Original Research

Occupational Sitting and Physical Activity Among University Employees

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ABSTRACT

International Journal of Exercise Science 7(4) : 295-301, 2014. The prevalence of overweight and obese in the U.S. has been thoroughly documented. With the advent of inactivity physiology research and the subsequent interest in sedentary behavior, the work environment has come under closer scrutiny as a potential opportunity to reverse inactivity. Therefore, the purpose of this study was to determine the sitting and physical activity (PA) habits among different classifications of university employees. University employees (n=625) completed an online survey based on the Occupational Sitting and Physical Activity Questionnaire (OSPAQ). Participants were instructed to describe time spent sitting, standing, walking, and in heavy physical labor during the last seven days, along with the number of breaks from sitting taken per hour. To establish habitual patterns of PA outside of work, employees recalled their participation in structured PA in the past seven days. Prior to data analysis, employees were categorized as Administration, Faculty, Staff, or Facilities Management. Statistically significant differences were found among employee classifications for min sit/d, $p<.001$; min stand/d, $p<.001$; min walk/d, $p<.001$; and min heavy labor/d, $p<.001$. No significant differences were found for breaks/h from sitting, $p=.259$ or participation in structured PA, $p=.33$. With the exception of facilities management workers, university employees spent 75% of their workday seated. In conjunction with low levels of leisure time PA, university employees appear to be prime candidates for workplace interventions to reduce physical inactivity.

KEY WORDS: Sedentary behavior, physical inactivity, workplace habits

INTRODUCTION

The prevalence of overweight and obese in the U.S. has been thoroughly documented (5,6,15,18), along with its associated health risks, including cardiovascular disease, premature mortality, type 2 diabetes, hypertension, and abnormal cholesterol (3,10,15,23,25). Current projections indicate obesity prevalence may be as high as 51% by 2030 (5), prompting considerable research focus on measures to combat obesity at the individual, community, worksite, and population levels (9,14,16,18).

Physical activity, exercise, and healthy eating habits are the cornerstone strategies to help mitigate obesity and promote health benefits. Recently there has been an emphasis on the importance of increasing

light-intensity physical activity (1.1-2.9 MET) while also reducing total sedentary time (< 1 MET) (3,10,17,23) as a way of improving health outcomes. Long periods of sedentary time, especially if unbroken, has been associated with health risks similar to those of excessive physical inactivity (3,10,23,25). Prolonged sitting has also been shown to increase postprandial glucose levels when compared to sedentary time coupled with short, light-intensity physical activity breaks every twenty minutes (4). Individuals classified as non-sedentary (<3.0 hours per day spent sedentary) spend a significantly higher percentage of their day in light-intensity physical activity and show a decreased risk for mortality and negative health outcomes compared to individuals classified as sedentary (10).

With the considerable evidence towards negative effects of prolonged sitting (4,17,25), the workplace has come under greater scrutiny for intervention due to its high percentage of computer-based, or sedentary jobs, since largely sedentary occupations have a higher prevalence of cardiovascular disease compared to occupations that require standing and ambulating (3). Also, work days are typically associated with less light-intensity physical activity compared to non-work days (13,24), and although limited data support work days including more moderate-vigorous physical activity (MVPA)(24), other data have found short bouts of MVPA are not enough to combat the negative effects of prolonged sitting (3,10,23). McCrady and Levine (13) found that two more hours per day are spent sitting during work days compared to leisure days, while other studies have shown that up to 77% of the work day is spent sedentary across various professions (17,24), including office, call center, and customer service employees (24). However, little to date is documented on sitting routines of university employees. Therefore, the purpose of this study was to determine the sitting and physical activity habits among different classifications of university employees.

METHODS

Participants

Employees at the University of Minnesota Duluth were emailed a link to a brief online survey assessing occupational sitting and physical activity. Potential subjects were recruited via an email containing consent information. If subjects consented, they were instructed to click on a link, which allowed them to take the survey. The Institutional Review Board (IRB) at the University of Minnesota approved the above protocol. Out of a workforce of approximately 1900 full-time and part-time employees, 625 employees responded to the survey, a 33% response rate.

Protocol

The online survey (Figure 1) was based on the Occupational Sitting and Physical Activity Questionnaire (OSPAQ), a validated survey measuring occupational sitting, standing, and physical activity time (1). Participants were instructed to describe time spent sitting, standing, walking, and in heavy physical labor during the last seven days, along with the number of breaks from sitting taken per hour (2). To establish habitual patterns of PA outside of work, employees recalled their participation in

structured physical activity in the past seven days (7).

