The Community Guide

Physical Activity: Community-Scale Urban Design and Land Use Policies (2004 Archived Review)

Table of Contents

Review Summary

Intervention Definition

To support physical activity, changes can be made to the physical environment of urban areas using the policies and practices of community-scale urban design land use. Urban planners, architects, engineers, developers and public health professionals may be involved in developing policies and practices to address the following.

- Design elements:
  - Closeness of residential areas to stores, jobs, schools, and recreation areas
  - Continuity and connectivity of sidewalks and streets
  - Aesthetic appeal and safety of the physical environment
- Policies about zoning regulations, building codes, builders' practices, and other governmental policies.

Summary of Task Force Finding

The Community Preventive Services Task Force recommends design and land use policies and practices that support physical activity in urban areas of several square miles or more.

About the Systematic Review

The Task Force finding is based on evidence from a systematic review of 12 studies (search period 1993 - 2003).

The review was conducted on behalf of the Task Force by a team of specialists in systematic review methods, and in research, practice, and policy related to increasing physical activity.

Summary of Results

Twelve studies were included in the review. They evaluated a variety of results.

- Overall, the median improvement in some aspect of physical activity (e.g., number of walkers or bicyclists) was 161%.
- Additional benefits that may have resulted from these interventions:
  - More attractive green space
  - Increased sense of community and decreased isolation
  - Increased consumer choice for places to live
  - Reduced crime and stress

Study Characteristics

- All included studies used cross-sectional designs.
- Included studies were conducted in the U.S. (11 studies) and Canada (1 study).
- Studies compared communities with grid/rectilinear street design with communities with cul-de-sac street design, or pedestrian-friendly environments (e.g., ease of crossing street, topography, continuity of sidewalks) with non-pedestrian-friendly environments.

Applicability

- Results from this systematic review should be applicable to diverse settings and populations if the intervention approach is adapted to the target population.
- Because included studies were carried out in urban or suburban environments, it is unclear whether findings can be applied to rural settings. Many of the design features noted in the included studies, however, can be found in small towns and cities in rural regions.

Publications

Heath GW, Brownson RC, Kruger J, Miles R, Powell KE, Ramsey LT, Task Force on Community Services. The effectiveness of urban design and land use and transport policies and practices to increase physical activity: a systematic review. *Journal of Physical Activity and Health*. 2006;3(Suppl 1):S55-76.

Task Force Finding

Intervention Definition

Community-scale urban design land use policies and practices involve the efforts of urban planners, architects, engineers, developers, and public health professionals to change the physical environment of urban areas of several square miles or more in ways that support physical activity. They include the following.

- Design elements that address:
  - Proximity of residential areas to stores, jobs, schools, and recreation areas
  - Continuity and connectivity of sidewalks and streets
  - Aesthetic and safety aspects of the physical environment
- Policy instruments such as zoning regulations, building codes, other governmental policies, and builders' practices

