



Reducing prolonged sitting in the workplace

An evidence review: summary report

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This report is a summary of the full evidence review *Reducing prolonged sitting in the workplace (An evidence review: full report)*, available at www.vichealth.vic.gov.au/workplace.

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Creating Healthy Workplaces evidence review series

VicHealth commissioned five international evidence reviews to build a body of evidence and knowledge about effective workplace health interventions. Both full and summary reports are available for each of the five evidence reviews:

- Preventing race-based discrimination and supporting cultural diversity in the workplace
- Preventing violence against women in the workplace
- Reducing alcohol-related harm in the workplace
- Reducing prolonged sitting in the workplace
- Reducing stress in the workplace

www.vichealth.vic.gov.au/workplace

Cover photo

Population groups that are most at risk of prolonged sitting include those working in offices, transportation and highly mechanised trades. Photo: Taras Mohamed

Reducing prolonged sitting in the workplace

An evidence review: summary report

VicHealth is playing a leading role in building the Australian knowledge base on effective workplace health interventions with our *Creating Healthy Workplaces* evidence review series. We hope that this report, and the series as a whole, becomes a focus for new conversations about workplaces and the critical role they play in the health of society.

> Jerril Rechter, CEO, VicHealth

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Foreword

Workplaces are important settings for health action and improvement. VicHealth has identified five areas where workplaces can begin to make advances, not only in improving the health of employees and preventing future problems, but also in enhancing productivity and reducing absenteeism and staff turnover. These five areas – race-based discrimination and cultural diversity, violence against women, alcohol-related harm, prolonged sitting and stress – are the subjects of VicHealth’s *Creating Healthy Workplaces* evidence review series.

This report deals with prolonged sitting and is a summary of the full evidence review *Reducing prolonged sitting in the workplace (An evidence review: full report)*, available at www.vichealth.vic.gov.au/workplace. Its findings show that prolonged workplace sitting is an emerging public health and occupational health issue with serious implications for the health of our working population. Importantly, prolonged sitting is a risk factor for poor health and early death, even among those who meet, or exceed, national activity guidelines.

Despite the growing evidence base on the detrimental health, social and economic impacts of prolonged sitting, the literature provides scarce guidance on the design and delivery of interventions to reduce prolonged sitting in the workplace.

The measures discussed in this report to reduce workplace sitting are consistent with existing occupational health and safety (OHS) guidelines and the recommendations put forward by the Australian Council of Trade Unions, the Australian Government and individual ergonomists. Interestingly, despite the widespread consensus on the importance of taking regular breaks, task variety and employing a variety of postures, there is currently no requirement under Victorian OHS legislation to provide specific breaks to computer users to address the health hazards of prolonged sitting.

The importance of efforts to reduce prolonged workplace sitting was highlighted in a 2009 National Preventative Health Taskforce report. Most working-age Australians spend around one-third of their waking lives at work and there are real opportunities to influence people’s health in this setting.

Although work itself has many recognised health benefits, some individuals may experience poorer health because of poor working conditions. The health problems of individual staff reverberate throughout the workplace, affecting co-workers, managers and businesses as a whole – not to mention families and communities.

VicHealth is thrilled to be playing a leading role in building the Australian knowledge base on effective workplace health interventions with our *Creating Healthy Workplaces* evidence review series. We invite you to read and consider the findings summarised in this report. We hope that this report, and the *Creating Healthy Workplaces* series as a whole, becomes a focus for new conversations about workplaces and the critical role they play in the health of society. While this report is not a definitive review, it introduces some key issues that require consideration when designing effective workplace health programs.

And finally, we hope that individual workplaces and employers are inspired to put practical interventions in place that reduce prolonged sitting in the workplace. Around the world, successful enterprises have found that implementing measures that enhance the physical and mental health of employees results in benefits far greater than the costs.



A handwritten signature in black ink that reads "Jerril Rechter".

Jerril Rechter
Chief Executive Officer
VicHealth

Executive summary

The evidence review, *Reducing prolonged sitting in the workplace (An evidence review: full report)*, found that prolonged sitting is a unique public health problem, distinct from the problems associated with inadequate physical activity. Time spent sitting is consistently associated with premature mortality, diabetes, and risk factors for cardiovascular disease, irrespective of time spent in exercise. However, there is currently little evidence relating to the prevalence and impacts of sitting in the workplace.

