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## Worksite Policies and Environments Supporting Physical Activity in Midwestern Communities

**Elizabeth A. Dodson, MPH,**

Prevention Research Center and Department of Community Health, Saint Louis University School of Public Health, St. Louis, MO

**Sarah L. Lovegreen, MPH,**

St. Louis Regional OASIS, St. Louis, MO

**Michael B. Elliott, PhD,**

Prevention Research Center and Department of Community Health, Saint Louis University School of Public Health, St. Louis, MO

Obesity Prevention Center and Department of Community Health, Saint Louis University School of Public Health, St. Louis, MO

**Debra Haire-Joshu, PhD,** and

Obesity Prevention Center and Department of Community Health, Saint Louis University School of Public Health, St. Louis, MO

**Ross C. Brownson, PhD**

Prevention Research Center and Department of Community Health, Saint Louis University School of Public Health, St. Louis, MO

### Abstract

**Purpose**—To examine the association of worksite policies and environments to physical activity.

**Methods**—Between 2001 and 2003, 977 adults from Missouri, Tennessee, and Arkansas participated in two random-digit-dialed telephone surveys regarding physical activity behaviors and worksite policies supporting physical activity. Logistic regression was used to investigate relationships between meeting national physical activity recommendations and supportive policies or environmental conditions (e.g., facilities, equipment, financial rewards) at worksites.

**Results**—Having multiple policies at worksites was associated with meeting physical activity recommendations, specifically the provision of accessible stairways and personal services (e.g., fitness testing, counseling). Meeting recommendations through walking was associated with having exercise facilities (e.g., gym, shower) and equipment (e.g., treadmill, weights).

**Discussion**—This study highlights the importance of supplementing health promotion information in workplaces with policies and environmental interventions. Particular consideration should be given to accessible stairways for onsite exercise and provision of exercise facilities and equipment. Future interventions should combine policy change with program delivery.

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Send reprint requests to Elizabeth A. Dodson, MPH, Saint Louis University School of Public Health/Community Health, Prevention Research Center, 3545 Lafayette Ave. St. Louis, MO 63104; dodson@slu.edu.

Manuscript format; research; Research purpose: modeling/relationship testing; Study design: nonexperimental; Outcome measure: behavioral; Setting: workplace; Health focus: fitness/physical activity; Strategy: built environment, policy; Target population age: adults; Target population circumstances: geographic location

## Keywords

Environment; Motivation; Physical Activity; Policy; Workplace

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## PURPOSE

Worksites are understudied as venues for physical activity policy but offer considerable potential for improving public health and for reducing the incidence of chronic disease. Because many adults spend at least half of their waking hours at work, worksites are natural places to assist employees in being active. Furthermore, interventions and policy changes have excellent potential to succeed in worksites because of the tools, resources, networks, and staff that already exist. A growing body of literature indicates that a variety of worksite health promotion activities produce significant financial savings, reductions in absenteeism, and reduced disability costs.<sup>1,2</sup>

Because worksites are understudied as venues for physical activity policy interventions, we examined the association of worksite policies and environments with physical activity. We hypothesized that meeting physical activity recommendations would be associated with the presence of worksite policies or environments supporting physical activity. Our research questions were as follows: What kinds of worksite policies or environments supporting physical activity are available in midwestern communities; and is the presence of worksite policies or environments associated with whether or not employees meet physical activity recommendations?

## METHODS

### Design

Data came from the combination of two, related, quasi-experimental studies described in detail elsewhere.<sup>3,4</sup> The first aimed to reduce major, modifiable risk factors for cardiovascular disease in six intervention communities in an area of southeastern Missouri known as the Bootheel. Six comparison communities were chosen in Arkansas and Tennessee. The second study, an outgrowth of the first, targeted a different region of Missouri. It was a multilevel, ecological intervention designed to promote moderate physical activity, walking in particular, in the Missouri Ozark Region, using new control sites in Tennessee and Arkansas.

### Sample

The six intervention communities in the first study ranged in size from 2399 to 17,642 residents. Compared with the rest of Missouri and with the United States, the Bootheel region has significantly more poverty, is medically underserved, and has lower educational levels. Age-adjusted death rates for chronic disease (i.e., heart disease, stroke, cancer, and diabetes) in this region were 18% greater than in Missouri overall (638 per 100,000 compared with 541 per 100,000) for 2001–2005.<sup>5</sup>

The six intervention communities in the second study were different from those in the first, ranged in size from 766 to 12,993 residents, and had a total of 16.7% of residents living below the poverty level. Comparison communities were selected to match the intervention sites on size, race/ethnicity, and proportion of the population living below the poverty line.

