Community Design: A toolkit for building physical activity into daily life

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This toolkit draws on research funded by the Active Living Research Program of the Robert Wood Johnson Foundation with Co-Principal Investigators Kathryn H. Schmitz and Michael Oakes.

This toolkit was initially prepared for the conference:
Health Implications of Community Design: Moving to Combat Obesity
September 27, 2004
It was revised in September 2005

Sponsored by:
Blue Cross and Blue Shield of Minnesota
American Heart Association
University of Minnesota College of Continuing Education
University of Minnesota College of Architecture and Landscape Architecture
League of Minnesota Cities
American Society of Landscape Architects

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Funding for this toolkit came from Blue Cross and Blue Shield of Minnesota.

Community Design:

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Contents

Many parts of downtown Minneapolis have features that support walking and biking: a high density of people, connected streets, many destinations (mixed-use), and pedestrian amenities such as street trees and pedestrian lighting.
Source: Metropolitan Design Center

Kentlands, MD, is one of the most complete new urbanist developments and includes significant pedestrian amenities. However, it is located in a relatively isolated suburban location.
Photographer Ann Forsyth, 2000

Downtown Minneapolis has a high density of activities and good transit access, encouraging walking and biking.
SOurce: Metropolitan Design Center

Active Living Definition

"A way of life that integrates physical activity into daily routines. The goal is to accumulate at least 30 minutes of activity each day. Individuals may achieve this by walking or bicycling for transportation, exercise or pleasure; playing in the park; working in the yard; taking the stairs; and using recreation facilities."
Active Living by Design

Community Design
A toolkit for building activity into daily life

How environment matters

Currently, there is a great deal of interest in how the physical environment affects physical activity and how changes in the environment can promote active living. These issues have captured public attention as well as the attention of professionals in public health, planning, and design. Prepared for the Blue Cross and Blue Shield of Minnesota-sponsored conference on Health Implications of Community Design: Moving to Combat Obesity, this toolkit provides background information and tools for addressing this issue.

This toolkit starts with general information on how the environment matters in physical activity and then provides more detail about four key dimensions of the environment: density, street pattern, mixed-use, and pedestrian infrastructure.

The toolkit is focused on walking rather than cycling, because it is an activity that is inexpensive, does not require special equipment, and almost everyone does it already every day. Many more people walk than bike. For example, according to the U.S. Census, only 0.4 percent of the population in the U.S. commuted to work by bike. In contrast 2.9 percent walked to work as the main means of transportation and almost all workers walked at some time in their commute, if only between their parking space and the office.

Reasons for physical activity

People are physically active for different reasons including:

- Work
- Exercise and leisure
- Care of others and chores
- Transportation for errands
- Commuting to work

The environment has a greater influence on some kinds of physical activities, particularly walking, than others. However, the physical environment is not always the key factor in whether people are physically active. Physical activity is also affected by social, economic, and psychological characteristics.

The role of the environment in supporting physical activity varies by the purpose for the activity. For example, physical activity for exercise or leisure does not seem to vary much with environment (see text box on next page). However, physically active transportation--for example, walking for errands or commuting to work--seems to be particularly sensitive to environmental features and is the focus of this toolkit. This extra utilitarian walking can make a small but significant difference--for example, one study suggested it would make a 1.8 kilogram (4 pound) difference over the course of a year (Saelens et al. 2003, 1556).

Why people walk

Professionals from transportation, urban design, and public health outline a range of reasons for walking for transportation, with each emphasizing a different aspect.

Transportation

Analyses of transportation systems often assume that demand for travel can be derived from the need to move between destinations. People maximize benefits and minimize the costs of transportation. While such costs and benefits can take a number of forms, the focus in transportation planning has been on minimizing time and money costs. Until recently transportation planners have paid most attention to motorized transportation--automobiles, trucks, aircraft, buses, and trains.

Costs beyond time and money--for example, physical discomfort, family responsibilities--have not been well integrated into such models (Handy 2003). Similarly the benefits of travel, such as exercise for those who bike and walk as well as the pleasure of movement, have not been taken into account in these assessments of costs and benefits (Mokhtarian and Salomon 2001).

However, transportation research is increasingly examining the issue of walking, focusing particularly on how walking is affected by issues such as population density, street pattern, and the presence of destinations.

Urban design

The field of urban design is a broad one and includes professionals who work in physical planning, architecture, and landscape architecture.

Box 1: A rough guide to recent approaches to urban design in relation to pedestrian orientation

	New Urbanism Traditional Neighborhood Development	New Urbanism Transit Oriented Development_	Smart Growth	Sustainable Development	Planned Unit Development
Mixed-use (retail)	Yes	Yes	Yes	Yes	Maybe
Mixed-use (jobs)	Maybe	Often	Depends	Yes	Maybe
Higher density	Slightly	Yes	Yes	Yes	Often
Pedestrian orientation	Yes	Yes	Yes	Yes	Maybe
Transit orientation	Maybe	Yes	Yes	Yes	Sometimes

Those in urban design assume that walking increases with physical features that provide comfort, safety, and interest such as spacious sidewalks; complex, varied environments with physical dimensions scaled to the human body rather than the automobile; and good coffee shops. There are several different schools of thought. For example, depending on their specific flavor (see box 1 on facing page), "new urbanists" try to create more walkable or transit oriented neighborhoods by slightly increasing densities, reducing block size, adding neighborhood and town centers, and adding pedestrian amenities such as sidewalks (Calthorpe 1993; Duany et al. 2000).

Critics of approaches such as new urbanism argue against this environmental determinism. Urban designers, who have years of training in being sensitive to the environment, may overestimate its importance.

Public health

Physical activity researchers propose that physical activity occurs in some environment; environmental characteristics (physical and social) will influence physical activity behavior.

However, it is only recently that built and physical environmental characteristics have been included in studies to predict physical activity, rather the focus has been on social and psychological supports and constraints.

Key environmental features

Overall a number of key features of the environment matter for active transportation, with general agreement from research studies in the fields above.

- Density
- Street pattern
- Mixed-use
- Pedestrian infrastructure

However, while these factors appear to have some association with how much people walk, there are a number of caveats:

1. The factors are highly interrelated--high density areas tend to have mixed uses and sidewalks--so it has been difficult to determine which features matter most (Saelens et al. 2003).

2. Some dimensions only seem to matter once certain thresholds are met or for particular kinds of people. Income is a key issue. More affluent people drive more even when living in the same kinds of neighborhoods (McNally and Kulkarni 1997). People with different incomes tend to perceive their environments differently, for example seeing them as less attractive for walking (Giles-Corti and Donovan 2002).

Walking increases with age in The Netherlands and Germany

"In most European Countries, at least a fourth of urban trips are made by walking and cycling.... [and] walking increases with age in both The Netherlands and Germany, while cycling falls off only slightly. Indeed, the Dutch and Germans who are 75 and older make roughly half their trips by foot or bike, compares with only 6% of Americans aged 65 and older" (Pucher and Dijkstra 2003, 1510).

