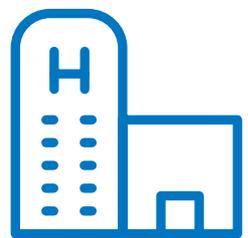
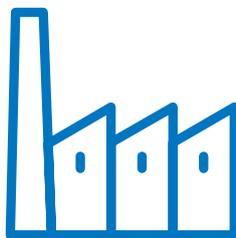




Reducing prolonged sitting

Final report

CREATING HEALTHY WORKPLACES SERIES



Acknowledgements:

VicHealth would like to acknowledge the staff at Baker IDI Heart and Diabetes Institute, The University of Queensland and Deakin University who contributed their time, knowledge and expertise to this project. In particular we thank the authors of this report: Professor David Dunstan, Professor Neville Owen, A/Prof Genevieve Healy, Professor Elizabeth Eakin and Professor Anthony LaMontagne. We are also grateful to the workplaces and stakeholders who participated in the project.

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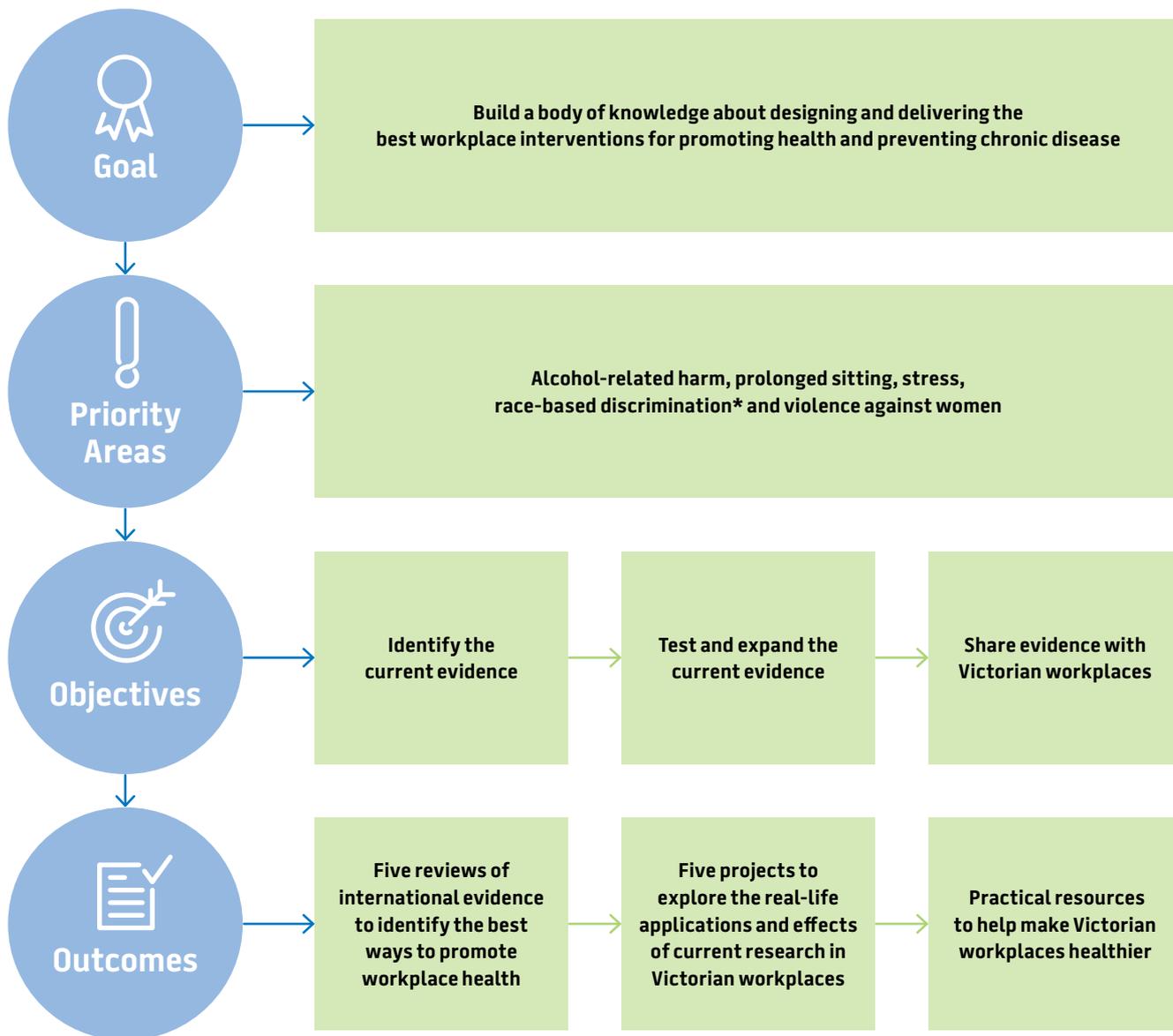
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Overview:

VicHealth's Creating Healthy Workplaces program



For more information and publications on the Creating Healthy Workplaces program, including five evidence reviews and a report on early insights from the projects, see www.vichealth.vic.gov.au/workplace and partner agency websites.