As part of each study, surveys were conducted in both the intervention and the comparison communities. Methods for each survey were based on the methods for the Behavioral Risk Factor Surveillance System Survey developed by the Centers for Disease Control and

Prevention.<sup>6</sup> In order to select cross-sectional samples of non-institutionalized adults, aged 18 years or older, who had working telephones, all blocks within a two-mile radius of a walking trail were catalogued and were used to create a random-digit list of residential telephone numbers. The surveys were not intended to be population-based but rather were meant to provide a purposive sample, based on proximity to preexisting walking trails.

Interviewers for both studies underwent at least 8 hours of training, and a manual was developed for reference. The telephone surveys for the first study were conducted from January to June 2001 (n = 1235) and achieved a Council of American Survey Research Organizations response rate of 89%. Telephone surveys for the second study were conducted between July and September 2003 (n = 2470) and had a 65% response rate.

## Measures

The survey instruments for both studies were developed using a combination of questions from the Behavioral Risk Factor Surveillance System Survey along with questions developed in San Diego, South Carolina, and St. Louis.<sup>7</sup> When valid and reliable scales were available and were documented in the literature, every effort was made to use these with the scale intact. Test-retest reliability of physical activity measures was moderate to substantial, and intraclass correlation coefficients ranged from .46 to .64; however, validity information was not known for our specific population. Psychometric properties of many questions and scales are reported elsewhere.<sup>7</sup> The survey instrument used in the first study contained 106 items and had an average administration time of 34 minutes. The second study's survey instrument contained 117 items and had an average administration time of 32 minutes. (Both instruments are available at <http://prc.slu.edu/articles.htm#PAInstrument>.)

Because of the demographic similarities in these two study populations, data from both studies were combined for these analyses. By design, the questions used to collect the specific data for these analyses were identical and were posed to respondents by the same trained interviewers. The survey questions of primary interest to this study were used intact and in their entirety with each of the two samples.

The combined study population (n = 3704) for these analyses was limited to those respondents who answered yes to the question, "Are you employed for wages"? Of these, 17% were employed part-time. The remaining sample (n = 1547) was further reduced to those who indicated that, while at work, they were mostly sitting or standing, which provided a total sample of 977. This excluded those who reported mostly walking or engaging in physically demanding labor while at work. These participants were excluded in an attempt to capture only voluntary, leisure-time physical activity in those at the greatest risk for inactivity. When participants had more than one job, they were instructed to consider all Jobs when answering questions.

After an initial screening question to determine whether any policies or environments were available at worksites, additional questions were posed to determine the number and type available. Specific policies and environments included accessible stairways for employees, time or breaks for exercise during the work day, facilities and equipment for exercise, personal or group services (e.g., fitness testing, exercise classes), resource materials, subsidized health club memberships, sponsored sports teams, reduced health insurance premiums, and other monetary incentives. The intraclass correlation coefficients for these measures ranged from .44 to .70.

Other questions determined whether or not respondents met physical activity recommendations. Meeting a threshold of physical activity was classified in four ways: (1) meeting moderate physical activity recommendations involved 30 minutes or more of

moderate activity (brisk walking or jogging) on 5 or more days per week, according to guidelines from the Centers for Disease Control and Prevention and from the American College of Sports Medicine; (2) meeting vigorous physical activity recommendations by participating in 20 minutes or more of vigorous activity (running or biking) on 3 or more days per week<sup>8</sup>; (3) meeting either moderate or vigorous activity recommendations; and (4) meeting the moderate level only through walking.

## Analysis

Logistic regression models were used to examine the association between the presence of worksite policies or environments and the likelihood of meeting physical activity recommendations. In order to remove potentially confounding variables, these models controlled for age, race, gender, and education through block entry. Other confounders, such as income, were considered but did not significantly affect results, so they were excluded. No adjustment for multiple testing was made. Measures of association were adjusted odds ratios (OR) and 95% confidence intervals (CI).