3. It is also unclear how much self selection is involved. For example, if someone likes to walk they may well choose to live in a neighborhood where walking is easier, but they would walk in any environment. Their attitudes magnify the actual effects of the built environment.

Environmental change is not a quick fix

Finally, while environment does matter in terms of physical activity, environmental change is not a quick fix to the problems of inactivity and obesity.

It is difficult to change existing environments, particularly such dimensions as street pattern which are related to property ownership.

There is also an open question about whether it is more effective to make environments more attractive or to make alternatives like driving more unattractive. In addition, perhaps both approaches need to be combined to have a really effective program.

Lastly, obesity seems to be increasing quicker than environments have been changing so other factors are at work. For example, people may be changing their food consumption.

Fine print facts

One study finds walking for errands is affected by environment

In a study of 107 adults in two San Diego neighborhoods that varied in walkability (density, land use mix, and street pattern) had typical findings for this kind of study: "No observed difference was found between neighborhoods regarding self-reported walking for exercise, self-reported leisure time physical activity, or objectively measured vigorous physical activity. There was, however, a difference between neighborhoods regarding walking for errands. This difference is consistent with transportation research that finds no differences in walking for exercise but finds significant differences in walking for transport purposes between high- and low-walkability neighborhoods. Other types of utilitarian walking in our study--to or from work or school or to and from transit--were infrequent in both neighborhoods...." (Saelens et al. 2003, 1566).

Boston's North End was one of the places that Jane Jacobs used in her classic book, *Death and Life of Great American Cities*, to illustrate her proposal about the vitality of areas with high densities, short blocks, and a mixture of uses providing "eyes on the street" during the day and night for safety.
Photographer Ann Forsyth, 1980s

Another study finds built environment features are not as important as demographics or weather

Based on the 2000 Bay Area Travel Survey of 15,066 randomly selected households, Cervero and Duncan examined records for trips for socializing, meals, personal services, recreation, entertainment,

volunteer, civic, religious, and shopping (with shopping trips under 15 minutes). For these types of trips they concluded: "urban landscapes in the San Francisco Bay Area generally have a modest and sometimes statistically insignificant effect on walking and bicycling. Although well connected streets, small city blocks, mixed land uses, and close proximity to retail activities were shown to induce non-motorized transport, various exogenous factors such as topography, darkness, and rainfall, had far stronger influences. Other control variables, such as demographic characteristics of trip makers, were also far stronger predictors of walking and bicycling choice than built-environment factors.... This suggests that a greater public health benefit might accrue from designing walkable neighborhoods that appeal to the niche market characteristics of different demographic groups versus microdesigning places in hopes of swaying travel behavior" (Cervero and Duncan 2003, 1483)

Within the Twin Cities, places vary greatly in terms of the four dimensions of density, street pattern, mixed-use, and pedestrian Infrastructure.
Photos Metropolitan Design Center

Nine principles for community design to increase walking

In community design there are a number of basic principles that make more walkable places. These are listed below and discussed in more detail in the following pages.

Density

1. Increased density can provide a critical mass of people and places, to create a physical sense of community.
2. Density can increase transit viability, auto congestion, and parking costs making walking a more attractive option.

Street pattern

3. Small blocks provide more direct routes.
4. Small blocks that are highly connected provide options for taking alternative routes for safety and variety.

Mixed-use

5. People often move between different kinds of activities and if they are close together they may be inclined to walk.
6. A mixture of uses likely means that people are around at different times of the day and night, increasing safety and the period of time in which people are likely to walk.

Pedestrian infrastructure

7. Street trees, street furniture, and such features as overhangs and awnings can improve pedestrian comfort.
8. Street lights, pedestrian crossings, sidewalks, and traffic calming enhance safety.
9. Varied and detailed surroundings make walking more interesting.

Some of these features are easier to change than others. For example, in an already developed area, it is very difficult to change the street pattern but easier to add street lights or street trees.



Portland Place
Portland Avenue and 26th Street, Minneapolis
8 Units/Acre*



Crocus Hill
Grand Avenue and Grotto Street, St. Paul
18 Units/Acre*



River City Center
1st Avenue and Somerville Street, Shakopee
28 Units/Acre*



Linden Hills
Queen Avenue and Linden Hills Boulevard, Minneapolis
32 Units/Acre*



River Gables
East 1st Street and South Walnut Street, Chaska
52 Units/Acre*



East Village
11th Avenue and 8th Street South, Minneapolis
62 Units/Acre*



Uptown
Lagoon and Knox Avenues, Minneapolis
110 Units/Acre*

*All densities are measured for a city block. More details are in the Density Fact Sheet series at www.designcenter.umn.edu

Density

1. Increased density can provide a critical mass of people and places, to create a physical sense of community.

2. Density can increase transit viability, auto congestion, and parking costs making walking a more attractive option.

Background

Density is a number of items per unit land area. However, there are dozens of different definitions of density depending on what is being measured (residents, housing units, employees) and the base land area (just a building site, a block, a city) (see text box on the next page for some residential density definitions). Most densities are measured for residential populations but workers and visitors are also important in creating a critical mass of people.

Perceived density is important in public debates, although this is often related to how bulky buildings appear rather than actual numbers of units or people in an area. The same building can also have different population densities over time as the numbers of people in each housing unit changes.

Density has a complicated relationship to walkability, however, areas with higher population densities encourage walking for transportation, both directly and indirectly.

Direct mechanisms include:

- Density creates a critical mass of people—more people to walk, to see others walking, and to feel safer walking.
- Congestion increases with population density so that at a certain threshold it is more convenient to walk than to take a car and find parking
- Transit viability increases with population density, so after a certain

Linden Hills (Minneapolis)

Block density: 21 dwelling units/acre

The structure on the left houses 2 units while the one on the right houses 15 units. However, the two buildings are similar in height and size, creating a consistent street presence and neighborhood character

Two similar looking houses with quite different numbers of units per acre. For more examples such as this one look at the fact sheets and residential design PowerPoints on the CD.

Table: Comparison of Residential Density Measures for the Same Location

Site density	10 DUs per acre
Block density	8 DUs per acre
Net neighborhood residential density	10 DUs per acre
Net neighborhood density	6 DUs per acre
Gross neighborhood density	5 DUs per acre
City density	4 DUs per acre
Metropolitan density	3 DUs per acre

This intersection in Manhattan's Chinatown is crowded because of a high density of people, both residents and those heading to destinations such as shopping. Served by transit, the pedestrian furniture is adequate but not at all outstanding.
Photographer Ann Forsyth, 2004

This very attractive path in a residential area of a low density development in Texas, is used primarily for recreational walking.
Photographer Ann Forsyth, 2001

threshold it can provide attractive frequent service. This means people walk to transit and may own fewer cars necessitating more walking just to get around even if this is not terribly frequent (Forsyth et al. 2004). One study by Frank and Pivo (1994, 51) suggested that for shopping trips, few people walked when census tracts had densities below 13 persons per acre.

