

© The Author 2005. Published by Oxford University Press on behalf of the New York Academy of Medicine. All rights reserved. For permissions, please e-mail: journals.permissions@oupjournals.org

Advance Access publication February 28, 2005

Where Does Walkability Matter the Most? An Environmental Justice Interpretation of New Jersey Data

Michael R. Greenberg and John Renne

ABSTRACT Physical inactivity contributes to a growing proportion of premature mortality and morbidity in the United States, and the last decade has been the focus of calls for action. Analysis of 340 residents of New Jersey found that 15%–20% reported multiple problems with using their immediate neighborhoods for physical activity. These respondents were disproportionately African Americans living in neighborhoods that they regard as only of fair or poor quality. Neighborhood walkability is a second-wave environmental justice issue meriting carefully designed research and ameliorative actions in concert with other neighborhood-level redevelopment activities.

KEYWORDS Bikeability, Environmental justice, Neighborhood quality, Physical activity, Walkability.

INTRODUCTION

In 1996, the U.S. Surgeon General officially recognized that regular physical activity promotes physical and mental health. Recent federal guidelines suggest that 5 days a week of moderately intense activity for 30 minutes or 3 days a week of vigorous exercise for 20 minutes reduces the chances of diabetes, heart diseases, and other chronic diseases and raises the quality of life. Yet recent data show that most Americans do not meet the recommendation, and a fourth of the population reports no leisure-time physical activities. Page 1975.

Research shows that nearby available locations for walking and biking promote physical activity. 9-11 For example, in a study of Georgia, Powell et al. 9 found that over 90% of people could identify a safe place to walk, often their neighborhood streets and sidewalks. They observed that the more convenient the location (usually within 10 minutes) the more likely they would walk or bike. Making immediate neighborhoods more walkable and bikeable is important to increase the likelihood of additional exercise. Mokdad et al. 12 reported that the combination of poor diet and lack of exercise is the second leading cause of death in the United States and may soon overtake tobacco as the leading cause of death. Efforts made to improve walkability and bikeability may be one of the most cost-effective ways of reducing health disparities, especially within a population with disproportionately high rates of cancer and heart diseases and obesity.

Dr. Greenberg and Mr. Renne are with the Edward J. Bloustein School of Planning and Public Policy, Rutgers University, New Brunswick, New Jersey.

Correspondence: Michael R. Greenberg, PhD, Professor and Director, Center for Neighborhood and Brownfields Redevelopment, Edward J. Bloustein School of Planning and Public Policy, Rutgers University, 33 Livingston Avenue, Suite 100, New Brunswick, NJ 08901-1958. (E-mail: mrg@rci.rutgers.edu)

African Americans as a whole have the highest mortality and morbidity rates from the set of diseases that exercise could partly address. ^{13,14} Walking and bicycling are among the simplest, familiar forms of exercise. Walking especially requires little preparation or money in equipment compared to swimming, rowing, or gym machines. Hence, it makes sense to determine if Blacks and other economically disadvantaged minority groups indicate that they would increase their exercise if their neighborhoods were more walkable/bikeable.

Using a convenience sample of New Jersey residents, this paper answers three questions about walkability and bikeability on the one hand and neighborhood and resident characteristics on the other:

- 1. According to residents, how walk/bikeable are their neighborhoods?
- 2. If neighborhoods were more walk/bikeable, how much more time would they spend outdoors in these activities?
- 3. What factors correlate with spending more time walking or biking, including, in particular, variations by race/ethnicity, age, and education?

To reduce awkward phrasing and repetitiveness, we use "walkable" as shorthand for walking, jogging, running, biking, in-line skating, and other nonmotorized forms of travel.

As context, recent studies about walkability with provocative outcomes triggered the research reported in this paper. Cervero and Duncan¹⁵ analyzed the likelihood of walking in the San Francisco-Oakland region. Among deterrents to walking were distance, having a disability, and being in a low-income neighborhood. African Americans were more likely to walk, and Whites were less likely. Yet the authors observed that the quality of the built environment was not strongly correlated with the choice to walk.