Initially, we examined the relationships between the presence of specific policies and environments and the likelihood of meeting each of the four categories of physical activity recommendations. We then combined the individual policies and environments into two categories. Structured activity policies and environments included those directly related to organized, leisure-time, physical activity (e.g., health club memberships). Nonstructured activity policies and environments included those without formal structures, which might make it easier or offer increased motivation to be active in any way (e.g., breaks for activity, stair use campaigns). Finally, we created a count variable to examine possible trends in meeting physical activity recommendations as the number of available policies and environments increased. For these analyses, the reference group consisted of those respondents who reported that no policies or environments were available at their worksite. The extended Mantel-Haenszel correlation statistic was used to test for linear trends.<sup>9</sup>

## RESULTS

Approximately one-fourth of the sample had an annual household income of less than \$25,000. Three-fourths of the participants were female, and the median respondent age was 43. Caucasians comprised 84% of the population, and African-Americans comprised nearly 15%. Over two-thirds of the participants were married, 32% completed high school or an equivalent, and 23% were college graduates. When asked about the presence of worksite policies or environments supporting exercise, 69% of respondents reported that none were available, 14% reported one, and 17% reported that two or more policies were available. Regarding participation in physical activity, 27% of respondents reported meeting physical activity recommendations through moderate activity, 23% through vigorous activity, 38% through either moderate or vigorous activity, and 21% only through walking.

Questions to determine specific types of policies and environments available at worksites revealed that 57% of respondents had accessible stairways at the worksite (Table 1). Fifteen percent reported the availability of facilities at worksites, and 11% reported the availability of equipment. Less than 10% of respondents indicated that other policies (e.g., breaks during the day for exercise or reduced health insurance) were available.

The presence of several worksite policies and environments was associated with meeting physical activity recommendations (Table 1). In particular, employees with accessible stairways were 1.4 times more likely to meet physical activity recommendations through moderate or vigorous activity than those without access to stairways (95% CI = 1.1–1.9). Those with access to personal services, such as fitness testing and counseling, were 1.9

times more likely to meet physical activity recommendations through moderate or vigorous activity than those without these services available at work (95% CI = 1.2–3.1). Employees with access to facilities and equipment at work were 1.7 to 2.0 times more likely to meet physical activity recommendations through walking (95% CI = 1.1–2.8 and 1.2–3.5, respectively; Table 1).

When individual policies and environments were combined into structured activity and nonstructured activity categories, the strength of association between the presence of policies or environments and the likelihood of meeting physical activity recommendations was greater. For example, employees with one structured activity policy or environment were nearly two times more likely to meet moderate physical activity recommendations than those with no structured activity policies or environments (adjusted OR = 1.9; 95% CI = 1.2–3.0; Table 2). Those with four or more such policies or environments were 2.3 times more likely to meet vigorous physical activity recommendations (95% CI = 1.01–5.4). Employees with four or more non-structured activity policies or environments available at worksites were three times more likely to meet vigorous physical activity recommendations than those with no policies available (adjusted OR = 3.0; 95% CI = 1.3–7.0). As the number of policies or environments available at worksites increased, the likelihood of meeting physical activity recommendations, for most types of activity, was greater (Table 2).

## DISCUSSION

### Summary

This study highlights an association between the presence of multiple policies and environments at worksites and meeting physical activity recommendations. It also suggests that policies and environmental resources for physical activity may not be widely available at the worksites of many residents of Missouri, Tennessee, and Arkansas. Furthermore, it contributes to the literature by revealing what types of policies and environments are available in some midwestern worksites. This study also supports findings from previous research, which indicate that the presence of various policies and environments at worksites can impact employee physical activity levels. Recent, site-specific literature reviews support the association between a small number of worksite policies, similar to those reported here, and increased physical activity.<sup>10,11</sup> We extend this work to examine a broad array of policies and their combined effect. Because of the high prevalence of inactivity among U. S. adults and because of the association of regular physical activity to improved overall health, it is important to identify a variety of successful ways to promote regular physical activity.

This study also identifies a significant linear trend, in many cases, in the number of policies and environments available at a worksite and the likelihood of meeting physical activity recommendations. These findings add to the growing body of evidence regarding the effectiveness of worksite health promotion strategies and suggest that, by offering several policies or environmental changes, employers can increase employee activity levels.<sup>12</sup>

### Limitations

Because these data are cross-sectional, we are unable to determine any causal relationship between the presence of worksite policies or environments and meeting physical activity recommendations. Although the measures used are reliable according to test-retest analysis, our study relied on self-reported data about levels of physical activity.<sup>6</sup> Furthermore, we do not have data about the number or types of jobs participants had, nor were we able to objectively examine individual worksites to evaluate or measure the policies and environments that were reported (e.g., through the use of a worksite audit). This may introduce inconsistencies into the study definitions or into categories of specific worksite

attributes. In some instances, we lacked the statistical power to determine whether the association between policies and meeting physical activity recommendations was present. Finally, generalizability of these results is limited because of the unique, midwestern, mostly female populations examined and because of the participants' close proximity to walking trails.

