

## Science News Online

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### Weighing In on City Planning

#### Could smart urban design keep people fit and trim?

**Ben Harder**

Lawrence Frank is no couch potato. Taking full advantage of his city's compact design, the Vancouver, British Columbia, resident often bikes to work and walks to stores, restaurants, and museums. That activity helps him stay fit and trim. But Frank hasn't always found his penchant for self-propulsion to be practical. He previously lived in Atlanta, where the city's sprawling layout thwarted his desire to be physically active as he went about his daily business.

"There was not much to walk to," says Frank, a professor of urban planning at the University of British Columbia. For example, he recalls that there was only one decent restaurant within walking distance of his old home. Many restaurants and other businesses in Atlanta cluster in strip malls that stand apart from residential areas.

In Vancouver, by contrast, Frank's neighborhood contains dozens of eateries, and he often strolls to and from dinner. "I'm more active here," he says.

The glaring difference between the two cities' landscapes figures in Frank's professional life as well as in his personal one. Frank is part of an emerging area of cross-disciplinary science that's examining the relationship between the shapes of our cities and the shapes of our bodies.

He and other researchers have evidence that associates health problems with urban sprawl, a loose term for humanmade landscapes characterized by a low density of buildings, dependence on automobiles, and a separation of residential and commercial areas. Frank proposes that sprawl discourages physical activity, but some researchers suggest that people who don't care to exercise choose suburban life. Besides working to settle that disagreement, researchers are looking at facets of urban design that may shortchange health.



*Metropolitan Atlanta, often called a poster child for urban sprawl, has undergone rapid geographical expansion as its population has burgeoned to about 5 million. Studies suggest that urban sprawl contributes to physical inactivity and obesity.*

Getty Images

As scientists investigate the relationship between sprawl and obesity, a compact style of city development sometimes called smart growth might become a tool in the fight for the nation's health. However, University of Toronto economist Matthew Turner charges that "a lot of people out there don't like urban sprawl, and those people are trying to hijack the obesity epidemic to further the smart-growth agenda [and] change how cities look."

## Studying spread

For decades, housing and population growth in U.S. suburban areas have outpaced those in city centers. Shifts in commuting patterns reflect the trend toward people residing at a sizable distance from where they work, shop, and play. According to U.S. Census data, the average commute lengthened from 22.4 minutes to 25.1 minutes between 1990 and 2000, and the proportion of workers walking or biking to work dropped by one-quarter.



*TIGHT FIT. Densely built urban areas such as Vancouver's downtown may encourage pedestrian traffic and promote physical activity. In contrast, cities of low density, where people depend on cars to get to stores and other facilities, seem to favor obesity.*

Corbis

A few communities buck the national trend. For example, Frank says, "there is a great deal of new development in Atlanta that is walkable."

"That said, the overall trend is not in this direction in that region or most others," he adds. Even "Vancouver is embarking on a massive road-building program that threatens [to create] sprawl in the developing parts of this region."

In September 2003, two major studies linked sprawl and obesity. Since those reports, researchers in fields as disparate as epidemiology and economics have generated a spate of similarly themed studies.

In the first of the 2003 reports, researchers analyzed data from a nationwide survey in which each of some 200,000 people reported his or her residential address, physical activity, body mass, height, and other health variables. Residents of sprawling cities and counties tended to weigh more, walk less, and have higher blood pressure than did people living in compact communities, concluded urban planner Reid Ewing and his colleagues at the University of Maryland at College Park's National Center for Smart Growth Research and Education.

In the second study, health psychologist James Sallis of San

Diego State University and his colleagues reported that residents of "high-walkability" neighborhoods, which have closely packed residences and a mix of housing and businesses, tended to walk more and were less likely to be obese than residents of low-walkability neighborhoods.

In 2004, Frank and his colleagues produced additional connections among urban form, activity, and obesity. The data on more than 10,500 people in the Atlanta area indicated that the more time a person spends in a car, the more obese he or she tends to be. But the more time people spend walking, the less obese they are.

