

# Effect of the Work Environment on Using Time at Work to Exercise

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## Abstract

**Purpose.** To determine whether workload, job satisfaction, and flexible schedules are predictive of using time at work to exercise.

**Design.** The study design was the quantitative analysis of the time at work to exercise intervention of a cluster-randomized controlled trial.

**Setting.** The study took place at Emory University, Atlanta, Georgia.

**Subjects.** Subjects comprised 188 full- and part-time faculty and staff (57% female).

**Intervention.** Employees were randomized into different intervention groups, and analysis focused on employees who were provided 30 minutes of time at work to exercise.

**Measures.** Time at work to exercise at was measured 9 months, and work environment characteristics were measured at baseline.

**Analysis:** Logistic regression modeling using generalized estimating equation analysis was used to account for departmental clustering.

**Results.** Time at work to exercise was used by 45% of participants. Participants who felt comfortable taking time off work to exercise were 2.8 times more likely to use time to exercise than those who did not feel comfortable taking time off (95% confidence interval: 1.3 to 6.1). Participants who reported too much work were .3 times less likely to exercise (95% confidence interval: 0.2 to 0.7). Job satisfaction and the ability to take time off for personal matters were not significantly associated with using time to exercise.

**Conclusion.** The results support the hypothesis that individuals with a supportive work environment would be more likely to use time at work to exercise. Workload and having time during the day are more important than job satisfaction. (*Am J Health Promot* 2015;29[6]: 345–352.)

**Key Words:** Time at Work to Exercise, Paid Time to Exercise, Workplace Physical Activity, Work Environment, Worksite, Prevention Research. Manuscript format: research; Research purpose: modeling/relationship testing; Study design: quasiexperimental; Outcome measure: behavioral; Setting: workplace, university; Health focus: fitness/physical activity; Strategy: incentives, policy; Target population age: adults; Target population circumstances: education/income level, race/ethnicity

## INTRODUCTION

Morbidity rates due to obesity and inactivity are increasing in the United States, and recent data indicate that physical activity (PA) can reduce all-cause mortality independent of its beneficial effect on weight and obesity.<sup>1,2</sup> Routine exercise reduces the risk of diabetes and cardiovascular disease, as well as other chronic illnesses, and improves mental health and overall quality of life.<sup>3–5</sup> Unfortunately, few individuals meet PA requirements. A national survey conducted in 2010 found that less than 50% of American adults over the age of 18 meet the PA recommendations of the Centers for Disease Control and Prevention (CDC) for 2.5 hours of moderate activity or 1.25 hours of vigorous activity per week.<sup>6</sup> Actual rates of physical activity in the United States may be even lower. When rates were determined using an accelerometer instead of a self-report, less than 10% of adults had sufficient physical activity to meet recommendations.<sup>7</sup>

The workplace provides an ideal environment for PA interventions because of a preexisting organizational structure, the potential for a large number of participants, the opportunity to take advantage of social support structures, and the fact that individuals spend much of their day at work. There is evidence of modest gains in PA after implementation of workplace interventions.<sup>8</sup> One such intervention is to provide employees with flexible time to exercise during the workday, although there is limited evidence on the impact of this policy on increasing PA. Many workplace interventions using flexible time have low adherence over the course of the intervention.<sup>9–11</sup>

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Low adherence is especially a problem with PA interventions that allow employees to determine when and how to take a PA break.<sup>9,12,13</sup>

Workplace interventions focusing on time during the workday have suffered from a number of limitations. Many such studies are not randomized controlled trials, have small sample sizes, and lack consistent use of a theory or conceptual framework.<sup>8,14</sup> Much of the literature on work environment associations with PA either uses general questions such as “Does your workplace support taking time to exercise?” or combines individual workplace characteristics into a general score, such as the perceived workplace environment scale<sup>15</sup> and the worksite physical activity promotion index.<sup>16</sup> This makes it difficult to determine which work environment characteristics are most important in adherence to an intervention and ultimately increased PA. While some studies did find significant associations between worksite support and PA, these studies used cross-sectional designs, and thus causality is unclear.<sup>16,17</sup>

The overall goal of this study is to determine the association between work environment characteristics and participation in using time at work to exercise (“using time”). This study examines whether any of six work environment characteristics (job satisfaction, ability to take time off work to exercise, ability to take time off work for personal matters, ability to change start and quit times, having too much work, and having enough time in the workday to do their job well) are predictive of using time.