Second, Staunton et al.¹⁶ found a substantial increase in walking and biking in Marin County (California.) because of a program that involved schools, parents, and children. A design change had a major impact. Third, Wang et al.¹⁷ compared the cost of building bike and pedestrian trails in Lincoln (Nebraska) with estimated heath care costs due to lack of exercise and found the per capita cost of health-related morbidity and mortality was 2.6 times higher than adding the walkways and trails.

Nor does improving walkability necessarily require enormous efforts and cost. For example, a study of Oakland, California showed that speed bumps can substantially reduce injuries. 18 Evans 19 identified a variety of engineering and institutional methods for increasing walkability in North America and Europe, and Librett et al.²⁰ found many municipal-level innovations that promote physical activity. Furthermore, some local governments already adjust street curbing whenever sidewalks are fixed. Urban redevelopment is occurring in forms that are consistent with increasing walkability. For example, community social capital building, crime prevention, and brownfields redevelopment programs are opportunities to take a program focused on one neighborhood activity and build in walkablility.²¹⁻²³ Overall, the San Francisco study may be right in observing that there is limited proof that increasing walkability will make a difference. However, given the achievements reported in some papers, the potential health benefits, and the possibility that a good deal can be accomplished as part of ongoing infrastructure changes, it is worthwhile to estimate the number and demographic characteristics of people who say they would increase their activity.

METHODS

A convenience sample collected by a combination of graduate and undergraduate students at Rutgers University gathered 350 surveys across the State of New Jersey. Subjects were recruited by personal contacts during the period from late January to the first week of March 2004. This method has typically yielded response rates of 80%–95%, as it did in this case, because surveyors ask people they know and who live in their neighborhoods. A total of 340 of the 350 responses were complete. No identifiers were placed on the surveys, so the results are anonymous. Even though the results of student and neighborhood convenience samples, including international comparisons, typically are reproduced by random sampling designs, 24-27 caution always needs to be exercised about the generalizability of convenience samples. One way of being appropriately cautious is to understand and identify any bias by race/ethnicity, education, and other demographic factors. In this case, bias by amount of existing exercise is important to determine. For example, we would want to know if the convenience sample was remarkably different from US norms with respect to amount of exercise. Hence, the results section describes the sample and compares it to the State of New Jersey as a whole to estimate sample bias.

Survey questions were developed to gauge respondents' views about the walkability of their neighborhoods, the quality of their neighborhood, the extent of their current physical activities and how these might be altered by increasing the walkability of their neighborhoods, and personal characteristics about the respondents. With a few exceptions, all of the questions have been used previously or were derived and slightly modified from existing surveys. Eleven questions defined indicators of walkability by asking the extent of respondent agreement with a statement (Table 2). For example, one question asked if there are sidewalks and places to ride a bicycle the whole way. A second asked if the sidewalks are in good condition. Others asked about safety, automobile traffic, crime, animals, hills, and attractive views. The questions were on a four-point scale (1=strongly agree, 2=agree, 3=disagree, 4=strongly disagree). Another question asked how much would their exercise increase a day if walkability were improved. Seven options were provided ranging from not at all to 30 minutes or more (Table 3).

Twenty-two questions measured public perception of neighborhood quality and problems. These frequently used questions identified 20 potential conditions in the respondent's neighborhood and asked if the condition exists and bothers the respondent.²⁸ After initial statistical analyses, these 20 were used to create a single neighborhood problem scale. Question 21 asked for a rating of neighborhood quality, with the following choices: excellent, good, fair and poor. The last question asked if the respondent's neighborhood was better, worse, or the same as their previous one.²⁸

A third set of seven questions asked about current physical activities because we wanted to know if those who currently did not engage in physical activity would engage if walkability were improved. Six of the seven questions were recommended by Center for Disease Control staff and come from their behavioral risk factor survey instrument.^{2,3} The first three ask if the respondent currently engages in "moderate" physical activity, which is defined as causing small increases in breathing or heart rate. The respondent is asked if they do moderate activity at least 10 minutes at a time. If the answer is yes, they are asked to fill in the number of days per week, and the number of hours and minutes per day they engage in the activities. The second set of three questions is repeated for "vigorous" exercise, which is defined as causing large increases in breathing or heart rate. These two sets of questions allowed us to

estimate the amount of time each respondent spends exercising a week. The seventh question asked respondents to indicate what proportion of their exercise is walking or biking outdoors. Combing these seven questions, we were able to estimate the amount of outdoor walking and biking.