* Information on the race-based discrimination project will be available at a later date.

Foreword

VicHealth is playing a leading role in building Australian knowledge on ways to make our workplaces healthier.

VicHealth's Creating Healthy Workplaces program has built a body of knowledge about how to promote good health and prevent chronic disease in the workplace. The program focused on finding the best ways to tackle alcohol-related harm, prolonged sitting, stress, race-based discrimination and violence against women.

At VicHealth we know that some of the most powerful influences on our mental and physical wellbeing exist in the environments where we live, work, learn, play and build relationships with one another. The workplace is an important place for promoting good health and preventing chronic disease. Many Victorians spend up to one third of their day at work, so workplaces have the potential to reach a substantial proportion of the population who may not otherwise respond to health messages, may not use the primary healthcare system or may not have time to make lasting changes to their behaviour. Healthy working environments can improve productivity, staff morale and enhance the ability of an organisation to attract and retain staff. It can also decrease staff turnover, absenteeism, accidents and injuries, and worker compensation claims. Promoting and protecting health in the workplace, particularly for those who are most vulnerable, is crucial to a fully functioning economy.

VicHealth's workplace program continues to inform and support the promotion of workplace physical and mental wellbeing and the prevention of chronic diseases. Our activity focuses on creating and sharing the outcomes of new research, development of new resources, collaboration with new partners and the design of innovative solutions to emerging workplace trends and problems.

Reducing Prolonged Sitting (known as Stand Up Victoria) is one of five projects funded under the Creating Healthy Workplaces program in 2012–15. Prolonged sitting increases people's risk of poor health and early death, even among those who meet, or exceed, national physical activity guidelines. Prolonged sitting is common in many work environments. Discouraging sedentary behaviour and encouraging regular physical activity are priorities for VicHealth. This report contributes new knowledge on occupational and public health strategies, enablers and barriers that will help reduce prolonged workplace sitting, as part of our efforts to promote health and prevent chronic health problems.

This report is one in a series of final reports on the projects, in which we share what we have learned about what works when promoting health and wellbeing in the workplace. We hope you find it interesting and relevant to your work.



Jerril Rechter
Chief Executive Officer, VicHealth



Introduction

This report is for employers, policymakers and workplace health practitioners. It aims to share the findings of Stand Up Victoria, the Reducing Prolonged Sitting project conducted as part of VicHealth’s Creating Healthy Workplaces program.

Stand Up Victoria was a cluster-randomised controlled trial delivered to Victorian-based office workers at the Australian Government Department of Human Services (DHS) and was designed to provide reliable evidence on how to reduce workplace sitting by office workers. A comprehensive systems approach was used to bring about change at the organisational, environmental and individual level in 14 office-based teams at the Australian Government Department of Human Services.

The project’s three key messages were:

- Stand Up
- Sit Less
- Move More.

The project was jointly funded by VicHealth and the National Health and Medical Research Council (NHMRC) and led by Baker IDI Heart and Diabetes Institute, in collaboration with researchers from the University of Queensland, Deakin University and The University of Melbourne.

Stand Up Victoria is a world first. It is the largest workplace intervention to use highly accurate objective measures of workplace sitting time and health outcomes, as opposed to self-reported data. This innovative study was a rigorously controlled scientific trial, designed to address many of the limitations of previous research, including the lack of reliable and valid measures, small sample sizes, non-representative samples, and short follow-up. Stand Up Victoria accurately determined physical activity levels at work and provided important new knowledge on effective and acceptable strategies to reduce the time that office workers spend sitting.

This report contributes new knowledge to guide occupational health and public health policy about strategies, enablers and barriers to reducing prolonged workplace sitting, as part of our efforts to promote good health and prevent chronic illness.

Project overview

Table 1: Overview of Stand Up Victoria

Department of Human Services, Australian Government	
Project aims	<ul style="list-style-type: none"> • Evaluate the effectiveness of a multi-component workplace intervention on workplace sitting time (primary outcome). • Determine the impact of the intervention on other activity outcomes (prolonged sitting, standing and stepping at work; sitting, standing and stepping across the whole day) and on health- and work-related outcomes. • Identify the factors that mediate and moderate intervention impacts. • Assess intervention cost-effectiveness. • Evaluate the acceptability of the intervention, and the barriers and facilitators of change.
Work sites	<p>Sixteen teams across 14 sites in the Melbourne metropolitan area and Geelong:</p> <ul style="list-style-type: none"> • six teams doing predominantly telephone-based work • eight teams doing predominantly non-telephone-based work • two teams with a mix of telephone-based and non-telephone tasks.

Target group

All eligible and consenting employees in participating work sites.

