High Point Walking for Health: Creating Built and Social Environments That Support Walking in a Public Housing Community

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Obesity and diabetes are major contributors to health inequities.[1] The excess burden of these diseases in low-income and minority populations is in part caused by adverse conditions in the built and social environments. These conditions in turn affect behaviors that lead to obesity and diabetes such as physical inactivity and unhealthy eating. The built environment influences opportunities for physical activity through access to trails, parks, recreation centers, and walkable streets.[2–5] The social environment affects physical activity through perceptions of community and pedestrian safety, social support, and access to recreation and activity programs.[6]

The growing awareness of the impact of built and social environments on health inequities has led to a more inclusive concept of the environment in the context of environmental justice.[7,8] The environmental justice movement originated as a response to inequitable exposure to environmental pollutants.[9,10,11] It is now clear that environmental injustice also includes disproportionate exposure to unhealthy places characterized by negative social and physical environments. This framing suggests that the methods developed by the environmental justice movement to address pollutants might also be useful for improving social and physical environmental determinants of health in marginalized communities. The environmental justice movement has used community mobilization[12] and community-based participatory research (CBPR) strategies[13,14] to successfully tackle environmental injustices.

We used community mobilization and CBPR to develop and evaluate activities aimed at increasing physical activity at the High Point public housing community in Seattle. Our project, High Point Walking for Health, sought to make the social and physical environments more supportive of walking and assessed the degree to which physical activity and walking

Objectives. We implemented and evaluated multiple interventions to increase walking activity at a multicultural public housing site.

Methods. A community-based participatory research partnership and community action teams assessed assets and barriers related to walking and developed multiple interventions to promote walking activity. Interventions included sponsoring walking groups, improving walking routes, providing information about walking options, and advocating for pedestrian safety. A pre–post study design was used to assess the changes in walking activity.

Results. Self-reported walking activity increased among walking group participants from 65 to 109 minutes per day (*P*=.001). The proportion that reported being at least moderately active for at least 150 minutes per week increased from 62% to 81% (*P*=.018).

Conclusions. A multicomponent intervention developed through participatory research methods that emphasized walking groups and included additional strategies to change the built and social environments increased walking activity at a public housing site in Seattle. (*Am J Public Health.* 2009;99:S593–S599. doi:10.2105/AJPH.2009.164384)

activity changed after the intervention was implemented.

METHODS

The new High Point community is a mixed-income, diverse community developed by the Seattle Housing Authority in partnership with local developers. High Point was originally built as housing for industrial workers during World War II. The Seattle Housing Authority acquired the site in 1953 and converted it into public housing. A decade ago, the old High Point community consisted of 716 housing units that were 60-years-old and in varying states of deterioration laid out in a suburban-style street plan. The Seattle Housing Authority used HOPE VI funds (awarded by US Department of Housing and Urban Development with the intention to revitalize severely distressed public housing and, thus, lessen concentrations of poverty, provide services to promote self-sufficiency, and improve quality of life)[15] to redevelop High Point as a health-promoting, mixed-income, sustainable

community with 1600 new publicly and privately owned housing units. Phase I, comprising half the site, was completed in 2006. Phase II was completed in 2009.

Principles of "new urbanism" guided the redevelopment process. Features that contributed to a healthy community were 21 acres of open spaces (a pond, a central park, and multiple pocket parks), trails, wider sidewalks, separation of sidewalks from traffic by swales and trees, traffic calming structures, and a grid street layout. Gathering spaces and community gardens were included to promote social interaction and outdoor activity and serve as walking destinations. Greenbelts, wetland preservation, and watershed protection were included to enhance environmental quality. The building design and orientation were intended to promote social interaction, create defensible spaces, and support physical safety (e.g., sidewalk-facing porches, windows facing streets to allow observation).[16]

When redevelopment began, High Point was a culturally diverse community that included many racial/ethnic groups: 36% of the

residents were African or African American, 29% were Asian/Pacific Islander, 18% were White, and 17% were other races/ethnicities. A majority of household heads (61%) were not born in the United States.[17] This cultural diversity was reflected in the linguistic diversity of residents: only 37% spoke English as their preferred language and 26% spoke Vietnamese, 12% Cambodian, 8% Somali, 4% Spanish, and the rest spoke 1 of 9 additional languages. Because of public housing income eligibility criteria, 85% of households had incomes at or less than 30% of the median for King County.[17] High Point remains a diverse community.