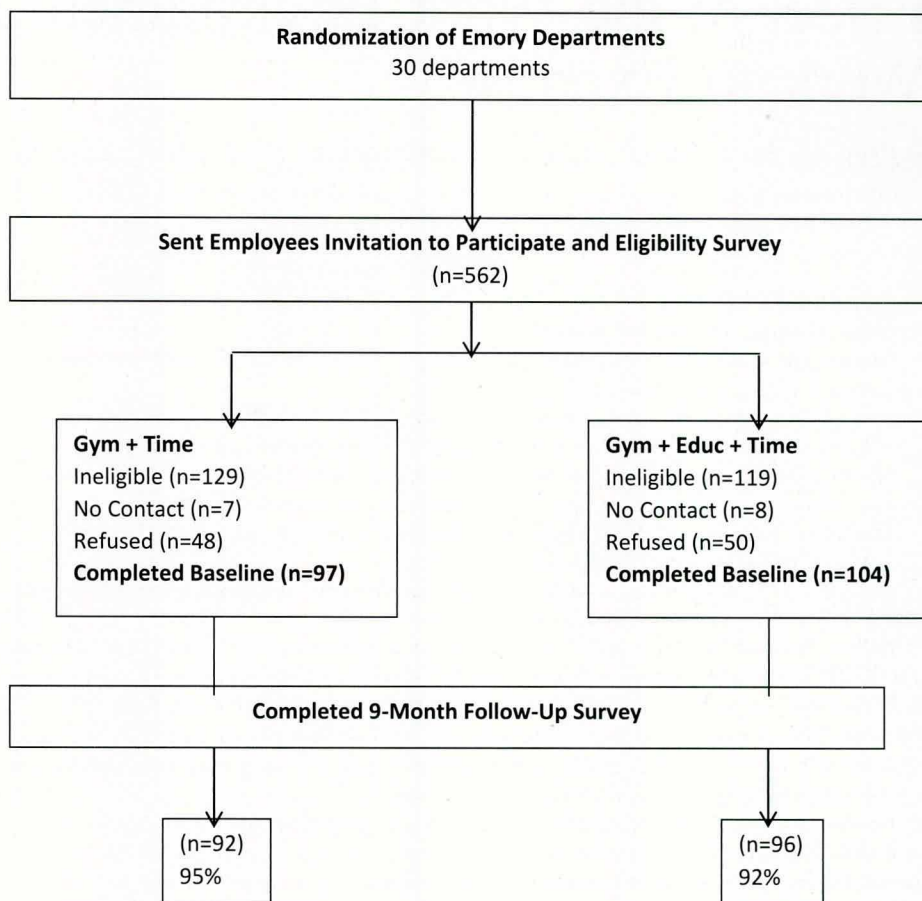
This study uses data from the Physical Activity and Lifestyle Study (PALS), a prospective evaluation of the effect of providing time during the workday to exercise on PA levels among inactive individuals.

## METHODS

### Design

PALS is a cluster-randomized controlled trial that was conducted from 2006 to 2007.<sup>18</sup> The full study design included four treatment groups and a control group. The design was informed by social cognitive theory and addressed multiple barriers to exercise.

**Figure**  
**Flow Chart of Physical Activity and Lifestyle Study Participation and Follow-Up for “Gym+Time” and “Gym+Educ+Time” Interventions**



Additional details about the full study are provided elsewhere.<sup>18</sup> The two treatment groups that included a “using time” provision are included in this analysis. Individuals were randomized into two treatment blocks, fall and spring. The study was conducted among full- and part-time (at least 20 hours per week) staff and faculty at Emory University, Atlanta, Georgia. Emory, a private university with over 14,000 students, employs more than 12,000 staff and faculty.

### Sample

Departments were randomized to treatment group with participants from 30 departments receiving the “using time” provision. The number of participants per department ranged from

1 to 21 with a median of 6. Details about recruitment of departments and department eligibility, recruitment of individuals and individual eligibility, randomization, intervention details, and data collection instruments for the PALS have been previously described.<sup>18</sup> For this analysis, faculty members and staff were included. The staff clocked in and out, but faculty did not. While the sample was adequately powered to detect moderate effects longitudinally and to account for non-eligibility and nonresponse, it was not powered for this secondary analysis.

### Objectives

The objectives of this analysis were to investigate if using time at work to exercise was influenced by the work

environment and to determine which work environment characteristics were more strongly associated with using time. The hypotheses for this analysis were as follows: (1) Individuals with a positive work environment at baseline would be more likely to use the 30 minutes of time than individuals with a neutral or negative work environment and (2) problems cited by participants not using time would include work environment characteristics such as workload and not having enough flexibility to exercise.

