THE FRUIT OF URBAN NATURE
Vital Neighborhood Spaces

WILLIAM C. SULLIVAN *is an associate professor in the Department of Natural Resources and Environmental Sciences at the University of Illinois, Urbana-Champaign, where he codirects the Human-Environment Research Laboratory. He examines ways in which humans value and benefit from nearby nature, especially in contested landscapes such as inner-city neighborhoods and at the rural-urban fringe.*

FRANCES E. KUO *codirects the Human-Environment Research Laboratory at the University of Illinois, Urbana-Champaign, where she holds joint appointments in Psychology and Natural Resources and Environmental Sciences. She investigates the relationship between nature and human health. She is interested in the myriad ways in which everyday forms of nature contribute to human health with outcomes ranging from lower crime rates in the inner city, to the relief of attention deficit symptoms in children, to more active living in older adults.*

STEPHEN F. DEPOOTER *received a master's degree in landscape architecture from the University of Illinois, Urbana-Champaign, where he worked as a teaching and research assistant in the Human-Environment Research Laboratory. As a practicing landscape architect, he has worked on award-winning projects such as Centennial Olympic Park and Freedom Park in Atlanta, World Golf Village in St. Augustine, and the Woodlands New Town Development in Texas.*

ABSTRACT: What makes a neighborhood space vital? This article explores the possibility that the presence of trees and grass may be one of the key components of vital neighborhood spaces. We report on 758 observations of individuals in 59 outdoor common spaces in a residential development. Twenty-seven of the neighborhood common spaces were relatively green, whereas 32 were relatively barren. Results indicate that the presence of trees and grass is related to the use of outdoor spaces, the amount of social activity that takes place within them, and the proportion of social to nonsocial activities they support. The findings improve and broaden our understanding of the physical characteristics that influence social contact among neighbors and provide evidence that nature plays an important role in creating vital neighborhood spaces.

Keywords: *nature; landscape; social ties; community; social activity*

ENVIRONMENT AND BEHAVIOR, Vol. 36 No. 5, September 2004 678-700
DOI: 10.1177/0193841X04264945

What makes a neighborhood space vital? What are the necessary characteristics of neighborhood spaces that draw people from their homes, encourage them to linger together outdoors, and engage with neighbors in a way that supports and builds community? Although designers and scholars have long wrestled with these questions (Calthorpe, 1993; Congress for the New Urbanism, 1999; Duany & Plater-Zyberk, 1991; Jacobs, 1961; Kelbaugh, 1989; Newman, 1972), none have emphasized the critical role that nearby nature—trees and grass in particular—might play in creating vital neighborhood spaces. Recent research, however, suggests that vegetation may be one of the key components of vital neighborhood spaces.

Vegetation may be especially key in creating vital spaces in inner-city neighborhoods. A recent study found that the use of inner-city neighborhood common spaces was disproportionately concentrated in spaces with trees and grass (Coley, Kuo, & Sullivan, 1997). In one low-rise and one high-rise public housing neighborhood, Coley et al. (1997) found that residents using the spaces immediately outside an apartment building were much more likely to be in a relatively green space than in a relatively barren space. Consistent with proposals by Newman and others (Crowe, 1994; Jacobs, 1961; Newman, 1972), Coley et al. suggested that these findings might have important implications for the vitality of the community and the establishment of local social control in neighborhood spaces with and without vegetation. The notion was that, by drawing residents into the spaces immediately outside their homes, trees and grass might actually promote opportunities for informal contact among neighbors and increase informal surveillance thereby potentially fostering stronger neighborhood ties and potentially reducing crime.

A number of studies since 1997 have borne out these predictions in many ways. For individuals living in inner-city apartment buildings, well-used,

---

AUTHORS' NOTE: *This research was supported by grants from the U.S. Department of Agriculture (USDA) Forest Service (on the recommendation of the National Urban and Community Forestry Advisory Council) and the USDA's Cooperative State Research, Education, and Extension Service under project no. ILLU-65-0857. This research was conducted in partial fulfillment of the requirements for the third author's master's degree in landscape architecture at the University of Illinois. Portions of these findings were presented at the 27th International Conference of the Environmental Design Research Association, Salt Lake City, Utah, in May 1996. Thanks go to our resident collaborators, Esther Davis and George Davis, for their insights and dedication; to the residents of Ida B. Wells for their participation; and the Chicago Housing Authority for their assistance throughout.* *Address correspondence to William C. Sullivan, Human-Environment Research Lab, University of Illinois, 1103 S. Dorner Dr., Urbana, IL 61801; e-mail: wcsulliv@uiuc.edu.*

urban, green spaces have been linked to stronger ties to neighbors (Kuo, Sullivan, Coley, & Brunson, 1998; Kweon, Sullivan, & Wiley, 1998); a greater sense of safety and adjustment (Kuo, Sullivan, et al., 1998); fewer incidents of graffiti and other incivilities (Brunson, Kuo, & Sullivan, 1998); and fewer crimes (Kuo & Sullivan, 2001).

But findings from a more recent study (Brunson, 1999) appear to throw Coley et al.'s (1997) findings in doubt. Do trees and grass help create more vital neighborhood common spaces? The article presented here reviews the evidence for and against an effect of vegetation on the vitality of residential outdoor spaces, proposes a possible interpretation of the apparent discrepancy in the previous findings, and reports a new study addressing the discrepancy. We examine three possible outcomes in relation to the density of vegetation in neighborhood common spaces: the use of outdoor common spaces, the amount of social activity that takes place within such spaces, and the proportion of social to nonsocial activities that they support.

NEARBY NATURE AND THE VITALITY OF NEIGHBORHOOD COMMON SPACES

High-rise residential areas. Do trees and grass actually promote residents' use of neighborhood common spaces and their social interaction in these spaces? In the context of high-rise apartment buildings, there are a number of reasons to think so.

First, a photosimulation-based study conducted in a high-rise setting showed that, although inner-city residents dislike barren, treeless common spaces, the addition of trees and grass was enough to dramatically change their responses—from spaces they did not prefer to spaces they preferred quite a lot or very much (Kuo, Bacaicoa, & Sullivan, 1998). To the extent that residents are more likely to use spaces they like, these findings suggest that residents would be more likely to use spaces with trees and grass. Indeed, approximately one out of three residents reported that they would use the outdoor spaces more if trees were planted.

