



The Effect of Sit-Stand Workstations on Physical Activity in Sedentary Office Workers: A Randomized Crossover Trial



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Background

High levels of sedentary time (e.g. sitting) is quite prevalent in the U.S. and appears to have detrimental health effects such as excess weight gain, cardiovascular disease, diabetes, and premature mortality.

Purpose

The purpose of this study was to determine whether the installation of sit-stand work stations could lead to decreased sedentary time and increased physical activity during the workday among sedentary office workers.

Methods

Design: We conducted a randomized cross-over trial from January to April, 2012 in sedentary office workers.

Setting: A single-floor small business in Minneapolis, Minnesota.

Participants: Out of a volunteer sample of 35 adults, we enrolled and randomized 29 employees doing light office work at least 20 hours per week, mostly sitting at a desk. One subject was excluded due sickness after the beginning of the study that caused the subject to miss the large portion of the study, leaving 28 for analysis.

Interventions: The four week intervention period included the use of a sit-stand work station with the goal of gradually replacing half of sitting time with standing during the workday. Actual sitting/standing time was measured objectively by accelerometer (two days per week) and subjectively by questionnaire (OSPAQ, weekly).

Main Outcome Measure: Physical activity measured objectively by accelerometer during all waking hours.

Secondary Outcome Measures: Dietary intake measured via 24 hour dietary recall (ASA-24, once a week); perceived energy/fatigue, relaxation/calmness, appetite, and overall sense of well-being via twice daily 1 minute long surveys (ecological momentary assessment).

Results

Table 1: Participants in the two groups (receiving intervention in period 1 vs. receiving intervention in period 2) were comparable.

	Period 1 Intervention Period 2 Control (N = 17) (Mean (sd))	Period 2 Intervention Period 1 Control (N = 11) (Mean (sd))
Age (years)	40.1 (8.8)	42.0 (8.3)
Sex (Male) [N (%)]	4 (24%)	5 (45%)
Body Mass Index (kg/m ²)	25.9 (5.3)	25.1 (3.9)
Hours Spent at Work	35 (7.0)	37 (5.0)

Figure 1: Participants replaced about 25% of their sitting time with standing (accelerometer, p-value <.0001).

