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The potential of bike desks to reduce sedentary time in the office: a mixed-method study



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ABSTRACT

Objectives: To investigate the use of bike desks in an office setting and office workers' experiences of bike desks.

Study design: Mixed-method study; quantitative data of cycling desk use in combination with qualitative data of users' experience were obtained via questionnaires.

Methods: Bike desks were provided in an office setting during a five-month period. The amount of cycled time, distance and the cycling intensity were registered. At the end of the intervention period, participants filled out a questionnaire about their experiences of cycling desks in the office.

Results: Participants cycled for approximately 98 min/week. Most participants were very positive about their bike desk experience and almost all of them would continue using them. About one third of the participants experienced a positive effect on attention and work performance and for about two thirds it positively influenced their motivation during work. Furthermore, about half of the participants felt more energetic, more self-confident and perceived a positive effect on their health and lifestyle.

Conclusions: Providing bike desks in an office reduces office workers sedentary time. Furthermore, people experienced positive effects on several personal and work-related parameters. Therefore, providing bike desks in office settings seems to be a promising means to reduce sedentary time.

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Introduction

Insufficient physical activity combined with prolonged sedentary time (often occurring in the workplace) may

increase risk of chronic disease and mental health problems.^{1,2} Direct and indirect costs of physical inactivity to society are estimated to be about €150–300 per citizen per year.^{3–5} Worldwide, 31.1% of all people aged 15 years and

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older are physically inactive⁶ and prolonged sitting has been engineered into our lives across many settings, including transportation, the workplace and the home.¹ Recently, interrupting sedentary time and integrating physical activity at the office has gained attention.⁷ One of the possibilities to offer office workers the opportunity to move during work is the implementation of active workstations. These allow people to incorporate low intensity physical activity into normally sedentary desk tasks. Longitudinal studies on active workstations showed improvements in physical health (reduction in body weight, waist and hip circumference, fat percentage, low density lipoprotein) and mental health (stress, job satisfaction).^{8–12} The question rises if implementing active workstations in an office setting is a feasible method of reducing sedentary time. Will people use them, do people like using them etc? It has been shown that providing standing or treadmill desks in an office setting decreases employees sedentary time at work.^{13–16} Using standing desks was associated with improved overall sense of well-being, mood states, reductions in upper back and neck pain, fatigue and confusion. People felt more energized, healthier, more focused, more productive happier and less stressed.¹¹ Standing desk users did not experience any effect on productivity.^{17,18} Also the use of treadmill desks positively influenced peoples energy levels, weight, mood, stress levels and tiredness.^{12,15,19} In the study of Thompson et al.,¹² people did not experience any effect on their productivity while in the study of Tudor-Locke et al.¹⁵ a positive effect on productivity was reported. Sliter et al.²⁰ compared the acute experience of people when using a sitting, standing, walking and cycling desk. They showed that participants experienced higher arousal and less boredom in the walking and the cycling conditions compared to the seated and standing conditions. Stress levels were lower while walking than while sitting or standing whereas no difference between cycling, sitting or standing was observed. Task satisfaction was only higher when walking than when standing while no difference between walking and sitting or cycling, standing and sitting was seen. However, to our knowledge, the use of bike desks in an office setting and the experience of office workers on the long-term have not yet been investigated. Therefore, the aim of this study was to investigate: (1) the use of a bike desk in the office over a five-month time period (quantitative); and (2) the participants' experiences of bike desks through the use of an open-ended questionnaire (qualitative).

Methods

Participants

Participants were recruited in the Brussels affiliation of the human resources company Securex, Belgium. All employees received an e-mail with information about the study and were invited to an information session in which more profound information was given and questions were answered. Inclusion criteria were, having a sedentary occupation (min 75% of the workday) and participating in physical activity for maximum 2.5 h per week. Exclusion criteria were the presence

of attention deficit hyperactivity disorder, type 1 and type 2 diabetes, cardiovascular disease, depression, musculoskeletal problems, use of stimulants and beta blockers. Furthermore, pregnant women or women planning to become pregnant within the intervention period were excluded from participation as they were likely to drop out before the end of the study and physiological changes could have influenced our findings.²¹ Before the start of the study, all participants were screened by a medical doctor.

Three male and 19 female office workers volunteered to start the study in October 2015 (T0). Three participants quit their job during the intervention period. Nineteen participants (two males, age \pm SD: 39.9 \pm 9.9 years) remained in the study until March 2016 (T1). The study was approved by the Ethical Committee of the Vrije Universiteit Brussel (B.U.N. 143201318930). All participants signed an informed consent before participating in the experiment.

Intervention

From the beginning of October 2015 till the end of February 2016 (20 weeks), participants were instructed to cycle on a height adjustable bike desk (LifeSpan C3-DT5 Bike Desk) for 8 \times 25 min per week. They were allowed to accumulate these eight bouts to 4 \times 50 min. Participants were free to adjust the cycling intensity to their preference. Every four weeks, the participants received an e-mail containing information about the amount of time and the distance they accumulated during this period.

Measurements

Descriptives

Age was self-reported. Height, body weight and fat percentage were measured to the nearest 0.1 cm, 0.1 kg and 0.1%, respectively. Fat percentage was determined by measurement of biceps, triceps, subscapular and suprailiacal skinfold thickness and was calculated based on the formula of Durnin et al.²² Peak oxygen uptake capacity (VO_{2peak}) was measured using an indirect calorimetry system (Metalyzer II, Cortex Biophysik, Leipzig, Germany) during an incremental cycle test to exhaustion. Participants started cycling at 50 Watts. Every 3 min, the load increased 25 Watts. The participants were asked to maintain a constant rhythm of 80 rpm. They were encouraged to exert themselves until volitional exhaustion. The decision to stop was based on signals of extreme fatigue and was confirmed by a heart rate that approximated the theoretical maximum heart rate (220–age) or a respiratory exchange ratio > 1.10. VO_{2peak} was defined as the highest VO_2 attained over 30 s. The maximal exercise test was performed on an electrically braked cycle ergometer (Excalibur Lode, Groningen, the Netherlands).

Bike desk information

The amount of cycled time, distance and the cycle intensity was registered by the bike desk. For further analyses, the intervention time was divided into five periods (P1 = week 1–4, P2 = week 5–8, P3 = week 9–12, P4 = week 13–16, P5 = week 17–20).

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