Second, there is direct evidence suggesting that, in high-rise neighborhoods, green spaces are more vital. In a study that observed the use of outdoor spaces in a high-rise neighborhood, more individuals and larger groups of people were found in spaces with a few trees than in spaces with no trees (Coley et al., 1997). Consistent with these results, residents of the same neighborhood who lived adjacent to common spaces with higher levels of vegetation reported using those spaces more often than did residents who

lived adjacent to spaces with lower levels of vegetation (Kuo, Sullivan, et al., 1998).

Third, the density of trees and grass in an inner-city, high-rise neighborhood has been linked to the strength of neighborhood social ties, and mediation tests indicate that the greater use of green spaces explains this link (Kuo, Sullivan, et al., 1998). Results from that study show that, the more vegetation was associated with a resident's building, the more she socialized with neighbors, the more familiar she was with nearby neighbors, and the greater her sense of community. These findings have been replicated in a sample of older adults (Kweon et al., 1998).

In sum, in the context of high-rise apartment buildings, both direct and indirect evidence suggests that trees and grass promote residents' greater use of neighborhood outdoor common spaces.

Low-rise residential areas. In the context of low-rise apartment buildings, the picture is slightly less clear, because there is conflicting evidence. On one hand, recent findings suggest that, just as high-rise apartment dwellers do, low-rise apartment dwellers also highly value trees and grass. When residents of one neighborhood were asked to list improvements they wanted for their neighborhood, they most frequently mentioned improvements related to protecting existing green space and providing more green space (Brunson et al., 1998).[1] It would be surprising if residents valued these spaces so highly but did not use them any more than their barren counterparts.

Moreover, there is direct evidence to suggest that green spaces are more vital in low-rise settings. An observational study of outdoor spaces in a low-rise neighborhood in Chicago found that the presence of trees consistently predicted greater use of outdoor spaces by all people, younger and older, as well as groupings of people consisting of both youth and adults together (Coley et al., 1997).

On the other hand, however, Brunson (1999) found evidence suggesting that residents living in buildings that had greener surroundings reported no greater social interaction with neighbors in their outdoor spaces than did their counterparts from buildings with more barren surroundings. In that study, the spaces around targeted apartment buildings were rated for greenness (from not at all green to very green). Residents were then asked about the number of individuals they interacted with around their homes. Responses from individuals living in relatively green and relatively barren buildings were compared. Results indicate that the greenness of the outdoor common spaces was not related to the number of neighbors with whom residents interacted in those spaces.

RESOLVING THE DIFFERENCES

Thus, there is a discrepancy between the findings from Coley et al. (1997) and Brunson (1999). This discrepancy may result from the different methodologies employed in the two studies. The design for Coley et al. involved observing spaces around targeted buildings when people were found in at least one of the spaces outside the building and then counting the number of people and the number of trees in each space around the building. The research design employed in the Brunson study had important differences. It involved identifying a set of buildings that had relatively high versus relatively low levels of nearby vegetation and interviewing people from those buildings regarding their social interactions with neighbors in the spaces around their buildings. How might the different methodologies lead to differences in the results? We consider three possible explanations here.

One possible explanation for the difference is that, by tracking the use of spaces only when some use was observed, the Coley et al. (1997) study gave a somewhat misrepresentative picture of the larger differences between green and barren spaces. That is, it might be that, although resident's use of these spaces is disproportionately concentrated in greener spaces when it occurs, the larger picture is that use is quite rare, and both green and barren spaces go largely unused.

Another possible explanation is that the discrepancy lies in the different measures used in the two studies. In Coley et al. (1997), use and resident interaction were measured by counting the number of people in a space and noting whether they were physically in a group or had a shared activity focus (e.g., playing catch). In the Brunson (1999) study, residents provided self-reports regarding how many *different* neighbors they greeted or interacted with in the common spaces outside their building.[2] It may be that green spaces do, in fact, promote more interaction among neighbors but that this effect manifests more in terms of a resident's frequent interaction with a small handful of neighbors rather than a more widely distributed pattern of interaction among a larger group of neighbors. It is also possible that the discrepant results grow from data gathered via observations versus self-report.

Yet another possible explanation for the discrepancy is that the Brunson (1999) study inadvertently excluded those residents who spent a great deal of their time outdoors. To the extent that trees have the power to encourage some residents to use their outdoor spaces more often and to the extent that the Brunson study involved interviews with residents found *at home in their apartments*, the research design of the Brunson study may have systematically worked against finding the effect. The Brunson study sought to anticipate this possibility by randomly selecting apartments within targeted build-

ings and by returning up to 10 times in an effort to interview an individual from the selected apartment. Nonetheless, the Brunson study may have systematically oversampled residents who spent most of their time at home. Because Coley et al. (1997) employed direct observations of use, it may have provided a more accurate relationship between greenness of outdoor spaces and use of those spaces.

The present study addresses these possibilities in a number of ways. Like Brunson (1999), it provides a systematic sampling of the use and social interaction in spaces *regardless of whether some use is present*. And like the Coley et al. (1997) study, it directly observes use and counts all instances of social interaction, even if they occur between the same individuals over the course of data collection. We observed multiple, comparable outdoor spaces with relatively low and relatively high levels of vegetation in an inner-city neighborhood on four occasions. The number of individuals present, their activities, their locations within the spaces, and the location of the spaces were recorded on each occasion.

We examine whether the amount of vegetation in a space is related to its use, the number of people engaged in social activities, and the proportion of social activities that occur within it.

METHOD

Data presented here were collected at Ida B. Wells, a large public housing development in Chicago, Illinois. Wells contains 124 low-rise (two- to four-story) apartment buildings. Each building is adjacent to one, two, or three other buildings creating outdoor common spaces. On average, 16 families share a single common space.

POPULATION

At the time of this study, Ida B. Wells provided housing for approximately 5,700 individuals of whom 65% were female, 97% were African American, and 44% were children younger than 14 years old (Chicago Housing Authority, 1995). Ida B. Wells was one of the poorest neighborhoods in the United States (Ihejirika, 1995).[3] Approximately 93% of the people living at Wells were officially unemployed, and roughly 50% of the families received Aid to Families with Dependent Children (Chicago Housing Authority, 1995).

