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A multilevel ecological approach to promoting walking in rural communities

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Abstract

Background. Walking is a key focus of public health interventions yet is particularly uncommon in rural residents. This study's purpose was to determine whether a multilevel community intervention affected rates of moderate physical activity, in particular walking.

Methods. A quasi-experimental design examined changes in walking in six rural intervention communities in Missouri and six comparison communities in Arkansas and Tennessee in 2003–2004. Interventions were developed with community input and included individually tailored newsletters; interpersonal activities that stressed social support and health provider counseling; and community-wide events such as fun walks. A dose variable estimated exposure to intervention activities. Primary outcomes were rates of walking and moderate physical activity in the past week.

Results. At follow-up (n = 1531), the percentage of respondents who met the recommendation for walking was the same across the intervention and comparison areas. Among the dependent variables, walking showed some evidence of a positive linear trend across dose categories (P = 0.090). After adjusting for covariates and baseline rates, intervention participants in the moderate and high dose categories were about three times more likely to meet recommended guidelines for walking.

Conclusions. Some evidence of effectiveness was shown for a multilevel intervention approach to promote walking.

Keywords: Community networks; Environment; Exercise; Intervention studies; Walking

Introduction

Among types of physical activity, it is increasingly clear that regular walking provides significant health benefits (Oguma and Shinoda-Tagawa, 2004). For example, brisk walking for at least 30 min per day is associated with a 30 to 40% reduction in risk of type 2 diabetes (Hu et al., 1999). Walking has been a particular focus of public health interventions due to its acceptability and accessibility, particularly among populations with a low prevalence of physical activity (Siegel et al., 1995). The rate of walking is nearly 13% less common among rural residents than among suburban dwellers (Eyler et al., 2003), and rural residents are more likely than urban/suburban individuals to report barriers to physical activity such as fewer sidewalks, limited access to exercise facilities, and lower social

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support for physical activity (Parks et al., 2003; Wilcox et al., 2000).

Multilevel physical activity interventions are viewed as having the largest potential to improve health on a population basis (Breslow, 1996; Sallis and Owen, 1997; Swinburn et al., 1999). The various ecological models highlight the importance of addressing problems at multiple levels and stress the interaction and integration of factors within and across levels (McLeroy et al., 1988; Simons-Morton et al., 1988). Interventions have been organized across at least three levels: *individual factors* that involve one-to-one delivery of information, *interpersonal factors* that often involve interactions with opinion leaders or social support enhancement, and *community factors* that seek to change the physical/policy environment.

There is a sparse literature on combined multilevel approaches to physical activity promotion. Individually adapted health behavior change programs have been shown to be effective in changing behavior (Kahn et al., 2002). Enhancing social networks also is effective, sometimes involving buddy systems or walking support groups. Attributes of the community environment across 18 studies of walking correlates showed consistent associations of behavior with aesthetics, convenience of facilities, accessibility of destinations, and perceptions about traffic (Owen et al., 2004). Among the few studies that have examined the prospective impact of walking trail development and promotion (Brownson et al., 2004a; Evenson et al., 2005), findings are inconsistent.

To augment the literature on the effectiveness of strategies to promote walking in communities, we report findings from Project WOW (Walk the Ozarks to Wellness) that involves a multilevel ecological intervention to promote moderate physical activity, in particular walking.

Methods

Study design and sites

We used a quasi-experimental design to examine changes in walking behavior in six intervention communities in the Missouri Ozark region (across five counties) and six comparison communities in Arkansas (n = 2) and Tennessee (n = 4). This program is an outgrowth of the Ozark Heart Health Project, described previously (Brownson et al., 1997). Comparison and intervention sites were matched according to size, race/ethnicity, and proportion of the population living below the poverty level. Of the 12 communities identified for this study, seven had populations of less than 2500 persons, two were between 2500 and 10,000 persons, and three had populations between 10,000 and 20,000 persons. Compared with the rest of Missouri and the United States, this region has significantly more poverty, is medically underserved, and has lower educational levels. Death rates for chronic diseases (i.e., heart disease, stroke, cancer, diabetes) were significantly higher in the 5-county intervention area (age-adjusted rate = 653 per 100,000) than in Missouri (602 per 100,000) for the period 1993–2002.