The last set of 15 questions were about the respondents. Six questions were used to examine the demographic correlates of respondents' willingness to increase walking and biking exercise. Six asked about age, gender, type of residence (own and rent), length of residence in the neighborhood, education, and race/ethnicity.

The remaining items were characteristics that we perceived might be associated with the propensity to increase walking. We asked respondents the extent to which they desire to have more control over what goes on in their neighborhood. The greater the desire for control, we assumed, the more likely they would want to be outdoors in the neighborhood. The question was posed as five-point Likert scale (1=strongly agree, 2=agree, 3=neutral, 4=disagree, 5=strongly disagree). The five-point Likert scale was used to probe a link to family and personal decisions about walking and exercise. One question asked how important walkability was in their choice of their current home. A second asked if they recalled their parents, friends, and relatives walking to work or to the train or bus when the respondent was a child. The third asked if they felt they had control over risks to their own health. We expected that those who chose their neighborhood because it was walkable, and who had a family history of walking and biking, would be more likely to walk in their neighborhoods.

RESULTS

Respondent Characteristics

The demographic and exercise characteristics of the respondents are compared to the State of New Jersey as a whole in Table 1. Respondents were more likely to be female, renters, high school and college graduates, 18–30 and 51–70 years old, and Asian or Black Americans than the State population as a whole. Lastly, our respondents were slightly less likely to meet the national recommendation for physical activity in the year 2004 than were their state and national counterparts as a whole did in the year 2001.

To determine how much bias the convenience sample introduced, we weighted the sample data by age, race/ethnicity, college education, gender, and homeownership so that it matched the data for New Jersey as a whole in the year 2000. The estimated proportion meeting the national guideline varied from 40.9 to 43.0, and the aggregate by weighting all the demographic characteristics was 42.6 compared to 42.2 for the unweighted sample. Clearly, a convenience sample is not going to match the characteristics of a larger population, and we do not claim that this one does. However, this finding suggested that the bias in the convenience sample was not remarkable.

Question 1: Walkable Neighborhoods Table 2 shows the response to the 11 measures of walkability. A lack of sidewalks/bikepath (20%), condition of sidewalks (16%), too much traffic (16%), and drivers not yielding to pedestrians (13%) were the most prevalent major concerns.

Cronbach's Alpha was used to determine the extent to which these 11 indicators could be used as a single walkability measure. Cronbach's Alpha among the

TABLE 1. Characteristics of respondents and residents of New Jersey as a whole

Characteristic (n = 340)	Respondents (%)	New Jersey, year 2000 (%)
Gender		
Female	55.1	51.5
Male	44.4	48.5
Homeownership		
Homeowner	59.8	65.6
Educational attainment		
High-school graduate	92.3	82.1
College graduate	42.4	29.8
Age		
18–30	36.5	22.4
31–50	25.0	43.2
51–70	34.9	23.8
71+	3.6	10.6
Ethnicity/race		
Asian	9.5	5.7
Black	17.6	13.6
Hispanic	5.5	13.3
White, non-Hispanic	58.5	66.0
Other	8.9	1.4
Current exercise		
Engaged in activities consistent with recommendations*	42.2*	44.0†
Engaged in no leisure time physical activity*	24.6	26.4

^{*}Age-adjusted to the 2000 US standard population. Age-adjustment for respondent data is less precise because age was gathered in slightly different categories than for Behavioral Risk Factor Surveillance System (BRFSS). †2001 data for New Jersey estimated in BRFSS.^{2,6-8}

TABLE 2. Walk/bikeability of neighborhoods

Indicator (n = 340)	Strongly agree (%)	Somewhat agree (%)	Somewhat disagree (%)	Strongly disagree (%)
Sidewalks or a bike path are present	34	30	16	20
Sidewalks in good condition	24	40	20	16
Too much traffic along route	26	35	23	16
Drivers yield to pedestrians	20	39	28	13
Attractive trees and views	39	37	14	10
Hills along route are a barrier	38	36	17	9
Safe from traffic	39	34	18	9
Easy to cross street	43	30	20	7
Feel safe from crime while walking	47	34	12	7
Walk is pleasant	43	39	13	5
Feel safe from animals	41	45	11	4