It is important to note that individuals observed in this study may or may not have been residents of Ida B. Wells. We did not determine the identity of

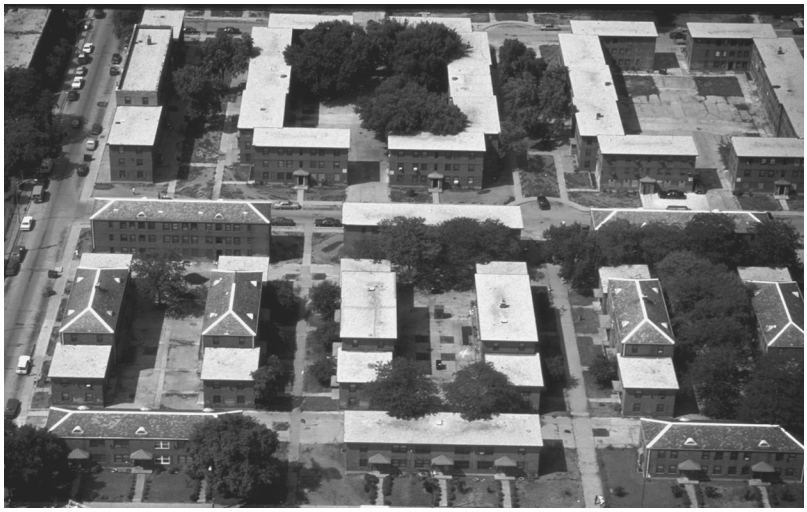

Figure 1: Aerial View of a Portion of Ida B. Wells Showing Buildings With Varying Amounts of Tree and Grass Cover

the individuals we observed or find out where they resided. Information from resident managers and our resident collaborators suggests, however, that very few outsiders spend time in the neighborhood. Therefore, individuals observed in these spaces are referred to as residents.

VEGETATION AND OUTDOOR SPACES OBSERVED

The amount of vegetation outside apartment buildings at Ida B. Wells varies considerably. When the development was originally built in the 1940s, trees and grass were planted around each of the low-rise buildings. Over time, the majority of these green spaces were paved in an effort to keep dust down and maintenance costs low. This paving killed many of the original trees thereby leaving some buildings with completely barren common spaces, others with a few scattered trees, and still others with leftover pockets of green (see Figure 1). Because grass was sparse and shrubs were nearly nonexistent, vegetation at Ida B. Wells was essentially the amount of tree cover around each building (see Figure 2).

To assess the level of vegetation in the outdoor spaces at Ida B. Wells, we took dozens of 35 mm slide photographs of the neighborhood from a helicopter. We also took ground-level photographs of the outdoor common spaces.

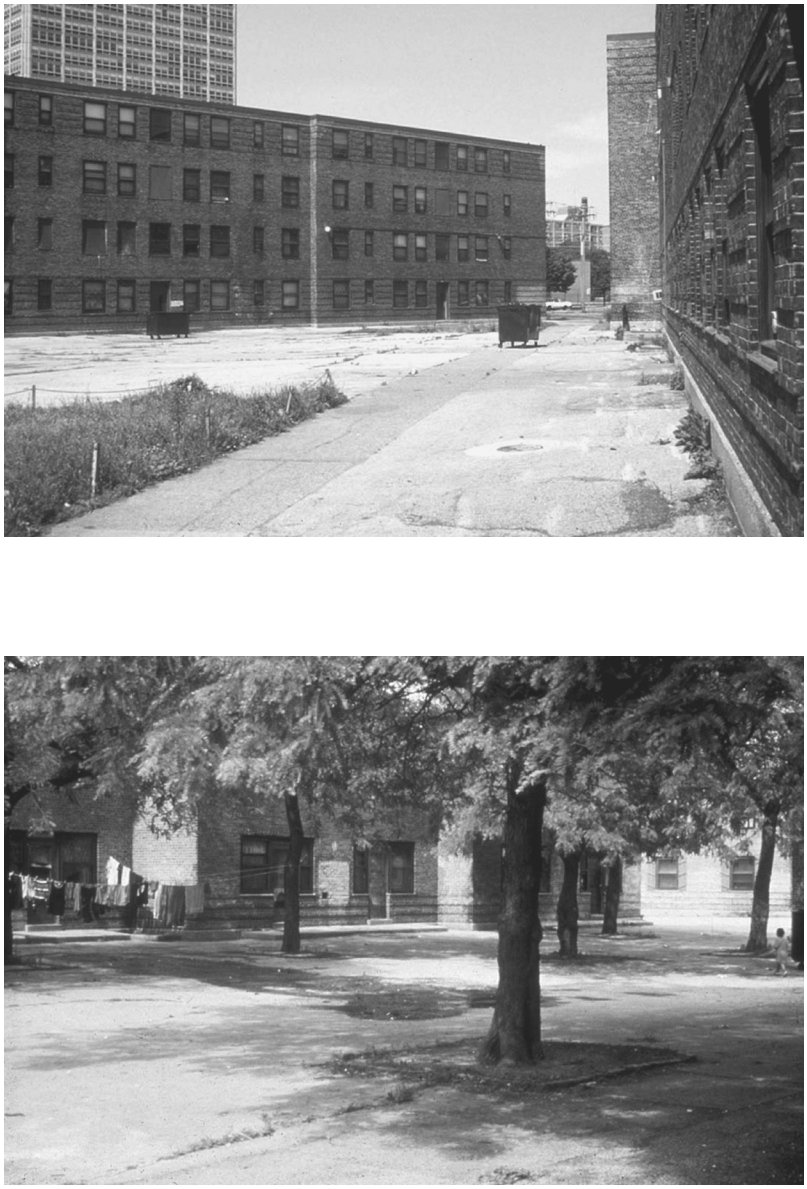

Figure 2: Ground Level View at Ida B. Wells Showing Apartment Buildings With Varying Amounts of Tree and Grass Cover

All the slides were taken in June when the tree canopy was full and the grass was green. For each outdoor space, the aerial and ground-level photographs were independently reviewed and rated by a team of five students in Landscape Architecture and Horticulture. Raters were encouraged to use the entire response scale from 0 to 4 (0 = no trees or grass, 1 = a little green, 2 = somewhat green, 3 = quite green, 4 = a space completely covered with tree canopy). Interrater reliability for these ratings was .94. The five ratings were averaged to give a mean green cover rating for each space.

A sample of 59 outdoor spaces was selected to represent the continuum of green cover from spaces totally devoid of trees and grass to spaces with a number of trees and some grass. To avoid confounding the level of vegetation with other environmental features, spaces were selected such that architecture of surrounding buildings, vacancy rate of surrounding buildings, and distance from busy streets were approximately balanced across levels of vegetation. The location of each space observed was identified as a front, back, or side yard.