Planning for a Healthy Environment

Partnership. The High Point Walking for Health project was developed and implemented by a partnership of residents, community-based organizations, Seattle Housing Authority staff, public health practitioners, university faculty, and additional public agencies. The partnership used CBPR methods to guide its formation and operation.[12,18,19] The values that guided its work included reducing health inequities, being cognizant of how race and class affect power and decision-making, development of community capacity and leadership skills, linguistic and ethnic inclusivity, and community ownership. Partners met monthly to determine project goals, design strategies, oversee implementation and evaluation methods, and review evaluation findings.

The project supported the development of community action teams made up of youths and adults. Each team (1 for adults, 1 for youths) consisted of 8 to 10 residents who assessed community conditions, discussed community concerns, built leadership and social capital, and developed project activities.

Community assessment. The partnership used multiple methods of data collection to describe community conditions related to physical activity. The initial assessment was conducted in the old High Point community and was updated as redevelopment progressed.

Community action team members participated in semiannual qualitative interviews over 2 years. The interviews elicited perceptions of community assets and challenges related to physical activity and ideas about culturally appropriate actions to increase activity. For example, pedestrians did not feel safe when

crossing the major arterial street forming the community's western border. Residents needed encouragement and an organized effort to get out and walk more often. Many were not aware of the benefits of walking and the walking opportunities presented by the new physical environment.

Researchers developed a door-to-door survey. Partners suggested additions, deletions, and rewordings of the survey instrument and then the evaluators shortened, pilot-tested, translated, and reviewed the instrument for accurate cross-cultural translation in each language. The final questionnaire contained 75 items and took 25 to 30 minutes to complete. The questionnaire included measures of physical activity from the Behavioral Risk Factor Surveillance System,[20] the built environment related to walkabilty (Neighborhood Environmental Walkability Survey),[21] and social capital.[22] All households with English, Vietnamese, and Cambodian speakers were eligible for inclusion in the survey (n=188, which was 75% of all households). Funding constraints limited our ability to conduct interviews in the remaining 11 languages. Researchers conducted focus groups, a less costly alternative, in the next 2 largest language groups (Spanish and Somali) to learn about perceptions of these residents, who comprised an additional 12% of households. The lead community-based interviewer informed residents of the survey and offered a grocery store gift card ($10) as a participation incentive. Bilingual interviewers from the community conducted the survey. Interviewers attempted to contact each household up to 9 times through a combination of phone calls and door-to-door visits at different times of the day and week during May and June 2005 while residents still lived at the old High Point community. They collected data from 155 of the eligible households (82%). Those not included declined to take the survey, moved out, or could not be contacted after 9 attempts.

Selected survey results are displayed in Table 1. Most respondents were non-White, had a high-school education or less, were very low income, and were female. The survey findings helped define the need for a walking intervention. Only 20% of respondents reported moderate weekly physical activity at recommended levels (150 minutes per week).[23] Fewer than half walked at least 30 minutes per

day for exercise, and 70% walked at least 30 minutes per day for all walking purposes combined. Many perceived the old High Point community environment as containing features that have been shown to discourage walking, such as lack of nearby shopping, natural sites, or other destinations; crime; and problems with too much traffic, speeding, and unsafe street crossings.[4]

Community action team members used photovoice (a participatory-action research approach to document community assets and concerns through photographs, critical discussions, and communication with policymakers) to document neighborhood features that supported or inhibited walking in the old High Point community.[24–26] Their work revealed assets such as the diverse mix of residents, 100-year-old trees, and large open spaces. They also found that the community was cut off from a neighboring greenway with trails, from schools, and from bus routes because of the poor condition of a block-long staircase that provided the only direct access to these destinations.