Task Force Finding (June 2004)*

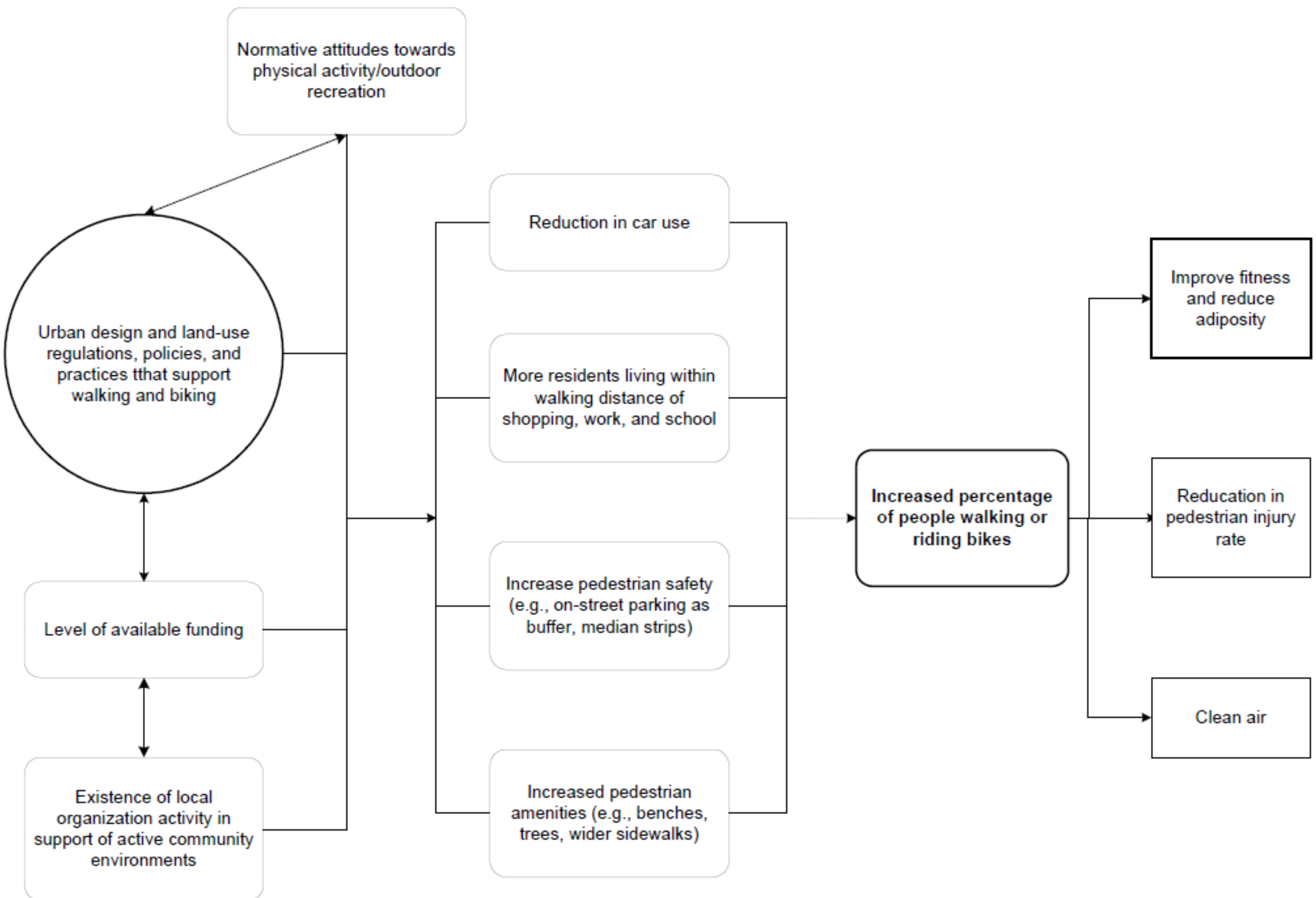
The Community Preventive Services Task Force recommends design and land use policies and practices that support physical activity in urban areas of several square miles or more based on sufficient evidence of effectiveness in facilitating an increase in physical activity.

Publications

Heath GW, Brownson RC, Kruger J, Miles R, Powell KE, Ramsey LT, Task Force on Community Services. The effectiveness of urban design and land use and transport policies and practices to increase physical activity: a systematic review. *Journal of Physical Activity and Health*. 2006;3(Suppl 1):S55-76.

Supporting Materials

Analytic Framework



Summary Evidence Table

Study Characteristics	Intervention and comparison elements	Study population description Sample size	Effect measure	Value used in summary	FU time
Author (year): Shriver K (1997) **Design suitability**: Least (cross-sectional) **Quality of execution:** Moderate	**Location:** Austin, TX (Hyde Park and Clarksville (traditional) and Barton Hills and Wells Branch (modern) **Components:** Traditional – grid street design, office sites within walking distance, shorter building setbacks or porches with outdoor seating modern discontinuous streets and cul-de-sacs, walking distance between houses and commercial services greater than average, homes setback from street and 60% more off street parking **Comparison:** modern neighborhood (cul-de-sac, discontinuous streets) and traditional neighborhoods (connections and direct routes)		(I-C)/C C = modern	Distance of average trip: -34.5% Duration of average trip: -30.4% Average trip distance and duration are less in traditional neighborhoods, but a greater proportion of trips are for errands and commuting than in modern neighborhoods	none

Study Characteristics	Intervention and comparison elements	Study population description Sample size	Effect measure	Value used in summary	FU time
Author (year): Handy SL (2001) **Design suitability**: Least (cross sectional) **Quality of execution:** Fair	**Location:** 6 middle-income neighborhoods in Austin, TX **Components:** Environmental factors of 6 communities were characterized by 3 factors. Individuals in each community were surveyed on their behavior and usage of local stores. Distance from home to local stores was calculated **Comparison:** To determine if location of local shopping opportunities reduces automobile dependence and to determine residents choice to walk vs. drive to local shopping	Traditional ((Old West Austin (*n* = 281) and Travis Heights (*n* =245)); Early modern (Cherrywood *n* = 226) and Zilker (*n* = 220)) Late modern ((Wells Branch (*n* = 204) and Tanglewood (*n* = 192))	Walking mode for shopping (I –C) / C x 100 C = early mod or late mod I = Trad	Walking mode for shopping (I –C) / C x 100 C = early mod or late mod I = Trad	none
Author (year): Handy SL (1992 and 1996) **Design suitability**: Least (cross sectional) **Quality of execution:** Fair	**Location:** Santa Clara and Santa Rosa, CA **Components:** local accessibility if being near a activity, such as convenience good, supermarkets and drug stores, and located in small enters **Comparison:** modern/low local accessibility and traditional/high local accessibility		(I – C)/C C = Sunnyvale, Rincon Valley - modern/ low Accessibility I = Mountain View and Junior College – traditional/ high accessibility	Walk/stroll to local shopping mall 181.8% % walking to shopping center monthly 48.6% Walks/strolls last month 1.2% % strolling at least monthly 4.5%	none