Vegetation ratings were used as the basis for assignment to conditions. Nearly half the spaces (27) earned vegetation ratings in the lowest 20% of the scale (between 0 and 1). To keep the number of spaces in the conditions nearly equal and to have a reasonable amount of power in the analyses, spaces were assigned to two categories: barren and green. The 27 barren spaces in the sample had a mean vegetation rating of 0.5; the 32 green spaces had a mean vegetation rating of 2.2.

PROCEDURES

To help ensure that measures and procedures were appropriate for the cultural context of urban public housing, our research team included two residents of a different Chicago public housing development. We worked with these resident-collaborators throughout the design and implementation of this study. Our collaborators indicated that they had no acquaintances at Ida B. Wells. Both resident-collaborators had received extensive data collection training through involvement in three previous studies with our research group and were responsible for collecting all the observational data for this study. The resident-collaborators were told that we were conducting a study that looked at how people used outdoor spaces at Ida B. Wells. They were not informed of the specific research questions or any hypotheses.

Each of the 59 common spaces was observed on four separate occasions between the last week of September and the second week of October 1995. The observations were conducted when leaves were still on the trees and the leaves had not yet turned to their full fall color. Three sets of observations

were conducted on weekdays between 3:30 p.m. and 6:15 p.m. It took 2 weekdays to complete one set of observations; half of the 59 spaces were observed on the first day and the remaining half on the following day. In addition to the weekday observations, on one Sunday, each of the 59 spaces was observed between 12:15 p.m. and 5:15 p.m.

Observers followed a route map designed to lead them past each space. To ensure that spaces were not always observed by the same individual or in the same order, observers traded routes and went in reverse direction, observing the last space first and vice versa during alternate observations. In other words, observer A would begin the second set of observations where observer B ended the first set. Observer A would then complete the route in the reverse order from the previous observation. This way each observer saw each space twice during the study, and each space was observed at a slightly different time of day.

Weather conditions were closely monitored and recorded; observations were made with temperatures between 60° and 80° F. Although cloud cover varied, no observations were made when it was raining or when there was a threat of rain.

RECORDING OBSERVATIONS

Observations were recorded on coding sheets. Each coding sheet consisted of (a) a table for entering information about each person observed and (b) a detailed map of the courtyard being observed. The table contained rows that corresponded to a person observed in a space and columns that corresponded to variables such as sex, age, and activities. For the age variable, individuals were identified as being in one of six categories: babies (children aged 0 to 2), children (ages 3 to 12), teens (ages 13 to 19), adults (ages 20 to 50), and older adults (ages 51 and older); the babies and older adults were not included in the analysis of this study.[4]

An individual who was merely passing through a space was not recorded as using the space. If no one was in the space, that information was recorded.

Activity was both described in detail (e.g., sitting on stoop talking) and recorded in six general categories: (a) eating, (b) doing chores/repairs, (c) socializing, (d) entertaining, (e) resting/thinking, and (f) playing. These activity categories were later collapsed into either social activities or nonsocial activities.

The map provided another opportunity to record information about the individuals using the outdoor spaces. The location of each person in a given space was recorded by writing a number that corresponded to each individual on the map of the space. Individuals who shared the same focus of attention,

that is, those who were engaged in the same activity and who were in close proximity to each other, were circled on the map to indicate that they were members of a group.

For reliability purposes, observers simultaneously observed two spaces together each day. They then observed the remaining spaces independently. Because the categories were distinct and relatively easy to assess, the reliabilities were high: for estimating age, 100%; for social versus nonsocial activities, 100%; and for group composition, 97%.

CODING BEHAVIOR

Using the detailed descriptions, the general activity categories, and the maps of the outdoor spaces, we coded each individual observed as either engaged in social or nonsocial activity. Individuals were coded as being involved in a social activity if they were identified as being involved in social activity in the activity column of the coding sheet and were circled as a group on the coding map (e.g., multiple people circled as a group who were eating and talking). Those individuals who were not involved in a group activity were coded as nonsocial (e.g., person alone reading a book). If an individual walking through a space was observed greeting another individual in the space, their behavior was coded as social only if they stopped for a moment and engaged in a short conversation. If they merely greeted a neighbor but did not stop and exchange more than hellos, their behavior was coded as nonsocial.[5]

RESULTS

Is the level of vegetation in an outdoor common space related to the use of that space, the amount of social activity that takes places within that space, and the proportion of social to nonsocial activities within that space? Analyses examining these questions are presented here. We also examine whether the location of a space was related to the amount of social activity observed. Analyses were conducted on 758 observations of individuals in 59 outdoor spaces.[6]

IS GREEN COVER RELATED TO THE USE OF SPACES?

If trees and grass attract people to outdoor common spaces, then more people should be observed in green spaces than in barren spaces. Indeed,

TABLE 1
Analysis of Variance Comparing Mean Number of Individuals and Groups in Outdoor Spaces With Low and High Vegetation Cover

	Low Green-Cover Spaces		*High Green-Cover Spaces*			
	M	SD	M	SD	F*(1, 57)*	p *Value*
All individuals	2.0	1.64	3.8	2.34	11.7	.001
Children	0.7	0.91	1.3	1.27	3.4	.07
Teens	0.5	0.67	0.7	0.68	2.0	.17
Adults	0.8	0.82	1.8	1.24	14.1	< .001
Males	1.1	1.00	2.0	1.39	8.9	< .01
Females	0.9	0.99	1.8	1.23	8.7	< .01
Individuals alone	0.4	0.39	0.9	0.74	9.4	< .01
Individuals in groups	1.7	1.41	3.1	2.31	7.4	< .01

this is what we found. An analysis of variance (ANOVA) examining the effects of green cover (barren or green) on the number of people observed simultaneously in a space indicates that green spaces contained on average 90% more people ($M = 3.8$) than barren spaces ($M = 2.0$), $F(1, 57) = 11.7$, $p = .001$.

Table 1 provides a closer examination of this finding. Note that the change in the number of people from barren to green spaces is always positive and ranges from a low of 40% to a high of 125%. For adults, the difference is significant; there were on average 125% more adults using green spaces than barren spaces. Green cover is also related to the use of outdoor spaces for both genders: Green spaces contain on average 82% more males and 100% more females than barren spaces.

