobile and is separated from the residential area by a busy five-lane arterial and large parking lots. The businesses in the

commercial area provide similar goods and services to those in the TN.

### Independent Variables

The primary independent variable is the objective evaluation of the neighborhoods' physical environments, based on the neighborhood selection criteria outlined above. The pedestrian-oriented TN is coded as a 1; the automobile-oriented MSN is coded as a 0. This variable represents the direct relationship between the pedestrian environment and sense of community. Also included, as an indirect link between sense of community and the pedestrian environment, are residents' subjective evaluations of their neighborhood pedestrian environment. This is represented in three variables: perceptions of walking in their neighborhood, reported strolling behavior within their neighborhood, and reported destination walking behavior within their neighborhood. Perception of walking in one's neighborhood is evaluated using a replica of a scale used in Handy's (1996) study of walking behavior in TNs and MSNs. The scale consists of eleven items (see Table 1) that address the

pedestrian conditions of comfort, safety, and appeal. Respondents rate each item on a five-point scale, ranging from *strongly disagree* (1) to *strongly agree* (5), and the final scores are then collapsed into a single perception of walking in the neighborhood score. Reported walking behaviors were measured by asking the respondents how many times in the past thirty days they had walked or strolled in their neighborhood (for personal or recreational purposes) and how many times during the same period they had walked to a local store or business. These questions were also drawn from Handy (1996).

### Dependent Variable

To measure sense of community, household surveys included the Psychological Sense of Community (PSC) Scale developed by Nasar and Julian (1995). This tool was selected for its ability to measure sense of community at the individual level and to detect differences across neighborhoods, as well as for its reliability (Chronbach's alpha score of .87). Also, due to space constraints on the survey, the length of the eleven-item scale was practical.

### Control Variables

As discussed previously, five variables were controlled to the extent possible in the neighborhood selection phase. The first four—access to a neighborhood commercial area, highway access, access to transit, and topography—were controlled due to the influence that they may have, above and beyond neighborhood design elements, on walking activity. Both neighborhoods are adjacent to a shopping area and a major transit route, are near a major highway, and have a flat terrain. The quality of the commercial pedestrian environment and frequency of transit service, however, were not controlled for because these aspects reflect fundamental differences in TNs and MSNs. The fifth variable, median household income, was controlled to avoid the wide range of issues that arise when comparing a higher income neighborhood with a lower income neighborhood, in terms of both pedestrian activity and sense of community. Both neighborhoods, however, have income variation within them, allowing the study to examine the influence of this variable on sense of community.

Also controlled, through the regression model, were four demographic variables that may influence sense of community according to past research. These are number of young children (younger than six years) in the household, household tenure (1 = owner, 0 = renter), length of neighborhood

**Table 1.**  
**Correlations between mean perception of walking in neighborhood item scores and mean psychological sense of community score.**

<i>Item in Perception of Walking in Neighborhood Scale</i>	<i>Correlation Coefficient</i>
I often see neighbors I know when I walk	.613***
I like to look at interesting houses when I walk	.440***
I feel safe walking in my neighborhood during the evening	.436***
I feel safe walking in my neighborhood during the day	.434***
I like to see other people when I walk	.416***
The houses in my neighborhood are interesting	.386***
I feel comfortable walking when it is hot	.207**
There is too much car traffic in my neighborhood	-.170*
I feel comfortable walking where there are no sidewalks in my neighborhood	.166
I often see people I do not know when I walk	.161
The trees in my neighborhood provide enough shade	-.017

\* $p = .10$ . \*\* $p = .05$ . \*\*\* $p = .01$ .

residency (in years), and approximate household income. Each is expected to have a positive relationship with sense of community. Because only household information was collected, individual variables such as age and gender could not be included in the analysis, although these factors have also been identified as potential influences.

Table 2 presents a summary of the variables used as well as the mean values and standard deviations for each neighborhood. Please note, however, that the only analysis to utilize mean values is the neighborhood comparison of PSC scores. The remaining analyses are conducted for all respondents, at the individual level, where having a wide standard deviation is more important to finding significance than is having dissimilar neighborhood mean values.