Obtaining community input

Physical activity interventions for the current project were developed in conjunction with a regional Steering Committee, consisting of 2–3 representatives from each intervention community. The interventions were developed using community-based health promotion principles (Israel et al., 1998). Specifically, community-based health promotion programs use ecological frameworks that attend to individual, interpersonal, and community factors; give those affected by programs a chance to participate in and influence program development, implementation, and evaluation; and are tailored to meet the needs of individuals and communities. Possible interventions were selected from a menu of evidence-based approaches (e.g., from the Guide to Community Preventive Services (Zaza et al., 2005)) and from Steering Committee meetings.

Previous work in these communities resulted in the development of walking trails through partnerships with coalitions, community organizations, and local government. Six walking trails in the Ozark communities are the focus of intervention activities. Built between 1990 and 2000, most walking trails are located in residential parks within city limits, all have paved surfaces of concrete or asphalt, and trail lengths vary from 0.2 miles to 1.0 miles (mean = 0.45 miles). At each trailhead, electronic counting devices were installed that allowed the team to monitor trail use with infrared beam technology. Some community members also received personal cards that tracked their trail use when swiped through a card reader as they entered and left the trail. Trail use data were used to create walking feedback for individual card users.

Monthly Steering Committee meetings were used to develop individual informational materials, identify the best mechanisms for developing social and community support, coordinate new programs with existing efforts, brainstorm media approaches, identify specific incentives that might enhance community participation, and share ideas across communities.

Intervention activities

Interventions were implemented at three levels: individual, interpersonal, and community. Individual level interventions focused on tailored newsletters sent from the research institution. Following established methods for computer-based tailoring (Kreuter et al., 1999), printed materials were created for individuals who filled out a 30-item intake questionnaire at baseline (time 1) that assessed their status on theoretical constructs such as self-efficacy, social support, perceived benefits and barriers, and preferences for walking alone or with others. During the second year of the project (time 2), a shorter questionnaire was completed to provide additional data for tailoring. The primary objective of the tailored newsletters was to provide positive reinforcement to those who walked regularly and motivational information and supportive resources for those who did not walk regularly. Participants received by mail 12 monthly and 6 bimonthly color tailored feedback letters (8.5″ × 11″ two-sided). These feedback letters consisted of (1) a masthead and two walking trail graphics tailored to the participant's community; (2) a calendar of upcoming community events; (3) one message about health-related events in the upcoming month and promotion of their community walking trail; and (4) one theory-based message tailored to their individual responses to items on the intake questionnaire. For participants who swiped their personal card at the card reader, the feedback letters included a walking report tailored to a participant's walking patterns as recorded by the card reader during the previous month. Data from the card reader were used to identify the date of the participant's last visit to the trail, the average number of minutes walked at the trail, the average number of days per week walked, and a projection of the average number of calories burned by walking at the trail. Newsletter participants were recruited in one of the following ways: (1) expressed interested during the baseline survey, (2) community events, (3) physician recommendation, (4) obtained survey from community organization, (5) trail signage, or (6) word of mouth. During the first year, 1271 participants were enrolled to receive the tailored letters.

Interpersonal interventions were focused in two areas: the patient–health care provider relationship and community social support. Multiple studies have shown the effectiveness of physical activity interventions delivered by health care providers (Simons-Morton et al., 1998). Multi-component intervention strategies (e.g., combining provider advice with other interventions) may be most promising in addressing the burden of inactivity (US Preventive Services Task Force, 2002). A tested provider-based intervention is the Patient-centered Assessment and Counseling for Exercise (PACE) program, which uses the "stages of change" approach (Calfas et al., 1996; Long et al., 1996; Prochaska and Diclemente, 1983). In 2003, nearly 100 physicians, nurse practitioners, and nurses were trained to counsel on increasing physical activity using the PACE program. Once trained, persons entering participating primary care offices in the six intervention communities receive an 8-item intake questionnaire that