### Interventions

In two groups, every individual received both a gym membership and 30 minutes on the clock for exercise per workday. Additionally, one of the two groups received education materials throughout the study period. Time provided to exercise was compensated as regular work time. The guidelines for taking the 30 minutes were explained in oral, written, and e-mail format. The requirements for taking the 30 minutes on the clock for exercise were as follows: (1) employees were cleared to use 30 minutes of time with their supervisor; (2) the time was for PA only and was unsupervised, and employees could not do other things with the time; (3) any extra time taken, for example, changing clothes, should be done within the 30 minutes; (4) the 30 minutes could be added onto lunch or dinner breaks, but could not be added onto the beginning or end of the workday; and (5) employees were asked to sign in and out when using the time by using either written or Web-based logs.

### Data Collection

There were five data collection points over 9 months during the PALS, of which this analysis used first and last. A baseline survey and interview collected variables on PA, demographics, health literacy, and work environment. This was followed by 6-week, 3-month, and 6-month telephone follow-ups and concluded at 9 months with surveys collecting variables on PA recall, exercise knowledge and attitudes, health status, using time, and work environment. Using time questions were asked at each time point after baseline.

**Table 1**  
**Personal Characteristics and Study Variables of Study Population by Those Who Took Time at Work to Exercise and Those Who Did Not at 9 Months (n = 183)\*†**

| Characteristic                              | Used Time<br>(n = 83) (%) | Did Not Use Time<br>(n = 100) (%) | P    |
|---------------------------------------------|---------------------------|-----------------------------------|------|
| Personal characteristics                    |                           |                                   |      |
| Age (mean [SD])                             | 44.5 (11.9)               | 40.4 (11.4)                       | 0.04 |
| Department                                  |                           |                                   | 0.33 |
| Facilities management                       | 19 (23)                   | 18 (18)                           |      |
| Marital status                              |                           |                                   | 0.87 |
| Married                                     | 43 (55)                   | 50 (54)                           |      |
| Education                                   |                           |                                   | 0.06 |
| High school or less                         | 9 (12)                    | 13 (14)                           |      |
| Some college                                | 35 (45)                   | 23 (25)                           |      |
| College                                     | 24 (31)                   | 39 (42)                           |      |
| Master's degree or greater                  | 10 (13)                   | 19 (20)                           |      |
| Gender                                      |                           |                                   | 0.20 |
| Female                                      | 53 (64)                   | 52 (52)                           |      |
| Income                                      |                           |                                   | 0.45 |
| ≥\$50,000                                   | 56 (37)                   | 87 (47)                           |      |
| Ethnicity                                   |                           |                                   | 0.10 |
| White                                       | 32 (40)                   | 57 (57)                           |      |
| African-American                            | 44 (54)                   | 39 (39)                           |      |
| Other                                       | 5 (6)                     | 4 (4)                             |      |
| Initial BMI                                 |                           |                                   | 0.39 |
| <25                                         | 23 (28)                   | 28 (28)                           |      |
| 25–<30                                      | 22 (27)                   | 36 (36)                           |      |
| ≥30                                         | 38 (46)                   | 36 (36)                           |      |
| Met CDC guidelines for exercise at baseline | 13 (16)                   | 18 (18)                           | 0.71 |
| Adequate health literacy score (5 or 6)     | 36 (43)                   | 65 (65)                           | 0.01 |
| Study variables                             |                           |                                   |      |
| Treatment                                   |                           |                                   | 0.03 |
| Gym+Time                                    | 48 (58)                   | 42 (42)                           |      |
| Gym+Educ+Time                               | 35 (42)                   | 58 (58)                           |      |
| Fall study block                            | 48 (58)                   | 56 (56)                           | 0.70 |
| Employees clock in/out                      | 67 (81)                   | 80 (80)                           | 0.94 |

CDC indicates Centers for Disease Control and Prevention; BMI, body mass index; and Educ, education.

\* Generalized estimating equation analysis, using the SAS procedure GENMOD, was used to test for significant bivariate relationships between each covariate and using time.

† Missing categories and responses are the following: Used Time, 5; Age, 1; Department, 12; Marital Status, 12; Education, 11; Income, 16; Ethnicity, 2.

### Quality Control

Quality control measures included initial and ongoing interviewer training, written protocols for all interviews and other interactions with PALS, interviewer scripts for phone and in-person interviews, weekly interviewer meetings, random supervisor assessment of written survey transcription, random supervisor assessment of in-person interviews, and consistent interviewer assignments.