### Data Collection

Surveys were dropped off with a cover letter and return envelope (no return postage) at the doorstep of every housing unit within the selected sites. Due to resource and time constraints, no follow-up was conducted. The cover letter requested that the survey be filled out by "the adult resident primarily responsible for most of the household shopping" (this was intended to get more information about local shopping behavior). Approximately 260 surveys were delivered in each neighborhood, for a rough total of 520. Of these, 57 (22.0

percent) were returned from the TN and 49 (18.8 percent) from the MSN. While the percentages indicate a fairly low return rate, the returned surveys do represent about one-fifth of the larger population.

### Research Limitations

The most obvious limitation to this study is that of sample size, regarding both the number of neighborhoods included and the somewhat low response rates within those neighborhoods. Strengthening the validity of the findings, however, is the general representativeness of both the survey respondents and the selected neighborhoods. Similarities and differences between respondents and the neighborhood as a whole are described below and summarized in Table 3. The strong degree to which the selected neighborhoods reflect the designs and characteristics of TNs and of post-World War II suburbs is described in Neighborhood Selection.

As portrayed in Table 3, home ownership rates and lengths of residency among respondents are roughly comparable, in both neighborhoods, to 1996 census data for the block group in which their neighborhood is located. Respondents in both neighborhoods slightly overrepresent middle- to high-income households (\$60,000 or more) and under-represent low- to middle-income households (less than \$60,000), yet even in the most severe case (the modern suburb), low- to middle-income groups still compose nearly one-half of the respondents. Of the sociodemographic variables collected in the household survey, it appears that only one factor—the overrepresentation of households with children (and the subsequent underrepresentation of single-person households)—may potentially affect the validity of this study's findings. As the overrepresentation of households with children is almost

**Table 2.**  
Summary of study variables and neighborhood values.

	<i>Traditional</i>		<i>Suburban</i>	
	M	SD	M	SD
<b>Independent variables</b>				
Neighborhood layout (1 = pedestrian oriented, 0 = auto oriented)	1		0	
Perception of walking in neighborhood (1 = <i>strongly disagree</i> , 2 = <i>disagree</i> , 3 = <i>not sure</i> , 4 = <i>agree</i> , and 5 = <i>strongly agree</i> )	2.92	0.43	2.57	0.66
Number of strolling trips within past thirty days	17.73	16.91	9.39	13.56
Number of destination walk trips within past thirty days	11.31	10.07	3.02	6.38
<b>Dependent variable</b>				
<b>Overall psychological sense of community score</b> (1 = <i>strongly disagree</i> , 2 = <i>disagree</i> , 3 = <i>not sure</i> , 4 = <i>agree</i> , and 5 = <i>strongly agree</i> )				
	2.88	0.52	2.45	0.63
<b>Sense of community scale items</b>				
I am quite similar to most people who live here.	2.42	0.86	2.29	1.01
If I feel like talking, I can generally find someone in this neighborhood to talk to right away.	2.65	0.79	1.82	1.25
I do not care whether this neighborhood does well. <sup>a</sup>	0.25	0.47	0.76	0.83
The police in this neighborhood are generally friendly.	2.62	0.70	2.47	0.8
People here know they can get help from others in the neighborhood if they are in trouble.	2.89	0.71	2.67	1.02
My friends in this neighborhood are part of my everyday activities.	2.29	1.17	1.48	1.05
If I am upset about something personal, there is no one in this neighborhood to whom I can turn. <sup>a</sup>	1.25	1.05	2.04	1.14
I have no friends in this neighborhood on whom I can depend. <sup>a</sup>	0.84	0.94	1.55	1.17
If there were a serious problem in this neighborhood, the people here could get together to solve it.	2.89	0.79	2.61	0.84
If someone does something good for this neighborhood, that makes me feel good.	3.32	0.66	3.14	0.54
If I had an emergency, even people I do not know in this neighborhood would be willing to help.	2.93	0.75	2.80	0.76
<b>Control variables</b>				
Number of young children (younger than six years) in household	0.40	0.75	0.22	0.51
Length of residency in neighborhood (years)	13.16	13.76	11.63	10.64
Household tenure (1 = owner occupied, 0 = renter occupied)	0.79	0.41	0.76	0.43
Approximate median household income (1 = < \$20,000, 2 = \$20,000-\$39,999, 3 = \$40,000-\$59,999, 4 = \$60,000-\$79,999, 5 = \$80,000-\$99,999, and 6 = \$100,000+)	3.48	1.43	3.70	1.52

a. Item is reverse coded when computing overall psychological sense of community score.

equal in each neighborhood, this factor is unlikely to affect the validity of the neighborhood comparison; it does, however, suggest that the findings may be more representative of these households than of nonchildren households.