Based on these findings, the community action teams, with support from the partnership, decided to focus on making High Point a walking community. The community action team members chose and implemented a series of actions in the built and social environments. They referred to the Centers for Disease Control and Prevention *Community Guide*, which describes effective interventions to promote physical activity.[27] The partnership and community action teams chose interventions they viewed as well-suited to High Point: additional enhancements to the built environment (improvements to walking routes and pedestrian safety features), a community-wide information campaign, social support (walking groups, tea and coffee groups), individually adapted behavior-change approaches (walking groups), and improved access to places combined with outreach activities (walking maps, posting of walking information). A description of these activities follows.

Improving the Built Environment

The staircase project. The community action teams applied for and received a city grant to restore the neglected staircase documented by the photovoice assessment. The staircase was overgrown with invasive vegetation, steps were

TABLE 1—Selected Variables from the High Point Housing Community Survey: Seattle, WA, 2005

Variable	Value
Demographics of survey respondents	
Employed, %	31.6
Age, %	
18–24 y	2.0
25–44 y	23.4
45–64 y	48.7
≥65 y	26.0
Race, %	
White	14.2
Black or African American	25.8
Asian	49.0
Native Hawaiian or Other Pacific Islander	0.6
American Indian/Alaska Native	2.6
Other	7.7
Hispanic ethnicity, %	6.8
Highest level of education, %	
None	15.6
Grade school	30.5
Some high school	13.6
High school graduate	22.1
Some college	14.3
College graduate or more	3.9
Household income less than $1000 per month, %	69.5
Female gender, %	77.4
Perceptions of built environment[a]	
There are many attractive natural sites in my neighborhood (such as landscaping, views), %	58.1
There is so much traffic along nearby streets that it makes it difficult or unpleasant to walk in my neighborhood, %	51.6
Most drivers exceed the posted speed limits while driving in my neighborhood, %	56.1
There are crosswalks and pedestrian signals to help walkers cross busy streets in my neighborhood, %	57.1
The crime rate in my neighborhood makes it unsafe to go on walks during the day, %	34.8
Stores are within easy walking distance of my home, %	56.5
There are many places (stores, playgrounds, parks, and so on) to go within easy walking distance of my home, %	58.1
Physical activity	
Minutes walking per day, total mean	64.2
Minutes walking per day for exercise, mean	26.7
Walk for exercise at least 30 min per day, %	44.7
Walk (exercise, to transit, errands, to work) at least 30 min per day, %	70.3
Moderate activity at least 150 min per week, %	56.3

Note. The sample size was N = 155.
[a]Percentage who strongly or somewhat agreed with the statements in this section.

covered with moss, and handrails were in disrepair. The community action team arranged training about terrain restoration, native plants, and the importance of the nearby Longfellow Creek watershed. They organized more than 30 residents to remove blackberry bushes and other invasive plants, plant 200 native plants, clean the steps, and restore the handrails. When their work was done, community action team members led tours down the staircase and along a trail to Longfellow Creek.

Advocacy for pedestrian safety. Residents, supported by partnership staff and Feet First (a local pedestrian advocacy organization), organized advocacy efforts directed at policymakers from city transportation and police departments, the Seattle Housing Authority, and the city council to improve pedestrian safety. Two rallies and 4 community forums involving more than 100 residents (including youths), visits by city council members, and tours through the neighborhood raised awareness. The campaign resulted in restrictions on street parking to improve car and pedestrian visibility, improvement of traffic signals, relocation of a school bus stop to a safer location, installation of radar speed monitors on a busy arterial street, and enhancements of safety at a busy intersection where traffic-related injuries had occurred (including a cyclist fatality).