Project phase

Plan

- Design the study
- Conduct study
- Consult managers
- Recruit and randomise work sites
- Recruit individuals and gain their consent

Implement strategies

- Staff consultation
- Provision of sit-to-stand workstations
- One-on-one health coaching session
- Telephone support calls
- Management support emails

Evaluate

A wide range of information was collected from participants to document the effects of the intervention.

The results were measured by collecting and comparing intervention and control groups' pre-project and post-project data on a variety of measures, as described in Table 3.

Data was collected at three time points:

- baseline (T1)
- immediately after the three-month intervention (T2)
- 12 months after the intervention (T3).

Evaluation indicators*

- Workplace sitting time (primary outcome)
- Body composition
- Cardio-metabolic data
- Socio-demographic data
- Health status
- Work
- Psychosocial-environmental
- Cost-effectiveness

Key findings

Sitting time at work was reduced substantially, with a mean of 1.7 hours per eight-hour work day less sitting than the comparison group at three months. This reduction was sustained at approximately one hour after 12 months.

The intervention reduced prolonged sitting time (sitting for more than 30 minutes) by an average of one hour per eight-hour work day after three months. This reduction was sustained at 20 minutes after 12 months.

Sitting time during workers' entire day (work time, non-work time and non-work days) was also reduced by an average of 1.2 hours per 16-hour waking day at three months, and 40–45mins per 16-hour waking day at 12 months. This is important, because time spent in the workplace is only one part of a person's total waking hours (approximately 36 per cent for a full-time worker). This finding demonstrates the important impact that reducing sitting time at work can have on a worker's overall sitting behaviour, and further highlights the potential of the workplace as a place to promote healthy practices.

* Evaluation categories only; see Table 3 for specific measures.

VicHealth's Creating Healthy Workplaces program was undertaken in partnership with Victoria's foremost researchers, business and industry, to promote health and prevent illness.

Project partners

On the Stand Up Victoria project, VicHealth worked with the Australian Government Department of Human Services, to run the trial in a number of Smart Centre work sites. The research and evaluation partners designed and evaluated the project. The project was jointly funded by VicHealth and the National Health and Medical Research Council.

Table 2: Stand Up Victoria project partners

Industry partner	
Department of Human Services, Australian Government	
<p>www.humanservices.gov.au Health and community services</p>	 <p>Australian Government Department of Human Services</p>
<p>The Department of Human Services (DHS) develops service delivery policy and provide access to social, health and other payments and services through Medicare, Centrelink and Child Support programs.</p> <p>DHS is a large Australian Government organisation with more than 35,000 staff nationwide. DHS Smart Centres are paperless offices with highly sedentary (inactive, with prolonged sitting time), desk-based office workers, doing predominantly computer-based and telephone-based tasks.</p>	
Research and evaluation partners	
Baker IDI Heart and Diabetes Institute (lead)	University of Queensland
<p>www.bakeridi.edu.au</p> 	<p>www.uq.edu.au</p> 
<p>Professor David Dunstan Head of Physical Activity Laboratory, and NHMRC Senior Research Fellow</p> <p>Professor Neville Owen Head of Behavioural Epidemiology Laboratory, and NHMRC Senior Principal Research Fellow</p>	<p>A/Prof Genevieve Healy NHMRC Career Development Fellow</p> <p>Professor Elizabeth Eakin Professor, School of Public Health</p>
Deakin University	
<p>www.deakin.edu.au</p> 	
<p>Professor Anthony LaMontagne¹ Professor of Work Health and Wellbeing, School of Health and Social Development, Faculty of Health</p> <p>Professor Marj Moodie Deputy Head, Deakin Health Economics</p>	

¹ Formerly at McCaughey VicHealth Community Wellbeing Unit, University of Melbourne.

Prolonged sitting

Workplace sitting is defined as time spent in sedentary behaviours at work. Sedentary behaviours involve sitting or reclining, with little or no energy expenditure.

High levels of sitting is a unique public health problem, distinct from the problems associated with inadequate participation in structured physical activity. Too much sitting is a risk factor for chronic illnesses, including type 2 diabetes and cardiovascular disease, and for early death. This is true even among people who meet, or exceed, national physical activity guidelines.

Prolonged, unbroken time spent sitting is common in many work environments. Workplace sitting has risen in recent decades, largely due to the widespread availability of computers and labour-saving devices. Workplace sitting is the largest contributor to daily sedentary time for office workers, with the average office-based employee spending 75 per cent of work hours seated, significantly more than during non-work time.

In Victoria, more than one-third of men (37 per cent) and more than one-quarter of women (28 per cent) report sitting for seven hours or more a day.

However, it appears that the increase in workplace sitting has not been compensated for by increased physical activity outside work, as evidenced by the relatively unchanged proportion of Australian adults who meet the physical activity guidelines. In fact, other measures that can be used as indicators of sedentary time outside work, such as television viewing time and car ownership, have significantly increased.