### Significance

This study contributes to the literature by highlighting the limited numbers of policies and environments supporting physical activity that may be available in midwestern worksites. Our previous research in this region indicates that meeting recommendations for physical activity is especially difficult in these small communities because of the often-limited access to prevention programs and the limited places to be physically active. This illustrates both the need for worksite health promotion interventions and the potential for worksite health promotion that is currently underutilized in these worksites.

Our results broaden the base of evidence suggesting that worksite policies and environments may positively affect employee physical activity levels. Some of the policies and environments examined in this study, such as making existing stairways accessible to employees, offering personal services related to fitness, and sponsoring sports teams, are simple and relatively inexpensive to implement. Physically active employees likely will enjoy better overall health, which may save employers costs through reduced absenteeism and increased productivity.<sup>1,2</sup> Future worksite health promotion interventions should combine environmental and policy change with general program delivery.

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### References

1. Pelletier KR. A review and analysis of the clinical and cost-effectiveness studies of comprehensive health promotion and disease management programs at the worksite: update VI 2000–2004. *Occup Environ Med.* 2005; 47:1051–1058.
2. Aldana SG. Financial impact of health promotion programs: a comprehensive review of the literature. *Am J Health Promot.* 2001; 15:296–320. [PubMed: 11502012]
3. Brownson RC, Hagood L, Lovegreen SL, et al. A multilevel ecological approach to promoting walking in rural communities. *Prev Med.* 2005; 41:837–842. [PubMed: 16256183]
4. Brownson RC, Smith CA, Pratt M, et al. Preventing cardiovascular disease through community-based risk reduction: the Bootheel Heart Health Project. *Am J Public Health.* 1996; 86:206–213. [PubMed: 8633737]
5. [Accessed December 1, 2006] Missouri Department of Health and Senior Services, Missouri Information for Community Assessment. Available at: <http://www.dhss.mo.gov/MICA/>.
6. Gentry EM, Kalsbeek WD, Hogelin GC, et al. The behavioral risk factor surveys: II—design, methods, and estimates from combined state data. *Am J Prev Med.* 1985; 1:9–14. [PubMed: 3870927]
7. Brownson RC, Chang JJ, Eyster AA, et al. Measuring the environment for friendliness toward physical activity: a comparison of the reliability of 3 questionnaires. *Am J Public Health.* 2004; 94:473–483. [PubMed: 14998817]
8. Pate RR, Pratt M, Blair SN, et al. Physical activity and public health. A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *JAMA.* 1995; 273:402–407. [PubMed: 7823386]

9. Mantel N. Chi-square tests with one degree of freedom; extensions of the Mantel-Haenszel Procedure. *J Am Stat Assoc.* 1963; 58:690–700.
10. Matson-Koffman DM, Brownstein JN, Neiner JA, Greaney ML. A site-specific literature review of policy and environmental interventions that promote physical activity and nutrition for cardiovascular health: what works? *Am J Health Promot.* 2005; 19:167–193. [PubMed: 15693346]
11. Kahn EB, Ramsey LT, Brownson RG, et al. The effectiveness of interventions to increase physical activity: a systematic review. *Am J Prev Med.* 2002; 22:S73–S107.
12. Lucove JG, Huston SL, Evenson KR. Workers' perceptions about worksite policies and environments and their association with leisure-time physical activity. *Am J Health Promot.* 2007; 21:196–200. [PubMed: 17233238]



**Table 1**  
Adjusted Odds Ratios for the Association Between Specific Policies and Environments and the Likelihood of Meeting Physical Activity Recommendations<sup>\*,†</sup>