Improving the Social Environment

Walking groups. Local walking advocacy groups (Feet First and Steps to Health—King County) introduced to the partnership and community action teams the concept of walking groups as an effective social environmental strategy to promote physical activity.[28–32] The *Walk Kit* from the California Center for Physical Activity served as a model program guide.[33] Partners and community action team members agreed that this approach had a good chance of success and modified it to meet the local context. In 2006, the adult community action team identified a 1-mile path around the new central pond as a walking trail. Feet First and Steps to Health trained 6 staff from community-based organization partners as group leaders, including bilingual coordinators with proficiencies in Cambodian and Vietnamese. Five residents also served as walk leaders. Leaders recruited public housing residents (all residents older than 14 years were eligible) through fliers and word of mouth. Leaders made reminder phone calls, checked walkers in, led stretching exercises, and timed the walk. Walkers were encouraged to meet then-current physical activity guidelines (e.g., 30 minutes of moderate to vigorous exercise most days per week[34]) and walking recommendations (10 000 steps per day[35]). The

walking groups met 5 times a week during weekday, evening, and weekend sessions. Participants generally walked for 1 hour around the pond although distances varied depending on the capacity of each walker. For example, 1 resident began by walking with an assistive device, later switched to a cane, and, near the end of the intervention, walked on her own. Groups ranged in size from 10 to 30 participants. Walkers received T-shirts, pedometers, and prizes for meeting individual walking goals. Phone call reminders, fliers, and incentives such as raffle tickets helped sustain participation.

Marketing walking. The assessment found that residents were not fully aware of the walking opportunities at the new High Point community. This led the youths' community action team to implement a walking information campaign that included designing and building a central kiosk for posting information about health and walking. Partners worked with a health educator from Public Health—Seattle and King County to prepare a walking map of High Point and the surrounding neighborhood. The walking groups themselves promoted walking as other community members observed them (members wore T-shirts or bright yellow rain ponchos) and joined in.

Evaluation Methods

We used a pretest–posttest design to evaluate the impact of the improvements to the built and social environments by surveying participants in the walking groups. The evaluation period was March through May 2007. Baseline data were collected prior to implementation of the walking groups, pedestrian advocacy campaign, and informational campaign. Posttest data were collected 3 months after the walking groups and informational campaign, but before all the pedestrian improvements were completed.

Walkers participated in baseline and 3-month follow-up surveys. Fifty-eight (97%) of the 60 group participants completed baseline surveys, and 53 (91% follow-up rate) completed exit surveys. The evaluator tried to contact those who did not complete the exit survey: two were visiting family on extended trips and 3 could not be reached. Surveys included measures of minutes walked per day,[21] physical activity,[20] general health,[20] and social connectedness.[36] Native-speaking contract

staff translated and then reviewed the questionnaire for appropriate language and content. An evaluator, who used bilingual interpreters as needed, administered the surveys. All survey participants received $10 shopping card incentives for pre- and postintervention survey completion. The significance of pre–post differences was assessed with the paired *t* test or the McNemar test via Stata version 10 (Stata Corp, College Station, Texas). The final sample size had a power of 0.8 to detect a difference of 22.6 minutes per day of walking, with $\alpha = 0.05$. We also collected qualitative data on the impact of the groups through interviews with walking group leaders.

RESULTS

The participants were diverse in age and race (Cambodians and Vietnamese accounted for the majority of the group members). Most had not attended college, were unemployed, and were female (Table 2). Relative to community survey respondents, they were more likely to be White and have higher educational attainment, less likely to be Black, and similar with respect to age and gender.

Participants significantly increased their walking. The total number of minutes walked per day increased from 64.6 to 108.8 (Table 3). Walking for exercise and errands both increased. There were no significant changes in walking to work, school, or bus stops. The number of participants meeting the recommendation for moderate physical activity (i.e., being active at least at a moderate intensity level for at least 150 minutes per week[23]) increased.

General health improved, with participants reporting fewer days when physical health and mental health were not good. Social connectedness grew, with a substantial increase in the mean number of neighbors that participants knew well enough to say hello to while walking. Perceptions of environmental factors associated with walking (those listed in Table 1) did not change, with the exception of a modest decrease in concern about crime and safety (mean change from 15.9 to 14.9; *P*=.009).

