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Workplace active breaks for university workers: the UNIFIT pilot study protocol

Maria Scoppolini Massini ,[1] Erika Pinelli ,[1] Alice Masini,[2] Raffaele Zinno,[1] Laura Dallolio,[3] Laura Bragonzoni[1]

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[1]Department for Life Quality Studies, Alma Mater Studiorum University of Bologna, Rimini, Italy
[2]Department of Translational Medicine, University of Eastern Piedmont, Novara, Italy
[3]Department of Biomedical and Neuromotor Sciences, Alma Mater Studiorum University of Bologna, Bologna, Italy

Correspondence to
Dr Maria Scoppolini Massini; maria.scoppolini2@unibo.it

ABSTRACT

Sedentary behaviour (SB) is associated with an increased risk of metabolic issues (negative effects on diabetes, fasting glucose, fasting insulin, triglycerides, high-density lipoprotein cholesterol and waist circumference), cardiovascular diseases, increased risk of all-cause mortality and accelerated ageing of skeletal muscle power. The research on SB is relatively new, with much evidence regarding its negative health effects gathered within the last decade. Office workers exhibit pronounced sedentary habits, with studies indicating they can spend up to 82% of their working day sitting. To address this issue, workplaces are responsible for promoting physical activity and minimising SB among employees. In this context, one potential strategy for reducing SB and its associated risks could be implementing active breaks (ABs). ABs are defined as brief, structured periods of physical activity or exercise. This quasi-experimental pilot study aims to implement workplace ABs programme aimed at interrupting SB among the University of Bologna (Italy) workers, and it will include both intervention and control groups. The intervention group will participate in an 8-week ABs programme. The findings from this study could establish a robust basis for future large-scale research on the effectiveness of ABs interventions in workplace settings.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ High sedentary behaviour (SB) levels are associated with increased health risks. Office workers are particularly known for their high levels of SB. Active breaks (ABs) represent a possible workplace intervention to reduce SB and related risks.

WHAT THIS STUDY ADDS

⇒ The study will provide a comprehensive plan of action for implementing workplace ABs programme aimed at interrupting SB among the University of Bologna (Italy) workers during working hours.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The findings from this study will contribute to the evidence base for ABs interventions. This could provide a solid foundation for future larger-scale research on the effectiveness of ABs interventions in the workplace, potentially influencing future guidelines and policies for promoting ABs in the workplace.

INTRODUCTION

Office workers are very sedentary, with studies indicating that they can spend up to 82% of their working day sitting.[1–3] Additionally, working from home (a change in the work model introduced due to the COVID-19 pandemic and, in some cases, still in place) appears to have exacerbated the already high levels of sitting time among office-based employees.[4] Sedentary behaviour (SB) is defined as any waking behaviour while in a sitting or reclining posture, characterised by an energy expenditure ≤1.5 metabolic equivalent tasks.[5–7] It is important to introduce two important terms to provide a clear and complete context: physical activity (PA) and physical inactivity (PI). PA is defined as any bodily movement produced by skeletal muscles that requires energy expenditure.[8] On the contrary, PI is defined as an insufficient PA level to meet guidelines.[8] This leads to an SB paradigm: following PA guidelines while remaining largely sedentary is possible. Conversely, an individual may avoid structured moderate-to-vigorous PA yet still significantly reduce their SB.[9]

While PA has been extensively studied in health research for many years, the study of SB is relatively new, with a large portion of evidence regarding its negative health effects gathered within the last decade.[9] There is scientific evidence that high levels of SB are associated with an increased risk of diabetes, cardiovascular disease, cardiovascular mortality and all-cause mortality.[10] In addition, SB has detrimental associations with fasting glucose, fasting insulin, triglycerides, high-density lipoprotein cholesterol and waist circumference.[11] A sedentary lifestyle also accelerates secondary ageing of skeletal muscle power.[12] It can also contribute to mood disorders and work dissatisfaction,

which in turn can impair productivity.[13 14] On the other hand, consistent PA is recognised as a protective factor in the prevention and management of non-communicable diseases, including cardiovascular disease, type-2 diabetes, and breast and colon cancer.[8 15 16] Furthermore, PA can contribute to the maintenance of healthy weight[8] and general well-being[17] while also providing benefits to mental health[18] and delaying the onset of dementia.[19] While there are precise guidelines regarding PA, recommendations on SB suggest limiting sedentary time only.[8]

The workplace can directly influence workers' physical, mental, social and economic well-being, and it is responsible for promoting PA and reducing sedentary time among its employees.[20] Considering this, a possible intervention to be carried out in the workplace to reduce SB and related risks is represented by active breaks (ABs). The ABs are defined as short periods of structured PA or exercise.