### Measures

**Primary Outcome.** The main outcome in this study was self-reported use of 30

minutes of time during the workday to exercise. The responses to the question "In a typical 5-day work week, how often do you use your PALS 30 minutes during the workday?" included "every day (5 days)," "4 days a week," "2 to 3 days a week," "once a week," and "rarely or never." The outcome was coded binomially, with individuals who reported at 9 months that they had used time at least once per week considered to have "used time."

If participants indicated that they "never" used time at work to exercise, they were asked the following: "Please tell me your reason(s) for not using

**Table 2**  
**Employee-Cited Reasons for Not Using Time Among Those Who Did Not Use Time to Exercise**

| Reason for Not Using Time*                         | Frequency (%) (n = 100) |      |
|----------------------------------------------------|-------------------------|------|
| Not enough time                                    | 47                      | (47) |
| Job not flexible                                   | 42                      | (42) |
| I need more time to exercise, change clothes, etc. | 13                      | (13) |
| My supervisor does not support me                  | 9                       | (9)  |
| I exercise during nonwork hours                    | 9                       | (9)  |
| I prefer to exercise at home or after work hours   | 9                       | (9)  |
| I keep forgetting about the program                | 7                       | (7)  |
| Health problems prevent using time                 | 5                       | (5)  |
| I am exempt so I don't sign out                    | 5                       | (5)  |
| Scheduling problems                                | 4                       | (4)  |
| No place to shower or change                       | 3                       | (3)  |
| I am not interested or motivated                   | 3                       | (3)  |
| Part time status                                   | 3                       | (3)  |
| Job includes exercise                              | 2                       | (2)  |
| Facilities are too far                             | 1                       | (1)  |
| It's too hot to exercise                           | 1                       | (1)  |

\* Employees could select more than one answer, and not all employees responded.

your 30 minutes during the workday to exercise more often." Participants were then instructed to check as many boxes as applied and were provided 13 predetermined choices and a choice for "other." Responses from the "other" category were grouped into the previous 13 choices if the respondent failed to check a box and then wrote that choice as other.

**Exposures.** Agreement with statements about work environment was assessed with a self-administered, interviewer-supervised questionnaire at baseline. The questionnaire was adapted from the National Institute for Occupational Safety and Health Quality of Worklife Module.<sup>19</sup> These statements included the following: (1) "All in all, I am satisfied with my job"; (2) "I am allowed to change/adjust my starting and quitting times on a daily basis"; (3) "I feel comfortable taking time during the workday to exercise"; (4) "When needed, I can take time off during the workday to take care of personal or family matters"; (5) "I have too much work to do everything well"; and (6) "I have enough time to get the job done." The response options for work environment questions were "strongly agree," "agree," "neither agree nor disagree," "disagree," and "strongly disagree." For analysis, these responses

were coded into three categories as agree, neither agree nor disagree, and disagree. Statements about work environment were also asked at 9 months, and the frequency of individuals that agreed was similar to baseline values.

**Covariates.** Covariates used in the analysis include age (in years); gender (male and female); ethnic group (black or African-American, white, or other); body mass index (normal: less than 24.9 kg/m<sup>2</sup>; overweight: 25 to 29.9 kg/m<sup>2</sup>; and obese: 30 kg/m<sup>2</sup> or greater);<sup>20</sup> marital status (married or member of an unmarried couple or not); education (less than or high school degree, some college, college degree, or master's or higher degree); income (above and below \$50,000); treatment group (either "Gym + Time" or "Gym + Time + Educ"); meeting initial CDC recommendations for exercise at baseline; does or does not clock in/out; department type (facilities management or not); study enrollment block (fall vs. spring/summer); and initial health literacy score (adequate health literacy or not).<sup>21</sup> The health literacy score was determined using the Newest Vital Sign instrument, which provides a score of 0 to 6 based on the number of questions answered correctly.<sup>21</sup> A score of 5 or 6 was considered adequate

health literacy. Demographic information was obtained from Emory University Human Resources department.

**Analysis. Descriptive Statistics.** Simple univariate and frequency statistics were obtained for all exposures, outcomes, and covariates. Generalized estimating equation (GEE) analysis, using the SAS software procedure GENMOD, was used to test for significant bivariate relationships between each exposure or covariate and using time, with a repeated statement for the clustering variable department using an exchangeable correlation structure.<sup>22</sup>

**Covariate-Adjusted Methods.** Logistic regression modeling using GEE methodology was used to evaluate the effect of the work environment on whether individuals used 30 minutes of exercise during the workday at 9 months. All covariates were offered in the model. Interactions between each other work environment exposure and facilities management, marital status, and study block were tested. The exposure was forced into the model. The best model was selected using backward elimination based on confounding assessment, precision (based on risk ratio, confidence ratios, and widths), and parsimony. Goodness-of-fit analysis was determined by using the quasi-likelihood under the independence model criterion and the receiver operating characteristic (ROC > .70 acceptable classification). All statistical analyses were run using SAS 9.2 (SAS Institute Inc, Cary, North Carolina) at an  $\alpha$  level of .05.