EVIDENCE REVIEW

The evidence review *Reducing prolonged sitting in the workplace* is available at:
www.vichealth.vic.gov.au/search/creating-healthy-workplaces-publications



In Victoria, more than one-third of men and more than one-quarter of women report sitting for seven hours or more a day.

Reducing prolonged sitting will potentially have significant long-term health and economic benefits (VicHealth 2012).

37%
men

28%
women



Stand Up Victoria project

Planning

Design study

The study was based on the following hypothesis: developing, implementing and evaluating the effectiveness of multiple strategies – encompassing organisational, environmental and individual change – will significantly change workplace sitting by office workers. In turn, this will impact individual workers' health and productivity.

Stand Up Victoria was a cluster-randomised controlled trial in office workers. Work sites were the unit of randomisation. The 12-month study included three assessment time points:

- baseline (T1)
- after three-months of intervention (T2)
- after 12 months of intervention (T3).

The partner organisation – Department of Human Services (DHS), an Australian government department – was recruited through a tender process. It is important to note that DHS had already identified prolonged sitting in the workplace as a priority for its workplace health promotion strategy.

Ethics approval was granted by the Alfred Health Human Ethics Committee in Melbourne.

For more detailed information on the project methods, see Dunstan et al. (2013).

Conduct study

Stand Up Comcare was a study conducted to test the intervention's short-term effectiveness in reducing office workers' sitting time. A total of 43 workers in the Melbourne offices of Comcare took part. This study was crucial in evaluating study processes and as further proof of concept. Recruitment processes, study measurements, intervention processes and logistical considerations were all tested at Comcare and then refined, based on their strengths and weaknesses, for use in Stand Up Victoria. For more detailed information on the Stand Up Comcare study, see Healy et al. (2013).

Consult managers

Information sessions were conducted for participating senior DHS managers. Discussions covered:

- the project
- the role of managers in the project
- strategies to encourage employees to take part
- existing organisational processes and structures (for example, policies relating to workplace activity).

Recruit and randomise work sites

Study sites were recruited between April 2012 and October 2013. DHS identified study sites as potentially eligible if they were geographically separate DHS buildings (at least 1 kilometre apart) in Victoria, and were not currently delivering a physical activity program to staff. At each site a team was identified; for instance, a distinct working group at the site that had a dedicated line manager and regular group meetings and interactions.

Before randomisation, written informed consent was obtained from the divisional manager(s) of each team for:

- their employees to participate in the project
- sit-to-stand workstations to be fitted in the office
- health coaching sessions to be conducted during work time.

Participating work sites were randomised into one of two groups:

1. Intervention: receive the intervention
2. Control: usual practice (no intervention, assessment only).

Randomisation to either the intervention group or the control group was undertaken at the work site level, so that all eligible and consenting participants at the one work site were allocated to the same group (either intervention or control). Sites were enrolled and then randomised.