1. How many hours did you work in the past 7 days?
2. During the last 7 days, how many days were you at work?
3. How would you best describe your typical workday in the last 7 days? (This involves workday only, and does not include travel to and from work or leisure time). Make sure it adds up to 100%
% of time sitting
% of time standing
% of time walking
% of time doing heavy labor or physically demanding tasks
4. How many breaks from sitting (such as standing up, stretching, or taking a short walk) do you typically take during one hour of sitting at work?
5. In the past 7 days, on how many days did you participate in structured exercise (such as brisk walking, jogging, or resistance training)?

Figure 1. Sitting survey questions.

Statistical Analysis

Prior to data analysis, employees were categorized as Administration (n=55), Faculty (n=181), Staff (n=357), or Facilities Management (n=32) as per demographic information obtained from the survey. As per OSPAQ guidelines (1) data were transformed into minutes per workday for each category and were abbreviated as follows: min sit/d, min stand/d, min walk/d, min heavy labor/d. Data specific to breaks per hour from sitting and days per week of structured exercise were abbreviated as breaks/h and PA d/wk, respectively. All data were analyzed using IBM SPSS Statistics (version 21). One-way ANOVA with Bonferroni post hoc tests were performed to determine differences among employee classifications. All data are presented as mean ± SD. Level of significance for all statistical tests was set at $P < 0.05$.

RESULTS

Descriptive statistics for occupational sitting and physical activity by employee classification are presented in Table 1. Statistically significant differences were found among employee classifications for min sit/d, $F(3,621)=25.1$, $p<.001$; min stand/d, $F(3,621)=35.6$, $p<.001$; min walk/d, $F(3,621)=35.6$, $p<.001$; and min heavy labor/d, $F(3,621)=56.8$, $p<.001$. No significant differences were found for breaks/h from sitting, $F(3,621)=1.3$, $p=.259$ or participation in structured PA, $F(3,621)=1.1$, $p=.33$. Post hoc analysis indicated that for both min walk/day and min heavy labor/day, Facilities Management employees accrued significantly higher amounts than did Administration, Faculty, and Staff, $p<.001$. For min sit/day, Administration and Faculty were significantly higher than Staff and Facilities Management, $p<.001$. For

Table 1. Occupational sitting and physical activity by employee classification.

	Administration n=55	Faculty n=181	Staff n=357	Facilities n=32	Total n=625
Min Sit/d*	394±112	394±170	338±143	158±162	350±158
Min Stand/d*	52±44	119±91	67±82	111±116	83±88
Min Walk/d*	65±57	51±43	54±47	150±104	59±55
Min Heavy Labor/d*	6±24	9±33	12±33	110±123	16±47
Breaks from Sitting/h	1.6±1.4	1.3±1.2	1.5±1.4	1.3±1.6	1.5±1.4
Leisure time PA d/wk	3.0±2.2	3.4±2.3	3.0±2.2	3.0±2.5	3.1±2.3

Note: Values are displayed as mean±SD. * denotes significant difference ($p<.05$) between employee classifications.

min stand/day, Faculty and Facilities Management were significantly greater than Administration and Staff, $p<.05$. Percent activity time for all university employees engaged in sitting, standing, walking, and physical labor is presented in Figure 2.

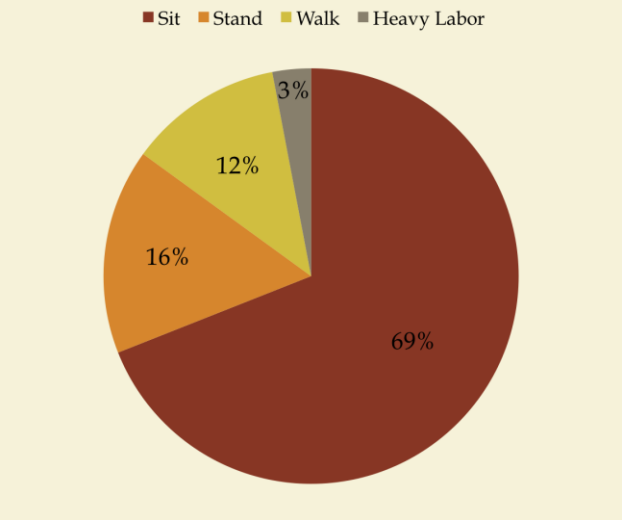

Figure 2. Percent activity time in the workday for all university employees.

DISCUSSION

The primary purpose of this study was to determine the workplace sitting and physical activity habits among university employees. With the exception of facilities management workers, university employees spent nearly 75% of their workday seated. Additionally, this cohort of university employees reported infrequent breaks from sitting during the workday and relatively low levels of leisure time physical activity.