Interviews with group leaders revealed unanticipated benefits. For example, a recent immigrant with limited English proficiency and no regular source of primary care joined the

walking group. Student nurses offered blood pressure measurement to all participants. A student found his pressure to be dangerously high (210/70 mm Hg) and ensured that he was evaluated at the public hospital and then linked to a primary care provider.

Another example of collateral benefit was an increase in the leadership skills of a walker who was a community action team member and resident activist. In a community-wide vote, he was elected as a representative to the neighborhood association despite his limited English-language proficiency. His participation in the walking group and other community action team activities led to his confidence in being

TABLE 2—Characteristics of Walking Group Participants (n = 58) at Baseline: High Point Housing Community, Seattle, WA

Characteristics	%
Age, y	
18–24	3.5
25–44	24.1
45–64	43.1
≥65	29.3
Femal Gender	74.1
Race/ethnicity	
White	31.0
Black	12.1
Asian	53.4
Cambodian	34.5
Vietnamese	17.2
Other Asian	1.7
American Indian/Alaska Native	3.5
Highest level of education	
None	10.5
Grade school	28.1
Some high school	7.0
High-school graduate	8.8
Some college	22.8
College graduate or more	22.8
Employment	
Employed	32.8
Out of work <1y	1.7
Homemaker	5.2
Student	6.9
Retired	17.2
Unable to work	36.2

TABLE 3—Changes From Baseline to Posttest for Walking Group Participants (N = 53): High Point Housing Community, Seattle, WA

Outcomes	Baseline	Posttest	Change (95% CI)	P
General health outcomes				
Number of days physical health not good in past 30 d, mean	9.6	4.7	−4.9 (−7.7, −2.2)	.001
Number of days mental health not good in past 30 d, mean	7.5	4.4	−3.2 (−5.2, −1.1)	.003
Walking and physical activity outcomes				
Minutes walked per day to bus stop, mean	7.7	7.1	−0.6 (−3.2, 2.0)	.645
Minutes walked per day to work or school, mean	2.3	3.6	1.3 (−1.1, 3.6)	.281
Minutes walked per day for errands, mean	24.1	48.1	23.9 (7.9, 40.0)	.004
Minutes walked per day for exercise, mean	31.7	51.0	19.2 (12.6, 25.9)	.001
Total minutes walked per day, mean	64.6	108.8	44.1 (28.0, 60.2)	.001
Meeting recommendations for moderate activity– new guideline[a] (>150 min/wk), %	61.5	80.8	19.2 (2.2, 36.3)	.018
Meeting recommendations for vigorous activity– new guideline[a] (>75 min/wk), %	38.5	40.4	1.9 (−18.1, 21.9)	.835
Meeting either moderate or vigorous activity recommendations–new guideline,[a] %	71.7	84.9	13.2 (−3.5, 29.9)	.090
Social outcomes: number of neighbors know well enough to say "hello" to, mean	6.3	10.6	4.3 (2.0, 6.7)	.001

Note. CI = confidence interval.
[a]US Department of Health and Human Services, *2008 Physical Activity Guidelines for Americans*.[23]

a spokesperson for others, especially for his fellow Cambodian residents.

DISCUSSION

A CBPR project aimed at increasing physical activity among low-income, culturally diverse public housing residents succeeded in increasing walking activity. The project used multiple strategies that addressed both the social environment (e.g., walking groups and building social capital to effect changes in the built environment) and the built environment (e.g., aesthetic and pedestrian safety enhancements and signage for walking trails). The results of this project support further testing of physical activity promotion strategies appropriate to the contexts of specific places that concurrently address both the built and social environments.

The study design did not permit us to quantitatively distinguish the relative contributions of each strategy because they were implemented concurrently as part of a multifaceted intervention. However, discussions among project participants suggested that the walking group was the most potent element. The benefits of walking group participation

appeared to extend beyond walking for recreation. Participants reported that they walked more for errands, increased their social interactions, and improved their general health status.

