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NOTES FOR PRACTITIONERS
Sit Less, Move More

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Abstract
Sedentary behaviour – a risk factor for obesity, heart disease, type 2 diabetes, and many other chronic diseases – is becoming increasingly prevalent within today's society, particularly among office-based employees. In this commentary, we discuss (i) sedentary behaviour in the workplace, (ii) subjective and objective measures of sedentary behaviour, and (iii) workplace interventions. We demonstrate the importance of addressing sedentary behaviour in the workplace. **Health and Fitness Journal of Canada 2016;9(1):15-19.**

Keywords: Sedentary Behavior, Workplace, Workplace Interventions, Chronic Disease, Accelerometry

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Introduction
The way humans work and travel within their daily lives has rapidly changed. The advancements in transportation (ex. sitting on transit or driving to and from work) and communication (e.g., sitting while talking on the phone or at a desk using a computer) have caused a significant reduction in the demands for physical activity and increased the amount of time spent sitting among adults (Owen et al., 2010). Sedentary behaviour, which is a different behaviour than physical inactivity, can be defined as 'any waking behaviour characterized by an energy expenditure of ≤1.5 metabolic equivalents while in a sitting or reclining position' (Sedentary Behaviour Research Network, 2012). Pro-longed periods of sedentary behaviour, particularly in office workers and desk bound employees, have led to an increased risk for obesity, heart disease and all-cause mortality (Chau et al., 2013; Warburton et al., 2006). Furthermore, evidence is emerging now that suggests prolonged, uninterrupted sitting despite fulfilling the recommended amounts of daily physical activity, may be more damaging to health than total sedentary time (Altenburg et al,, 2013; Dunstan et al., 2012). Since sedentary time is becoming increasingly harmful to one's health, exercise based interventions should be implemented in the workplace to encourage people to reduce and interrupt their sitting time (Blangsted et al., 2008).

Sedentary Behaviour in the Workplace is an Increasing Health Problem
Industrialization and urbanization has led to a decrease in manual labour (i.e., farming), reduced active transportation (walking or cycling) and an increase in sedentary employment (i.e., desk bound office workers) (Physical Activity and Obesity-2nd Edition, 2000). Sedentary occupations are linked to an increased risk for all-cause mortality (Chau et al., 2013; Warburton et al., 2010). Canadians aged 18-79 spend on average, 10 hr per day in sedentary positions (Government

of Canada, 2013). Working hours account for over half of total wake time (Basner et al., 2007), and many work environments require prolonged periods of sedentary behaviour with up to 70% of their work time sitting (Mathiassen, 2006). Sitting for prolonged periods of time can decrease the effects of an enzyme called Lipoprotein-lipase. The loss of this enzyme can lead to a low uptake of fatty acids within skeletal muscle which contributes to metabolic disease such as obesity, and cardiovascular disease (Bey and Hamilton, 2003; Hamilton et al, 2004). In addition to total sedentary time, the manner in which it is accumulated is important. Research has shown that additional unwarranted sedentary time can increase the risk for disease even if physical activity guidelines are being met (Tremblay et al., 2010).

Measures of Sedentary Time

Accurately measuring sedentary behaviour is imperative when it comes to public health observation, assessing results from interventions and promoting health benefits of physical activity (Physical Activity and Obesity-2nd Edition, 2000; Rosenberg et al., 2010). A wide range of measurement methods, both subjective and objective, are being used to document patterns of, and changes in, sedentary behaviour. Subjective measures can include self-report, questionnaires and diaries while objective measures include accelerometers and heart rate (HR) monitors. Questionnaires are the most commonly reported subjective method of capturing sedentary behaviour (Atkin et al., 2012). One questionnaire commonly used is the International Physical Activity Questionnaire (IPAQ). This assessment has some support for reliability and validity, however only enquires about time spent sitting in general and while driving (Craig et al., 2003; Rosenberg et al., 2008). There are no additional questions on other types of sedentary behaviour (i.e. working or TV time). Another accepted questionnaire is the Sedentary Behaviour Questionnaire (SBQ) which assesses the amount of time in nine completely sedentary pursuits. The SBQ provides a brief but comprehensive measure of sedentary behavior, however, the validity is low when compared with accelerometers (Rosenberg et al., 2008). While subjective methods for measuring physical activity and sedentary behaviour are cost effective and easy to administer, objective methods are now being viewed as the optimal method of measurement (Reilly et al., 2008). Objective methods are unlikely to produce biased measures of the amount of physical activity or sedentary behaviour (Reilly et al., 2008). Accelerometry can capture a broad spectrum of activity, even the smallest changes in sedentary behaviour, which may go undetected using self-reported measures. This will improve our understanding of the relationship between physical activity, sedentary behaviour and health. While a degree of uncertainty remains over certain practical and logistical issues, accelerometry can offer a noticeable improvement over more traditional subjective methods.

It's About Sitting Less

Skeletal muscle is the major site for triglyceride removal, therefore it is important to improve skeletal muscle contraction in order to maintain lipoprotein lipase function (Hamilton et al., 2004). The more breaks one can accumulate throughout the day, even if

they are short in duration, is associated with a decrease in cardio metabolic risk factors such as adiposity, triglycerides and 2-hr plasma glucose (Healy et al., 2008). Similar observations have also been reported that interrupted sitting can lower postprandial glucose and insulin levels in overweight or obese adults (Dunstan et al., 2012). Implementing short breaks is also a practical and realistic intervention that can be applied across many environments and demographics. Given that working adults typically spend about half of their working day sitting, the workplace is an appropriate site for interventions aimed at reducing sedentary time (Dunstan et al., 2013). In the workplace, breaks can be employed through walking meetings, technology arrangement (i.e. printer and photocopier set away from desk) and task organization (i.e. stand to talk on the phone). Providing standing options for deskbound workers is believed to be of benefit to both musculoskeletal health as well as work performance (Mathiassen, 2006). One study implemented sit-stand workstations over a four week period, and reported a 21% decrease in sitting time, which translates to a decrease of eight hours of sitting during a 40 hour work week (Dutta et al., 2014). In recent reviews, it was concluded that sit-to-stand workstations can be effective in reducing perceived discomfort and do not change worker productivity (Karakolis and Callaghan, 2014). While future studies should implement larger sample sizes and longer follow-ups, there is preliminary evidence that multicomponent wellness interventions can - at least in the short term - result in significant reductions in workplace sitting time.

Conclusions

Office workers and deskbound employees have come to dominate modern society. Achieving the recommended amount of daily physical activity is beneficial to one's overall health, however it must be accompanied by other lifestyle changes including dietary habits, and reduced smoking and alcohol consumption. Therefore, workplace wellness interventions should be multifaceted and emphasise the importance of interrupting sitting time. This implementation could have a positive impact on reducing overall sedentary behaviour, even during non-working hours. As a result, getting employees moving more frequently, will result in better worker health and overall well-being.

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Authors' Qualifications

The authors' qualifications are as follows: Tara Giallonardo, MKIN, BKIN, HFFC-CEP, Darren E. R. Warburton PhD, MSc, HFFC-CEP.

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