Recruit individuals and gain their consent

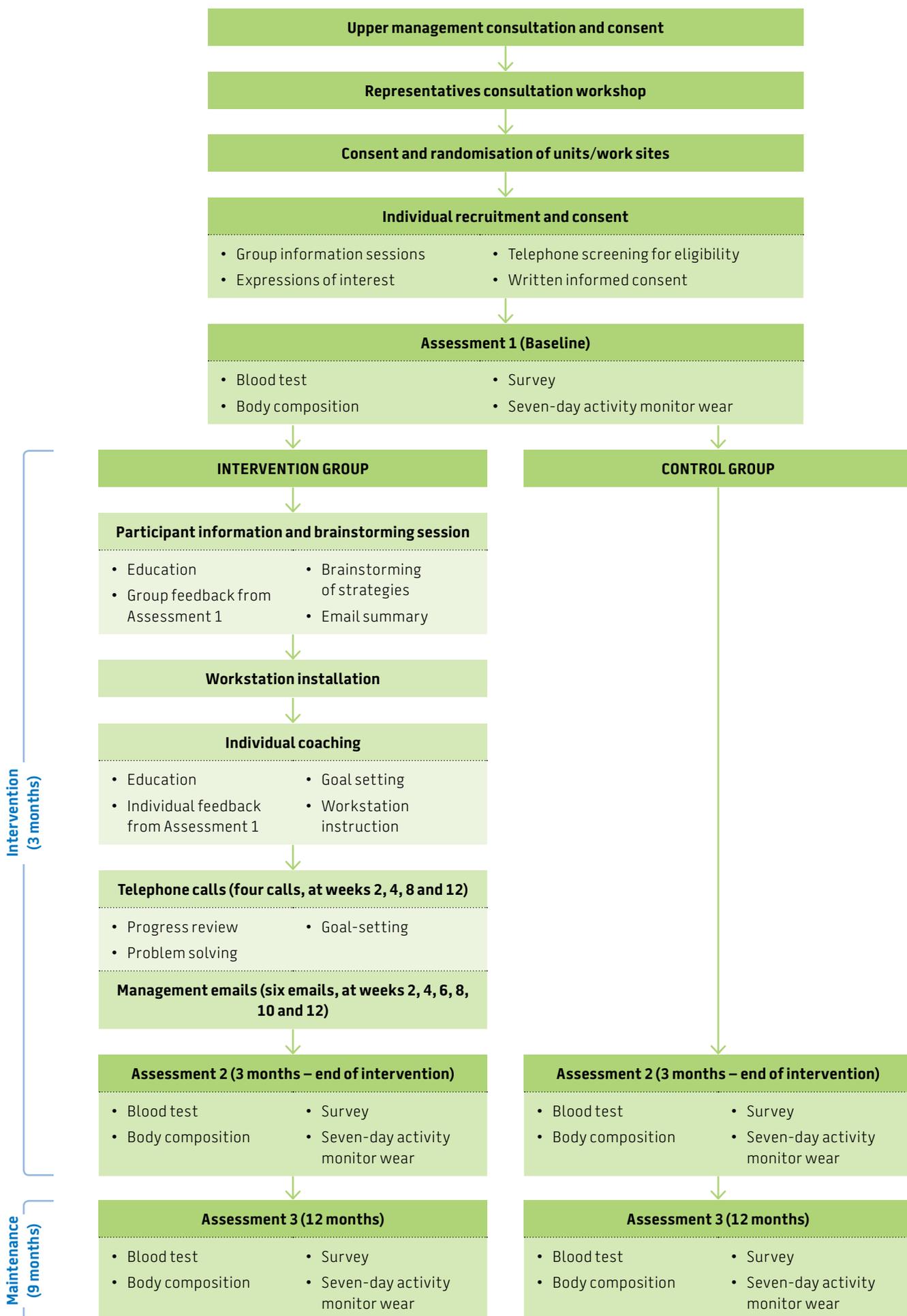
After the work sites had been randomised, all eligible employees in the consenting work sites were approached to participate. An information session about the study was conducted and information sent out by email. Potential participants completed an expression of interest form, either directly following the information session, or by email afterwards.

To be eligible to take part, workers needed to be:

- 18–65 years of age
- working at least 0.6 full-time equivalent hours (FTE)
- ambulatory (able to stand and walk comfortably)
- able to access a telephone, internet and desk at their workplace
- not pregnant
- not absent from work for longer than two weeks during the three-month intervention period
- not part of a planned relocation to another work site
- not currently using a sit-stand workstation.

A total of 278 employees initially expressed interest in taking part. Of these, 231 (from five to 39 workers per team) were found eligible, enrolled, and completed the baseline assessment.

Figure 1: Study overview



Implementing the strategies

The intervention was conducted over three months, with the intervention group only. The intervention comprised three key messages:

- Stand Up
- Sit Less
- Move More.

The aim was to reduce sitting time by replacing it with either standing or stepping and to do this throughout the day (both during and outside work hours). A particular focus was on reducing prolonged, unbroken periods of sitting (i.e. sitting for 30 minutes or more).

A DHS-appointed staff member acted as liaison person for the project team (0.4 FTE) throughout the project, helping to recruit work teams and organise project logistics.

Staff consultation

Staff consultation processes included:

- Representatives consultation workshop: a facilitated four-hour workshop with representatives from each work site that was to receive the intervention. Information on the project was presented, and the role of organisational, environmental and individual factors in determining workplace sitting time was explored, such as workplace arrangements and workplace design. Representatives identified 'team champions' to actively promote the project and be responsible for sending the tailored management support emails (described further below). The representatives brainstormed feasible strategies to promote Stand Up, Sit Less, Move More in DHS.
- Participant information and brainstorming session: a group consultation session of 30–45 minutes at each intervention site, to outline the health consequences of prolonged sitting, provide summary feedback from the group's baseline assessment, and brainstorm local, site-specific strategies to Stand Up, Sit Less, Move More.

Provision of sit-to-stand workstations

Dual-screen sit-to-stand workstations were provided for all intervention participants. The workstation allowed the participant to easily and quietly alternate their working posture between sitting and standing.

Employees received a workstation that suited their current computer setup, and were given instructions on its use and on the correct ergonomic posture for both sitting and standing, as recommended by the product manufacturers. A workplace ergonomist assessed the workstation fitting in relation to posture.

The workstations were installed outside work hours, onto existing desks, without the need for any structural change in the workplace.

One-on-one health coaching session

Between one and three days after a participant's workstation was installed, they received a 30 minute face-to-face health coaching session. This session included:

- personalised feedback on baseline data (percentage of time spent sitting, standing or stepping)
- discussion of goals and barriers
- information and resources for participants to use in recording their goals and strategies. These included a tracker and a workstation tip sheet.