## RESULTS

### Study Population

The majority of the study participants (94%, 188/201) completed the 9-month survey (see the Figure). The number of participants per department ranged from 1 to 22. The size of the Gym + Time and Gym + Time + Education intervention groups were 92 and 96, respectively. Most employees clocked in and out during work hours; only 36 (20%) participants did not (Table 1).

### Time at Work to Exercise

Table 1 presents demographic characteristics for the study population by usage of time. The majority of partic-

Table 3

Work Environment Characteristics of Study Population by Those Who Took Time at Work to Exercise and Those Who Did Not at 9 Months (n = 183)\*†

| Characteristic                                 | Used Time (%) (n = 83) | Did Not Use Time (%) (n = 100) | P    |
|------------------------------------------------|------------------------|--------------------------------|------|
| Job satisfaction                               |                        |                                | 0.97 |
| Satisfied                                      | 59 (74%)               | 72 (75%)                       |      |
| Neither                                        | 13 (16%)               | 14 (15%)                       |      |
| Not satisfied                                  | 8 (10%)                | 10 (10%)                       |      |
| Ability to change start and quit times         |                        |                                | 0.20 |
| Could change                                   | 36 (46)                | 45 (47)                        |      |
| Neither                                        | 9 (11)                 | 21 (22)                        |      |
| Could not change                               | 34 (43)                | 29 (31)                        |      |
| Ability to take time off work to exercise      |                        |                                | 0.14 |
| Could take time off                            | 40 (50)                | 31 (33)                        |      |
| Neither                                        | 18 (23)                | 24 (25)                        |      |
| Could not take time off                        | 22 (28)                | 40 (42)                        |      |
| Ability to take time off for personal matters  |                        |                                | 0.06 |
| Could take time off                            | 65 (81)                | 68 (71)                        |      |
| Neither                                        | 6 (8)                  | 18 (19)                        |      |
| Could not take time off                        | 9 (11)                 | 10 (10)                        |      |
| Have too much work to get everything done well |                        |                                | 0.02 |
| Have too much work                             | 10 (13)                | 28 (29)                        |      |
| Neither                                        | 17 (22)                | 27 (28)                        |      |
| Did not have too much work                     | 52 (66)                | 40 (42)                        |      |
| Have enough time to get work done              |                        |                                | 0.03 |
| Have enough time                               | 57 (71)                | 51 (54)                        |      |
| Neither                                        | 14 (18)                | 19 (20)                        |      |
| Did not have enough time                       | 9 (11)                 | 25 (26)                        |      |

\* Generalized estimating equation analysis, using the SAS procedure GENMOD, was used to test for significant bivariate relationships between each exposure and using time.

† Missing categories and responses are the following: Used Time, 5; Job Satisfaction, 7; Ability to change start and quit times, 9; Ability to take time off work to exercise, 8; Ability to take time off for personal matters, 7; Have too much work to get everything done well, 9; Have enough time to get work done, 8.

Participants were married, white, female (57%), had a college degree or higher, and had an income below \$50,000. Time at work to exercise (at least once a week) was used by 45% of participants at 9 months. Older individuals were more likely to use time than were younger individuals (mean 44.5 vs. 40.4,  $p = .04$ ). Individuals who had lower health literacy skills were more likely to use time at work than were those who scored a 5 or 6 (65% vs. 43%,  $p = .01$ ). Individuals who were provided educational materials in addition to the time and gym pass were less likely to use time at work than were those who did not receive the educational materials (42% vs. 58%,  $p = .03$ ). There were no significant differences in the other variables.

There were many reasons cited for not using time among participants who

did not use the intervention (Table 2). The most frequently cited reason for not using time was not having enough time (47%). Having a job that was not flexible was the second most cited reason for not using time (42%).

#### Work Environment Characteristics

The majority of participants (74%) were satisfied with their job; only 10% of participants were not satisfied with their job (Table 3). A greater percentage of participants could change their start and quit times than could not change (47% and 36%, respectively), felt comfortable taking time off work to exercise than did not feel comfortable (41% and 35%, respectively), did not have too much work to do everything well than did those who believed they had too much work to do everything well (53% and 22%, respectively), and had enough time to get work done

than did not have enough time to get work done (62% and 19%, respectively). Thirteen percent who used time reported they had "too much work" compared to 29% who did not use time ( $p = .02$ ). Having enough time to get work done was more commonly reported among those using time (71% vs. 54%;  $p = .03$ ).