11 measures was .781. A Cronbach' Alpha of ≥.7 is considered good evidence of a single scale, and ≥.8 is considered excellent evidence of a single scale. Cronbach's Alpha suggests that same respondents identified multiple walkability problems. This finding means that it was legitimate to compute an aggregate walkable scale, which ranged

from 11, which is strongly in agreement with the presence of all walkable elements to 44, which is strongly in disagreement with all the 11 elements of walkability. The average score across all respondents was 22.0, and 80% of respondents had a score between 16 and 26. A score of 28–44 signifies that a respondent had problems with at least half of the 11 walkable elements, and 15% of respondents reported such a score.

Question 2: Potential Increase in Outdoor Walking Table 3 shows that even if walkability were improved, 46% of the respondents would not increase their outdoor exercise at all. Another 16% say that they would increase their outdoor exercise by less than 10 minutes a day. This left 39% who would increase their walking by at least 10 minutes.

Question 3: Correlates of Potential Increase in Outdoor Walking Associations between potential outdoor walking and 21 independent variables were examined in two stages. First, depending upon the type of variable, all 21 were screened for significance with chi-square or one-way analysis of variance tests. Eleven of the 21 had statistically significant associations at P < .01 with potential increase in outdoor walking compared to less than one expected by chance $(21 \times 01 = 0.21)$.

Nine of the 11 showed strong associations with race/ethnicity, neighborhood quality, and personal decisions. We focus on the last three sets of results in presentation of the multivariate analysis, which was the second stage of the analysis. Ordinal regression was used because the dependent variable is an ordinal variable that measures seven categories of stated willingess to increase outdoor walking. The ordinal regression results presented in Table 4 represents four aggregated potential increase in walking categories from the original seven: (1) no increase; (2) 1–9 minutes; (3) 10–19 minutes; and (4) 20+ minutes. The results are presented for this regrouping rather than the seven original groups because the four groups more closely equalize the number of observations in each category. Note, however, that ordinal regression also was computed with the original seven categories. The results were not notably different. For example, the Cox and Snell pseudo R-square value for the four-category model was 0.213 and was 0.220 for the seven-category version. The Nagelkerke pseudo R-square for the four-category model was 0.231 and was 0.229 for the seven-category version.

The first of the three interesting findings was that self-designation as White or Black comprised two of the four strongest correlates. Many more Blacks claimed that they would add more time walking outdoors than did Whites. Specifically, only 8% of those who said they would not increase their walking were Black, and 72%

TABLE 3.	Stated increase in walking if outdoor
walkabilit	y conditions were improved

Time increase in minutes (n = 340)	Frequency	Percent
Not at all	155	46
<5	23	7
5–9	31	9
10–14	39	12
15–19	45	13
20-29	10	3
≥30	37	11
Total	340	101

TABLE 4. Ordinal regression of intention to spend additional time walking outside if neighborhood is made more walkable

Correlate (n = 340 valid cases)	Group	B value	SE
Neighborhood walkability (11–19 = most walkable;	1, 11–19	-1.375	0.300
20–24 = moderate walkability; 25–44 = least walkable)	2, 20–24	-0.413	0.254
	3, 25–44	0.00	
White respondent	1, yes; 0, no	-0.585	0.259
Want more control over what goes on in neighborhood	1, yes; 0, no	0.669	0.221
Black respondent	1, yes; 0, no	0.252	0.335
Neighborhood quality	1, fair, poor; 0,	0.234	0.302
Bothersome neighborhood problems (range 0–20)	excellent, good	0.202	0.270
bothersome neighborhood problems (range 0–20)	1, 2	-0.282	
	2, 3–4 3, 5+	-0.116 0.000	0.311
Friends, family walked to work or to train	1, yes; 0, no	0.477	0.220
Choose neighborhood because of walkability	1, yes; 0, no	0.483	0.279
Neighborhood worse than previous neighborhood	1, yes, 0, no	0.677	0.394