In addition to simply attracting people to outdoor spaces, it seems likely that greener spaces might attract more individuals who are alone as well as more who are in groups. Indeed, as Table 1 shows, nearby nature is related to the number of individuals who were alone as well as the number of individuals in groups in the outdoor spaces at Ida B. Wells. Compared to barren spaces, green spaces were used by, on average, 125% more individuals who were alone and 82% more individuals in groups.

Mean differences between the green and barren conditions for the number of people simultaneously using outdoor spaces at Ida B. Wells ranged from one quarter to more than three quarters of a standard deviation. Overall, the results show that green spaces were used more than barren spaces. This pat-

TABLE 2
Analysis of Variance Comparing Mean Number of Individuals Involved in Social Activities in Outdoor Spaces in Low and High Green-Cover Conditions

	Low Green-Cover Spaces		*High Green-Cover Spaces*		*Percent Change, Low to High*		
	M	SD	M	SD	*Green Cover*	F*(1, 57)*	p *Value*
All individuals	1.61	1.41	2.94	2.02	83	8.2	< .01
Children	0.67	0.84	1.17	1.22	75	3.3	.07
Teens	0.32	0.61	0.41	0.53	28	0.5	*ns*
Adults	0.63	0.76	1.35	1.07	114	8.7	< .005
Males	0.84	0.91	1.46	1.19	74	4.9	< .05
Females	0.77	0.91	1.48	1.13	92	6.9	.01

NOTE: The percent change from low to high levels of green cover presented here were calculated on the actual means, not on the rounded means presented in this table.

tern held for adults, both genders, individuals who were alone, and individuals in groups.

IS GREEN COVER RELATED TO THE VITALITY?

Is the condition of the nature in outdoor spaces at Ida B. Wells related to the vitality of the space? That is, do more individuals engage in social interaction in green than in barren outdoor spaces?

To address this question, we conducted an ANOVA in which the independent variable was the level of tree and grass cover (barren or green) and the dependent variable was the number of persons involved in social activity. Results indicate there were on average 83% more individuals involved in social activity in green spaces than in barren spaces, $F(1, 57) = 6.9, p < .01$.

Table 2 provides a closer examination of this finding by age and gender. Here again, the change from barren to green spaces in the number of people involved in social activity is always positive and ranges from a low of 28% to a high of 114%. For adults, the difference is large and significant; there were on average 114% more adults engaged in social activities in green spaces than in barren spaces. Green cover is also related to the number of males and females engaged in social activity in neighborhood spaces at Ida B. Wells. There were 74% more males and 92% more females engaged in social activity in green spaces compared to barren spaces.

Taken together, these findings indicate that, at Ida B. Wells, the level of tree and grass cover in an outdoor space is related to the amount of social activity that occurs there. This pattern held for the total sample of people observed—for adults in particular and for both genders.

DO GREEN SPACES PROMOTE VITALITY?

Is it possible that we found more social activity in green spaces simply because there were more people in green spaces, not because green spaces somehow promote social interactions? If that were the case, we would expect the ratio of social-to-nonsocial activity to be the same in barren and green spaces. Thus, we wondered, do green spaces have proportionately more social activity than barren spaces? To answer this question, we checked for an interaction between the condition of the nearby nature (barren or green) and the number of individuals engaged in social versus nonsocial activities. When all the individuals observed are included in the analysis, results suggest an interaction; there seems to be proportionately more social activity in green than barren spaces, $F(1, 57) = 3.6$, $p = .06$.

To explore this further, we examined the ratio of nonsocial-to-social activity by age and gender. For the three age categories (children, teens, and adults) and for males, we found no significant difference in the proportion of social activities in barren and green spaces. As can be seen in Figure 3, however, for all females, there was an interaction between green cover and social activity: Proportionately more social interaction was observed in green spaces than in barren spaces, $F(1, 57) = 8.6$, $p = .05$. Thus, for all females, green spaces appear to support proportionately more social activity than barren spaces at Ida B. Wells.

DID LOCATION MATTER?

It is possible that front yards had more green cover than back yards and that neighbors were more likely to engage in social greetings and conversations in front yards. If that were the case, the relationship we found between nearby nature and social activity would be confounded with the location of the outdoor spaces. Thus, we wondered whether spaces in the front of buildings had a different relationship to social activities than spaces in the back or on the sides of buildings. We conducted an ANOVA using the space location (front, back, or side) as the independent variable and the amount of social activity as the dependent variable and found that the location of space did not predict the amount of social activity, $F(1, 57) = 0.9$, $p = ns$. In other words, the location of spaces (front, back, or side of the apartment building) was not

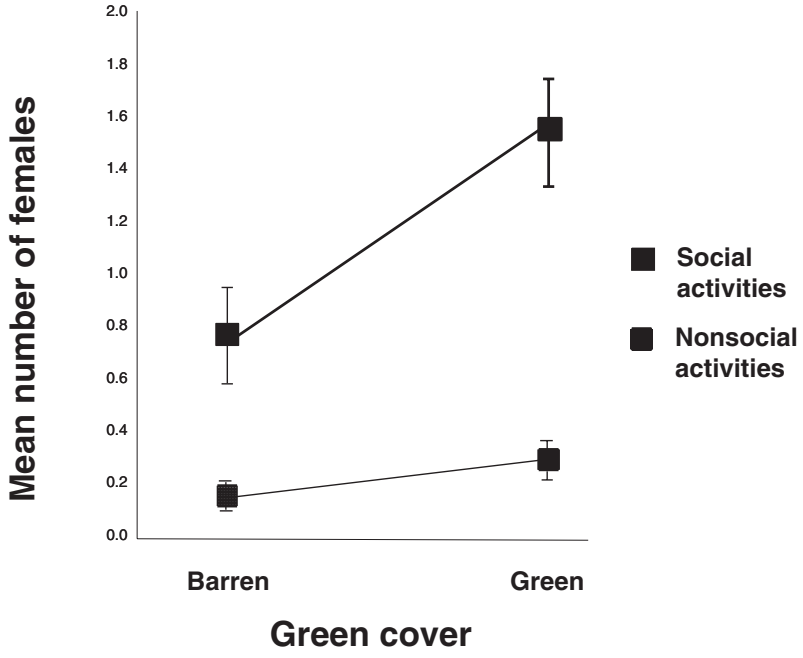

Figure 3: Interaction Between Number of Females Engaging in Social or Nonsocial Activities and the Condition of Nearby Nature in Outdoor Spaces at Ida B. Wells in Chicago

related to the amount of social activity observed in outdoor spaces at Ida B. Wells. Whether a space was green or barren, on the other hand, did predict the amount of social activity that neighbors engaged in.