Telephone support calls

A total of four 10-minute telephone support calls were made to each intervention participant over the three-month intervention period, to help them reach their goals and solve any problems they might encounter.

Management support emails

Six email templates with information about the detrimental effects of prolonged sitting and the benefits of standing and moving more were provided to team champions at weeks 2, 4, 6, 8, 10 and 12. The team champions (typically the work site team leader) personalised and then sent the emails to participants in their team, to demonstrate that managers supported, and were interested and involved in, the intervention.

Evaluation

A wide range of information was collected from participants, to document the effects of the intervention. Its efficacy was measured by collecting and comparing intervention and control groups' pre-intervention and post-intervention data on a variety of measures, as provided in Table 3. Data was collected at three time points:

- baseline (T1)
- after three-months of intervention (at the completion of the telephone support calls and management support emails) (T2)
- after 12 months of intervention (T3).

At each assessment point, participants received printed feedback summarising the individual changes to their physical activity levels, body composition and blood results. All measurements were completed at baseline, three months and 12 months, except where noted.

Table 3: Stand Up Victoria evaluation measures

Behaviour			
Objectively measured and self-reported	Physical activity and sitting time		
	<table border="1"> <tr> <td> The activPAL3 activity monitor measured: <ul style="list-style-type: none"> • Workplace sitting time (primary outcome) • Prolonged workplace sitting time (at least 30 minutes) • Workplace standing time • Workplace moving time (stepping time, number of steps) • Number of sit-stand transitions at the workplace • Overall sitting, standing, moving time </td> <td> The Actigraph GT3X+ activity monitor measured: <ul style="list-style-type: none"> • Average daily moderate- to vigorous-intensity physical activity (MVPA) • Average daily light physical activity </td> <td> Self-reported measures: <ul style="list-style-type: none"> • Percentage of sitting, standing, walking and physically demanding tasks at work • Recent work attendance (days per week, hours per week) • Non-workplace sitting time (television or video viewing time) • Diet (fat intake, fibre intake) • Smoking status </td> </tr> </table>	The activPAL3 activity monitor measured: <ul style="list-style-type: none"> • Workplace sitting time (primary outcome) • Prolonged workplace sitting time (at least 30 minutes) • Workplace standing time • Workplace moving time (stepping time, number of steps) • Number of sit-stand transitions at the workplace • Overall sitting, standing, moving time 	The Actigraph GT3X+ activity monitor measured: <ul style="list-style-type: none"> • Average daily moderate- to vigorous-intensity physical activity (MVPA) • Average daily light physical activity
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Body composition			
Objectively measured	<ul style="list-style-type: none"> • Height (baseline only) • Weight • Body mass index (BMI) (body weight in kilograms, divided by square of height in metres) • Waist circumference • Hip circumference • Waist-to-hip ratio • Body composition (percentage and kilograms of fat and fat-free mass) 		
Cardio-metabolic			
Objectively measured	<ul style="list-style-type: none"> • Fasting blood glucose • Fasting insulin • Cholesterol (total, high-density lipoprotein, low-density lipoprotein) • Triglycerides • Blood pressure 		
Sociodemographic			
Self-reported	All baseline only <ul style="list-style-type: none"> • Age • Gender • Race/ethnicity • Marital status • Education 		

Health status	
Self-reported	<ul style="list-style-type: none"> • History of diabetes or hyperlipidaemia (baseline only) • Musculoskeletal health • Eye strain • Stress-related symptoms (fatigue, headaches, digestive problems, sleep quality)
Work	
Self-reported, internal DHS measure, and employee records	<ul style="list-style-type: none"> • Employment status (baseline only) including length of tenure, job classification, full-time equivalent (FTE) level • Secondary employment status (including FTE level) • Productivity • Presenteeism (attending work while unwell) and absenteeism • Work performance
Psychosocial-environmental	
Self-reported and objectively measured	<ul style="list-style-type: none"> • Perceptions of the work environment • Desk/workstation use • Frequency and duration of working with colleagues as well as perceived adequacy of space(s) for such interactions • Quality of life • Acceptability of workstations (intervention group only) • Preference for sitting or standing in the workplace • Knowledge • Barrier self-efficacy • Perceived behavioural control • Perceived organisational social norms • Use of self-regulation strategies • Use of intervention-specific strategies • Descriptive office audit
Cost-effectiveness	
Self-reported	<ul style="list-style-type: none"> • Health-related quality of life • Health care use • Cost to deliver intervention • Adverse events (intervention group only, at three and 12 months only)