Summary statistics: Goodness-of-Fit Chi-square 516.7, *P* < .01. Pseudo R-square: Cox and Snell 0.213, Nagelkerke 0.231.

were White, a Black/White ratio of 0.11. In contrast, 34% of those who said that they would walk at least 20 minutes more were White, and 34% were Black a ratio of 1.0. While Black–White differences were apparent, age, gender, and education were not significant correlates in the screening tests or the ordinal regressions. The greater willingness of Blacks to spend more time outside walking than that of Whites is not obviously explained by differences in age, gender, and socioeconomic status.

A second notable finding is the high correlations of the neighborhood quality measures. Starting with walkability, moving to an indication of a desire to have more control over what is going on in their neighborhood, third to poor or fair neighborhood quality, then to bothersome neighborhood problems, and to current neighborhood is worse than previous neighborhood, the respondents clearly are saying that the overall neighborhood quality is a strong predictor of walkability and the willingness to spend more time walking outdoors. The poorer the quality of the neighborhood, the more likely the respondent indicated that he/she would increase walking if the neighborhood was made more walkable. Among those who said that they would not increase their neighborhood walking, only five percent said that their present neighborhood was worse than their former neighborhood; 14% rated the neighborhood as fair or poor quality; and they rated an average of 3.5 neighborhood problems of 20 as bothersome. In contrast, the comparable numbers for those who said that they would walk 20 or more minutes were as follows: 21% said that their present neighborhood was worse than their prior one; 40% said the neighborhood was fair or poor quality; and they identified an average of 6.9 problems as bothersome. Clearly, those who say they would walk more reside in neighborhoods they perceived as more distressed.

Particularly striking was the strong difference between respondents' answers to the question about their desire for more control of their neighborhood. Thirty-seven percent of the group that would not walk more wanted more control compared to 70% who would walk more. This finding suggests that the responses to the walkability questions were part of a desire to regain some control or at least feel more comfortable in their neighborhoods.

Stated increase in minutes walking outside	Black respondents (n = 25) (proportion)	White respondents (n = 62) (proportion)
None	5 (0.20)	42 (0.68)
1–9	7 (0.28)	5 (0.08)
10–19	6 (0.24)	9 (0.15)
20+ minutes	7 (0.28)	6 (0.10)
Total	25 (1.00)	62 (1.01)

TABLE 5. Benefits for Black and White respondents of more walk/bikeable neighborhoods: respondents currently reporting no outdoor exercise

To further explore this finding, cross-tabulations were made between the 11 measures of walkability and the wish for more control. Respondents who wanted to gain more control were most concerned about drivers not yielding to pedestrians, too much traffic, poor condition of sidewalks and the lack of sidewalks or bike-paths.

The third interesting result is that those respondents who would spend more time outdoors walking were more likely to remember that their parents walked to work or to transportation (62%), and that an important criteria for them choosing the current neighborhood was that they could walk or bike to work or to transportation (34%). The comparable numbers from their counterparts who said that they would not walk more were only 35% and 15%. Family history and self-interest motivations add to the stated willingness to walk more in more walkable neighborhoods.

The ordinal regression model produces projected group membership, and these were compared with the actual group memberships. Overall, 182 of 340 (54%) were accurately predicted into their actual group. In the vast majority of cases the prediction was off by one group. For example, only three cases of 155 were predicted to be in group 4 (20+ minutes) when the respondent had placed themselves in group 1 (no increase).

As we examined the data, we observed that the overall findings might be obfuscating racial/ethnic differences among the group that reported no current exercise, which constituted one fourth of the respondents (87 of 340). Table 5 summarizes the essence of the observation. More outdoor exercise would clearly be expected from Blacks who do not currently engage in outdoor walking than from their White counterparts. Forty-two of the 62 (68%) White respondents who currently reported no outdoor exercise would not engage in any even with a more walkable neighborhood. This compared with only 5 of the 25 (20%) of Black respondents. More than half of the Blacks said that they would engage in 10 or more minutes of outdoor exercise (13 of 25) compared to a fourth (15 of 62) of their White counterparts. This implies a greater potential health benefit in heavily Black communities.