DISCUSSION

This study examined whether nearby nature contributes to the vitality of urban neighborhood spaces. We made 758 observations of individuals in 59 relatively barren and green outdoor spaces in an inner-city neighborhood and found on average 90% more people using green than barren spaces. We also found on average 83% more individuals engaged in social activity in green versus barren spaces. Moreover, for females, greener spaces were found to

support proportionately more social activity than more barren spaces. The location of the spaces examined (front, back, or side of the apartment building) was not related to the amount of social activity observed.

It should be noted that we found no significant relationship between green cover and the use of outdoor spaces for teens. Although there were 40% more teens in green compared to barren spaces, this difference did not reach statistical significance ($p = .17$). This result is curious. From previous research, it is clear that teens and young adults prefer settings with nature to those without it (Owens, 1988; Smith, 2001) and that teens can benefit from exposure to nature (Kaplan, 1974). It may be that the relatively low incidence of teens in these spaces obscured a real difference. Perhaps a study that had greater statistical power than the one presented here would have detected a difference in the use of green and barren spaces by teens. This result is worthy of investigation in future studies.

In considering these findings below, we explore how they resolve the discrepancy in findings from previous work, examine two alternative interpretations of the current results, and discuss the contributions, generalizability, and implications of this work.

DISCREPANCY IN PREVIOUS WORK

Two previous studies exploring the relationship between nearby nature and use of neighborhood common spaces reported conflicting results. Coley and her colleagues (1997) found that the presence of trees consistently predicted greater use of neighborhood spaces, whereas Brunson (1999) found individuals living in buildings with greener surroundings reported no more social interaction with neighbors than their counterparts from buildings with more barren surroundings.

One possible explanation for the discrepancy between the previous studies was that, although resident's use of neighborhood spaces was observed to be disproportionately concentrated in greener spaces, the larger picture is that use was quite rare, and both green and barren spaces were largely unused. Another possible explanation for the discrepancy was that Coley and her colleagues (1997) counted the number of people in a space as a measure of use, whereas Brunson (1999) asked participants how many *different* people they interacted with outdoors. A final possible explanation was that the Brunson study inadvertently excluded those residents who spent a great deal of their time outdoors. The study presented here employed a research design that could address each of these possibilities. In this study, we systematically counted each new instance of social interaction even if it occurred between

the same individuals. The results here provide evidence that, as Coley et al. found, greener neighborhood spaces support more social interaction.

ALTERNATIVE INTERPRETATIONS

Because these are correlational data, the causal direction of the relationship between green neighborhood spaces and the use of such spaces is open to interpretation. That is, one can reasonably question whether green spaces influence use and social activity or whether particularly social individuals somehow create greener neighborhood spaces. Let us consider this latter possibility first.

Do sociable neighbors create greener neighborhood spaces? Perhaps the relationships in this study are a function of more sociable neighbors somehow creating greener spaces outside their apartment buildings. More sociable neighbors, for instance, might go outside and talk to their neighbors more than less sociable neighbors, and in doing so, their presence might discourage vandalism to trees. Or, more sociable neighbors might work together to improve neighborhood spaces by planting trees. In either case, one would expect that, over time, more vegetation would exist around areas where more socially active individuals lived. If this were the case, then higher levels of social interaction would lead to greener neighborhood spaces.

The age of the trees at Ida B. Wells suggests that this mechanism is not currently at work. At the time of this study, the trees at Ida B. Wells ranged from approximately 25 to 50 years old; there were no newly planted trees in the spaces we observed. It is newly planted trees, rather than mature trees, that are most vulnerable to vandalism. Any causal association between sociable neighbors and reduced vandalism or increased planting of trees would have to stem from individuals living at Ida B. Wells between 2 and 5 decades ago. Even if such an association did exist that long ago, it cannot explain the relationships reported in this study between green neighborhood spaces and currently higher levels of use or higher levels of social interaction in those spaces. Thus, we conclude that the current relationship between green spaces and the number of people engaged in social activities is not explained by more socially active people planting or protecting trees.

Trees help create vital neighborhood spaces. A more plausible interpretation of the association between green neighborhood spaces and the amount of use and social interaction they support is that, by spending more time in greener outdoor common spaces, residents actually get to know their neighbors better and end up spending more time socializing with them. It seems

likely that spending more time in nearby common spaces with trees and grass fosters informal face-to-face contacts among neighbors that lead to more social interaction.

CONTRIBUTIONS

The results presented here make three contributions to the literature regarding the benefits of nature in urban settings.

The first contribution is to resolve a discrepancy in the literature regarding the relationship between nearby nature and use of neighborhood common spaces. By replicating and extending the findings of Coley et al. (1997) through a different research design, the results presented here give confidence that trees and grass help create vital neighborhood spaces in inner-city settings.

The second contribution of this study is to demonstrate a systematically positive link between greenness of neighborhood spaces and the number of individuals involved in social activity within such spaces. Although social interaction is often seen as occurring at random within a neighborhood (Segal & Meyer, 1974; Sprague & Huckfeldt, 1995), we found on average 83% more individuals involved in social activities in green compared to barren spaces. This result replicates earlier findings (Coley et al., 1997) with a more comprehensive research design and a larger sampling of spaces and individuals.

This finding improves our understanding of the physical characteristics that influence social contacts among neighbors. We know from previous work that some physical characteristics inhibit social interactions: Modern neighborhood design (Krassa & Flood, 2000), crowding (Baum, Davis, & Aiello, 1978; McCarthy & Saegert, 1978), and noise (Cohen, & Lezak, 1977) each promote social withdrawal and reduce the probability that individuals will interact. The results here suggest that the presence of trees and grass in neighborhood spaces increases the use of those spaces and the number of individuals involved in social interactions within them. Future research might examine the extent to which greenness interacts with other features that make an outdoor space comfortable and inviting (high levels of maintenance, comfortable places to sit, a view of water).