Although prior evaluations of walking groups have demonstrated their effectiveness, we are unaware of any that were conducted among a highly diverse group of public housing residents. Despite the diversity of walkers, participants tended to have higher educational attainment than the community average. This suggests that future efforts need to address outreach and recruitment to less–well-educated residents.

The walking groups continue to meet more than 18 months after the National Institutes of Health grant funds that supported their initial development ended; there are currently 3 active groups with 30 to 45 walkers. Support comes from in-kind staff contributions from a local community health center and Neighborhood House (the community-based organization that implemented the original groups) and from subsequent grant funding. The High Point Neighborhood Association recently initiated sponsorship of additional daily walking

groups led by resident volunteers. The positive evaluation findings and sustained implementation of the groups suggest that this intervention can be effectively translated from the research setting into a multicultural community setting.

Of note, vigorous physical activity among walking group participants did not decrease, suggesting that the observed increases in walking and moderate-intensity physical activity did not compromise the amount of total or vigorous activity. The lack of change in perceived environmental factors related to walking was not surprising when one considers that the pre- and postintervention data collection both took place in the new High Point community and before the traffic safety measures were fully implemented.

The resources to support walking groups and community action teams were reasonable. The walking group cost $20 000 for a 6-month period (or about $330 per participant), including the cost of bilingual staff time and participant incentives. Program administration, development, and implementation; research and evaluation support; bilingual staff support; training; member stipends; and supplies for a year for the community action teams cost approximately $90 000.

The use of CBPR methods enhanced the project in several ways. Inclusion of partners and residents in the design, development, and implementation of the interventions allowed the project to build on strengths and resources within the community. For residents, CBPR facilitated participation by a more diverse group of residents, allowing them to engage in research and program activities and learn how to design health-promoting activities. For partners, the use of CBPR methods led to an equitable sharing of decision-making power, increased skills in grant writing and research, financial benefits such as grant funds, an opportunity to contribute their expertise in implementing the project, recognition as resources for health promotion, and support for expanding the intervention to additional local public housing communities. The use of CBPR provided a framework that enabled partners and residents from diverse class, race, institutional, and disciplinary backgrounds to form a productive collaboration.[37]

This study has several limitations. The pre–post design has well-described inherent

limitations.[38] Walking was measured only by self-report.[39] Resources and logistical constraints did not permit us to use more objective methods such as accelerometry. Some studies that have compared accelerometry with self-report measures suggest that although self-reports may not accurately assess the absolute amount of activity, they may offer advantages for assessing changes over time.[40] In the context of the demonstrated effectiveness of walking groups in studies with more rigorous designs,[28] and the similar effect size seen in our study relative to these prior studies (30 to 60 minutes per week), our work adds to the evidence of the effectiveness of walking groups. We collected posttest data 3 months after participation began and, thus, cannot describe the longer-term durability of the observed changes.

We reported on changes in walking activity only among walking group participants, and, thus, cannot comment on whether walking activity changed among other residents as a result of the other community-level strategies, including building a walkable community (new High Point). We have recently completed a second door-to-door survey of all community residents 3 years after the first survey described herein. When analyzed, this follow-up survey will allow us to examine the community-level impact of the interventions.

In conclusion, a multicomponent intervention to increase walking activity that emphasized walking groups and included additional strategies through changes to the built and social environments was successful in a public housing site in Seattle. ∎

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Contributors

J. Krieger and D. Sharify originated the study and oversaw all aspects of its implementation and evaluation. J. Krieger had primary responsibility for preparing the article, assisted by J. Rabkin. J. Rabkin assisted with implementation and led the evaluation. L. Song conducted the statistical analyses. All authors helped to conceptualize ideas, interpret findings, and review drafts of the article.

Human Participant Protection

The study was approved by the Human Subjects Division institutional review board of the University of Washington.

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