#### Multivariate Models of Work Environment Characteristics

**Characteristics Influencing Exercise at Work.** *Workload.* Employees who had too much work were .3 (95% confidence interval [CI]: 0.2, 0.7) times less likely to use time than were employees who did not have too much work (Table 4). Similarly, a significant association was found between having enough time to get everything done and using time when controlling for covariates. Employees who had enough time were 3.7 (95% CI: 1.6, 8.5) times as likely to use time than were employees who did not have enough time.

*Comfortable with Using Time.* A significant association was found between employees who felt comfortable using time during the workday to exercise and using time when controlling for covariates. Employees who felt comfortable taking time off to exercise were 2.8 (95% CI: 1.3, 6.1) times as likely to use time than employees who could not take time off.

*Ability to Change Start and Quit Times.* A significant association was found between employees who could change their start and quit times on a daily basis and using time when controlling for covariates. Employees who neither agreed nor disagreed that they could change start and quit times were 0.3 (95% CI: 0.1, 0.8) times as likely than those who could not change times to use time.

*Characteristics Not Influencing Exercise at Work.* No significant association was found in using time between individuals who could and could not take off time for personal matters and between individuals who were and were not satisfied with their job.

*Effect of Covariates.* Age was significant in every model but the model for the "ability to take time off work for personal matters." Each year increase in age resulted in a less than 10% increase in the likelihood of using

time. Education was found to be significant in the “ability to change starting and quitting times” model, with individuals with some college being 2.4 times as likely to exercise as individuals with master’s degrees and above (95% CI: 1.2, 4.3). Gender was significant in every model except the “ability to take time off work for personal matters” and “job satisfaction” models. In each of the other models, women were between 2.1 and 3.3 times as likely to exercise as males (95% CI: 1.1, 7.4). Health literacy was significantly associated with using time in the “ability to take off work to exercise” model; participants with adequate health literacy were 0.5 (95% CI: 0.3, 0.8) times less likely to exercise than participants without adequate health literacy.

## DISCUSSION

The data support the hypothesis that participants in certain work environments would be more likely to use time at work to exercise. Significant, positive relationships were found for not having too much work, having enough time, and feeling comfortable taking time. Not having enough time was the most important reason for not using time to exercise. Workload was the strongest barrier to successful implementation of time, suggesting that future interventions ensure employees and supervisors address workload issues.

Individuals who felt comfortable taking time off to exercise were much more likely to use the intervention, suggesting that employees were aware of their job flexibility before the study began. Future “using time” interventions should ensure the employees and supervisors have the flexibility required to successfully implement the policy.

This study provides further evidence to support the observations that workload and flexibility influence an employee regarding using time to exercise. Work load and inflexible schedules were found to be associated with using time at work in a PA intervention that provided time.<sup>23</sup> Workplace flexibility was also shown to be positively associated with PA fre-

**Table 4**  
**Multivariate Analysis Examining the Relationship Between Work Environment Characteristics and Using Time at Work to Exercise\***