Workplace sitting is defined as time spent in sedentary behaviour at work. Sedentary behaviours involve sitting or reclining, with little or no energy expenditure. Prolonged, unbroken time spent sitting is common in many Australian work environments. Despite the absence of empirical data, there is strong speculation that workplace sitting has risen in recent decades, largely due to the widespread availability of computers and labour-saving devices.

Workplace sitting is associated with musculoskeletal disorders and symptoms and an increased risk of premature mortality and diabetes, while prolonged computer use is associated with eye strain. As the evidence base on the prevalence and impacts of workplace sitting increases, it is expected to provide further data on the benefits that will accrue from reducing workplace sitting, both to individuals (i.e. better health) and to organisations (i.e. improved productivity). This in turn will provide greater impetus for efforts to reduce workplace sitting. Efforts to reduce workplace sitting will likely result in economic benefits associated with a reduction in potentially preventable chronic diseases, such as diabetes and cardiovascular disease, and other long-term health conditions, such as musculoskeletal disorders.

Population groups that are most at risk of prolonged sitting include those working in offices, transportation and highly mechanised trades.

Workplace sitting reduction interventions identified in the review typically had a beneficial or neutral impact on productivity, absenteeism and injury costs, where the relevant evidence could be identified. No studies suggested likely harm from sensibly-implemented breaks from, or reductions in, workplace sitting time. In order to effectively reduce prolonged sitting, workplace interventions should:

- incorporate change elements targeting the organisation, environment and individual
- secure a commitment from all stakeholders
- enable employee participation
- be sustained and integrated into the organisational structure
- use multiple and mutually reinforcing strategies
- be flexible and allow for adaptation to the context
- utilise a strong evaluation framework
- conduct a baseline assessment
- be of minimum three-months duration with long-term follow-up
- utilise existing guidelines and frameworks.

1. Introduction

The workplace has been identified as a priority setting for health action and improvement in VicHealth's *Strategy and Business Plan 2009–2013*. Late in 2009 VicHealth established a new program, **Creating Healthy Workplaces**, to enhance and sustain workplace health promotion research, policy and practice in Victoria by building the evidence base on effective workplace health interventions.

VicHealth's *Creating Healthy Workplaces* program focuses on five factors that influence health:

- race-based discrimination and cultural diversity
- violence against women
- alcohol-related harm
- prolonged sitting
- stress.

In recognition of the limited research currently available to guide the design and delivery of interventions, VicHealth commissioned five international reviews to build the evidence base on effective workplace health interventions in relation to these five determinants of health.

This report is a summary of the full evidence review, *Reducing prolonged sitting in the workplace (An evidence review: full report)*, available at www.vichealth.vic.gov.au/workplace. The key objective of the evidence review was to identify workplace interventions that reduce prolonged sitting.

The review focused on interventions that target change at the organisational and systems levels. An organisational and systems approach involves a whole of workplace focus that includes all stakeholders and brings about change in the workplace culture and infrastructure as well as policy, procedures and practices.

Organisational and systems levels interventions represent an effective and sustainable approach to creating supportive and healthy workplace environments. They target and seek to change the influences on, or root causes, of ill health within the workplace (e.g. the working conditions and culture). Organisational and systems-focused interventions result in benefits to both the workplace and individual employees. In contrast, individually focused interventions can be effective at the individual level but don't always have favourable impacts at the broader organisational level. VicHealth's focus on interventions that target change at the organisational and systems levels will build upon and complement existing workplace health practices and evidence, which largely focus on effecting change at the individual employee level.

The workplace as a health promotion environment

Workplaces are an important environment for health action and improvement. VicHealth identifies the workplace as a priority setting in its *Strategy and Business Plan 2009–2013* because:

- Employment and working conditions are important social determinants of health. There is strong evidence linking fair, safe and secure employment arrangements with good health. Conversely, poor job security and conditions are associated with poor health.
- Workplaces play a critical role in the health of society. The workplace directly influences the physical, mental, economic and social wellbeing of employees, and in turn the health of their families, communities and society. Effective workplace health promotion can therefore result in a multitude of beneficial outcomes across all levels.
- The workplace provides an ideal setting and infrastructure to support the promotion of health to a large audience. Approximately two-thirds of working-age Australians are in paid work – many spending up to a third of every day at work.