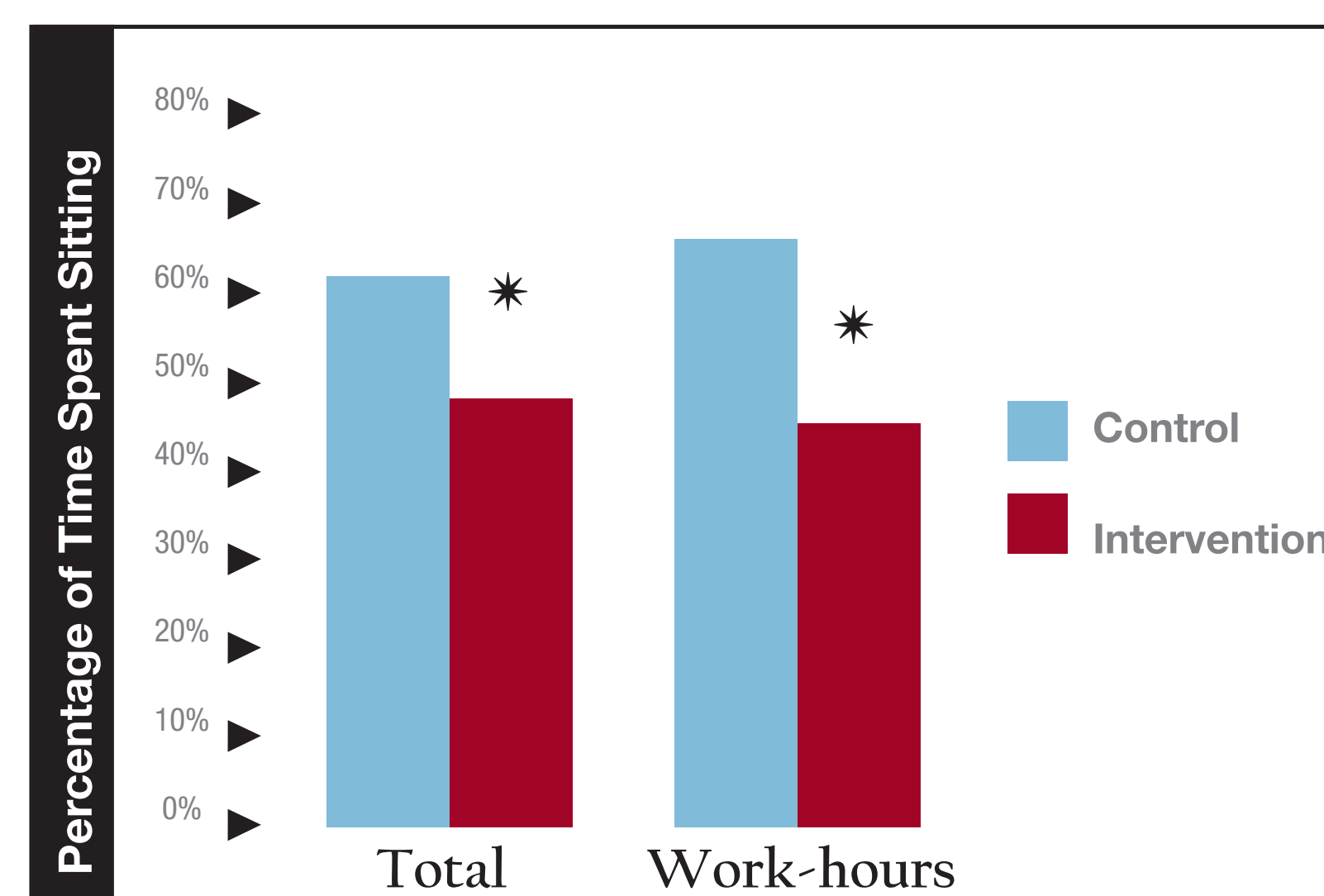