Study Characteristics	Intervention and comparison elements	Study population description Sample size	Effect measure	Value used in summary	FU time
Author (year): Cervero (1995) **Design suitability**: Least (cross-sectional) **Quality of execution:** Fair	**Location:** Los Angeles Area, CA; San Francisco Bay area, CA **Components:** transit neighborhood built along streetcar line or around a rail station, primarily grid design, largely built before 1945 Auto neighborhood laid out without regard to transit, > 50% intersections, 3-way or cul-de-sacs, built after 1945 **Comparison:** Transit and Auto neighborhood	Los Angeles – 6 match paired neighborhoods San Francisco – 7 match paired neighborhoods	(I – C)/C C = auto neighborhood I = transit neighborhood	% difference in proportion of pedestrian trips and in pedestrian trips per 1000 housing units Los Angeles area, CA pedestrian trips 161% pedestrian rates/1000 housing units 163 (Without Claremont) pedestrian trips 38% pedestrian rates/1000 housing units 109% Calculated without Claremont because college and large number of students on or near campus increases pedestrian rate San Francisco Bay Area, CA % pedestrian trips 183 pedestrian rates/1000 housing units 164	none

Study Characteristics	Intervention and comparison elements	Study population description Sample size	Effect measure	Value used in summary	FU time
Author (year): Berrigan D (2002) **Design suitability**: Least (cross sectional) **Quality of execution:** Fair	NHANES III survey which is a national stratified multi-stage probability design. N = 17,030 adults responded to household and family survey questions, however, only N = 14,827 respondents responded to behavioral and demographic variables used in this paper Home age is a measure of urban form because it is associated with density, street design, building characteristics. Neighborhoods containing older homes in urban areas are more likely to have sidewalks, have denser interconnected networks of streets and often display a mix of business and residential uses **Setting:** National survey Delivery: NHANES III	Population description: % Male – 48 % White – 77.7 % AA – 10.1 % Hispanic – 4.8 % Other – 7.3 % Age 20-39 – 45.5 % Age 40-59 – 31.4 % Age > 60 – 23.1 % < High school – 23.4 % High school – 33.7 % Any college – 42.9 % SES < $20,000 – 31.7 % SES > $20,000 – 68.3 % Activity limitation yes – 15.7	Odds ratios calculated for differences in walking by home age, comparing urban vs. suburban Age of home: > = 1974, 1946-1973 and < 1946	OR for walking frequency comparing : > = 1974 vs. 1946-1973 home age = 1.44 (unadj) 1.36 (adj) > = 1974 vs. < 1946 home age = 1.44 (unadj) 1.43 (adj) Net intervention effect % walking 1 mile without stopping Home built post 1973 (OR = 1.0) vs. home built pre 1946 (OR = 1.43) = 43%	

Study Characteristics	Intervention and comparison elements	Study population description Sample size	Effect measure	Value used in summary	FU time
Author (year): Parsons–Brinckerhoff (1993) **Design suitability**: Least (cross-sectional) **Quality of execution:** Fair	**Location:** Portland, OR – 400 zones **Components:** Pedestrian Environment Factor (ease of street crossing, sidewalk continuity, local street characteristics, topography) each zone is scored **Comparison:** PEF, pedestrian zone, household density	5000 households in random zones	(PEF9-12)-(PEF 4-8))/ PEF 4-8	Mode of choice walk/bike PEF 4-8 vs 9-12 201% Zones with higher PEF (9-12) made 3x as many transit trips and 4x as many walk bike trips Ped zone cat – more ped friendly the environment the greater the proportion of trips made by walking/biking Zonal density 0-3 vs 3- >5 163% less dense zones generate more auto trips transit level of service 0 – 120,000 vs > 120,000 182%	NA