In 2010 a research team from Baker IDI Heart & Diabetes Institute, in collaboration with researchers from The University of Queensland's School of Population Health, was commissioned to conduct the evidence review and identify:

- the impacts (health, social and economic) of prolonged sitting
- the benefits to the workplace of reducing prolonged sitting
- population groups that are most at risk
- workplace interventions that reduce prolonged sitting, including:
 - the major components of effective interventions
 - principles, frameworks and models to guide the design and delivery of interventions
 - tools and resources to support implementation
 - case studies.

This report is a summary of the full evidence review, *Reducing prolonged sitting in the workplace (An evidence review: full report)*, available at www.vichealth.vic.gov.au/workplace

2. Prolonged sitting: definitions and prevalence

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

Sitting can be measured across the whole day (total time) or across different domains: work, leisure and transport. Patterns of sitting time can also be measured to assess if the sitting time is accrued in long bouts (which can be more detrimental to health), or shorter (such as <20 minutes), more frequent bouts. Sitting time is typically estimated by self-report questionnaires although devices are increasingly being used to provide a more accurate measure, including accelerometers to measure physically active and inactive time and inclinometers to measure body posture.

Workplace sitting is time spent in sedentary behaviour – sitting or reclining with little or no energy expenditure – while at work.

There is strong speculation that workplace sitting has risen in recent decades, largely due to the widespread availability of computers and labour-saving devices.

Prolonged, unbroken time spent sitting is common in many Australian work environments. The number of work tasks focused around sitting at a computer has increased markedly in recent decades, which corresponds with an increased number of Australian businesses owning a computer and having internet access. Australian research has found that the average office-based employee spends 75 per cent of work hours in sedentary time, significantly more than during non-work time.

Despite the absence of empirical data, there is strong speculation that workplace sitting has risen in recent decades, largely due to the widespread availability of computers and labour-saving devices. However, it appears that the suspected rise in workplace sitting has not been compensated for by increased physical activity outside of work, as evidenced by relatively unchanged prevalence levels of Australian adults meeting the physical activity guidelines. In contrast, other measures which can be used as indicators of sedentary time outside of work such as television viewing time and car ownership have significantly increased.

3. The impacts of prolonged sitting

There is a growing body of evidence that time spent sitting, as distinct from the problems of too little exercise, is a unique public health problem. Time spent sitting is consistently associated with premature mortality, diabetes, and risk factors for cardiovascular disease, irrespective of time spent in exercise.

To date, the majority of evidence on the impacts of sitting have focused either on total daily sitting time or have been specific to television viewing. For most adults, time spent sitting in the workplace is likely to be a significant contributor to total daily sitting time; however, there is little evidence relating specifically to the prevalence and impacts of workplace sitting.

Prolonged sitting is a risk factor for poor health and early death, even among those who meet, or exceed, national physical activity guidelines.

The impacts of workplace sitting on individuals' health are documented in an emerging yet growing body of international research. Most of the current evidence comes from the ergonomic literature, and focuses on musculoskeletal disorders (where a part of the musculoskeletal system is injured over time through repetitive overuse). Currently there is no strong evidence of the direct impact of workplace sitting on organisations.

Physical health

The incidence and severity of musculoskeletal disorders and symptoms is the most commonly measured outcome in studies examining the health impacts of prolonged workplace sitting. Here, the evidence is strong and consistent with jobs that require constrained sitting or standing postures. For example, estimates of the prevalence of musculoskeletal symptoms in computer users are as high as 50 per cent.

Workplace sitting is also associated with an increased risk of premature mortality and diabetes, while prolonged computer use is associated with eye strain.

Mental health and social wellbeing

Sitting has been associated with an increased risk of mental disorders and depression. To date, evidence on the impact of workplace sitting on workplace mental wellbeing issues, including job stress, depression and fatigue, is limited with no strong links yet reported. Furthermore, while the proliferation of email and the routine use of internal telephone systems has probably reduced the amount of time that employees have in face-to-face contact with each other, the impact of such changes on social wellbeing outcomes has not been investigated.