Frameworks and guidelines

Table 4: Frameworks and guidelines informing Stand Up Victoria

Framework	How the framework was used
Socioecological models of sedentary behaviour	During the project planning and design phase, socioecological models of sedentary behaviour were used to consider the multiple influences on workplace sitting and to address them via a multi-component approach including behaviour change strategies at the organisational/managerial, environmental, and individual level.
Social cognitive theory	The project is based on social cognitive theory, which emphasises the key constructs of self-efficacy, outcome expectancies (physical, social, and self-evaluative) and sociostructural (facilitators and impediments). The operationalisation of theoretical constructs into intervention strategies was guided by an intervention taxonomy.
Taxonomy of behaviour change techniques (Abraham & Michie 2008; Michie, Ashford, Sniehotta, Dombrowski, Bishop & French 2011)	A taxonomy of behaviour change techniques used in interventions guided the operationalisation of social cognitive theoretical constructs into intervention strategies.
Organisational and systems approach	An organisational and systems approach combines individual or worker-directed intervention with organisationally focused or work-directed intervention. It addresses the causes of prolonged sitting (working conditions and culture) as well as its consequences (including increased risk of type 2 diabetes and lost productivity). Typically, it involves all levels of an organisation and all aspects of its day-to-day operations, from governance and management to staff facilities, services and health behaviours.
World Health Organization's <i>Healthy Workplaces: a model for action: for employers, workers, policymakers and practitioners</i> (WHO 2010)	The project followed the principles set out in the World Health Organization's <i>Healthy workplaces: a model for action</i> , in particular the principles of successful workplace interventions: <ul style="list-style-type: none"> • leadership engagement based on core values • involvement of workers and their representative • gap analysis • learning from others • sustainability and integration.

Key findings

Project results

Overall, Stand Up Victoria was an effective and acceptable intervention for reducing sitting time by office workers, as demonstrated by the project's primary outcome: reduced workplace sitting time (Table 5). Activity patterns throughout the entire day also improved (Table 6), demonstrating an overall beneficial behaviour change.

Other evaluation measures also showed benefits, as summarised in Table 7. The project team is currently analysing the data further, to assess the project's cost-effectiveness and to better understand the factors that improve or worsen the effects of the intervention.

Stand Up Victoria participants

- 16 teams across 14 sites, with 231 individual participants.
- Retention in the study was high; fewer than 15 per cent of participants had formally withdrawn or were otherwise lost to follow-up at the 12-month mark.
- The mean age of participants was 45.6 years, ranging from 24 to 65 years.
- The majority of participants were:
 - female (68.4 per cent)
 - married (65.5 per cent)
 - with post-school education (66.8 per cent)
 - overweight or obese (body mass index of at least 25: 70.6 per cent).

Table 5 and Table 6 show the percentage of time spent sitting, standing or stepping at work and across the entire waking day respectively, for both the intervention and control groups at the three assessment time points: baseline, three months and 12 months.

Table 5: Activity patterns at work

	Baseline	3 months		12 months	
	Control + intervention	Control	Intervention	Control	Intervention
Total sitting time	79%	77%	54%	76%	62%
• Prolonged sitting time	42%	40%	24%	36%	31%
• Non-prolonged sitting time	37%	37%	30%	40%	31%
Standing time	14%	15%	40%	17%	31%
Stepping time	7%	8%	7%	7%	7%

Note: Bold font denotes statistically significant result.

Table 6: Activity patterns across entire waking day

	Baseline		3 months		12 months	
	Control	Intervention	Control	Intervention	Control	Intervention
Total sitting time	64%	65%	64%	55%	63%	59%
Standing time	25%	25%	25%	34%	26%	30%
Stepping time	11%	11%	11%	11%	11%	10%

Table 7: Overview of Stand Up Victoria results

	Activity patterns	Health risk indicator	Satisfaction and productivity
Results	<p> Activity patterns at the workplace were significantly improved among the intervention group over the course of the intervention. The intervention group did less sitting (a mean reduction of 1.7 hours per eight-hour work day at three months compared to the comparison group, which was sustained at approximately one hour after 12 months), including less prolonged sitting (reduced by one hour after three months, which was sustained at 20 minutes after 12 months). This improvement was mostly achieved through increased standing; workplace stepping increases were only minor.</p> <p> Activity patterns across the entire waking day (combined work time and non-work time, including non-work days) were improved in the intervention group by an average of 1.2 hours per 16-hour waking day at three months. This is compared to the control group, with significant improvements seen at the 12-month follow-up (40–45mins per 16-hour waking day).</p>	<p> There was no statistically significant effect on body composition, blood lipids or blood pressure.</p> <p> There was a statistically significant improvement in glucose metabolism at 12 months in the intervention group compared to the control group.</p>	<p> The majority (more than 80 per cent) of intervention participants enjoyed using the workstation and found it easy to use.</p> <p> There were no significant or meaningful reported changes in overall productivity. The absence of change in productivity is a positive outcome – the intervention did not reduce productivity.</p> <p> However, one in three participants self-reported that the workstation made them more productive (29.1 per cent at three months and 31.5 per cent at 12 months).</p>

Successes

Using organisational systems to consolidate and maintain change

A comprehensive organisational and systems approach was used to consolidate and maintain improvements made at DHS. This approach included:

- organisational measures
 - management consultation
 - team champion training
 - a participatory information and brainstorming session for staff
 - management emails to staff
- environmental measures
 - providing sit-stand workstations
 - signs at lifts prompting use of stairs
 - centrally located printers and bins.
- individual measures
 - a staff information session and associated materials
 - a face-to-face health coaching session for each participant
 - self-monitoring tools
 - four telephone calls at weeks 2, 4, 8 and 12.

