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Sedentary Work and Measuring Physical Activity in Applied Sedentary Behavior Research

Brad Wipfli, PhD

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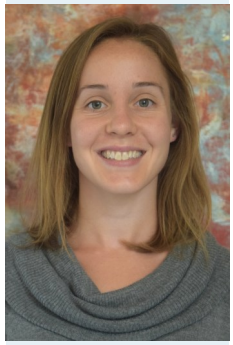

Sara Wild, MPH

Oregon Institute of Occupational Health

There is a long-term, global trend towards physical inactivity and sedentary behavior (Kohl et al., 2012) that persists in work and non-work settings. Worldwide, physical inactivity is estimated to be the fourth leading cause of death (Kohl et al., 2012). In the United States in particular, labor force trends have resulted in a steady increase in the prevalence of sedentary jobs and a population level decrease in energy expenditure at work (Church et al., 2011).

To date most employers have not treated sedentary work like a traditional safety or health hazard. The reasons for this are likely multifaceted and complex, but one reason may be the lagging consequences of exposure. The impacts of slips, trips, and falls on employee health and organizational expenses, for example, are immediate. However, the consequences of sedentary behavior, which include increased risk for cardiovascular disease, diabetes, injury, all-cause mortality, and more (see Tudor-Locke & Schuna, 2012), develop over long periods of time and may not cause an immediate expense for employers.

Workplace sedentary behavior is also intertwined with overall sedentary behavior. Employers may view sedentary behavior as something that employees should address during non-work time. But as a place where many people spend 50% of waking hours, the workplace plays a significant role in overall sedentary behavior, and employers should therefore bear some responsibility for reducing exposure to sedentary work.

From an employer perspective, as the consequences of sedentary work become clearer and more pervasive, they should proactively protect the health and safety of employees and reduce or eliminate exposure to sedentary work. From a researcher perspective, it is important to identify and disseminate effective strategies for reducing exposure to sedentary work.

Pedal stands are an appealing option for reducing exposure to sedentary work because they do not impair job performance, are less expensive and more portable than treadmill desks, and they produce virtually no noise. To our knowledge we were among the first groups of researchers to conduct intervention research with pedal stands. One of the first challenges we faced was measuring how much time a person spends pedaling, which is a primary outcome in our intervention. Because there were no previous publications on measuring pedal stand use, we conducted a pilot study to develop a measurement method.

If people share pedal stands, which is more efficient than providing a pedal stand to each individual, attaching a measurement device to the pedal stand itself does not provide individual level data. We therefore began pilot testing with accelerometers. Waist-worn accelerometers were unable to detect pedaling, and the pilot study therefore used thigh-worn accelerometers. Helpfully, the thigh is also the optimal location for measuring sitting time and standing time (Edwardson et al., 2016), which is another important outcome in sedentary behavior research.

We collected data in three ways: a structured condition in which researchers dictated and directly observed a 90-minute routine of activities while participants worked at their desks; an unstructured condition in which participants used pedal stands freely and self-recorded pedaling and other physical activities; and a condition in which participants used pedal stands freely, with an accelerometer attached to the pedal of their pedal stand. In all three conditions participants wore ActiGraph GT3X or Link accelerometers on their thighs.

We used Actilife software to analyze accelerometer data. The software provides several variables that describe characteristics of motion (e.g., the number of seconds a participant spends sitting in a one-minute epoch, number of steps recorded in the epoch, estimated kcal expenditure, intensity of motion, etc.).

We generated multiple formulas to classify participant pedaling time from the thigh-worn accelerometer, combining different Actilife variables and various criteria for each variable. We then cross-tabulated these data with known pedaling time data to find the most accurate formula to identify pedaling. Overall, we tested over 30 formulas and found that adding more variables to the formula consistently produced less accurate results. The most accurate formula for identifying pedaling time from a thigh-worn accelerometer was that the participant is sitting for at least 56 seconds in a one-minute epoch, combined with at least 6 recorded steps in that epoch. This formula produced 91.1% sensitivity and 98.3% specificity.

The formula may be able to be improved by accounting for very low speed pedaling, or more accurately classifying non-pedaling, repetitive, seated leg motions. However, the formula provides acceptable accuracy and is a good starting point for researchers working with pedal stands. We are currently conducting a *Total Worker Health®* oriented intervention with call center workers (https://www.activestudy.org/) in which we plan to use this formula to identify pedaling time among participants, and look forward to sharing results in upcoming publications.

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Welcome to the Society for Occupational Health Psychology Newsletter!

Summer 2019
Volume 21

We begin this edition of the newsletter with a tribute to Ronald J. Burke, written by his students and collaborators, Lisa Fiksenbaum, Esther Greenglass, Eddy Ng, Jacob Wolpin, and Isabel Metz. Ron worked as a professor of organization studies in the Schulich School of Business at York University in Toronto, where he shined as a teacher, mentor, and researcher. Ron's research focused on many important OHP topics, including workaholism, gender and careers, job satisfaction, and employee well-being. He will be missed by the OHP community.

This edition of the newsletter also includes an update on the new journal, Occupational Health Science, written by founding editor-in-chief, Bob Sinclair. Bob shares a summary of the journal's metrics, including submissions, acceptance rate, and downloads of OHS articles. He lets readers know of several ways that they can get involved and help the journal. Bob also describes some of the challenges involved in editing a journal and some of the ongoing issues in the field where people have different viewpoints.

This newsletter also features a column by Irvin Schonfeld, describing a program of research on the overlap between burnout and depression. Irvin shares eight key findings from his work on burnout and depression over his many years of collaborating with Renzo Bianchi and Éric Laurent.

Continuing with the topic of burnout, Marissa Shuffler-Porter shares a column about her research efforts on healthcare leadership interventions that aim to reduce health provider burnout. Marissa describes some work in progress with a local healthcare organization and future plans for targeted interventions based on burnout profiles.

Up next, we have a question and answer interview session with Joel Bennett. Joel is the founder and president of Organizational Wellness and Learning Systems (OWLS), and shares information on how he began this organization, its offerings, challenges, and success stories.

The next piece focuses on research conducted by Brad Wipfli and Sara Wild related to reducing sedentary behavior through pedal stands at work. Brad and Sara describe their efforts from a recent pilot study to develop a measurement method for reliably capturing physical activity through pedal stands.

This edition of the newsletter also features a column from Joe Mazzola on the stressors and work experiences of self-employed individuals. In this column, Joe provides some highlights from an interview study he and Irvin Schonfeld published on self-employed individuals in 2015.

We have also included a list of OHP conferences for the upcoming year. Lastly, we share an announcement of a recently published book, Cyberbullying in Schools, Workplaces, and Romantic Relationships, edited by Gary Giumetti and Robin Kowalski.

We would like to thank all of the contributors and the editorial team for your work and support of the newsletter. We hope you enjoy this issue of the newsletter and wish you a healthy and happy summer!

If you have any comments or would like to write an article for a future issue, please reach out and let us know:

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Society for Occupational Health Psychology

Inside this issue

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