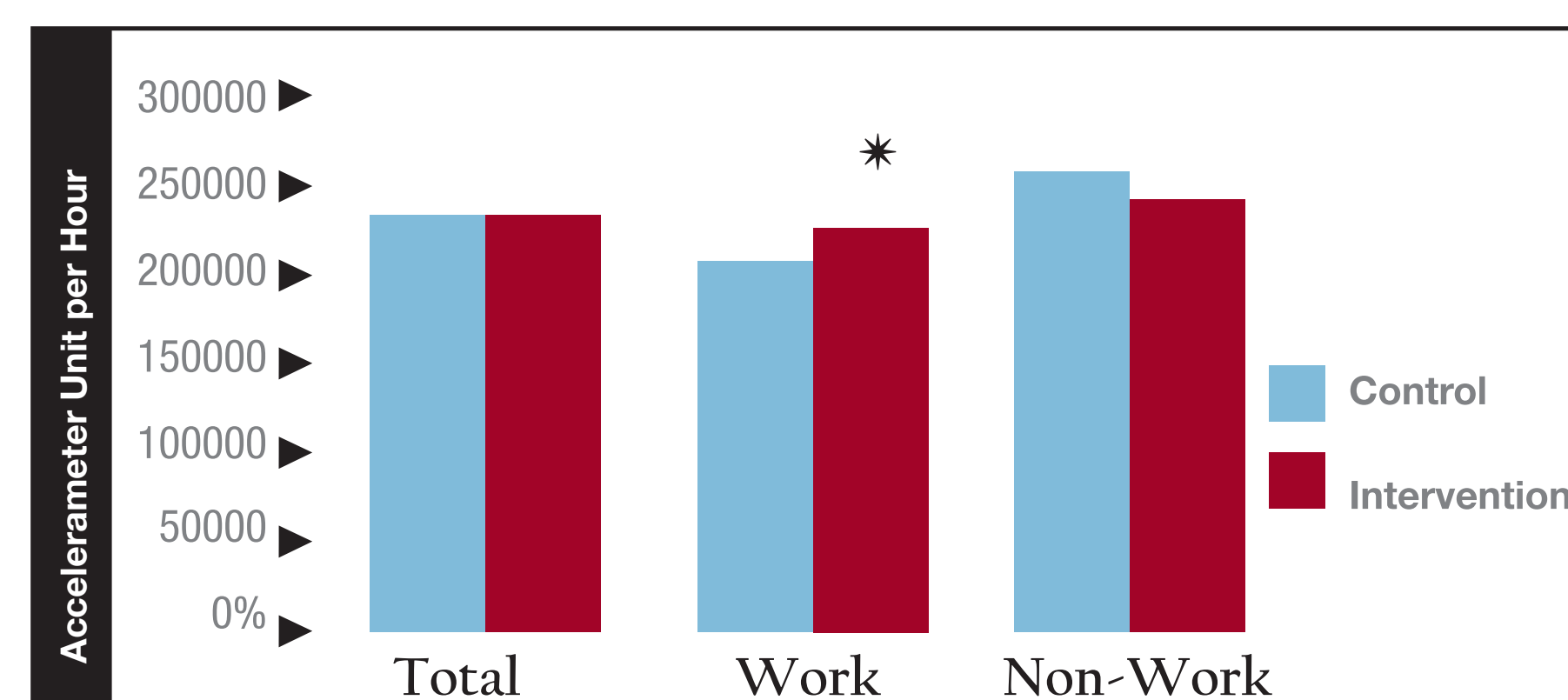