Long established within the school environment for children,[21–23] these practices are now beginning to be embraced in the workplace setting for adults as well. The scientific literature confirms that performing brief physical exercises to interrupt SB can improve postprandial glycaemia, insulin responses, cardiovascular parameters and blood pressure. Additionally, there appear to be benefits for cognitive functions, although further studies are needed.[24–26] A review[27] conducted on employees with orthostatic and sedentary jobs demonstrated that active microbreaks, including various exercise programmes such as stretching, strengthening, torso stabilisation and ergonomic interventions, were more beneficial than passive microbreaks. These active microbreaks reduced pain and feelings of fatigue and improved employees' mood. Moreover, in office workers, ABs that involve postural changes have been shown to reduce pain and discomfort.[28]

Codesign methodologies actively involve end-users by leveraging their knowledge, experience and opinions,[29] making the designed solutions more acceptable, adopted and sustainable.[30] In particular, focus groups (FGs) are a widely used qualitative research method: a small group of individuals engage in discussions facilitated by a moderator. Participants respond to prompts during these sessions to uncover their thoughts, beliefs and attitudes regarding a specific topic.[31] This method enables researchers to gain insights into people's views, attitudes and beliefs towards health promotion and their perceptions of prevention programmes more generally.[32 33]

The main objective of this quasi-experimental pilot study is to implement workplace ABs programme aimed at interrupting SB among the University of Bologna (Italy) workers (UNIBO workers). This intervention was codesigned with the potential end-users through previous FGs. These FGs helped identify individual, social and environmental barriers and facilitators regarding an intervention to combat SB in the workplace. Indeed, qualitative research addresses questions regarding the why, what and how of phenomena[34] and can provide insights that inform quantitative studies.[35] The hypothesis is that codesigning the intervention directly with the potential end-users can be effectively implemented, ensuring feasibility and long-term adherence. The results could provide a solid foundation for future larger-scale research on the effectiveness of ABs intervention in the workplace.

MATERIALS AND METHODS

The present study adhered to the Standard Protocol Items: Recommendations for Interventional Trials reporting guideline.[36]

Study design

The study design is a quasi-experimental pilot study,[37] characterised by including a control group (CG) and an intervention group (IG). Randomisation was not implemented as it could have increased the risk of bias.

Participant recruitment

The study will be proposed to the UNIBO workers. This will be done through direct contact via institutional email, and a letter sent to the department directors and the directors of specialisation and PhD courses. Participants will join the study only after signing the informed consent form. They will have the option to choose whether to join the CG or the IG independently. The only inclusion criterion for this study is being a worker at the UNIBO. Only participants who do not want to sign the informed consent will be excluded.

Sample size

Power computation has yet to be undertaken for this study as the study design is a pilot study. The proposed sample size is 15 participants for each group.

Intervention group

Before starting the ABs programme, participation in the IG will involve a 30 min counselling session by expert kinesiologists. The counselling session aims to provide participants with all the technical and practical information on carrying out the study. First, the questionnaires and the time frames they must complete will be explained. Subsequently, all the indications regarding the correct carrying out of the ABs will be given, starting from the safety information (how to carry out the exercises safely) and then providing all the technical indications (how to carry out the exercises correctly).

Subsequently, ABs programme will be proposed for 8 weeks. Participants in the IG will be assessed at baseline (T0) and at the end of the 8-week ABs programme follow-up (T1). Additionally, they must complete an adherence diary throughout the 8 weeks of ABs programme. The ABs programme, developed using a codesigned methodology with potential end-users, will be implemented to end-users through videos. Each video will feature a single ABs section comprising a combination of exercises such as breathing, balance, activation, muscle strengthening and stretching. Each video will

Table 1 Exercises of a single ABs section

Exercises	Number of repetitions
Shoulder elevation depression	5
Shoulder protraction retraction	5
Neck flexion extension	5
Chair squats	10
Step touch	10
Stretching of the spine	10

have a maximum duration of 5 min. Three ABs videos will be available during the workday (at the beginning, approximately mid-day and at the end) across the five working days of the week. ABs are structured to align with the rhythms of the workday. The first break of the day focuses on activation to prepare the mind and body for optimal work performance. The second break consists of low to moderate-intensity exercises. The third and final break of the day primarily includes stretching and relaxation exercises to unwind muscles after a full workday. No equipment will be required to perform the exercises, as the ABs are designed to be executed using office furniture such as a desk and chair. Table 1 presents an example of the sequence of exercises in a single ABs section.

