

# Patterns of Objectively-Measured Prolonged Sedentary Time and Physical Activity at Work

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## ABSTRACT

Prolonged sitting is associated adversely with biomarkers of cardio-metabolic risk and with premature mortality. Much of adults' total sitting may occur in the workplace. However, limited evidence is available on the patterns of sedentary time among adults during working hours.

**PURPOSE:** To examine patterns of prolonged sedentary time and physical activity at the workplace in employees from different workplace settings.

**METHODS:** A convenience sample of 193 employees working  $\geq 4$  days/week in office (131), call center (36) and customer service (26) settings was recruited. Actigraph GT1M accelerometers were used to derive percentage of monitored working time that was spent: sedentary (<100 counts per minute; cpm); in light-intensity activity (100-1951 cpm); and, in moderate-to-vigorous physical activity (MVPA;  $\geq 1952$  cpm). Prolonged bouts ( $\geq 20$  minutes and  $\geq 30$  minutes) of sedentary time were also assessed (both frequency and duration).

**RESULTS:** Time at work (mean 8.6 hours) was mostly spent sedentary (mean [95% CI]: 75.7% [74.4, 77.0]), with some light-intensity activity (20.7% [19.6, 21.8]), and very little MVPA (2.3% [1.9, 5.0]). A substantial portion of workplace sedentary time was accrued in prolonged bouts of at least 20 minutes (39% of total sedentary time) or 30 minutes (24%). All outcomes differed significantly across workplace settings ( $p < 0.001$ ). Call-center workers were generally the most sedentary and least physically active; customer service workers were typically the least sedentary and the most active.

**CONCLUSIONS:** Further studies are required to document the nature and extent of exposure to prolonged sedentary time at work and to determine the health risks that may be involved for different occupational groups. Future workplace regulations and health promotion initiatives for workers whose jobs involve sitting for long periods might aim to reduce prolonged sedentary time.

## INTRODUCTION

- Prolonged sitting time- a predominant feature of most adults' waking hours—is recognised as an independent risk factor for early death and poor health outcomes.<sup>1</sup>
- Breaking up prolonged sedentary time can potentially provide important health benefits, independent of how much time adults spend sedentary.<sup>2,3</sup>
- For most adults, time spent sitting in the workplace may be the greatest single contributor to overall sitting time (hours per day).<sup>4</sup>
- Occupational sitting time is detrimentally associated with health risks.<sup>5</sup> However, little data exists on the sedentary patterns of adults measured objectively within the context of the workplace; most studies have relied on self-report estimates.<sup>6,7</sup>

## AIM

To examine patterns of prolonged sedentary time and physical activity at the workplace in employees from different workplace settings.

## METHODS

- A convenience sample of 193 adults aged 20-61 years working  $\geq 4$  days/week were recruited from four Melbourne-based organisations across three workplace settings: office (n=131), call centre (n=36) and customer service (n=26).
- Demographic (age, sex, marital status, education level) and anthropometric (height and weight) data were collected at the commencement of the study.
- Participants wore an accelerometer (Actigraph model GT1M) for five work days and self-reported work hours (start and finish times) in an event diary.
- The proportions of daily work time spent sedentary (<100 counts per minute; cpm), in prolonged sedentary bouts ( $\geq 20$  mins or  $\geq 30$  mins), in light-intensity activity (100-1951 cpm) and in moderate-to-vigorous intensity activity ( $\geq 1952$  cpm) were determined from accelerometer data during self-report work hours.
- Accelerometer data were excluded from analyses if <75% of work hours was unobserved (n=20 days); or if participants did not self-report work hours (n=12).

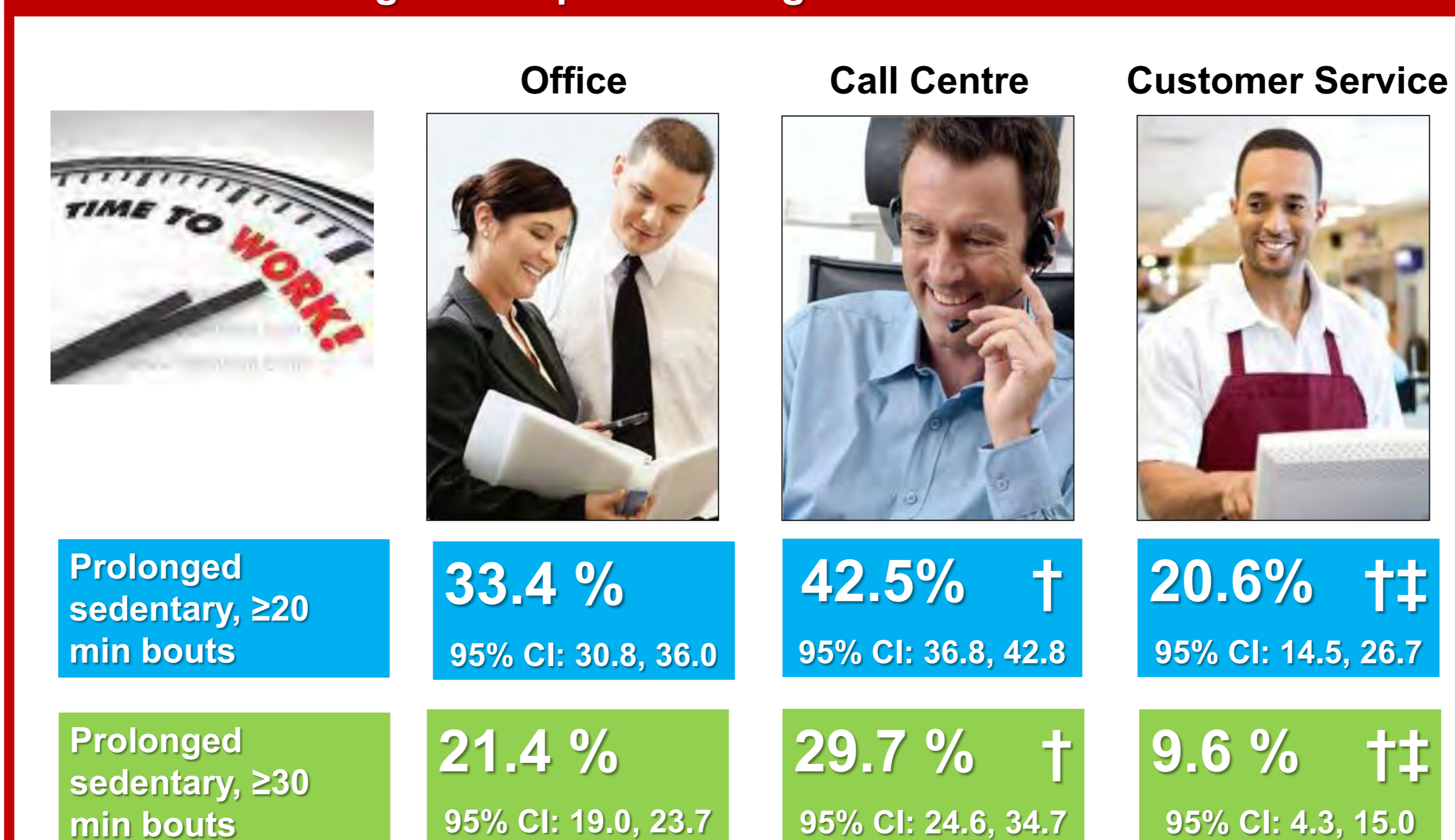
Figure 1. Proportion of working time spent sedentary and in physical activity according to workplace setting