Frank's team, like the other groups, found that areas with interspersed homes, shops, and offices had fewer obese residents than did homogeneous residential areas whose residents were of a similar age, income, and education. Furthermore, neighborhoods with greater residential density and street plans that facilitate walking from place to place showed below-average rates of obesity.

The magnitude of the effect wasn't trivial: A typical white male living in a compact, mixed-use community weighs about 4.5 kilograms (10 pounds) less than a similar man in a diffuse subdivision containing nothing but homes, Frank and his colleagues reported.

So far, the dozen strong studies that have probed the relationships among the urban environment, people's activity, and obesity have all agreed, says Ewing. "Sprawling places have heavier people," he says. "There is evidence of an association between the built environment and obesity."

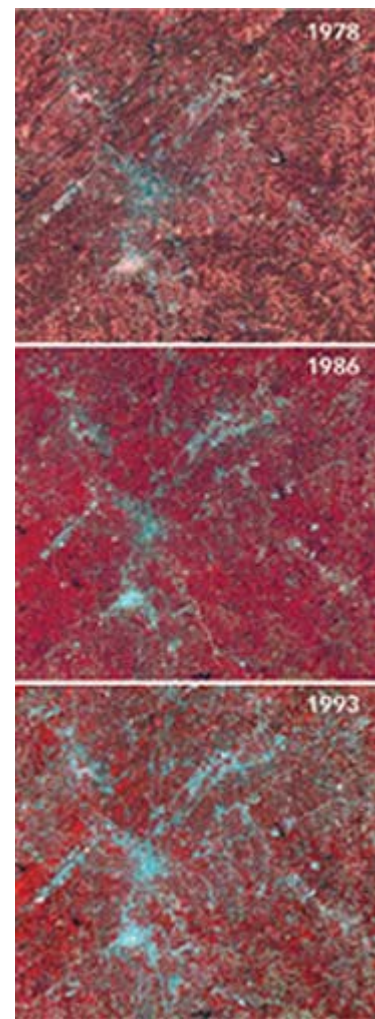
### Cause or coincidence

The evidence for a relationship between physical activity, body weight, and the environmental characteristics called urban form "looks compelling," adds Ross Brownson, an epidemiologist at St. Louis University School of Public Health in Missouri.

But Brownson, Ewing, and others caution that these associations don't prove that sprawl causes laziness or weight gain. Most of the studies provide only a snapshot of different people at a single time. Such studies can't prove that living amid sprawl leads to inactivity; it may also be that inactive people choose to inhabit areas where driving is the easiest way to get around.

In other words, people with different health habits and different propensities to gain weight may sort themselves into different kinds of neighborhoods.

That's what Turner suggests is going on. Turner conducted a study that tracked people over



*OBESITY CITY. Infrared satellite images show the rapid geographical expansion of metropolitan Atlanta. Built-up areas, such as roads and buildings, appear bluish-white against the red backdrop of areas dominated by trees and plants.*  
Frank

time, as some of them moved from one neighborhood to another. He and his collaborators found no change in weight associated with moving from a sprawling locale to a dense one, or vice versa.

"We're the only ones that have tried to distinguish between causation and sorting ... and we find that it's sorting," he says. "The available facts do not support the conclusion that sprawling neighborhoods cause weight gain."

Turner's team analyzed data collected over 6 years on more than 5,000 young adults living across the United States. Most of the volunteers moved at least once during the study. The researchers compared individuals' weights before and after they moved between communities with different degrees of sprawl.

To measure sprawl, they used satellite images to calculate the average distance between residential buildings. They also determined the average density of nonresidential establishments such as churches and shops in each volunteer's zip code.

"We're estimating the effect [of sprawl on weight] to be zero or very close to zero," Turner says. Any weight gain attributable to sprawl, he says, is at most "a couple of ounces."

The authors released the study as a working paper on Oct. 30, 2006.