Density may also be viewed as a proxy for other environmental features with which it often co-occurs (Ewing 1994, Steiner 1994, Cervero and Kockleman 1997). These indirect mechanisms include:

- Denser places are often older, have more building types, and thus visual variety—a more visually varied place is more interesting place to walk and encourages people to walk both for recreation and utilitarian reasons.
- Denser places have more nearby destinations and thus density may be a proxy for mixed-use. At a certain population level there are shops nearby, there are more likely to be places of employment, entertainment, education, and lodging. There may be fewer open spaces but these may be highly designed and highly used.
- Historically in the U.S., particular kinds of people have self selected or been pushed into higher density, center city areas, or in the denser parts of suburbs, and thus density measures are often actually measuring income level. Low-income people are one group concentrated in such areas and have a low level of access to cars and higher transit dependence and are more likely to walk because they do not have other options. Denser areas also include those urbane, cosmopolitan neighborhoods where residents value street life and choose to walk (Forsyth et al. 2004).

Selected Residential Density Definitions

Source: Forsyth 2003

Parcel or Site Density: dwelling units (DUs) or residential population (RP) divided by total site/parcel area (all uses). This is often used by developers. It is easy to calculate with GIS but also fairly simple by hand if there is only one parcel. However, since parcel boundaries are not always visible on the ground this form of density can be hard to calculate from physical observations.

Block Density: DUs or RP divided by block area measured to the curb. This is relatively easy to measure from aerial photos and census data, and reflects a unit that is part of the experience of place, the block. However, if the block is not surrounded by roads, for example where it abuts open space, the boundaries can be less clear.

Net Neighborhood Residential Dwelling/Population Density: DU or RP divided by total land area devoted to residential facilities. This is a calculation that involves defining both a neighborhood and residential land within that neighborhood. Care must be taken in assigning land to residential uses rather than, say, recreation--the key is to find equivalent elements in different residential designs.

Net Neighborhood Density (NND): DU or RP divided by the neighborhood area with the base land area calculated to exclude city-wide uses in the neighborhood. Included in the neighborhood land area are residential land, streets, and neighborhood type uses—schools, parks, churches/synagogues/temples etc. and neighborhood shopping. Excluded are city-wide businesses, public uses, high schools and colleges, major arterials, major regional parks, and vacant and unusable land. These exclusions can be difficult to calculate (adapted from Alexander 1993).

Gross Neighborhood Density (GND)/Gross Census Tract Density (GCTD): DU or RP divided by the total neighborhood area. This is easy to calculate although it may be skewed by regional uses such as regional parks. The Gross Census Tract Density is particularly useful as it is available across the United States from Census information and does not rely on local data.

City Density (CD): DU or RP divided by the entire developed area of the city or town. In built out local government areas this is in practical terms the entire city. On the urban edge, it includes only developed land, a more complex calculation (adapted from Alexander 1993). This is also a gross density.

Metropolitan Density (MD): DU or RP for US Census Metropolitan Statistical Area divided by total land area. This calculation includes undeveloped areas which will lower the overall figures, but is nationally comparable. The US Census prepares such density figures. This is also a gross density.

Tools

Typical tools for increasing walking include increasing density through infill development or new higher-density development.

Fine print facts

Density increases can decrease vehicle miles traveled

Holtzclaw (1990) examined odometer readings collected during smog checks in California and concluded that density made a difference in vehicle miles travelled (VMT) in a study that, however, did not control for other factors. "Doubling residential or population density reduces the annual auto mileage per capita 25 to 30 percent and the annual auto mileage per household around 30 percent" (Holtzclaw 1990, 26).

Density particularly affects transit viability

In a study of density thresholds required for bus service in Dade County, Florida, found very high densities required at the Traffic Analysis Zone level. This is important because one reason people walk is to get to transit.

"With 11.7 routes per square mile (the average for all zones in our sample, 16 hr of service per day, and 25-minute headways between buses in each direction (the average for this system), a square mile of land must generate 1,168 bus trips per day to maintain a productivity of 1.3 trips per revenue mile...."

"On balance, holding all other variables constant, a shift to 15-min headways would increase the required density to 11.1 dwellings per acre at the systemwide minimum productivity and 19.4 dwellings per acre at the systemwide average productivity" up from 8.4 units (Messenger and Ewing 1996, 152).

Street pattern

3. Small blocks provide more direct routes.

4. Small blocks that are highly connected provide options for taking alternative routes for safety and variety.

Background

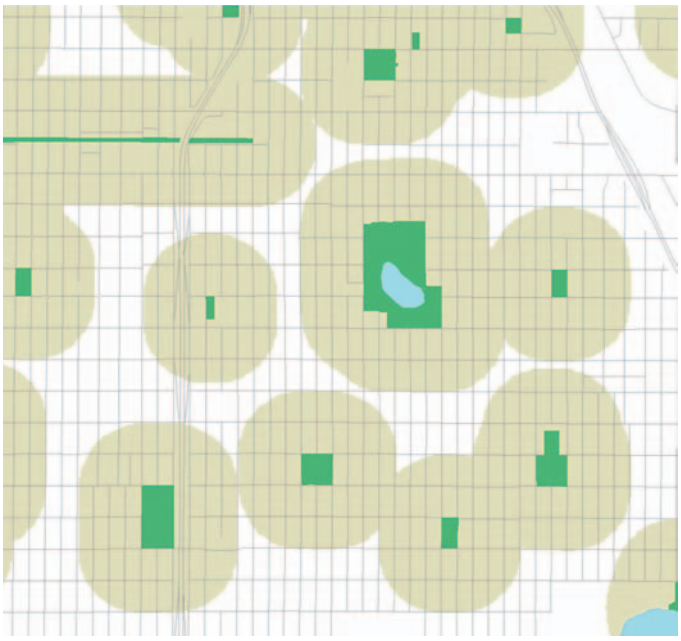
Street pattern is the design or arrangement of streets and blocks; connectivity is "the directness or ease of travel between two points" (Saelens et al. 2003, 81). The two issues are intimately related.

Street pattern affects:

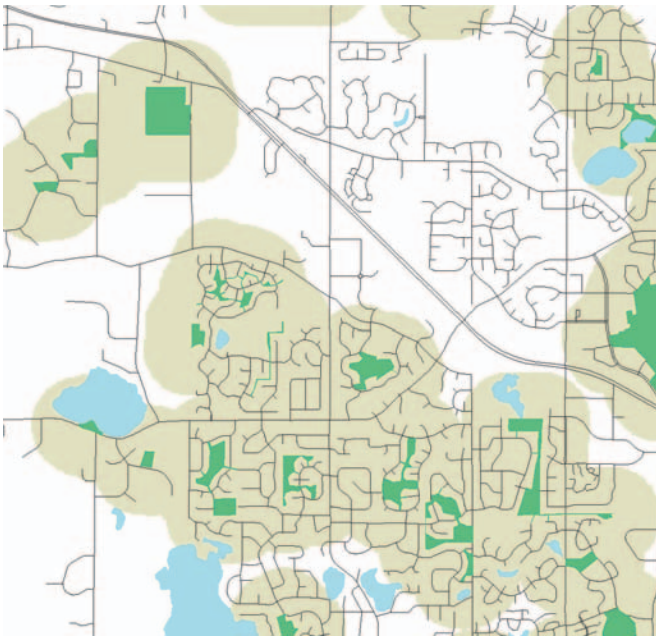
- Directness of travel, making travel more or less efficient (transportation theories).
- Number of alternative routes. If there are more potential routes pedestrians can choose different routes to achieve such ends as avoiding boredom or enhancing safety. Variety has been found to be a positive value, outweighing other preferences (Ratner et al. 1999). Alternative routes enhance safety (urban design and physical activity theories, transportation) (Forsyth et al. 2004). However, grids also provide more alternative routes for motorists, meaning that people are inclined to drive (Crane 2000; Ewing and Cervero 2001).