The third contribution of this study is to help document the mechanism by which green neighborhood spaces affect neighborhood social ties. Previous research has shown that inner-city individuals living in close proximity to trees had stronger social ties to their neighbors (Kuo, Sullivan, et al. 1998; Kweon et al., 1998) and that these stronger ties were *not* mediated by an individual's positive mood, mental fatigue, or level of stress. Moreover, statisti-

cal mediation tests indicated that the relationship between greenness and stronger neighborhood social ties in those studies was mediated by a resident's self-reported use of outdoor spaces. The contribution here is to go beyond self-report data and provide direct observational data on both the use of neighborhood spaces and the number of individuals involved in social behavior within them. The results here suggest that, by increasing face-to-face contact and the number of individuals involved in social interactions, trees and grass in inner-city common spaces contribute to the social cohesion and vitality of a neighborhood.

GENERALIZABILITY

Do the results from this study of an inner-city public housing neighborhood generalize to neighborhoods outside poor inner cities? The answer might depend on the condition of the neighborhood trees. Many older, urban and suburban neighborhoods are characterized by mature trees, a high overall level of greenness, and low variation in greenness (sometimes lacking barren spaces altogether). In such settings, it is not clear that relatively greener neighborhood common spaces would attract or support more social interaction than less green (but still quite green) common spaces.

In other settings, however, there may be a relationship between the amount of nearby vegetation and social interaction with important potential implications. Barren, new, suburban neighborhoods are being built with astonishing frequency. It seems likely that green spaces in these new neighborhoods would have a positive influence on the amount of social interaction that neighbors engage in and, by extension, on neighborhood social cohesion. Future research might explore the social implications of green neighborhood spaces in otherwise barren, new housing developments.

Perhaps just as important as the question of generalizability is the question of whether the outcomes examined in this study of a profoundly poor neighborhood might matter to individuals and neighborhoods that are not profoundly poor. One might argue that vital neighborhood spaces and neighborhood social ties are of little value for middle- and upper-income individuals who have a host of opportunities to form social ties outside the neighborhood—at work, in voluntary organizations, through participation in their children's activities. A review of the literature suggests, however, that neighborhood ties are indeed beneficial to individuals who are not poor. Neighbors with strong social ties are more capable of building consensus on values and norms (Dubow & Emmons, 1981), monitoring neighborhood activity and intervening if problem behaviors occur (Taylor, 1998), and defending their neighborhoods against crime (e.g., Perkins, Florin, Rich,

Wandersman, & Chavis, 1990; Taylor, Gottfredson, & Brower, 1981) than those with weak social ties. Thus, neighborhood social ties are likely to matter in many communities that are not desperately poor. Moreover, that expensive New Urbanist communities such as Seaside, Florida, market themselves as having a strong sense of community suggests that many people who are not poor value ties to their neighbors a great deal.

IMPLICATIONS FOR PRACTICE

Far too many poor, inner-city neighborhoods remain urban deserts. The results from this study strengthen the argument for transforming these neighborhoods from barren, often treeless places into neighborhoods with nature at every doorstep.[7]

The U.S. Department of Housing and Urban Development (HUD) could provide significant leadership in producing greener urban neighborhoods by taking two steps. First, HUD should revise its recently released *Principles for Inner City Neighborhood Design* (Congress for New Urbanism & HUD, 2000). The principles should be amended to include guidelines for developing and maintaining green neighborhood spaces in all HUD-supported developments. Second, HUD should actively promote neighborhood greening efforts. HUD might, for instance, develop partnerships with the U.S. Forest Service, local housing authorities, and local nonprofit organizations to plant trees in barren neighborhoods. Neighborhood residents should be involved in all aspects of these efforts. Previous scholarship suggests that residents are not only willing to help plant and care for trees (Kuo, Bacaicoa, et al., 1998) but also that resident involvement is essential for the long-term success of such efforts (Hester, 1984). Moreover, there is some evidence that, when residents are involved in tree selection and planting, their involvement leads to higher levels of satisfaction with the new trees (Sommer, Learey, Summit, & Tirrell, 1994).

The findings here also have implications for local housing authorities. Public housing is intended to provide an environment in which residents function effectively (Cisneros, 1997). This intention is expressed not only by providing housing but also by providing a range of social services in support of residents. Previous research in poor neighborhoods has shown that individuals have a clear order of preference for obtaining support: Family and friends are sought out first and then, if more assistance is necessary, social service agencies are approached (Cantor, 1979). If green neighborhood spaces facilitate the development of supportive relationships among neighbors, then perhaps public housing managers should provide more green space in their developments. Doing so could help improve residents' social

support thereby potentially reducing the burden on public social service agencies.

This study provides systematic evidence that trees and grass help create vital neighborhood spaces—spaces that not only bring neighbors together but that also support social interaction among them. That an act so simple as planting a few trees in an otherwise barren neighborhood could have such pervasive consequences suggests that HUD, housing authorities, municipalities, nonprofit organizations, and local citizens should push to have trees planted in barren neighborhoods. Clearly, the goal should be to have nature at every doorstep.

NOTES

1. To assess whether residents would express interest in having more green spaces available in their neighborhood, an open-ended interview question was asked: "Other than safety, what would be the most important change to outdoor spaces that you would want for your kids?" The most common response was a desire to increase or protect green space (Brunson et al., 1998).

2. Brunson (1999) measured social interaction with different neighbors with the aid of a map that identified the survey participant's apartment building and the surrounding buildings. Participants were asked how many neighbors they greeted regularly, how many neighbors they regularly stopped to talk with, how many neighbors they had asked to watch their children for a few minutes, and how many neighbors they had borrowed or exchanged something with. Participants were also asked how many neighbors they knew by name in the surrounding buildings. In each case, the questions were close-ended with responses ranging from 0 (none) to 4 (almost all).

3. Ida B. Wells is located in (but does not completely fill) two census-track neighborhoods, both of which were among the 12 poorest neighborhoods in the United States in 1995.

4. Children 2 years old and younger were excluded from the analysis, because their use of outdoor spaces was not sufficiently separate from their caregivers to warrant being counted as an independent additional use of space and because their social interactions were qualitatively different from that of older children and adults. Older adults (individuals older than 50 years) were excluded from the analysis, because we observed less than one such individual for every 8 spaces we examined. Perhaps we saw so few older adults outdoors because the outdoor spaces at Wells lack site furniture such as benches and chairs that would make outdoor spaces comfortable for older individuals, or perhaps we saw few older adults because we made our observations during the afternoon when older adults were less likely to be outside (cf. Kweon et al., 1998).