Sustainability

The Stand Up Victoria project is part of the broader Stand Up Australia program of research aimed at understanding the benefits of reducing prolonged sitting time in the workplace. The findings and materials from Stand Up Australia, as well as other relevant evidence and resources, have been used to develop a new Stand Up, Sit Less, Move More™ program. This scalable workplace health promotion program is designed to encourage a 'dynamic' workplace: one that encourages and provides opportunities to be active throughout the day, including frequent changes between sitting, standing and moving. The new Stand Up, Sit Less, Move More™ program will be delivered online using a 'train the champion' approach. A Train the Champion toolkit has been developed; this provides a step-by-step guide, and associated tools and materials, to enable the work site champion to encourage participation and to deliver and evaluate the program in their work site. The toolkit is currently being tested and will be provided as a free resource for all workplaces.

For more detailed information on the development of the Stand Up Australia intervention see Neuhaus et al. (2014).

Insights

Enablers and barriers to change

A number of important considerations should be taken into account when delivering interventions to reduce workplace sitting. Individuals and groups wanting to develop such interventions should consider the following factors that either facilitate or hinder change, as experienced in the Stand Up Victoria project.

Enablers of change

Provide employees with:

- sit-to-stand workstations that staff can alter as they please, accompanied by instructions on use
- information and training on ergonomics and working safely
- coaching and support for setting individual goals
- explicit information on the health implications of prolonged sitting
- feedback on employees' activity levels and behaviour through objective monitoring (for instance activPALs, accelerometers, Fitbits)
- opportunities to see other workers standing, as colleagues will use one another as visual cues to stand.

Provide employers with:

- feedback on intervention outcomes.

Incorporate the following elements:

- a comprehensive systems approach that consolidates and maintains change at the organisational, environmental and individual level
- a strong evaluation framework, with reliable and valid measures of workplace sitting time
- management support and active involvement
- active participation of employees in all phases of the project, especially during planning. This may include having a project coordinator or liaison person in the workplace, and team champions
- exploration and understanding of site-specific local conditions
- building a 'healthy workplace' culture (for instance, explicitly allowing standing during all or part of meetings)
- time-based prompts (for example, stand up after lunch) and task-based prompts (for example, stand up after sending an email) to reduce prolonged sitting.

Barriers to change

- Certain work tasks (such as extended or confidential telephone calls, note taking) discourage or prohibit standing or movement.
- Physical environment may not be conducive to standing and movement, due to lack of audio or visual privacy (such as the voice carrying too far).
- Structural problems with the workstation can occur (such as lack of stability, distance from eyes to screen, lack of working space).
- Unsupportive workplace cultures discourage behavioural change (for example, employees may feel self-conscious standing if they are not explicitly encouraged to do so).

Stand Up Victoria was an effective and acceptable intervention to reduce sitting time by office workers.

Conclusion



Sitting time was reduced substantially at work, with a mean reduction of 1.7 hours per eight-hour work day at three months compared to the comparison group. This improvement was sustained at approximately an hour after 12 months.

Sitting time was also reduced across the workers' entire day (by an average of 1.2 hours per 16-hour waking day at three months and by approximately 0.5 hours at 12 months), which included work time, non-work time and non-work days, demonstrating an overall beneficial change in behaviour. This is important, because time spent in the workplace is one part of a person's total waking hours (approximately 36 per cent for full-time workers). It demonstrates the important effects that reducing sitting time at work can make to a worker's overall sitting behaviour, and further highlights the potential of the workplace as a place to promote healthy practices. Importantly, the intervention reduced prolonged sitting time (sitting for more than 30 minutes) by over one hour in an eight-hour working day after three months. This reduction was sustained at 0.3 hours after 12 months.

The standing workstations were generally well accepted by users and did not appear to affect productivity. However, despite the relatively large shift from sitting to standing, the effect on cardio-metabolic risk biomarkers was typically small, and not statistically significant. This may suggest that additional emphasis needs to be placed on the 'Move More' element of the intervention message.

The project provides evidence and understanding of how the workplace environment can reduce prolonged sitting and prevent chronic diseases. Stand Up Victoria is a world first – the largest workplace intervention to use highly accurate objective measures of workplace sitting time and health outcomes. This innovative, rigorously controlled scientific trial accurately determined physical activity levels at work and has given us important new knowledge on effective and acceptable strategies to reduce sitting time by office workers. It continues VicHealth's pioneering work to encourage regular physical activity for all Victorians.

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