DISCUSSION

Four limitations of this research are apparent. First, the sample was only 340 people. Second, it was a convenience sample. Weighting the results showed very little change in the indicator of current exercise. Nevertheless, the generalizability of the results is open to question. Third, walking and various other nonmotorized forms were lumped together. In some places, they require entirely different paths. Fourth, the results are based on what respondents say they would do if their neighborhoods were more walkable. They are not based on measured evidence of what respondents

have actually done. This paper has no incontrovertible proof that a more walkable neighborhood will lead to more walking.

With these caveats noted, the findings of the research are that disproportionately Blacks say that they would walk more if their neighborhoods were more walkable. They also say that they want more control over events in their neighborhoods, which they disproportionately characterize as fair or poor quality and worse than their previous neighborhoods.

We interpret these observations as evidence to support walkability as a second decade, or second wave environmental equity issue. On February 11, 1994, President Bill Clinton's Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations) required every federal agency to develop an environmental justice strategy "that identifies and addresses disproportionately high and adverse human health or environmental effects of its programs, policies or activities on minority populations."²⁹ The programmatic focus of the environmental justice movement was designed to gain fair treatment with respect to development, implementation and enforcement of environmental laws, regulations and policies and to try to assure that no group is supposed to bear a disproportionate share of the negative environmental consequences of enterprise. The focus of the issue in the United States during the first decade has been primarily on locally unwanted land uses, such as landfills, hazardous waste incinerators, chemical, metal and oil production facilities, lead in homes and other pollutants. But the concept of environmental justice is not static, and we suggest walkability should be considered as part of an evolving definition of the elements of environmental justice.

Given the preliminary evidence presented in this paper, a call for an entire environmental justice-based program to address walkability in distressed urban neighborhoods is unreasonable. It is reasonable to argue for funding to reduce the uncertainty about the relationship between improving the design of urban neighborhoods and outdoor walking and other forms of exercise. More specifically, we recommend two research paths to increase the reliability of the observations. One research path begins with focus groups that can produce key walking paths leading to shopping, schools, parks and community facilities, and train and bus stops. Then these results should be captured in GIS maps and turned into follow-up surveys to ascertain public perceptions about these key routes. Such an exercise would prioritize changes to walkability and get people involved in talking about the subject.

The second research path is to use retrospective and prospective designs to ascertain the actual impact on walkability of neighborhood design changes, such as new schools; train stations, bus stops, and park-and-ride facilities; and side-walk repaving. As part of this effort, we should gather survey data, but it is essential that we try to gather data that actually shows how much time and effort resulted from design changes by using personal monitoring devices. A final point is that we make this argument about urban design and environmental justice during a period when efforts are being made to bring back the formerly strong relationship between urban design and public health, ³⁰ and this linkage of walkability to public health is clearly consistent with rebuilding that link.

ACKNOWLEDGEMENTS

We appreciate the thoughtful suggestions about an earlier version of this paper made by two anonymous reviewers.

REFERENCES

 Centers for Disease Control and Prevention. Physical Activity and Health: Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 1996.