Figure 2: This intervention significantly increased activity during work hours, (accelerometer, p-value <.0001).



* = Statistically significant difference.

Results

Figure 3: For the average five-day work-week, sedentary time at work was reduced by 3.2 hours (accelerometer, p-value <.0001).

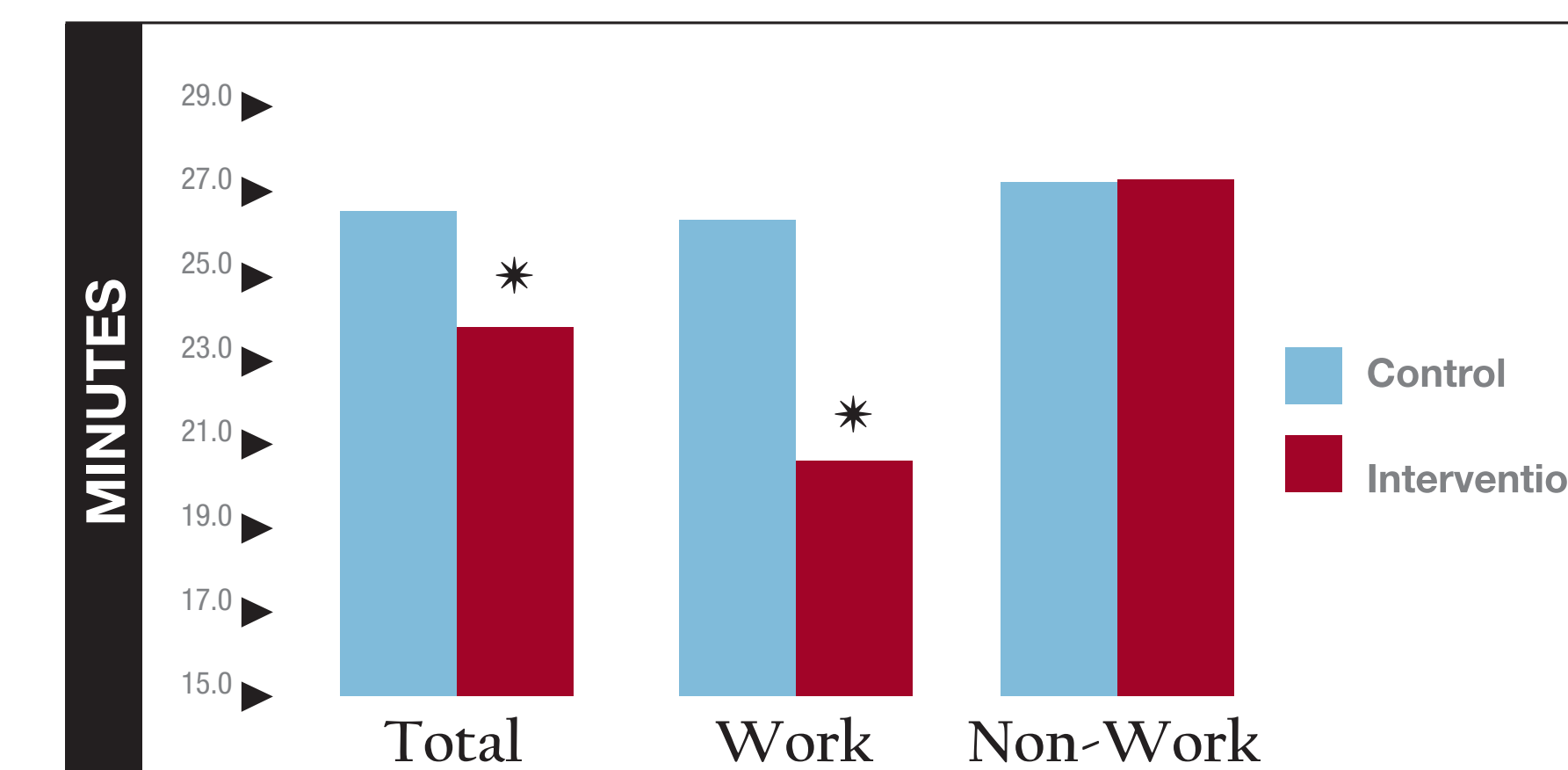


Table 2: The intervention increased overall sense of well-being, decreased fatigue, and, surprisingly, reduced appetite.

	Control Period (scale of 1 to 5)	Intervention Period (scale of 1 to 5)	Treatment effect (p-value)
Relaxed	3.4	3.5	0.02
Calm	3.4	3.5	0.004
Energetic	3.2	3.3	0.03
Not Tired	3.6	3.7	0.05
Not Hungry	3.7	3.9	0.06
Not Sluggish	3.9	4.0	0.01
Overall Wellness	3.4	3.5	0.008

Table 3: Reported energy intake was also reduced during the intervention period.

	Control Period	Intervention Period	Control - Intervention (estimate, 95% CI)
Total kilocalories	2037	1825	212 (45 - 379)
Protein (g)	78.6	69.6	9.0 (0.6 - 17.5)
Total fat (g)	80.5	71.7	8.8 (-0.6 - 18.2)
Total carbohydrate (g)	234.0	217.0	17.2 (-5.1 - 39.4)

Conclusion

Overall, a sit-stand desk appears to be a promising tool to reduce sedentary time at work. Given the proportion of hours spent at work, sit-stand desks may contribute to decreasing sedentary time and improving the health of sedentary office workers.

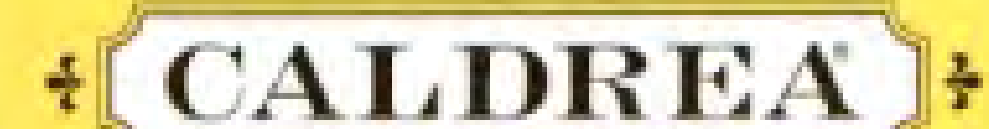


“The sit-stand workstations were highly popular with over 96% of the subjects enjoying their use.”

Acknowledgements

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Ethics Statement: The study was approved by the University of Minnesota institutional review board and was registered on clinicaltrials.gov (NCT01863056).