With the emergence of inactivity physiology research and further insight into the potential harms of prolonged sedentary behavior (4,9,14,16,17,23,25) the modern workplace appears to be a prime candidate for potential interventions to incorporate light to moderate intensity physical activity into the lives of employees. However, this study suggests that when examining occupational sitting and physical activity by employee classification, significant differences among employees are noted, thus any prospective workplace intervention may need to be targeted to the unique demands of each job category. With the limited resources facing many health promotion professionals, the practicality of such targeted interventions could be a major challenge, especially with minimal evidence to suggest the effectiveness of any such endeavor (8). Subsequently, this study serves a valuable purpose in providing descriptive data of the wide range of workplace physical activity and inactivity in multiple employee classifications.

The typical workplace may be even more restrictive towards PA, as it tends to be associated with prolonged sedentary time and limited availability of physical activity time compared to non-work days (13,24) . Thorp et al. (24) found that only 62.9% of time was spent sedentary on non-work days compared to 70.4% of workdays. Likewise, McCrady and Levine (13) looked at healthy, weight-stable adults and found that significantly more time (597 min) of work days were spent sedentary compared to 484 minutes on non-work days. Further, Thorp et al. (24) noted that sedentary time within a given day, as a percent of total time, was higher during work than the rest of the day, 77.0% vs. 70.4%, respectively.

While our results confirm previous research that the majority of the work day is spent in sedentary behavior, this may be

compounded by the evidence indicating that short bouts of MVPA occurring during non-work hours are usually not enough to make up for the lack of work-related PA when it comes to disease risk (4,10,23). Additionally, within the workplace, there tends to be noticeable differences in accumulated PA based on job classifications. Our results show that facility management employees accrued significantly more steps per day than administration, faculty, and staff. This finding agrees with previous literature indicating that blue-collar type employees are typically more active at work compared to white-collar employees (19,20). Steele and Mummer (20) surveyed 25,104 Japanese employees spanning across a variety of occupations and found that weekly physical activity for "low-class occupations" (machine operators, skilled workers, and laborers) was significantly higher than "high-class occupations" (managers and professionals). Further, there was a negative correlation between hours worked each week and weekly physical activity for men. Schofield et al. (19) analyzed pedometer data from 181 New Zealand employees and found that blue-collar workers accrued an average of 10,334 steps at work as measured by a pedometer. On the other hand, university faculty and staff accrued only 4442 and 4790 steps respectively. Even with the addition of non-work pedometer values, university faculty and staff did not reach the recommended amount of daily steps, putting them at higher risk for cardiovascular disease and other health problems, a finding true across almost all occupations requiring high amounts of prolonged sitting (5).

The present study is not without limitations. Workplace sitting and physical activity were not directly measured, and are thus duly noted as estimates via the OSPAQ survey tool. Whereas devices such as pedometers and accelerometers can provide objective measurements of physical activity patterns, the cost of such devices and potential burden on participants is an important consideration for researchers to weigh. Therefore, the high test-retest reliability and moderate validity of the OSPAQ in estimating occupational sitting and standing time (1), coupled with a minimal burden on participants time as per the short survey format, may warrant consideration in future epidemiological investigations. An additional limitation was that this study investigated the occupational sitting and physical activity habits of university employees, thus caution should be made if generalizing the results to other workplace environments. The eclectic composition of a university workforce features a unique blend of both blue and white-collar workers, with each demonstrating a very distinct temporal pattern of work activity. In contrast, other workplace environments may be much more homogeneous than the present study, ranging from call centers in which employees are seated, assembly lines at manufacturing plants in which employees stand for the majority of an assigned shift, to jobs necessitating heavy physical labor, thus the results of this study are best generalized to a similar workplace environment and employee makeup.

In summary, this study of occupational sitting and physical activity found university employees spend nearly 75% of their workday seated, report infrequent

breaks from sitting, and participate in low levels of leisure time physical activity. University employees appear to be prime candidates for workplace interventions to reduce physical inactivity. Future research investigating workplace interventions faces many challenges. Whereas devices such as walking treadmill desks (8,11) have been demonstrated to result in significant energy expenditure throughout the workday, the cost and space demands of such options may render such options as non-practical for the majority of workplaces. Less intrusive options such as hydraulic stepping devices (12), stepping in place (21,22), or simple postural changes every 20 minutes (4) may hold promise as potential interventions to break-up prolonged bouts of sitting. Challenges remain for health promotion professionals to identify interventions that are not only feasible, but also cost effective and practical.

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