5. An individual watching a game was coded as being part of the group playing the game if they were in close proximity to the group and had the same focus of attention as the individuals playing the game. This was the case, for instance, when a group of children were playing hand-clapping games or jump rope games and a child was close by observing or waiting for a turn. If, on the other hand, a child was observing a ball game, alone, from a distance, then that child was coded as nonsocial.

6. Each of the 59 outdoor spaces was observed on four separate occasions. It is likely that some of the same individuals were observed on more than one occasion, and therefore, the 758 observations of individuals were not necessarily of different individuals.

7. The phrase, "nature at every doorstep," derives from Kaplan's (1985) article "Nature at the Doorstep."

REFERENCES

Baum, A., Davis, G. E., & Aiello, J. R. (1978). Crowding and neighborhood: Mediation of urban density. *Journal of Population*, *1*, 266-279.

Brunson, L. (1999). *Resident appropriation of defensible space in public housing: Implications for safety and community*. Unpublished doctoral dissertation, University of Illinois, Urbana-Champaign.

Brunson, L., Kuo, F. E., & Sullivan, W. C. (1998). *Sowing the seeds of community: Greening and gardening in inner city neighborhoods*. Unpublished manuscript, University of Illinois, Urbana-Champaign.

Calthorpe, P. (1993). *The next American metropolis: Ecology, community and the American dream*. New York: Princeton Architectural Press.

Cantor, M. H. (1979). Neighbors and friends. *Research on Aging*, *1*(4), 434-463.

Chicago Housing Authority. (1995). *Statistical profile: The Chicago Housing Authority 1994 to 1995*. Chicago: Author.

Cisneros, H. G. (1997). *The transformation of America's public housing: A 1996 status report*. Retrieved August 17, 1999, from http://www.hud.gov/pih/pihcont.html

Cohen, S., & Lezak, A. (1977). Noise and inattentiveness to social cues. *Environment and Behavior*, *9*, 559-572.

Coley, R. L., Kuo, F. E., & Sullivan, W. C. (1997). Where does community grow? The social context created by nature in urban public housing. *Environment and Behavior*, *29*(4), 468-492.

Congress for New Urbanism. (1999). *Charter of the New Urbanism: Region/neighborhood, district, and corridor/block, street, and building*. New York: McGraw-Hill.

Congress for New Urbanism & U.S. Department of Housing & Urban Development. (2000). *Principles for inner city neighborhood design*. Washington, DC: U.S. Department of Housing & Urban Development.

Crowe, T. (1994). Understanding crime prevention through environmental design. *Planning Commissioners Journal*, *16*, 5.

Duany, A., & Plater-Zyberk, E. (1991). *Towns and town-making principles*. New York: Rizzoli International Publications, Inc.

Dubow, F., & Emmons, D. (1981). The community hypothesis. In D. A. Lewis (Ed.), *Reactions to crime* (pp. 167-181). Beverly Hills, CA: Sage.

Hester, R. T., Jr. (1984). *Planning neighborhood space with people*. New York: Van Nostrand Reinhold.

Ihejirika, M. (1995, January 26). CHA has nation's poorest, study says. *Chicago Sun Times*, pp. 3-4.

Jacobs, J. (1961). *The death and life of great American cities*. New York: Random House.

Kaplan, R. (1974). Some psychological benefits of an outdoor challenge program. *Environment and Behavior*, *6*, 101-116.

Kaplan, R. (1985). Nature at the doorstep. *Journal of Architectural and Planning Research*, *2*, 115-127.

Kelbaugh, D. (1989). *The pedestrian pocket book: A new suburban design strategy*. New York: Princeton Architectural Press.

Krassa, M. A., & Flood, A. K. (2000, April). *Neighborhood form, resident satisfaction, and civic engagement: An exploration of the political consequences of neighborhood design*. Paper presented at the United Kingdom Political Studies Association meetings, London, UK.

Kuo, F. E., Bacaicoa, M., & Sullivan, W. C. (1998). Transforming inner-city neighborhoods: Trees, sense of safety, and preference. *Environment and Behavior*, *30*(1), 28-59.

Kuo, F. E., & Sullivan, W. C. (2001). Environment and crime in the inner city: Does vegetation reduce crime? *Environment and Behavior*, *33*(3), 343-367.

Kuo, F. E., Sullivan, W. C., Coley, R. L., & Brunson, L. (1998). Fertile ground for community: Inner-city neighborhood common spaces. *American Journal of Community Psychology*, *26*(1), 823-851.

Kweon, B. S., Sullivan, W. C., & Wiley, A. (1998). Green common spaces and the social integration on inner-city older adults. *Environment and Behavior*, *30*(6), 832-858.

McCarthy, D., & Saegert, S. (1978). Residential density, social overload, and social withdrawal. *Human Ecology*, *6*(3), 253-272.

Newman, O. (1972). *Defensible space*. New York: Collier.

Owens, P. E. (1988). Natural landscapes, gathering places, and prospect refuges: Characteristics of outdoor places valued by teens. *Children's Environments Quarterly*, *5*(2), 17-24.

Perkins, D. D., Florin P., Rich, R. C., Wandersman, A., & Chavis, D. M. (1990). Participation and the social and physical environment of residential blocks: Crime and community context. *American Journal of Community Psychology*, *18*, 83-115.

Segal, D., & Meyer, M. (1974). The social context of political partisanship. In M. Dogan & S. Rokkan (Eds.), *Social ecology* (pp. 217-232). Cambridge, MA: MIT Press.

Smith, B. A. (2001). *Uncovering different needs: Race and other factors in response to urban nature*. Unpublished master's thesis, University of Illinois, Urbana-Champaign.

Sommer, R., Learey, F., Summit, J., & Tirrell, M. (1994). Social benefits of resident involvement in tree planting: Comparison with developer-planted trees. *Journal of Arboriculture*, *20*(6), 323-328.

Sprague, J., & Huckfeldt, R. R. (1995). *Citizens, politics, and social communication: Information and influence in an election campaign*. New York: Cambridge University Press.

Taylor, R. B. (1998). *Human territorial functioning: An empirical, evolutionary perspective on individual and small group territorial cognitions, behaviors, and consequences*. New York: Cambridge University Press.

Taylor, R. B., Gottfredson, S. D., & Brower, S. (1981). Territorial cognitions and social climate in urban neighborhoods. *Basic and Applied Social Psychology*, *2*, 289-303.