The diagrams on the facing page show the difference in accessibility between grid and cul-de-sac road patterns. The maps are of areas within a quarter mile distance to parks--as the crow flies and along the street network. As can be seen that amount of area accessible within a grid street network is close to the area within a quarter mile straight line distance. However, in the cul-de-sac location, a far smaller area is within a quarter mile of a park via the streets. This means that in cul-de-sac areas there are fewer options for routes and fewer places one can reach with the same amount of walking.

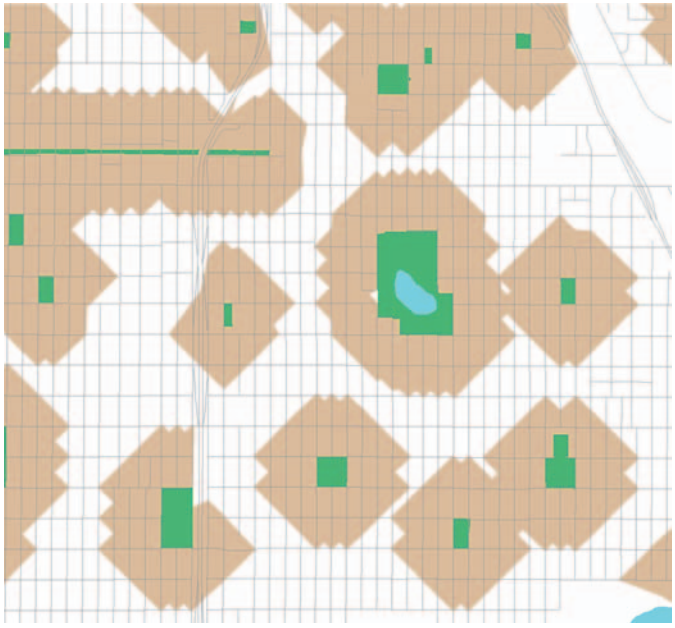
These photos of locations in the Twin Cities illustrate a continuum from looped to gridded street patterns.
Photos from Metropolitan Design Center.



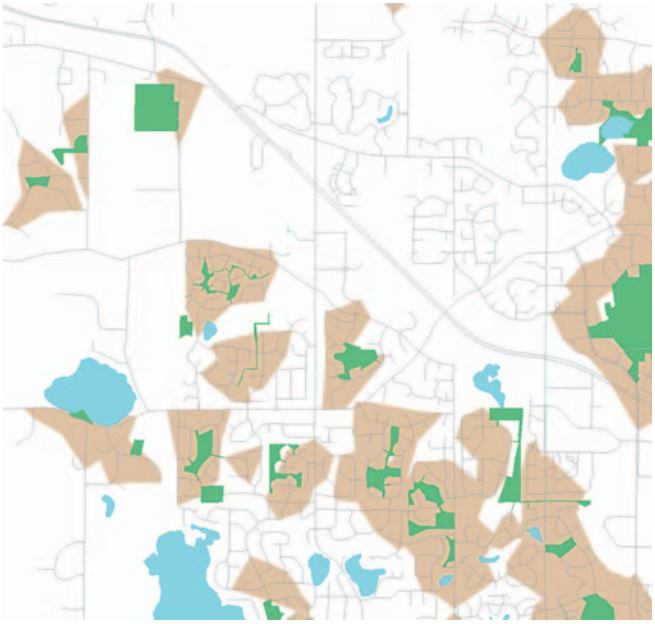
Grid streets highlighting 0.25 mile crow flies distance from public parks.



Cul-de-sac streets highlighting 0.25 mile crow flies distance from public parks.



The same grid streets as the diagram above, highlighting 0.25 mile street network distance from public parks. The areas in the two maps are quite similar meaning that the grid pattern gives many options for movement within a 0.25 mile street distance of the parks.



The same cul-de-sac streets as the diagram above, highlighting 0.25 mile street network distance from public parks. The areas in the two maps are quite different, showing the limited number of options for routes in this kind of street pattern.

There are, however, options for making cul-de-sac layouts more grid like for pedestrians, though not vehicles. These include paths that link the ends of culs-de-sac. Similarly, grid developments can be retrofitted with street closures and traffic calming that makes them more like culs-de-sac for cars. These kinds of hybrid designs provide safety from through traffic, though they limit some of the crime prevention benefits of car traffic that provides some "eyes-on-the-street" in areas where there are few pedestrians.

Top: Path connecting end of cul-de-sac to other pedestrian paths in The Woodlands, TX;
Bottom: path parallel to and between culs-de-sac in Radburn, NJ.
Photographer Ann Forsyth, 2000, c. 2000

Tools

It is difficult to change the street pattern once it is in place, although when building new, alternative designs can be tried. Such designs include:

- Smaller blocks.
- Hybrid cul-de-sac designs that provide pedestrian path connections through the ends of each cul-de-sac.
- Mid block crossings to make the road network easier to cross.
- Trails.

Fine print facts

Streets are a major location for physical activity

In a random sample survey of 1,818 adults Brownson et al. asked about where people were physically active:

"The most common responses were as follows: on neighborhood streets (66.1%), a shopping malls (37.0%), at parks (29.6%), on a walking and jogging trail (24.8%), on a treadmill (24.7%), and at an indoor gym (21.3%)" (Brownson et al. 2001, 1998).

Local pedestrian orientation may not overcome regional access issues

Cervero and Gorham studied 7 pairs of neighborhoods in the San Francisco area and 6 in Southern California, with each pair containing one neighborhood oriented toward the automobile and transit (more four-way intersections, higher densities). They examined data on commuting to work and found:

"...neighborhood design seems to affect the degree to which people drive alone to work, and the degree to which they walk or bicycle.... Transit neighborhoods averaged higher walking and bicycling modal shares and generation rates than their automobile counterparts" (Cervero and Gorham 1995, 222).

However, this relationship was not as strong in Southern California:

"In fact, some Transit neighborhoods in the Los Angeles region showed weaker pedestrian and transit modal shares and generation rates than their Auto counterparts did. Because the Los Angeles region is so expansive and laced with over 500 miles of freeways, it may be that the form of the region as a whole has at least as great a role in influencing modal choices as neighborhood design or layout does....Islands of neotraditional development in a sea of freeway-oriented suburban will do little to change fundamental commuting habits" (Cervero and Gorham 1995, 222).