4. The benefits of reducing prolonged sitting

The potential benefits of reducing workplace sitting were highlighted in the 2009 National Preventative Health Taskforce report, which included the recommendation to 'fund, implement and promote comprehensive programs for workplaces to support healthy eating, promote physical activity and *reduce sedentary behaviour*' (Action 3.2, our italics). The report specifically cites recent Australian research showing improved weight and metabolic effects from avoiding prolonged sedentary time, interspersing periods of inactivity with breaks, and substituting light-intensity activity for sedentary time.

Given the emerging interest in this field of research, it is anticipated that the evidence base for workplace sitting research will become considerably stronger in coming years. As the evidence base on the prevalence and impacts of workplace sitting increases, it is expected to provide further data on the benefits that will accrue to individuals (i.e. better health) and to organisations (i.e. improved productivity), which will in turn provide greater impetus for efforts to reduce workplace sitting.

Reducing prolonged sitting will potentially have significant long-term health and economic benefits.

Economic benefits of reducing workplace sitting

Potentially preventable chronic diseases, such as diabetes and cardiovascular disease, and other long-term health conditions, such as musculoskeletal disorders, are linked to prolonged sitting, and contribute substantially to Australian health expenditure (estimated to account for >\$11 billion). Although there is no strong evidence from large, well-controlled trials on the direct economic impact of workplace sitting on workplaces (i.e. productivity, absenteeism), it may contribute indirectly to detrimental economic outcomes by increasing the risk of chronic diseases among staff. Chronic conditions in the workforce are related to lower labour force participation and lost productivity.

The economic benefits of reducing workplace sitting at a population level are further strengthened due to the association of workplace sitting with being overweight or obese. Overweight and obesity are estimated to be responsible for 7.5 per cent of the total burden of disease and injury in Australia, ranked second behind tobacco and high blood pressure. Overweight and obesity were associated with over four million days lost from Australian workplaces in 2001. The total direct financial cost of overweight and obesity was estimated to be \$8.3 billion in 2008; \$3.6 billion (44 per cent) of this was associated with lost workplace productivity.

Musculoskeletal disorders are linked to prolonged sitting, and are common in the workplace (44 per cent of compensation cases) and costly (an average of \$7,400 per case). Musculoskeletal disorders account for a significant proportion of workplace sick leave (15–22 per cent) and adversely affect employee morale, productivity and wellbeing.

5. Population groups most at risk

Population groups that are most at risk of prolonged workplace sitting were identified by assessing exposure to prolonged sitting in the Victorian working population.

Population groups that are most at risk of prolonged sitting include those working in offices, transportation and highly mechanised trades.

Groups most at risk of experiencing prolonged sitting and associated illness burdens are those working in offices, transportation and highly mechanised trades. Reducing and breaking up prolonged sitting for these groups would lead to the greatest population health benefits.

In Australia, office-based staff are the largest occupational group, with more than 12 per cent of the working population based in offices. This suggests there are at least 324,000 office-based staff in Victoria – more, if all workplaces requiring some computer time are included. Australian research has found that office-based staff are highly inactive at work. The average office-based employee spends 75 per cent of work hours in sedentary time, significantly more than during non-work time. It is estimated that office-based employees spend around 80,000 hours seated in the course of their working life.

Based on the high risk of exposure to prolonged sitting in office-based settings combined with the high proportion of the Victorian workforce being based in offices, office-based settings are a priority for interventions to reduce workplace sitting.

The transportation industry (e.g. taxi drivers, truck drivers, bus drivers, aeroplane pilots) and highly mechanised trades (e.g. crane operators, bulldozer operators, single driver garbage collectors, sewing machine operators) are also at risk of exposure to prolonged sitting.

6. Best practice: workplace interventions

Review method

The authors conducted an evidence review to identify interventions that reduce sitting in the workplace, including:

- the major components of effective interventions
- principles, frameworks and models to guide the design and delivery of interventions
- tools and resources to support implementation
- case studies.