	Office	Call Centre	Customer Service	p
<b>N=</b>	<b>127</b>	<b>31</b>	<b>23</b>	
<b>Number of work days</b>	<b>525</b>	<b>124</b>	<b>98</b>	
<b>Mean wear time (hrs)</b>	<b>8.8</b>	<b>8.2</b>	<b>7.5</b>	
<b>% of worn time spent<sup>b</sup></b>				
<b>Sedentary</b>	<b>75.8%</b> (74.5, 77.1)	<b>83.4% †</b> (81.3, 85.2)	<b>73.7% ‡</b> (70.2, 76.8)	<b>&lt;.0001</b>
<b>Light intensity physical activity</b>	<b>20.6%</b> (19.5, 21.8)	<b>15.3% †</b> (13.6, 17.3)	<b>24.4% †‡</b> (21.5, 27.8)	<b>&lt;.0001</b>
<b>Moderate-vigorous physical activity</b>	<b>2.4%</b> (1.9, 2.8)	<b>0.7% †</b> (0.4, 0.9)	<b>1.3% †‡</b> (0.8, 1.7)	<b>&lt;.0001</b>

† different to office workers ( $p < 0.05$ ). ‡ different to call centre workers ( $p < 0.05$ ). Data presented as marginal means (95% CI) from linear mixed models that account for repeated measures and adjust for age (years), gender, BMI (overweight or obese: yes/no), marital status (married: yes/no), education (post school qualification: yes/no).

<sup>b</sup> Marginal means (95% CI) back-transformed for percentage worn time spent sedentary [inverse log], in light-intensity activity [log], and in MVPA [log of MVPA % +0.001].

Figure 2. Proportion of working time spent in prolonged sedentary bouts according to workplace setting



†= different to office workers ( $p < 0.05$ ). ‡= different to call centre workers ( $p < 0.05$ ). Data presented as marginal means (95% CI) from linear mixed models that account for repeated measures and adjust for age (years), gender, BMI (overweight or obese: yes/no), marital status (married: yes/no), education (post school qualification: yes/no).

## RESULTS

- Of the 193 adults who participated in the study, 181 provided valid data for analyses: office n=127; call centre n=31; and customer service n=23.
- The majority of participants were female (66%), overweight/obese (52%), had completed a post-school qualification (77%) and worked in an office-setting (70%).
- The proportion of working time spent sedentary, in prolonged sedentary bouts, in light- and moderate-to-vigorous intensity activity differed significantly across the three workplace settings (all  $p < 0.001$ ). (see figure 1 and 2)
- Call centre workers were the most sedentary, engaged in more prolonged sedentary bouts and were the least active during work hours compared to both office and customer service workers. (see figure 1 and 2)
- For all participants (n=181), working hours were mostly spent sedentary (77.0%, 6.6 hours) with the remaining time comprised of light-intensity activity (20.2%, 1.7 hours), with minimal moderate-to-vigorous intensity activity (1.9%, 0.2 hours).
- Approximately half of all participants sedentary time at work was accumulated in prolonged bouts of either  $\geq 20$  mins or  $\geq 30$  mins (i.e. 33.5% and 21.5 % respectively of total work hours).
- Differences in patterns of prolonged sedentary time and physical activity across the three workplace settings most likely reflect variations in the opportunities of these groups of workers to interrupt sedentary periods through task-based activities.

## KEY FINDINGS

- **Approximately three quarters of work time was spent sedentary (77%) with a substantial proportion of this time accumulated in prolonged sedentary bouts.**
- **Call-centre workers were generally the most sedentary and the least active at work; customer service workers were typically the least sedentary and the most active at work.**
- **The workplace is a key setting for prolonged sedentary time, particularly for occupational groups such as call centre workers; the potential health risks of occupational sitting time requires further investigation.**

## ACKNOWLEDGEMENTS

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