Control group

Participants in the CG will solely continue their regular working routine. They will be assessed at baseline (T0) and after 8 weeks follow-up (T1).

Primary outcome

The primary outcome will be evaluating the efficacy of the ABs programme by assessing the interruptions of SB during working hours. This will be achieved through the measurement of adherence to the ABs sections. Adherence will be calculated using the adherence diary as the percentage of ABs completed compared with the total number of scheduled ABs sections. The reasons for dropping out of the ABs programme will be investigated as part of the adherence assessment.

Secondary outcomes

The secondary outcomes will encompass various assessments across domains, including PA levels, health and work productivity, musculoskeletal discomfort, work environment satisfaction and ABs intervention satisfaction.

The levels of PA will be assessed through modifications in the responses to the PASSI (Progressi delle Aziende Sanitarie per la Salute in Italia) questionnaire.[38] The PASSI questionnaire is a public health surveillance tool that collects information on the adult Italian population regarding behavioural risk factors and preventive measures for non-communicable diseases.[38]

Health and work productivity will be evaluated through modifications in the responses to the Health and Work Questionnaire (HWQ).[39] The questionnaire measures workplace productivity and worker health.[39]

Musculoskeletal discomfort will be evaluated through modifications in the responses to the Nordic Musculoskeletal Questionnaire (NMQ).[40] The questionnaire collects information regarding musculoskeletal symptoms.[41]

Work-environment satisfaction will be evaluated through modifications in an ad hoc satisfaction questionnaire. This is composed of 5-point Likert scale questions.

ABs programme satisfaction will be evaluated through an ad hoc satisfaction questionnaire comprising 5-point Likert scale questions.

The reasons for interruption and abandonment will be carefully evaluated during the study.

Data collection and measures

The instruments used to collect the primary and secondary outcome measures and the timing of their use are summarised in table 2.

Safety

The entire study will be carried out to ensure maximum safety for the participants. The counselling session will guide the IG regarding the correct and safest way to perform each ABs. Moreover, each video depicting the ABs will provide clear and detailed instructions (both audio and video) regarding the correct and safest way to carry out each exercise. The research staff will remain available to the groups (both IG and CG) for any information and support.

Statistical analysis

The adherence and satisfaction will be described as the mean and SD or median and IQR and percentages of adherence for all participants, as appropriate. Subsequently, adherence and satisfaction percentages will be categorised into <50% low, 50%–75% medium and >75% high.

The interaction effect between group and time on questionnaire scores (PASSI Questionnaire, NMQ, HWQ, Work environment satisfaction ad hoc Questionnaire) will be assessed through a two-way repeated measures analysis of variance.

Demographic characteristics will be analysed with descriptive statistics using mean and SD or frequency and percentage as appropriate. The χ^2 test will be used to compare participants' characteristics between groups.

DISCUSSION

The main aim of this quasi-experimental pilot study is to implement ABs programme to interrupt SB among the UNIBO workers.

The scientific literature confirms that adherence to PA is fundamental for its efficacy.[42–44] To improve adherence, the ABs programme of this pilot study was codesigned with input from potential end-users, which could also increase satisfaction. Adherence and satisfaction will be evaluated through adherence diaries and ad

Table 2 Participants information and primary and secondary outcome measures

	Baseline (T0)	8 weeks (T1)
Sociodemographic parameters		
Date of birth	X	X
Gender	X	X
Occupation	X	X
Participants information		
Weight	X	X
Height	X	X
Right/left-handed	X	X
Current job position	X	X
Type of work	X	X
Department worked in	X	X
Total duration of current job position	X	X
Total duration employed by the present company	X	X
Permanent/temporary employment	X	X
Continuous/shift work schedule	X	X
Shift rotation	X	X
Average weekly working hours	X	X
Assessment scale		
Adherence to the ABs programme*		X
PASSI questionnaire[38]	X	X
Health and Work Questionnaire[39]	X	X
Nordic Musculoskeletal Questionnaire[40]	X	X
Work environment satisfaction ad hoc questionnaire	X	X
ABs programme satisfaction ad hoc questionnaire*		X

*For IG only.
ABs, active breaks; IG, intervention group; PASSI, Progressi delle Aziende Sanitarie per la Salute in Italia.