Type of Policy or Environment	Reported Policies or Environments Present at Worksite	%	Meets Moderate Physical Activity Recommendations		Meets Vigorous Physical Activity Recommendations		Meets Physical Activity Recommendations		Meets Physical Activity Recommendations Through Walking	
			OR <sup>‡</sup>	95% CI <sup>‡</sup>	OR	95% CI	OR	95% CI	OR	95% CI
Structured activity										
Facilities for exercise (gym, locker, shower)		15	1.3	0.9-2.1	1.4	0.9-2.3	1.4	0.9-2.1	1.7	1.1-2.8
Equipment for exercise (treadmill, cycle, weights)		11	1.0	0.6-1.6	1.6	0.9-2.6	1.2	0.7-1.8	2.0	1.2-3.5
Subsidized health club memberships		9	1.3	0.8-2.2	1.2	0.7-2.1	1.3	0.8-2.1	1.1	1.6-2.1
Group services (exercise classes, health fairs)		8	1.2	0.7-2.0	1.2	0.7-2.1	1.2	0.7-1.9	1.1	0.6-2.1
Sponsored sports teams		7	1.3	0.8-2.3	1.0	0.5-1.8	1.2	0.7-2.1	1.3	0.7-2.5
Nonstructured activity										
Accessible stairways		57	1.4	1.00-1.9	1.4	1.1-2.0	1.4	1.1-1.9	1.1	0.8-1.5
Personal services (fitness testing, counseling)		8	1.7	1.00-2.9	1.7	1.00-3.0	1.9	1.2-3.1	1.2	0.6-2.2
Time or breaks during the day for exercise		8	1.6	0.9-2.7	1.1	0.6-2.0	1.5	0.9-2.5	1.2	0.6-2.1
Resource materials (brochures, posters, videos)		8	1.6	0.9-2.7	1.6	0.9-2.8	1.6	1.00-2.6	1.5	0.8-2.8
Reduced health insurance		3	1.3	0.6-3.0	1.1	0.5-2.6	1.7	0.8-3.4	0.9	0.3-2.3
Other monetary incentives		2	1.1	0.4-3.0	1.4	0.5-3.8	1.3	0.5-3.0	1.2	0.4-3.6

\* Total sample = 977 respondents.

† All analyses were adjusted for age, race, gender, and education.

‡ OR indicates adjusted odds ratio; CI, confidence interval.



**Table 2**  
Adjusted Odds Ratios for the Association Between Groups of Policies and Environments and the Likelihood of Meeting Physical Activity Recommendations\*

Policy and environment count	n	Meets Moderate Physical Activity Recommendations		Meets Vigorous Physical Activity Recommendations		Meets Physical Activity Recommendations		Meets Physical Activity Recommendations Through Walking	
		OR <sup>†</sup>	95% CI <sup>‡</sup>	OR	95% CI	OR	95% CI	OR	95% CI
Structured Activity Policies and Environments <sup>†</sup>									
0	336	1.0	—	1.0	—	1.0	—	1.0	—
1	117	1.9	1.2–3.0	1.3	0.8–2.3	1.7	1.1–2.6	1.5	0.9–2.5
2	53	0.7	0.3–1.6	0.9	0.4–1.9	0.8	0.4–1.6	1.7	0.8–3.9
3	39	1.6	0.8–3.4	1.3	0.6–2.9	1.4	0.7–2.9	1.4	0.6–3.5
4–5	32	1.7	0.8–3.8	2.3	1.01–5.4	2.0	1.00–4.3	2.2	0.9–5.3
Linear trend	577		0.07		0.04		0.04		0.26
Nonstructured Activity Policies and Environments <sup>§</sup>									
Policy and environment count	n	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
0	198	1.0	—	1.0	—	1.0	—	1.0	—
1	247	0.8	0.5–1.3	1.4	0.8–2.2	1.1	0.7–1.6	1.2	0.8–1.8
2	79	1.9	1.1–3.5	1.2	0.6–2.4	1.8	1.1–3.2	1.1	0.6–2.2
3	26	1.6	0.7–4.0	1.3	0.5–3.8	1.6	0.7–3.6	0.6	0.2–2.1
4–6	30	1.7	0.7–3.9	3.0	1.3–7.0	2.6	1.2–5.9	1.7	0.6–4.4
Linear trend	580		0.03		0.008		0.002		1.0

\* All analyses were adjusted for age, race, gender, and education.

<sup>†</sup> Structured activity policies and environments: facilities, equipment, subsidized health club memberships, sports teams, group services.

<sup>‡</sup> OR indicates adjusted odds ratio; CI, confidence interval.

<sup>§</sup> Nonstructured activity policies and environments: stairways, breaks, personal services, resource materials, reduced health insurance, monetary incentives.