Mixed-use

5. People often move between different kinds of activities and if they are close together they may be inclined to walk.

6. A mixture of uses likely means that people are around at different times of the day and night.

Background

Mixed-use refers to "The level of integration within a given area of different types of uses for physical space, including residential, office, retail/commercial, and public space" (Saelens et al. 2003, 81). However, as Grant (2002) outlines "mixed-use" is often used to indicate a mix of housing types e.g. detached houses and apartments.

Mixed land use can provide:

- A greater variety of destinations within walking distance. However, this raises a number of issues: is variety enough on its own? Might one terrific destination be more important than a wide mix of uses that are less attractive? Are there differences between destinations that have a regional versus a local draw (Handy 1992)? Once a critical mass of land use variety has been reached, will more mix make a difference (Krizek 2003)? There has been a focus on commercial destinations—what about schools, faith-based facilities, or parks (Audirac 1999)?
- More visual variety and interest for pedestrians. Varied land uses are seen as promoting architectural and landscape variety, making walking more interesting. This leaves aside other aspects of the visual environment such as materials and views, or that variety that can occur within one land use.
- Greater street safety due to informal policing. This assumes that the uses are open long hours and do not undermine safety in themselves.

Tools

Typical tools include:

- Creating commercial centers or nodes near to homes.
- Zoning for increased housing densities near shops and employment.
- Developing mixed-use buildings.

Fine Print Facts

Increased walking among older women is associated with destinations such as stores and parks

A study of 149 older Caucasian women in Pennsylvania found that for this group, with a median age of 74, having destinations within a 20 minute walking distance of their homes increased walking:

"...women within walking distance of a park; biking or walking trail; or department, discount, or hardware store had significantly higher pedometer readings than women who did not" (King et al. 2003, 79).

Destination trips (errands) are affected by the presence of destinations but strolling trips are not

A survey study of approximately 500 residents of eight neighborhoods in Portland, Oregon, with different levels of access to parks and shops, found that people who walked to destinations such as shops was most affected by their attitudes to walking.

"A particularly important finding of this study is the significant role that personal attitudes play, relative to neighborhood factors, in predicting individual behaviors. In many instances personal attitudes toward a particular behavior (e.g. walking to daily activities, interacting with neighborhoods) were more important in predicting that behavior than objective neighborhood variables" (Lund 2003, 427).

Manhattan is a classic mixed-use environment, supported by high residential densities and small blocks.
Photographer Ann Forsyth, 2004

A terrific destination can draw pedestrians even without good pedestrian paths and street patterns. This woman is walking to a large suburban shopping mall.
Photographer Ann Forsyth, c2001

Pedestrian infrastructure

7. Street trees, street furniture, and awnings improve pedestrian comfort.

8. Street lights, pedestrian crossings, sidewalks, and traffic calming enhance safety.

9. Varied and detailed surroundings make walking more interesting.

Background

Pedestrian infrastructure includes the built and planted features that provide pedestrian amenities or that affect pedestrian mobility, safety, and comfort. From marked pedestrian crossings to street trees, these are more open to modification than the basic street pattern (Forsyth et al. 2004).

- Pedestrians are exposed to the outdoor elements—amenities can make walking much more enjoyable e.g. street trees for shade and wind protection, bus shelters for waiting.
- Pedestrians have specific safety concerns, some of which are affected by design features e.g. street lights, pedestrian crossings. However, many design features need to be considered in the context of policies and other external circumstances e.g. the effect of road width is modified by speed limits and traffic volumes as well as by design features such as crossings.
- The street pattern and pedestrian infrastructure such as sidewalks do not always coincide—some areas with gridded street patterns do not have sidewalks; some areas with superblocks and culs-de-sac have highly connected pedestrian path and trail networks overlaid (see street pattern section) (Forsyth 2002; Forsyth et al. 2004).

Gadgets to help people cross the road--such as these pedestrian flags in Salt Lake City--are often a sign of a hostile walking environment.
Photographer Ann Forsyth, 2001.

Overall, pedestrian infrastructure is probably the easiest of the four areas for cities to improve. However, is it useful? Will adding some street trees make a difference in the absence of reasonable densities, connected street patterns, and destinations. The differences are obvious when comparing between walking on the edge of a bleak windswept roadway industrial park and a lively, tree-lined sidewalk beside office buildings and shops. However, it is not yet clear from the research whether marginal improvements make a difference in environments that are already adequately provided with pedestrian amenities.

Tools

Typical tools for enhancing pedestrian infrastructure include:

- Streetscape improvements such as installing street trees and street lamps, or implementing facade improvement programs.
- Infrastructure improvements such as completing sidewalks and trails.

These two tree lined paths look rather similar but the one above is in an area perceived to be high crime. The one below is in a very high density residential area that is well patrolled. More people walk on the second path.
Photographer Ann Forsyth 2001, 2004..

- Traffic calming on roadways, that is modifying the street to slow and reroute traffic.
- Traffic signalization

Fine print facts

The role of pedestrian infrastructure such as sidewalks and trails is unclear in a study of adults

In a study of self-reported, leisure-time physical activity among 1796 adults in North Carolina, Huston et al. found:

"...those reporting neighborhood sidewalks were only slightly more likely to engage in any activity, and this association did not remain after adjusting for other factors [such as education and income]; sidewalks were not associated with [reaching] recommended activity" (Huston et al. 2003, 64).

Huston et al. continue:

"Our findings, that neighborhood trails were positively associated with any leisure activity (although not after adjusting for other factors) and with recommended activity (even after adjusting for other factors), are consistent with those of previous findings. Only 2.7% of those who engaged in leisure-time physical activity during the past month reported that they used a trail for this activity, however having a trail in a neighborhood may be correlated with other factors not measured here that are associated with activity (such as a nearby park or other community facility)" (Huston et al. 2003, 65).

Low income people affected by scenery but high income by sidewalks and personal barriers

In a survey of 1818 adults:

"Among those with lower incomes, the most important neighborhood variable was enjoyable scenery. The presence of sidewalks was the most important neighborhood variable among those with higher incomes. Only 1 personal barrier (not being in good health) was inversely related to activity among lower income respondents. Conversely 6 personal barriers (lacking time, being too tired, not being in good health, lacking energy, lacking motivation, not liking

exercise) showed inverse associations with activity among those with higher incomes" (Brownson et al. 2001, 1999 with statistics omitted).

Perceptions of comfort and safety affect walking

In the previously mentioned survey study of approximately 500 residents of eight neighborhoods in Portland, Oregon, perceptions of the environment were important variables in whether people walked near their homes:

"Respondents were more likely to walk in their neighborhood if they had a favorable perception of the local walking environment...[and] perceptions of comfort, opportunities for neighbor interactions, and feeling safe walking in the evening were especially important" (Lund 2003, 427).

Compared with Europe, walking and cycling is more dangerous in the United States.

In a review of statistics from Europe and North America, Pucher and Dijikstra conclude:

"It is much more dangerous to walk or cycle in American cities than to travel by car. Per kilometer traveled, pedestrians were 23 more times more likely to be killed than car occupants in 2001 (140 vs 6 fatalities per billion kilometers), while bicyclists were 12 times more likely than car occupants to get killed... Per kilometer and per trip walked, American pedestrian are roughly three times more likely to get killed than German pedestrians and over 6 times more likely than Dutch pedestrians" (Pucher and Dijkstra 2003, 1511).