hoc satisfaction questionnaires, respectively. The chosen methods will provide accurate and specific data tailored to the aspects of interest. The existing scientific literature on ABs confirms their benefits for sedentary working populations. Specifically, ABs with postural changes have been shown to reduce pain and discomfort.[28] In this pilot study, we will evaluate these outcomes using the NMQ.[40] Additionally, research indicates that ABs improve interpersonal relationships, reduce absenteeism and enhance workplace vigour without impairing performance.[45 46] To investigate these effects further, we will administer the HWQ.[39] This could provide insights into how ABs may affect workplace productivity and worker health. By interrupting SB in the workplace through implementing ABs, psychophysical processes can be initiated within daily routines, potentially leading to an increase in daily PA. To evaluate this aspect, we will analyse the responses provided in the PASSI Questionnaire.[38]

An innovative aspect of our study is that we codesigned the ABs programme with the target group. By understanding the opinions and perspectives on barriers and facilitators of workplace health promotion through PA, we aim to implement a 'worker-centred' intervention. Many ABs interventions may appear optimal in theory but encounter challenges with adherence and feasibility in practice.[47] Through codesign,[29] we hope to address these issues effectively. Another important aspect of this study is its connection to neuroscience. ABs are delivered via video, harnessing the power of mirror neurons in workers to trigger a cascade of positive effects. The ability to imitate the gestures of others, both unconsciously and consciously, is based on the Mirror Neuron System (MNS).[48] Observing ABs videos specifically created by the research staff and observing colleagues, supervisors or employers performing ABs could activate the MNS, potentially promoting the practice of ABs in the workplace. This could conceivably foster greater collaboration during the performance of ABs, improving the work environment and relationships with colleagues, supervisors and employers. This study is aimed at the working community of the UNIBO, including administrative workers, professors, researchers and fellows. These individuals are closely linked to students and the future workforce. This relationship could promote the

transmission of ABs culture from workers to students, potentially contributing to creating and maintaining a future work environment that embraces and promotes ABs. Furthermore, the ABs proposed in this study can be performed in any context and environment without requiring specific equipment or clothing. This allows the ABs to be carried out in the office, at home, or in any work setting. This aspect is particularly relevant given the changes in work methodologies introduced due to the COVID-19 pandemic.[4] Lastly, the study includes a CG, which provides an advantage: this design compares outcomes between those participating in ABs programme in the workplace and those maintaining their regular work routines.

This study has several limitations to note. First, obtaining a quantitative measure of the impact of the ABs programme on general health is impossible due to the absence of technological tools (eg, accelerometers and heart rate monitors). Secondarily, the workers might spend more time walking than usual depending on the time of year or the tasks assigned. Additionally, due to its pilot nature, the sample size is small, with approximately 15 subjects per group, which inherently limits its generalisability. Finally, the follow-up period will be limited to just 8 weeks, which may be relatively short. Future research should include tools to assess general health parameters and trials with longer follow-up periods to better evaluate ABs' effectiveness in interrupting SB and the associated benefits.

CONCLUSION

This quasi-experimental pilot study provides a comprehensive plan for implementing workplace ABs programme to interrupt SB among the UNIBO workers. The findings of this pilot study could provide a robust foundation for future large-scale research on the effectiveness of workplace ABs interventions, thereby contributing to the scientific evidence supporting ABs interventions.

Contributors Study conception and design: LB, LD, EP and AM. Data collection: LB, LD, MSM, EP, AM and RZ. Writing–original draft preparation: MSM. Supervision: LB and LD. All authors read and agreed to the published version of the manuscript. LB is the guarantor.

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Competing interests None declared.

Patient and public involvement University of Bologna (Italy) workers were involved in the co-creation of the ABs programme through previous Focus Group.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and the local bioethical committee approved this study: protocol N. 0289784. Participants gave informed consent to participate in the study before taking part. The study processes will follow the protocol, and any protocol amendments will be submitted to the University of Bologna Bioethics Committee. All documents will be kept confidential. The study protocol will be published in peer-reviewed journals. The study results will be disseminated via conference presentations, reports to the grant funder, websites or social media and publications in peer-reviewed journals. The presentation of the study will keep the anonymity of participants.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement No data are available. Not applicable.

ORCID iDs
Maria Scoppolini Massini http://orcid.org/0009-0007-9644-6048
Erika Pinelli http://orcid.org/0000-0001-7451-3739

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