Other researchers challenge some of the study's analytical methods, particularly the way in which Turner's team assessed sprawl and mixed use. For example, Sallis says, "They assumed that [churches and retail businesses] were equally dispersed around the zip code." The study may therefore have inaccurately estimated volunteers' access to walkable destinations, he says.

Sallis also argues that it could take many years for significant weight gain to develop after a person moves between dissimilar neighborhoods. Moreover, the study didn't assess whether volunteers' degree of physical activity changed when they moved, a measure that would hint at impending changes in weight.

Still, Sallis says, Turner's longitudinal approach to the issue is "definitely an advance. We've been wanting studies like this for some time."

Ewing has also completed a prospective study using a similar set of data, but he declined to discuss his results with *Science News* before the study's publication.

Obesity is not the urban environment's only—nor even necessarily its most likely—potential health effect, says physician Deborah Cohen, a health researcher at the RAND Corporation in Santa Monica, Calif. If a neighborhood's design were to make people less active, they might eat less to avoid obesity but still miss out on other health benefits of physical activity, notes Cohen.

"Physical activity is independently important for health, [and] urban form is important for physical activity," she says.

In 2004, Cohen and Roland Sturm of RAND asked more than 8,000 residents of 38 U.S. communities to list their health problems. The researchers also assessed the degree of

sprawl in each resident's community.

"People reported more complaints—more health problems—when they lived in more sprawling areas," Cohen says. The excess of physical problems such as arthritis linked to sprawl was comparable to the change that would occur if the entire population suddenly aged by 4 years, Cohen and Sturm concluded.

### Setting and sorting

Frank's latest findings could split the ideological difference. By surveying people in a variety of neighborhoods, he learned that people who are less inclined to be active tend to live in less pedestrian-friendly locales—evidence that people are sorting themselves. But he also found that, no matter how much people like or dislike being active, they are more active when they live in compact, walkable areas than when they live in sprawling neighborhoods.



*THE DISCONNECT. A community's so-called network efficiency influences its walkability. In an efficient network, such as in the gridlike neighborhood at left, pedestrians can walk relatively directly between any two points. The maze of cul-de-sacs at right forms an inefficient network.*

Frank

His study, he says, "demonstrates that both preferences and the neighborhood in which people live impact their behavior." He described the findings at a conference in Atlanta on Jan. 19 and reports them in an upcoming *Social Science and Medicine*.

The people most at the mercy of sprawl, Ewing suggests, are those who have limited access to healthy foods and who don't recognize the importance of fitness.

Children are another group that could be disproportionately affected by urban design, Frank says.

In two recent studies, Cohen and her collaborators examined the relationship between adolescent girls' physical activity and specific aspects of the urban environment. Girls who live near parks and recreational facilities are more physically active than those whose neighborhoods contain no such spaces, the researchers found.

They selected a middle school in each of six metropolitan areas throughout the country. From among the female students attending the schools, the team randomly selected 1,556 sixth graders.

In one study, the researchers used maps and government records to locate public parks. On average, 3.5 parks lay within a 1-mile radius of each volunteer's home. That figure varied from about six parks in Minneapolis to about one park in Tucson.

The researchers outfitted the girls with pedometerlike devices called accelerometers, which record motion and can be used to measure the intensity of physical activity. Each volunteer wore her accelerometer for 6 consecutive days. During that time, the girls performed, on average, the metabolic equivalent of 611 minutes of vigorous physical activity.

The researchers conservatively estimated that each park within a half-mile of home contributed an extra 17.2 minutes of vigorous activity per girl over the course of the study. The team reports its findings in the November 2006 *Pediatrics*.

"Neighborhood parks are particularly important for adolescents who are too young to drive," says Diane Catellier, a statistician at the University of North Carolina at Chapel Hill who collaborated with Cohen on that study.

In the other study, reported in a 2006 supplement to the *Journal of Physical Activity and Health*, Cohen's team used data on the same girls to show that living in proximity to one's school is also associated with increased levels of physical activity.

"The overarching message is that the built environment is an enabler or a disabler of active transportation—of walking," Frank says.

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