Study Characteristics	Intervention and comparison elements	Study population description Sample size	Effect measure	Value used in summary	FU time
Author (year): Saelens BE (2003) **Design suitability**: Least (cross sectional) **Quality of execution:** Fair	*N* = 107; 54 –high walkability neighborhood – 53 low walkability neighborhood **Eligibility:** communities selected on basis of walkability and comparable on the basis of age of residents, SES of residents **Comparison:** cross sectional assessment among persons living in two different built environments regarding walking behavior and other physical activity	Population description: High walk Low walk % F 51.9 54.7 % W 79.6 83.0 % L 13.0 5.7 % B 0.0 1.9 % other 3.7 3.7 Ed/C 63.0 41.5 Age 44.9 50.8	(I-C)/C I = High walk C = Low walk	Walking and total PA by neighborhood CSA measures: Walk avg min/day 195-131/131 x 100 = 48.9% NIE Total PA avg min/day 211-140/140 x 100 = 50.7% NIE	

Evidence Gaps

Additional research and evaluation are needed to answer the following questions and fill existing gaps in the evidence base.

- What characteristics of a community are necessary for optimal implementation of policy and environmental interventions?
- Does the effectiveness vary by type of access (e.g., worksite facility or community facility) or socioeconomic group?
- How can the necessary political and social support for this intervention approach be created or increased?
- Does creating or improving access motivate sedentary people to become more active, give those who are already active an increased opportunity to be active or both?
- If you build it, will they come? In other words, is enhanced access to places for activity enough to create higher physical activity levels or are other intervention activities also necessary?
- Do these interventions increase awareness of opportunities for and benefits of physical activity?
- What are the effects of creating new places for physical activity versus enhancing existing facilities?
- Which neighborhood features (e.g., sidewalks, parks, traffic flow, nearness to shopping) are the most crucial in influencing activity patterns?
- How does closeness of places, such as trails or parks to residences, affect ease and frequency?
- How do interventions affect various population subgroups, such as age, gender, race, or ethnicity?
- Are there any key harms?
- What are the barriers to implementing these interventions (e.g., political, social, time, money)?
- Physical activity is difficult to measure consistently across studies and populations. Although several good measures have been developed, reliable and valid measures are needed for the spectrum of physical activity including moderate or light activity.
- What is the cost-effectiveness of each of these interventions? What combinations of components are most cost-effective?
- How can effectiveness in terms of health outcomes or quality-adjusted health outcomes be better measured, estimated, or modeled?
- How can the cost benefit of these programs be estimated?
- How do specific characteristics of interventions contribute to economic efficiency?

Included Studies

The number of studies and publications do not always correspond (e.g., a publication may include several studies or one study may be explained in several publications).

Berrigan D, Troiano RP. The association between urban form and physical activity in U.S. adults. *Am J Prev Med* 2002;23 (2S):74-9.

Cevero R, Gorham R. Commuting in transit versus automobile neighborhoods. *APAJ* 1995.

Cervero R. Mixed land-uses and commuting: evidence from the American Housing Survey. *Transport Res* 1996;30:361-77.

Craig CL, Brownson RC, Cragg SE, Dunn AL. Exploring the effect of the environment on physical activity: a study examining walking to work. *AJPM* 2002;23:36-43.

Handy S L. Regional versus local accessibility. *Built Environment* 1993;18(4):253-67.

Handy S. Understanding the link between urban form and nonwork travel behavior. *J Plan Educ Res* 1996;15:183-98.

Handy SL. Clifton KJ. Local shopping as a strategy for reducing automobile travel. *Transportation* 2001;28:317-46.

Kitamura R, Mokhtarian PL, Laidet L. A micro-analysis of land use and travel in five neighborhoods in the San Francisco Bay Area. *Transportation* 1997;24:125-58.

McNally MG, Kulkarni A. Assessment of influence of land use-transportation system on travel behavior. *Transport Res Record* 1997;1607:105-15.

Moudon A, Hess P, Snyder MC, Stanilov K. Effects of site design on pedestrian travel in mixed-use, medium density environments. Washington State Transportation Center, 1997. WA-RD 432.

Parsons Brinkerhoff Quade and Douglas, Inc. 1000 Friends of Oregon: Making the land use transportation air quality connection: the pedestrian environment Volume 4A.

Saelens BE, Sallis JF, Black JB, Chen D. Neighborhood-based differences in physical activity: an environmental scale evaluation. *Am J Public Health* 2003;93:1552-8.

Shriver K. Influence of environmental design on pedestrian travel behavior in four Austin neighborhoods. *Transport Res Record* 1997;(1578):64-75.

Disclaimer

Document last updated May 2, 2017