|                                                                              | Rate Ratio (95% CI)   | P            |
|------------------------------------------------------------------------------|-----------------------|--------------|
| <b>Model 1: Have too much work to do everything well (N = 162)</b>           |                       | <b>0.003</b> |
| Agree vs. disagree                                                           | <b>0.3 (0.2, 0.7)</b> |              |
| Neither agree nor disagree vs. disagree                                      | <b>0.5 (0.2, 1.0)</b> |              |
| <b>Covariates</b>                                                            |                       |              |
| Age                                                                          | 1.0 (1.0, 1.1)        | 0.03         |
| Facilities management vs. other department                                   | 2.1 (0.8, 5.5)        | 0.13         |
| Married or cohabitating                                                      | 1.5 (0.7, 3.2)        | 0.28         |
| Education                                                                    |                       | 0.18         |
| (≤HS vs. ≥MS)                                                                | 1.8 (0.4, 8.7)        |              |
| (Some college vs. ≥MS)                                                       | 1.5 (0.7, 3.2)        |              |
| (College vs. ≥MS)                                                            | 1.0 (0.5, 2.3)        |              |
| Female vs. male                                                              | 2.6 (1.1, 6.2)        | 0.03         |
| Income less than \$50,000                                                    | 1.5 (0.6, 3.8)        | 0.37         |
| Treatment group with education vs without education                          | 0.7 (0.4, 1.2)        | 0.18         |
| Ethnicity                                                                    |                       | 0.32         |
| Black vs. white                                                              | 1.8 (0.7, 4.7)        |              |
| Other vs. white                                                              | 2.0 (0.5, 8.4)        |              |
| Study block fall vs. spring/summer                                           | 1.5 (0.8, 3.0)        | 0.24         |
| <b>Model 2: Can take time off work to exercise (N = 174)</b>                 |                       | <b>0.03</b>  |
| Agree vs. disagree                                                           | <b>2.8 (1.3, 6.1)</b> |              |
| Neither agree nor disagree vs. disagree                                      | <b>1.3 (0.5, 3.2)</b> |              |
| <b>Covariates</b>                                                            |                       |              |
| Age                                                                          | 1.0 (1.0, 1.1)        | 0.04         |
| Female vs. male                                                              | 2.1 (1.1, 4.0)        | 0.03         |
| Adequate health literacy                                                     | 0.5 (0.3, 0.8)        | 0.01         |
| <b>Model 3: Have enough time to get everything done (N = 163)</b>            |                       | <b>0.04</b>  |
| Agree vs. disagree                                                           | <b>3.7 (1.6, 8.5)</b> |              |
| Neither agree nor disagree vs. disagree                                      | <b>2.3 (0.6, 8.1)</b> |              |
| <b>Covariates</b>                                                            |                       |              |
| Age                                                                          | 1.0 (1.0, 1.1)        | 0.048        |
| Facilities management vs. other department                                   | 2.3 (1.0, 5.6)        | 0.06         |
| Married vs. not married                                                      | 1.2 (0.6, 2.5)        | 0.56         |
| Education                                                                    |                       | 0.16         |
| (≤HS vs. ≥MS)                                                                | 1.2 (0.3, 5.0)        |              |
| (Some college vs. ≥MS)                                                       | 2.2 (1.0, 5.0)        |              |
| (College vs. ≥MS)                                                            | 1.3 (0.5, 3.2)        |              |
| Female vs. male                                                              | 3.3 (1.5, 7.4)        | 0.02         |
| Income < \$50,000                                                            | 1.7 (0.7, 4.2)        | 0.25         |
| Treatment group                                                              | 0.8 (0.5, 1.4)        | 0.50         |
| Study block fall vs. spring/summer                                           | 1.4 (0.8, 2.7)        | 0.24         |
| <b>Model 4: Can Change Work Times (N = 163)</b>                              |                       | <b>0.04</b>  |
| Agree vs. disagree                                                           | <b>0.9 (0.4, 2.2)</b> |              |
| Neither agree nor disagree vs. disagree                                      | <b>0.3 (0.1, 0.8)</b> |              |
| <b>Covariates</b>                                                            |                       |              |
| Each year increase in age                                                    | 1.0 (1.0, 1.1)        | 0.04         |
| Facilities management vs. other departments                                  | 1.8 (0.8, 4.2)        | 0.17         |
| Married vs. not married                                                      | 1.3 (0.7, 2.5)        | 0.40         |
| Education                                                                    |                       | 0.02         |
| (≤HS vs. ≥MS)                                                                | 1.2 (0.4, 4.3)        |              |
| (Some college vs. ≥MS)                                                       | 2.4 (1.2, 4.3)        |              |
| (College vs. ≥MS)                                                            | 0.9 (0.5, 1.9)        |              |
| Female vs. male                                                              | 2.8 (1.3, 6.3)        | 0.01         |
| Income < \$50,000                                                            | 2.0 (0.8, 5.1)        | 0.14         |
| Treatment group with education vs. without education                         | 0.7 (0.4, 1.3)        | 0.30         |
| <b>Model 5: Ability to Take Time Off Work for Personal Matters (N = 170)</b> |                       | <b>0.08</b>  |
| Agree vs. disagree                                                           | <b>1.2 (0.4, 3.2)</b> |              |
| Neither agree nor disagree vs. disagree                                      | <b>0.4 (0.1, 1.5)</b> |              |