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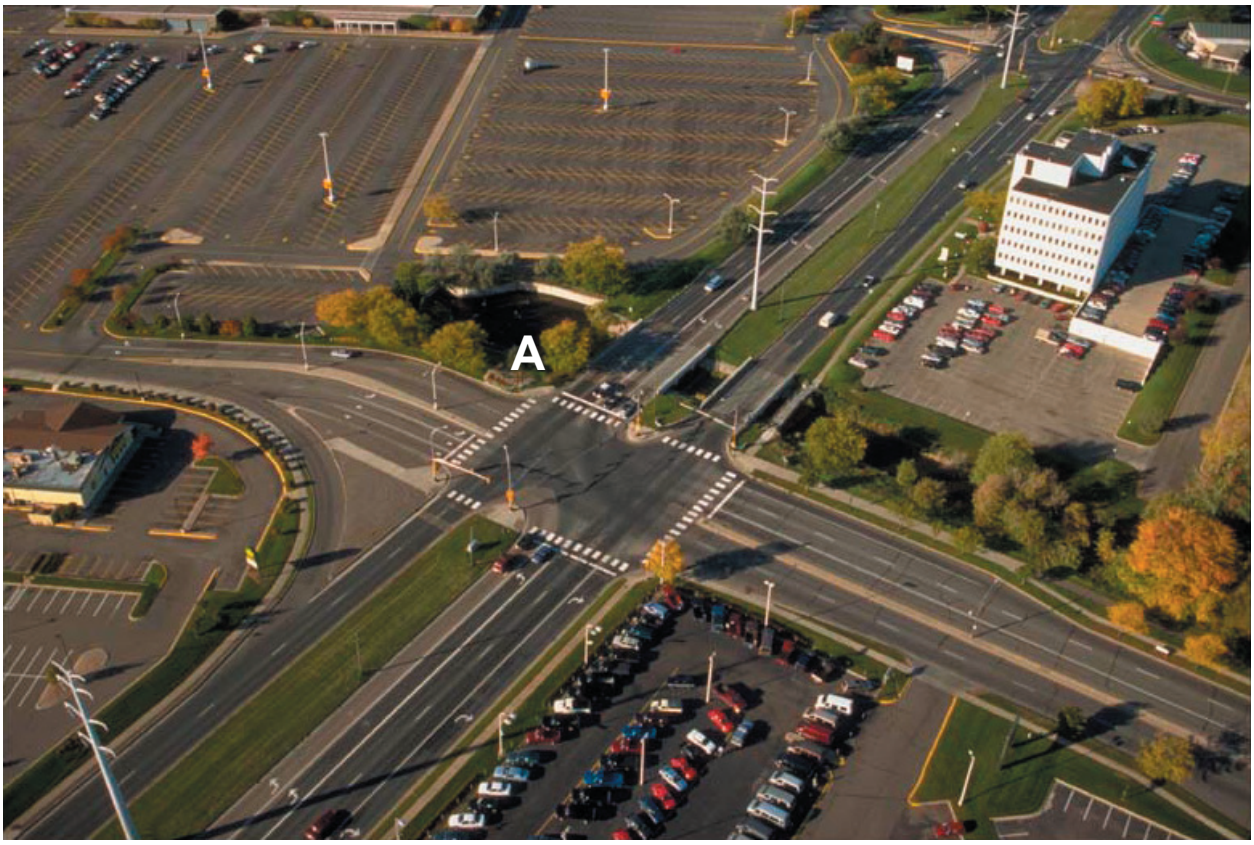
This area in Maple Grove includes a main street area with high quality pedestrian infrastructure, but largely cut off from wider connections.
Source: Metropolitan Design Center,

Applying the principles



Brooklyn Center, Metropolitan Design Center, 1994

Evaluating a place 1

Density: While the office building is a high-rise, and there are apartments and a shopping center nearby, the large amount of unbuilt space means that the density is low. The activities, such as shops, are made viable because people can drive to them--they would not be supported by pedestrians.

Street pattern: This image shows a gird street pattern to the right but a very automobile oriented large block to the left.

Mixed-use: Uses are mixed but widely spaced.

Pedestrian amenities: While there are sidewalks and clearly marked zebra striped pedestrian crossings the pedestrian network is not continuous--pedestrians can get to the end of a sidewalk with nowhere to go as occurs in area A .

Linden Hills Neighborhood, Minneapolis, Metropolitan Design Center,2000.

Evaluating a place 2

Density: This area contains a mix of shops, apartments, and houses on smallish lots. While certainly not the highest density area in the Twin Cities there are enough nearby people to support local shops.

Street pattern: The streets have a grid structure.

Mixed-use: Shops, offices, and apartments are concentrated in this area.

Pedestrian amenities: Sidewalks and striped pedestrian crossings are fairly continuous, although there are places where this is not the case (A). Street trees are small.

Stuyvesant Town, New York, Ann Forsyth, 2004

Evaluating a place 3

Density: This image is in the common space in a high density residential development from the early post World War Two period. The people in the housing live at a density that can support nearby shops and transit.

Street pattern: While the development itself is a superblock, a very large block with few through streets, well-lit pedestrian paths break up the development into smaller pedestrian blocks.

Mixed-use: While largely a residential area, shops line the major street edge within the development and also line nearby thoroughfares.

Pedestrian amenities: Deciduous canopy trees provide summer shade. Paved paths and street lamps all provide pedestrian comfort and safety.

Resources

Key resources including web sites, downloadable publications, and journal special issues

Journals

American Journal of Health Promotion, special issue on Health Promoting Community Design, September/October 2003. Richard Killingsworth (Editor), JoAnne Earp, Robin Moore (Associate Editors). Copies can be ordered on the web site at www.healthpromotionjournal.com for $24.95 or see http://www.healthpromotionjournal.com/publications/journal/ib2003_09.htm for contents.

The American Journal of Public Health, special issue on the Built Environment and Health, September 2003. http://www.ajph.org/future/93.9.shtml.

Progressive Planning magazine, special issue on the Active City, www.plannersnetwork.org.

Reports

McCann, Barbara C., and Reid Ewing. 2003. Measuring the Health Effects of Sprawl: A National Analysis of Physical Activity, Obesity and Chronic Disease. Smart Growth America and Surface Transportation Policy Project. Copies can be obtained at Smart Growth America's web site, www.smartgrowthamerica.org. Hard copies can be obtained for $15 by calling or writing SGA, 1200 18th St. NW Suite 801, Washington, D.C. 20036, (292) 207-3350 or by emailing sga@smartgrowthamerica.org.

Jackson, Richard J. and Chris Kochtitzky. Undated. Creating a Healthy Environment: The Impact of the Built Environment on Public Health. Sprawl Watch Clearinghouse Monograph Series. Available from http://www.sprawlwatch.org/health.pdf.

U.S. Department of Health and Human Services. 1996. Physical activity and health: A report of the surgeon general. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion.