The relatively small sample size was also compensated for by conducting the regression analysis (which composes the bulk of the analysis presented in this article) at the household

unit ( $n = 106$ ), rather than focusing on neighborhood-level ( $n = 2$ ) analysis.

A second limitation was that only one measure of community was incorporated into the study. As many researchers have pointed out, “community” comes in a variety of forms (Mann 1954; Unger and Wandersman 1985; Skjaeveland, Garling, and Maeland 1996) and is unlikely to be fully captured in a single eleven-item scale. Due to space constraints on the survey, it was decided that this study would focus on the PSC, as enhancing sense of community is a commonly cited New Urbanism goal. It is suggested, however, that future, more comprehensive studies address multiple dimensions of community sentiment.

## ► Results

### Neighborhood Comparison

An analysis of variance of the mean PSC values by neighborhood reveals that not only is sense of community at the neighborhood level higher in the TN (2.88, compared to 2.44 in the MSN), this difference is significant at the 99 percent confidence level (mean square = 4.91,  $F = 14.88$ ,  $p < .01$ ).

### Sense of Community Model

To help understand the relative correlation between each independent variable and PSC as well as the overall contribution of neighborhood variables relative to that of demographic variables, a hierarchical regression model was used (see Table 4 for results of the regression analysis). The first model includes only the household demographic variables—number of young children, length of neighborhood residency, household tenure, and household income—and accounts for 15 percent of the total variation in PSC ( $R^2 = .15$ ,  $F = 4.18$ ,  $p < .01$ ). Of these variables, only the number of young children variable is significantly correlated with PSC ( $\beta = .27$ ,  $t = 2.77$ ,  $p < .01$ ), with

**Table 3.**  
Select household characteristics of respondents and their corresponding block group, by study area (in percentages).

	Traditional <sup>a</sup>		Modern <sup>b</sup>	
	Respondents	Block Group	Respondents	Block Group
Household ownership	78.9	68.7	75.5	73.8
Households with children	42.2	20.5	48.0	19.0
Single-person households	14.0	37.1	20.4	32.0
Length of residency in unit				
Less than 5 years	45.6	42.9	53.1	36.6
5 to 9.9 years	15.8	14.6	6.1	19.6
10 years or more	38.6	42.5	40.8	43.7
Approximate annual household income				
Less than \$20,000	5.4	18.8	6.4	17.9
\$20,000-\$59,999	51.8	50.0	40.4	56.7
\$60,000-\$99,999	30.4	28.3	38.2	18.5
\$100,000 or more	12.5	2.9	14.9	7.0

a. Block group boundary is identical to the study area boundary.

b. Block group boundary is larger than the study area boundary.

household tenure showing a mild correlation ( $\beta = .20$ ,  $t = 1.69$ ,  $p < .10$ ).

In the second model, only the objective evaluation of the pedestrian environment (the neighborhood variable) is added. This provides a statistically significant increase of 9 percent in the explanatory power of the model ( $R^2$  change = .38,  $F$  change = 17.87,  $p < .01$ ). Adding this variable also reduces the amount of variation in PSC that is explained by the number of young children.

The third model includes all the above variables, plus the subjective evaluations of the neighborhood pedestrian environment. Adding the subjective variables into the model more than doubles its explanatory power, jumping from explaining less than one-quarter (24 percent) of the variation in PSC to explaining more than one-half (53 percent) ( $R^2$  change = .29,  $F$  change = 18.22,  $p < .01$ ). It also reduces the relative influence of the objective neighborhood variable, which becomes almost nonsignificant once the subjective variables are accounted for ( $\beta = .15$ ,  $t = 1.7$ ,  $p < .10$ ).

Of the subjective variables, the perception of walking in the neighborhood variable is most significantly correlated with PSC ( $\beta = .52$ ,  $t = 6.23$ ,  $p < .01$ ). This means that individuals with a more positive overall perception reported a higher PSC. Also significant is the influence of strolling through one's neighborhood, which is positively correlated with PSC ( $\beta = .24$ ,  $t = 2.28$ ,  $p < .05$ ). An unexpected finding, however, is the somewhat significant, negative relationship that appears in this model between the number of destination walking trips and PSC ( $\beta = -.22$ ,  $t = -1.92$ ,  $p < .10$ ).