Table 4, Continued

|                                         | Rate Ratio (95% CI)   | P           |
|-----------------------------------------|-----------------------|-------------|
| Covariates                              |                       |             |
| Age                                     | 1.0 (1.0, 1.1)        | 0.10        |
| Model 6: Job Satisfaction (N = 171)     |                       | <b>0.98</b> |
| Agree vs. disagree                      | <b>0.9 (0.3, 2.4)</b> |             |
| Neither agree nor disagree vs. disagree | <b>0.8 (0.2, 3.9)</b> |             |
| Covariates                              |                       |             |
| Each year increase in age               | 1.0 (1.0, 1.1)        | 0.02        |
| Education                               |                       | 0.02        |
| (≤HS vs. ≥MS)                           | 0.6 (0.2, 1.9)        |             |
| (Some college vs. ≥MS)                  | 3.3 (1.4, 7.8)        |             |
| (College vs. ≥MS)                       | 1.5 (0.6, 3.5)        |             |
| Female vs. male                         | 1.8 (0.9, 3.5)        | 0.09        |

CI indicates confidence interval; HS, high school; and MS, master's degree.

\* Logistic regression modeling was used to test the effect of the work environment. Generalized estimating equation analysis, using the SAS procedure GENMOD, was used with a repeated statement for department using an exchangeable correlation structure. Rate ratios and *P*-values are bold if significant at *P* < 0.05.

quency in a study of 3193 employees in a pharmaceutical company.<sup>24</sup> This study measured perceived workload and flexibility, which may be different from actual workload and flexibility. Participants who did not use the intervention because of high workloads may have had the same amount of work than those who did. These results suggest that when developing a workplace intervention, it is important to consider how employees perceive their workload and flexibility as opposed to using only objective measures of these work environment characteristics.

Significant results were not found for job satisfaction and the ability to take time off for personal matters. This result was surprising, since job satisfaction generally enhances employees' engagement with their work. There has been some support for job satisfaction associated with using time at work because individuals who used a corporate health club had higher job satisfaction than did nonmembers of the club in one study, although it is unclear whether job satisfaction determined PA use.<sup>25</sup> There may have been no significant effect of job satisfaction in our study because there was little variance of job satisfaction, with most participants satisfied with their job. It was also surprising that participants who change start and quit times were less likely to use time. It could be that these

participants also had a greater workload and so they were unable to take time off during the workday to exercise.

Adherence to using time may have been below 50% because many individuals within a department were not part of the study. The number of participants in each department accounted for a small percentage of total employees. There may not have been enough participants modeling using time for other participants to also use time. The effect of the intervention may have been much greater if co-workers of participants were also allowed time at work to exercise. Adherence may also have been below 50% because of individual motivations to exercise. Some individuals may not have prioritized exercise regardless of their work environment or having time at work to exercise.

#### Strengths and Limitations

This study has several strengths. First, the study used a randomized controlled trial design to randomize departments to intervention groups, which is stronger than self-selecting participants. Second, this was a prospective study with a long follow-up period of 9 months. This allowed for analysis of sustained gains in using time to exercise to be measured. Third, work environment characteristics were analyzed separately, which allows com-

parison to determine which characteristics are more important in the use of the intervention than others. Fourth, there was a high response rate, which reduced potential bias of results. In the majority of the literature, response rates were low (around 50%). This study had a response rate of above 90% for participants. Finally, the study was developed using a specific theory, the social cognitive model, thus a theory-based set of variables was collected.

Despite these strengths, there were at least three limitations of the study. First, using time was self-reported by employees and may be inaccurate. Employees may overreport using time. Overreporting has been shown to occur in PA reporting.<sup>26</sup> Second, this is a secondary analysis. The sample size was determined to detect differences between the five intervention groups for minutes of PA per week, whereas this analysis was limited to data from two of those intervention groups on a dichotomous outcome. Third, the work environment may have changed from baseline owing to factors other than the intervention; thus use at 9 months may not be as strongly related to baseline characteristics of the work environment.

The results of this study provide novel data that can be used as the basis for future intervention trials. Because

#### SO WHAT? Implications for Health Promotion Practitioners and Researchers

##### What is already known on this topic?

Workplace interventions that provide flexible time at work to exercise have low adherence. Workplace environmental factors, such as job satisfaction and job flexibility, are shown to be related to adherence in cross-sectional studies.

##### What does this article add?

Workload negatively influences the ability to exercise at work. Individuals with greater job flexibility and lower workload were more likely to use time. Surprisingly, job satisfaction was not associated with using time.

##### What are the implications for health promotion practice or research?

Providing flexibility and appropriate workloads would enable more employees to exercise in the workplace.

job flexibility and workload significantly affect employees using time to exercise, new models to balance flexibility and productivity should be investigated. Workplace policies should be examined carefully to ensure that they provide opportunities for employees to exercise throughout the workday. If implemented and shown to increase employee exercise, exercise in the workplace could be an immensely beneficial public health intervention.

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