The review focused on interventions that had a whole-of-organisation and systems approach.

A broad search of national and international peer-reviewed as well as other literature produced 34 items, of which 13 (reporting on 11 distinct studies) met the search inclusion

criteria. The intervention studies were grouped into categories according to their focus.

This summary report presents the intervention studies identified in the review and their impact on workplace sitting, health, social and economic outcomes, along with key features of effective interventions.

Visit www.vichealth.vic.gov.au/workplace for a copy of the full evidence review: *Reducing prolonged sitting in the workplace (An evidence review: full report)*.

Workplace sitting reduction interventions

The impact of workplace sitting reduction interventions on workplace sitting, health and social/economic outcomes is presented in Table 1 and discussed on pp 12 and 13.

Table 1: The impact of workplace sitting reduction interventions

Category	Outcomes		
	Workplace sitting	Health	Social/economic
Increasing the number of breaks from sitting time (n=4)	<ul style="list-style-type: none"> • Increased number of breaks 	<ul style="list-style-type: none"> • Reduced musculoskeletal discomfort • Reduced eye strain 	<ul style="list-style-type: none"> • Increased productivity/ no change
Postural changes (n=3)	<ul style="list-style-type: none"> • 'Sit-stand' posture preferred over 'just sit' or 'just stand' 	<ul style="list-style-type: none"> • Reduced musculoskeletal discomfort • Reduced spinal shrinkage 	
Ergonomic changes to the individual workspace (n=4)	<ul style="list-style-type: none"> • Decreased sitting time • Increased standing time 	<ul style="list-style-type: none"> • Reduced musculoskeletal discomfort • Reduced body part discomfort • Reduced foot-swelling/ no change • Decreased illness and injuries 	<ul style="list-style-type: none"> • Increased productivity • Reduced cost of injuries • Positive employee and employer feedback
Altering the built design of the broader workplace (n=1)		<ul style="list-style-type: none"> • Increased energy and reduced tiredness 	<ul style="list-style-type: none"> • Increased employee communication and interaction • Decreased privacy • Increased distractions
Multiple strategies (combinations of the above; n=1)	<ul style="list-style-type: none"> • Increased number of breaks 	<ul style="list-style-type: none"> • Reduced health care system use • Reduced pain • Improved recovery rate for neck and upper limb symptoms 	<ul style="list-style-type: none"> • Reduced health care system use

(a) Increasing the number of breaks from sitting time

The studies involved introducing structured breaks (e.g. set time for the break) in addition to conventional breaks (e.g. mid-morning, mid-afternoon breaks and lunch). As the studies used structured breaks, the reductions in sitting time were dictated by the intervention schedule. One study reported an increase in the number of breaks in the intervention group, while the other reported that 50 per cent of people in the intervention group complied with the new break schedule.

In terms of health outcomes, all four studies reported improvements in perceived musculoskeletal discomfort. Two studies reported improvements in eye strain. One study assessed mood, and found no intervention effect.

Importantly, increasing the number of breaks did not have a detrimental effect on workplace productivity. Rather, increases in productivity and a neutral effect on productivity when comparing conventional and supplementary breaks were observed.

(b) Postural changes

Three studies examined the impact of implementing postural changes. The first study reported reduced foot swelling in participants with 'sit-stand' workstations (who stood for 15 minutes every hour) compared to those with non-adjustable sitting workstations. The second reported reduced musculoskeletal discomfort for participants using a 'sit-stand' posture, which involved changing posture every 30 minutes. Importantly, this posture was preferred over 'just sit' and 'just stand' by 70 per cent of participants. The third study indicated positive findings for musculoskeletal health, showing that spinal shrinkage (potentially detrimental due to compression of the spine) was significantly less in participants who stood for longer periods.

Other outcomes of postural change strategies such as standing or walking meetings include reduced meeting times and feeling more energised.

(c) Ergonomic changes to the individual workspace

The studies focused on ergonomic modifications that promoted less sitting, rather than modifications to ensure correct postural alignment. The main tool used was the 'sit-stand' workstation.