**Table 4.**  
**Relative influence of demographic, objective pedestrian environment,**  
**and subjective pedestrian environment variables on psychological sense of community.**

	<i>Model 1: Household Variables Only</i>			<i>Model 2: Objective Pedestrian Environment Added</i>			<i>Model 3: Subjective Pedestrian Environment Added</i>		
	b	$\beta$	t	b	$\beta$	t	b	$\beta$	t
Intercept			11.84			3.35			3.35
Number of young children	.25	.27	2.77***	.20	.21	2.25**	.22	.23	3.01***
Household tenure	.28	.20	1.69*	.28	.19	1.78*	.16	.11	1.14
Approximate household income	.01	.15	1.33	.07	.16	1.47	.02	.04	0.43
Length of residency in neighborhood	.06	.02	0.17	.00	.01	0.14	.00	.04	0.46
Neighborhood layout				.37	.31	3.28***	.18	.15	1.70*
Perception of walking in neighborhood							.55	.52	6.23***
Trip frequency: strolling							.01	.24	2.28**
Trip frequency: destination							.00	-.22	-1.92*
$R^2$		.15			.24			.53	
Adjusted $R^2$		.12			.20			.49	
Standard error of the estimate		.58			.55			.44	
Change statistics									
$R^2$		.15			.09			.29	
F		4.18			10.74			18.22	

\* $p = .10$ . \*\* $p = .05$ . \*\*\* $p = .01$ .

### Correlations between Perception of Walking in Neighborhood and PSC

To further analyze the strongest relationship in this model—the influence of an individual's subjective view of the pedestrian environment on sense of community—a correlation between the items of the perception scale and the PSC score (Table 1) proves very informative. The six variables with the strongest PSC relationship all relate to three issues of the pedestrian environment: opportunities for social interaction, a safe walking environment, and an interesting walking environment.

### Personal Attitudes

In any comparison study of neighborhood behavior, the influence of residents' personal attitudes and their ability to self-select the neighborhood that meets their needs and lifestyles is always an issue. While self-selection was addressed in this research only in terms of pedestrian behavior (the central focus of the larger study), it may be useful to include that analysis here as well, even though the link is an indirect one. Attitudinal data were collected using three attitude scales developed and identified by Kitamura, Mokhtarian, and Laidet (1997) as

being strongly connected to pedestrian behavior. These included scales for two attitudes positively correlated with pedestrian behavior, protransit (Chronbach's alpha .67) and proenvironment (Chronbach's alpha .83), and one negatively correlated attitude, proautomobile mobility (Chronbach's alpha .52). For each of these scales, an analysis of variance of the mean values revealed no significant differences (at the 95 percent confidence level) between the two neighborhoods.

### ► Discussion

The result of the neighborhood comparison supports the first hypothesis that the TN residents have a higher sense of community than those of the suburban development. Some may argue, however, that this difference cannot be attributed to neighborhood design altering residents' behavior but is due instead to residents selecting neighborhoods based on the lifestyles that that neighborhood supports. In other words, people who value social interaction and being able to walk to their daily activities will move to a traditional-style neighborhood, where these behaviors are accommodated. And those who place a greater value on privacy and auto mobility will select a more modern-style suburban neighborhood. The results of the attitudinal data presented above, however, indicate that

this is not the case here: neighborhood variations in residents' sense of community, at least to the extent that it is influenced by pedestrian behavior, was not a result of self-selection bias.

The sense of community model reveals two demographic variables that have at least a somewhat significant, positive influence on PSC: owning your home and having children under the age of six in the household. These findings are neither new nor surprising (Unger and Wandersman 1982; Chavis, Hogge, and McMillan 1986; Buckner 1988; Skjaeveland, Garling, and Maeland 1996); however, the lack of significance in the relationships between either household income or length of residency and PSC seems contradictory to past research (Glynn 1981; Buckner 1988; Skjaeveland, Garling, and Maeland 1996). The lack of a relationship between income and PSC in this study may be due to the fact that mean household income was controlled through neighborhood selection, limiting the range of incomes. Length of residency, however, was not controlled for, and the range of residencies was large for both neighborhoods (see Table 2). The lack of significance for this variable (length of residency) should therefore be of great interest to the New Urbanism movement; if long residency in a neighborhood is not necessary for the development of community, this strengthens the potential for creating community in new neighborhood developments. Also interesting is the elimination of the relationship between household tenure and sense of community once the environmental variables were added into the model, indicating either that sense of community is not limited to home owners or that home owners are more likely to be walkers.