- 2. Centers for Disease Control and Prevention. Prevalence of physical activity, including lifestyle activities among adults—United States, 2000–2001. MMWR Morb Mortal Wkly Rep. 2003;52:764–769.
- Centers for Disease Control and Prevention. Compliance with physical activity recommendations by walking for exercise—Michigan, 1996 and 1998. MMWR Morb Mortal Wkly Rep. 2000;49:560–565.
- 4. Centers for Disease Control and Prevention. Increasing physical activity, a report on recommendations of the task force on community preventive services. MMWR Morb Mortal Wkly Rep. 2001;50:560–565.
- Centers for Disease Control and Prevention. State-specific prevalence of selected chronic disease-related characteristics—behavioral risk factor surveillance system, 2001. MMWR Morb Mortal Wkly Rep. 2003;52:560–565.
- Centers for Disease Control and Prevention. Prevalence of no leisure time physical activity—35 states and the District of Columbia, 1988–2002. MMWR Morb Mortal Wkly Rep. 2004;53:82–86.
- 7. Centers for Disease Control and Prevention. Physical activity trends—United States, 1990–1998. MMWR Morb Mortal Wkly Rep. 2001;50:166–169.
- 8. Centers for Disease Control and Prevention. Prevalence of physical activity, including lifestyle activities among adults—United States, 2000–2001. MMWR Morb Mortal Wkly Rep. 2003;52:764–769.
- 9. Powell KE, Martin LM, Chowdhury PP. Places to walk: convenience and regular physical activity. *Am J Public Health*. 2003;93:1519–1521.
- 10. Humpel N, Owen N, Leslie E. Environmental factors associated with adults' participation in physical activity: a review. *Am J Prev Med*. 2002;22:188–199.
- 11. Giles-Corti B, Donovan RJ. The relative influence of individual, social, and physical environmental determinants of physical activity. *Soc Sci Med.* 2002;54:1793–1812.
- 12. Mokdad AH, Marks JS, Stroup D, Gererding JL. Actual causes of death in the United States, 2000. *JAMA*. 2004;291:1238–1245.
- 13. U.S. Centers for Disease Control. Report of the Secretary's Task Force on Black and Minority Health. Vol 10. Washington, DC: U.S. Department of Health and Human Services; 1985.
- 14. Byrd WM, Clayton LA. An American Health Dilemma, Race, Medicine and Health Care in the United States: 1900–2000. Vol 2. New York, NY: Routledge; 2002.
- 15. Cervero R, Duncan M. Walking, bicycling, and urban landscape: evidence from the San Francisco Bay Area. *Am J Public Health*. 2003;93:1478–1483.
- 16. Staunton CE, Hubsmith D, Kallins W. Promoting safe walking and biking to school: the Marin County success story. *Am J Public Health*. 2003;93:1431–1434.
- 17. Wang G, Macerca C, Scudder-Soucie B, et al. Cost analysis of the built environment: the case of bike and pedestrian trails in Lincoln, Neb. *Am J Public Health*. 2004; 94:549–553.
- 18. Tester JM, Rutherford G, Wald Z, Rutherford MW. A matched case-control study evaluating the effectiveness of speed bumps in reducing child pedestrian injuries. *AJPH*. 2004; 94:646–650.
- 19. Evans L. A new traffic safety vision for the United States. *Am J Public Health*. 2003;93:1384–1386.
- 20. Librett JJ, Yore MM, and Schmid T. Local ordinances that promote physical activity: a survey of municipal policies. *Am J Public Health*. 2003;93:1399–1403.
- 21. McAvoy PV, Driscoll MB, Gramling BJ. Integrating the environment, the economy, and community health: a community health center's initiative to link health benefits to smart growth. *Am J Public Health*. 2004;94:525–527.

22. Fullilove MT. Promoting social cohesion to improve health. *J Am Med Womens Assoc.* 1998;53:72–76.

- 23. Leyden KM. Social capital and the built environment: the importance of walkable neighborhoods. *Am J Public Health*. 2003;93:1546–1551.
- 24. Fishhoff B, Slovic P, Lichtenstein S, Read S, Combs B. How safe is safe enough? A psychometirc study of attitudes towards technological risks and benefits. *Policy Sci.* 1978;9:127–152.
- 25. Siegrist M. A causal model explaining the perception and acceptance of gene technology. *J Appl Soc Psychol.* 1999;22:2093–2106.
- 26. Siegrist M. The influence of trust and perceptions of risk and benefit on the acceptance of Gene Technology. *Risk Anal.* 2000;20:195–203.
- 27. Goszczynska M, Tyszka T, Slovic P. Risk perception in Poland: a comparison with three other countries. *J Behav Decis Making*. 1991;4:179–193.
- 28. Greenberg M, Schneider D. Environmentally Devastated Neighborhoods, Perceptions, Policies and Realities. New Brunswick, NJ: Rutgers University Press; 1996.
- 29. Clinton WJ. Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations. Washington, DC; 1994 Executive Order, No. 12898. Available at: http://inel.gov/program/exec/eo-12898.html.
- 30. Coburn J. Confronting the challenges in reconnecting urban planning and public health. *Am J Public Health*. 2004;94:541–546.