The interventions involving employee-driven changes (i.e. when the employee chose how much they sat or stood) resulted in significant decreases in time spent sitting and increases in time spent standing. In terms of health outcomes, reductions in the severity of musculoskeletal symptoms, body part discomfort and the occurrence of illness and injuries was observed. Both a reduction and no difference in foot swelling was observed.

An improvement in productivity was observed in two studies, while keystrokes and time spent at the computer (as markers of productivity) was reduced in another. The cost of injuries in one workplace dropped to zero dollars. Positive feedback from both groups of employees (e.g. appreciation of the opportunity/choice to stand as they pleased, improved working environment) was reported. Positive employer feedback relating to ergonomic changes to the individual workspace is also reported in other literature and includes reduced floor space and open office landscapes supporting mobile and flexible staff.

(d) Altering the built design of the broader workplace

One study evaluated the impact of modifications of the workplace environment. In terms of health outcomes, participants in the redesigned work environment felt significantly more alert and energetic, and less tired and sluggish. The open office increased employee communication and interaction, but significantly decreased perceived privacy and increased visual and noise distractions.

(e) Multiple strategies

One study utilised multiple strategies (combinations of the strategies outlined above); it reported increased breaks from computer work, reduced health care system use, improvement in all pain measures, and a quicker recovery rate for neck and upper limb symptoms.

Limitations

There are several limitations within the existing literature that need to be considered when interpreting the review findings:

- mixed study quality – comparability of studies difficult
- evidence largely from an occupational health and safety (OHS) and ergonomics perspective
- reliable and valid measures of workplace sitting time generally not used
- social and economic outcomes usually not reported
- all eligible studies conducted with populations that could broadly be defined as office staff.

Key features of best practice approaches

The following features of best practice approaches are based on both the current evidence base on workplace sitting reduction interventions and the authors' content knowledge and expertise.

- Incorporate change elements targeting various levels such as:
 - a. the organisation: gain upper management support through thorough consultations; identify site representatives/champions to serve as role models and spokespeople for employees; ensure site representatives reinforce the intervention message; establish new workplace policies and practices (e.g. standing meetings, face-to-face visits instead of emails)
 - b. the environment: supply employees with standing workstations; move waste bins, printers, supplies away from individual offices to more central locations
 - c. the individual (employee): educate on breaks in sitting and health; encourage use of prompts (e.g. stand when phone rings, when someone enters the office).
- Secure a commitment from all stakeholders.
- Enable employee participation in all phases of the intervention, especially during preparation and planning.
- Ensure that intervention strategies are sustainable and integrated into the organisational structure.
- Use multiple and mutually reinforcing strategies.
- Provide flexibility for employers and employees to choose/tailor/modify the most appropriate strategies for their individual worksite/business units/workplace.
- Help build the evidence base by utilising a strong evaluation framework that:
 - evaluates outcomes relating to physical and mental health (e.g. cardio-metabolic outcomes, stress), social (e.g. employee interactions and perceived privacy), economic (e.g. productivity, staff retention) and sitting
 - utilises device-based measures of sitting time such as inclinometers
 - uses validated measurement methods.
- Conduct a baseline assessment to establish the extent of the problem.
- Run interventions for a minimum of three months with long-term follow-up to assess outcomes and the maintenance and sustainability of intervention changes.
- Utilise existing guidelines and frameworks, such as Occupational Health and Safety and Australian Council of Trade Unions guidelines, as the basis for sitting reduction interventions that are part of broader occupational health promotion initiatives.

Effective interventions provide employees with:

- flexibility in choice of working environments, such as 'sit-stand' workstations that staff can alter as they please or unstructured breaks; unstructured breaks (chosen or planned by individual staff themselves) provide flexibility and a sense of control, and are preferable over structured breaks, which can be constraining and may interrupt work tasks
- comfort
- minimal interruption to the work task
- assistance with productivity when incentives or quotas are in place
- instructions and motivation; to encourage adherence to the workplace sitting reduction protocols or the use of 'sit-stand' workstations, provide specific guidelines, training (around ergonomics and working safely) and make health implications explicit
- feedback on intervention outcomes.

Effective interventions provide employers with:

- evidence of no detrimental effect on employee productivity while preferably causing an increase in long-term productivity or a reduction in costs related to staff turnover or absenteeism
- feedback on intervention outcomes.

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