The significant correlation between each of the objective and subjective environmental variables and PSC provides great support for the link between pedestrian environments and community that is repeatedly suggested by planners and designers of neotraditional neighborhoods. Being that the most influential, however, appears to be people's subjective view of the walking in their neighborhood, this indicates that there is a great need for further research into how people perceive physical environments and what influences these perceptions. The results of the correlation analysis indicate that the three areas particularly deserving of attention in both research and planning are what makes a person feel safe walking in his or her neighborhood and how this can be addressed through design, how to create environments that are interesting to pedestrians, and how to design neighborhoods so that they are conducive to social interaction.

An interesting twist in the model is the negative correlation between destination trips, including walks to the store, and PSC. Why would strolling trips have a positive correlation with

sense of community and destination trips have a negative correlation, when both are being made within the same neighborhood environment? One possible explanation may be that the choice to make these trips is based more on necessity, as opposed to the more pleasure-driven strolling trips. In other words, whereas strollers may be choosing to walk through their neighborhood because they feel like being a part of the neighborhood or they feel like running into and maybe even socializing with their neighbors, destination walkers may more often be walking purely out of necessity or under time constraints. They may not feel like being, or have the time to be, "disturbed" by their neighbors or to enjoy their surroundings. They are also more likely to be limited in their route choices. Whereas strollers can choose the safest and most pleasant route, or the one where they know they are more likely to run into a neighbor, destination walkers will typically choose the most direct route. If this route is not as pleasant as they may wish, this may contribute to a decreased sense of community.

### ► The Environmental Determinism Critique

Any discussion of designing physical environments in an attempt to shape or encourage certain behaviors, such as in the case of New Urbanism where TN designs are intended to encourage walking, sense of community, and so forth, will face the critique of being deterministic. The concern is that planners and designers are trying to create their ideal community, in terms of both design and behaviors, rather than accommodating Americans' actual desires and lifestyles. In response, I would first like to point out that designing a neighborhood in a particular way is not going to force people into a behavior or lifestyle that they do not wish to partake in, unless there are no other alternatives available. Residents of TNs can still live private lives, can still shop outside their neighborhood, and can still use automobiles as their primary form of transportation. Secondly, the popularity of New Urbanism developments, plus the findings by researchers that there already appear to be more interaction, less automobile travel, and a greater sense of place among the residents of these new communities, indicates that there actually is a demand for traditional-style neighborhoods and their associated lifestyles. In sum, people who desire the suburban way of life still have that opportunity—the conventional American suburb is likely to be around for a long, long time—but now, people who desire a more close-knit, self-sufficient neighborhood are being given that opportunity as well.

## ► Conclusion

The purpose of this article was to investigate the relationship between sense of community and pedestrian environments in two neighborhoods of varying designs. One TN and one modern suburb in Portland, Oregon, were evaluated using the PSC Scale developed by Nasar and Julian (1995). Through hierarchical regression, it was determined that variables related to the neighborhood pedestrian environment, including both objective and subjective evaluations, contribute significantly to PSC, above and beyond important demographic factors. Of these environmental variables, subjective evaluations were of greater significance than the objective evaluation. PSC was also determined to be significantly higher in the TN than in the conventional suburban neighborhood. These findings coincide with the claims being made by advocates of neotraditional neighborhood designs and provide further support for developing community in the context of neighborhood.

This study begins to lend some credence to the ability of planners, urban designers, and architects to design neighborhoods in a way that promotes a feeling of community among their residents. It only scratches the surface, however, of the relationship between a neighborhood's physical environment and the strength and nature of its social environment. Further research is clearly needed to understand which elements (physical, political, social, economic, demographic, personal, etc.)—or combination of elements—strengthen and/or weaken which forms of community within the context of neighborhoods. This will require not only an understanding of the neighborhood environment and the larger social and political context in which this neighborhood resides but also an understanding of who actually lives in the neighborhoods and how their attitudes and expectations influence their perceptions and feelings of community. How can we plan and design a neighborhood without knowing who lives or is going to be living there? As these areas of research expand, we will be in a better position to evaluate the potential for neotraditional neighborhood design and to inform designers and planners as they attempt to implement these—and other—design techniques.

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