Web Sites

Active Living by Design, www.activelivingbydesign.com

National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control, Physical Activity http://www.cdc.gov/nccdphp/dnpa/physical/

Metropolitan Design Center, www.designcenter.umn.edu

Forsyth, Ann, editor. 2005., Environment and Physical Activity: GIS Protocols. Version 2.3, August 2005, 210 pp.
http://www.designcenter.umn.edu/projects/current/current_research_areas/walkability/twin_cities_walking/epaGISprotocols.html

Best of Slide Shows
http://www.designcenter.umn.edu/reference_ctr/idatabase/idatabase.html

Resources on the conference CD

The following Metropolitan Design Center publications are available on the CD.

Metropolitan Design Center. 2003/2005. Fact Sheet series
- Twin Cities Parkways Fact Sheets
- Housing Density Fact Sheets
- Small Town Density Fact Sheets
- Housing Design Issues Fact Sheets
- Housing Types Fact Sheets

Metropolitan Design Center. 2003. Housing Posters series
- Housing Density Scale (7MB)
- Housing Types (6.3MB)
- (Housing Types Key) (420KB)
- Mixed-use Developments (6.8MB)
- New Affordable Housing in the Twin Cities (1.3MB)
- Design Strategy for Housing on Corridors (4.7MB)

Metropolitan Design Center. 2004. Residential Design in Minneapolis. Suite of 22 PowerPoints. Minneapolis: DCAUL (now MDC). Main shows include:
- Start Show
- Urban Design
- Neighborhood Character
- Bump-outs, Add-ons, Pop-tops, Up-and-outs, Tear-downs, and Fill-ins
- Housing Intensification
- Factory-built Housing

Metropolitan Design Center, 2005. GIS and Physical Activity. Draft PowerPoint Suite of 13 PowerPoints.

Forsyth, Ann. 2003. Measuring Density: Working Definitions for Residential Density and Building Intensity. Design Brief 9. Minneapolis: DCAUL (now MDC).

Healthy cities, environmental justice, and active living

While the focus of this toolkit is on active living, it is important to note that a number of other recent movements have been concerned about urban health issues. These include the largely U.S.-based environmental justice movement that focuses on unequal distribution of environmental hazards, and the international healthy cities movement sponsored by the World Health Organization.

Environmental justice and healthy cities advocates focus on social inequality and health, have an ecological bent, are concerned about how basic needs are met, and promote participation by urban residents in creating a healthy environment.

The text box below contains definitions of each of these approaches.

A Healthy City

- "A clean, safe physical environment of a high quality (including housing quality).
- An ecosystem that is stable now and sustainable in the long term.
- A strong mutually supportive and non-exploitative community.
- A high degree of participation and control by the public over the decisions affecting their lives, health and well-being.
- The meeting of basic needs (food, water, shelter, income, safety and work) for all the city's people.
- Access to a wide variety of experiences and resources, with the chance for a wide variety of contact, interaction and communication.
- A diverse, vital and innovative city economy.
- The encouragement of connectedness with the past, with the cultural and biological heritage of city dwellers and with other groups and individuals.
- A form that is compatible with and enhances the preceding characteristics.
- An optimum level of appropriate public health and sick care services accessible to all.
- High health status (high levels of positive health and low levels of disease)."

World Health Organization Regional Office for Europe
http://www.who.dk/healthy-cities/How2MakeCities/20020114_4

Environmental Justice

"The fair treatment and meaningful involvement of all people—regardless of race, ethnicity, income or education level—in environmental decision making. Environmental Justice programs promote the protection of human health and the environment, empowerment via public participation, and the dissemination of relevant information to inform and educate affected communities."

U.S. Department of Energy, Office of Environmental Management
http://web.em.doe.gov/public/envjust/definition.html

Walkability Checklist

How walkable is your community?

Take a walk with a child and decide for yourselves.

Everyone benefits from walking. These benefits include: improved fitness, cleaner air, reduced risks of certain health problems, and a greater sense of community. But walking needs to be safe and easy. Take a walk with your child and use this checklist to decide if your neighborhood is a friendly place to walk. Take heart if you find problems, there are ways you can make things better.

Getting started:

First, you'll need to pick a place to walk, like the route to school, a friend's house or just somewhere fun to go.

The second step involves the checklist. Read over the checklist before you go, and as you walk, note the locations of things you would like to change. At the end of your walk, give each question a rating. Then add up the numbers to see how you rated your walk overall.

After you've rated your walk and identified any problem areas, the next step is to figure out what you can do to improve your community's score. You'll find both immediate answers and long-term solutions under "Improving Your Community's Score..." on the third page.

Partnership for a Walkable America

Pedestrian and Bicycle Information Center

U.S. Department of Transportation

Reprinted with permission: http://www.walkinginfo.org/walkingchecklist.htm

Take a walk and use this checklist to rate your neighborhood's walkability.

How walkable is your community?

Location of walk _____

_____

Rating Scale: 1 awful · 2 many problems · 3 some problems · 4 good · 5 very good · 6 excellent

1. Did you have room to walk?

☐ Yes ☐ Some problems:

- ☐ Sidewalks or paths started and stopped
- ☐ Sidewalks were broken or cracked
- ☐ Sidewalks were blocked with poles, signs, shrubbery, dumpsters, etc.
- ☐ No sidewalks, paths, or shoulders
- ☐ Too much traffic
- ☐ Something else _____

Locations of problems: _____

Rating: (circle one) _____

1 2 3 4 5 6 _____

2. Was it easy to cross streets?

☐ Yes ☐ Some problems:

- ☐ Road was too wide
- ☐ Traffic signals made us wait too long or did not give us enough time to cross
- ☐ Needed striped crosswalks or traffic signals
- ☐ Parked cars blocked our view of traffic
- ☐ Trees or plants blocked our view of traffic
- ☐ Needed curb ramps or ramps needed repair
- ☐ Something else _____

Locations of problems: _____

Rating: (circle one) _____

1 2 3 4 5 6 _____

3. Did drivers behave well?

☐ Yes ☐ Some problems: Drivers...

- ☐ Backed out of driveways without looking
- ☐ Did not yield to people crossing the street
- ☐ Turned into people crossing the street
- ☐ Drove too fast
- ☐ Sped up to make it through traffic lights or drove through traffic lights?
- ☐ Something else _____

Locations of problems: _____

Rating: (circle one) _____

1 2 3 4 5 6 _____

4. Was it easy to follow safety rules? Could you and your child...

☐ Yes	☐ No	Cross at crosswalks or where you could see and be seen by drivers?
☐ Yes	☐ No	Stop and look left, right and then left again before crossing streets?
☐ Yes	☐ No	Walk on sidewalks or shoulders facing traffic where there were no sidewalks?
☐ Yes	☐ No	Cross with the light?

Locations of problems: _____

Rating: (circle one) _____

1 2 3 4 5 6 _____

5. Was your walk pleasant?

☐ Yes ☐ Some unpleasant things:

- ☐ Needed more grass, flowers, or trees
- ☐ Scary dogs
- ☐ Scary people
- ☐ Not well lighted
- ☐ Dirty, lots of litter or trash
- ☐ Dirty air due to automobile exhaust
- ☐ Something else _____

Locations of problems: _____

Rating: (circle one) _____

1 2 3 4 5 6 _____

How does your neighborhood stack up? Add up your ratings and decide.

1. _____
2. _____
3. _____
4. _____
5. _____

Total _____

26–30	Celebrate! You have a great neighborhood for walking.
21–25	Celebrate a little. Your neighborhood is pretty good.
16–20	Okay, but it needs work.
11–15	It needs lots of work. You deserve better than that.
5–10	It's a disaster for walking!

Now that you've identified the problems, go to the next page to find out how to fix them.

Now that you know the problems, you can find the answers.

Improving your community's score...

	What you and your child can do immediately	What you and your community can do with more time
1. Did you have room to walk?		
Sidewalks or paths started and stopped Sidewalks broken or cracked Sidewalks blocked No sidewalks, paths or shoulders Too much traffic	• pick another route for now • tell local traffic engineering or public works department about specific problems and provide a copy of the checklist	• speak up at board meetings • write or petition city for walkways and gather neighborhood signatures • make media aware of problem • work with a local transportation engineer to develop a plan for a safe walking route
2. Was it easy to cross streets?		
Road too wide Traffic signals made us wait too long or did not give us enough time to cross Crosswalks/traffic signals needed View of traffic blocked by parked cars, trees, or plants Needed curb ramps or ramps needed repair	• pick another route for now • share problems and checklist with local traffic engineering or public works department • trim your trees or bushes that block the street and ask your neighbors to do the same • leave nice notes on problem cars asking owners not to park there	• push for crosswalks/signals/parking changes/curb ramps at city meetings • report to traffic engineer where parked cars are safety hazards • report illegally parked cars to the police • request that the public works department trim trees or plants • make media aware of problem
3. Did drivers behave well?		
Backed without looking Did not yield Turned into walkers Drove too fast Sped up to make traffic lights or drove through red lights	• pick another route for now • set an example: slow down and be considerate of others • encourage your neighbors to do the same • report unsafe driving to the police	• petition for more enforcement • request protected turns • ask city planners and traffic engineers for traffic calming ideas • ask schools about getting crossing guards at key locations • organize a neighborhood speed watch program
4. Could you follow safety rules?		
Cross at crosswalks or where you could see and be seen Stop and look left, right, left before crossing Walk on sidewalks or shoulders facing traffic Cross with the light	• educate yourself and your child about safe walking • organize parents in your neighborhood to walk children to school	• encourage schools to teach walking safely • help schools start safe walking programs • encourage corporate support for flex schedules so parents can walk children to school
5. Was your walk pleasant?		
Needs grass, flowers, trees Scary dogs Scary people Not well lit Dirty, litter Lots of traffic	• point out areas to avoid to your child; agree on safe routes • ask neighbors to keep dogs leashed or fenced • report scary dogs to the animal control department • report scary people to the police • report lighting needs to the police or appropriate public works department • take a walk wih a trash bag • plant trees, flowers in your yard • select alternative route with less traffic	• request increased police enforcement • start a crime watch program in your neighborhood • organize a community clean-up day • sponsor a neighborhood beautification or tree-planting day • begin an adopt-a-street program • initiate support to provide routes with less traffic to schools in your community (reduced traffic during am and pm school commute times)
A Quick Health Check		
Could not go as far or as fast as we wanted Were tired, short of breath or had sore feet or muscles Was the sun really hot? Was it hot and hazy?	• start with short walks and work up to 30 minutes of walking most days • invite a friend or child along • walk along shaded routes where possible • use sunscreen of SPF 15 or higher, wear a hat and sunglasses • try not to walk during the hottest time of day	• get media to do a story about the health benefits of walking • call parks and recreation department about community walks • encourage corporate support for employee walking programs • plant shade trees along routes • have a sun safety seminar for kids • have kids learn about unhealthy ozone days and the Air Quality Index (AQI)

Need some guidance?
These resources might help...

Great Resources

WALKING INFORMATION

Pedestrian and Bicycle Information Center (PBIC)
UNC Highway Safety Research Center
730 Airport Road , Suite 300
Campus Box 3430
Chapel Hill, NC
27599-3430
Phone: (919) 962-2202
www.pedbikeinfo.org
www.walkinginfo.org

National Center for
Bicycling and Walking
Campaign to Make
America Walkable
1506 21st Street, NW
Suite 200
Washington, DC 20036
Phone: (800) 760-NBPC
www.bikefed.org

WALK TO SCHOOL DAY WEB SITES

USA event: www.walktoschool-usa.org
International: www.iwalktoschool.org

STREET DESIGN AND TRAFFIC CALMING

Federal Highway Administration
Pedestrian and Bicycle Safety Research Program
HSR - 20
6300 Georgetown Pike
McLean,VA 22101
www.fhwa.dot.gov/environment/bikeped/index.htm

Institute of Transportation Engineers
www.ite.org

Surface Transportation Policy Project
www.transact.org

Transportation for Livable Communities
www.tlcnetwork.org

WALKING COALITIONS

America Walks
P.O. Box 29103
Portland, Oregon 97210
Phone: (503) 222-1077
www.americawalks.org

Partnership for a Walkable America
National Safety Council
1121 Spring Lake Drive
Itasca, IL 60143-3201
Phone: (603) 285-1121
www.nsc.org/walkable.htm

PEDESTRIAN SAFETY

National Highway Traffic Safety Administration
Traffic Safety Programs
400 Seventh Street, SW
Washington, DC 20590
Phone: (202) 662-0600
www.nhtsa.dot.gov/people/injury/pedbimot/ped

National SAFE KIDS Campaign
1301 Pennsylvania Ave. NW
Suite 1000
Washington, DC 20004
Phone: (202) 662-0600
Fax: (202) 393-2072
www.safekids.org

WALKING AND HEALTH

US Environmental Protection Agency
Office of Children's Health Protection (MC 1107A)
Washington, DC 20460
Phone: 202-564-2188
Fax: 202-564-2733
www.epa.gov/children/
www.epa.gov/airnow/
www.epa.gov/air/urbanair/ozone/what.html
www.epa.gov/sunwise/uvindex.html
www.epa.gov/otaq/transp/comchoic/ccweb.htm

President's Task Force on Environmental Health Risks and
Safety Risks to Children
www.childrenshealth.gov

Centers for Disease Control and Prevention
Division of Nutrition and Physical Activity
Phone: (888) 232-4674
www.cdc.gov/nccdphp/dnpa/readyset
www.cdc.gov/nccdphp/dnpa/kidswalk/index.htm

Prevention Magazine
33 East Minor Street
Emmaus, PA 18098
www.itsallaboutprevention.com

Shape Up America!
6707 Democracy Boulevard
Suite 306
Bethesda, MD 20817
www.shapeup.org

ACCESSIBLE SIDEWALKS

US Access Board
1331 F Street, NW
Suite 1000
Washington, DC 20004-1111
Phone: (800) 872-2253;
(800) 993-2822 (TTY)
www.access-board.gov

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