This evidence brief forms part of the Australian National Preventive Health Agency’s evidence brief series which aims to disseminate information and inform dialogue relating to high priority preventive health issues.

This evidence brief was prepared by The Boden Institute of Obesity, Nutrition, Exercise & Eating Disorders and the Menzies Centre for Health Policy, University of Sydney for the Australian National Preventive Health Agency.

This brief is written in plain English to appeal to a wide audience. A more detailed technical paper supports the evidence presented in this brief and is available upon request from ANPHA@anpha.gov.au
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SUMMARY

• Sedentary behaviour describes the behaviours of sitting or lying down while awake. This includes sitting while watching TV, driving a car, working at a desk, doing schoolwork, and sitting and using a computer or mobile device.

• Sedentary behaviour is not the opposite of physical activity. Sitting and physical inactivity are independent risk factors for chronic disease. It is possible to be active and meet the 150-300 minutes/week guideline for moderate intensity activity, and still sit too much.

• Australians are sedentary for 50-70% of their waking hours, or 8-12 hours per day.

• Sitting for prolonged periods each day, no matter what else people do, impairs health. Too much sitting is associated with higher mortality rates and with developing diabetes and other chronic diseases.

• Encouraging people to sit less is likely to reduce their risk of developing chronic diseases.

• People who sit for prolonged periods are more likely to be overweight or obese. This may be because overweight people sit more, or whether sitting more leads to weight gain, or both.

• For adults, evidence suggests it is appropriate to encourage less sedentary behaviour. Being sedentary for more than 11 hours a day impairs health, and that the cut-off point for risk may be as low as 7 or 8 hours a day.

• For children, evidence supports that spending more than two hours a day in front of screens is damaging to health. Some of this negative health effect comes through prolonged sitting, and some through the poor diet that may be associated with watching TV.

• Time spent in sitting/sedentary behaviours seems to be increasing due to changes in patterns of work and transport and to increases in the use of technology at work, in education and leisure.

• There are two approaches to reducing sedentary time – being sedentary for less total time each day or interrupting sedentary time. It is not yet clear whether one approach is better than the other.

• Research is in the early stage of understanding the importance for health of sedentary behaviour and knowing how best to address it.
WHAT IS SEDENTARY BEHAVIOUR?

Formally, sedentary behaviour is any waking behaviour characterised by a low expenditure of energy while in a sitting or reclining posture. It is one of the four states of activity into which the day can be divided:

- sleeping
- sedentary time
- light activity, which involves moving but not sweating (such as walking, gardening, riding a bike slowly and sports such as bowls or swimming)
- health-enhancing moderate to vigorous intensity physical activity (such as running, brisk walking, climbing stairs and sports such as netball and football)

Informally, sedentary behaviour generally refers to sitting.

Contemporary life in many countries comprises a vast number of daily activities requiring sitting – working at a desk, sitting in school, reading a newspaper, watching TV, eating a meal, interacting through social media, driving a car, sitting on the train and more.

But being sedentary is not simply the opposite of being active. Some people sit for 12 hours a day, and then are physically active for an hour at night. They are classified as sedentary but they also meet the national guidelines for ‘sufficient physical activity’. The issue of sedentary behaviour is an independent issue in its own right, with its own health risks.

Sedentary, active or both?

**CONNIE**
WAITRESS

Connie works as a waitress, on her feet and moving all day. When she gets home, she cooks dinner then hits the couch for a night of TV. While she has low daily sitting time, she does not engage in much health-enhancing physical activity.

**JACK**
DRUMMER

Jack is a drummer in a rock band. He sits most of evening, but uses up a lot of energy banging the drums. His other passion is mountain-climbing, and he trains most days. He is both ‘highly physically active’ and also ‘not sedentary’.

**SUU KIM**
ANALYST

Suu Kim is a finance analyst. She rarely leaves her desk, but stops for an hour at the gym each night. She spends a lot of time sitting, but is also physically active.

Australia’s Physical Activity and Sedentary Guidelines recommend that children and adults should minimise the amount of time spent in prolonged sitting and being sedentary everyday.
HOW MUCH TIME DO WE SPEND BEING SEDENTARY?

Australians typically spend between 50-70% of their waking hours being sedentary.3

**Adults**

Most adults spend about 8-12 hours per day being sedentary out of an average of 16 waking hours.4-7 Although, we typically report 5-6 hours, total sitting time is usually under-estimated.8-10 Most of the rest of the time is spent in light activity, which is mostly spent standing. “Moderate to vigorous physical activity”, which is of sufficient intensity to improve health and fitness, makes up very little of a typical adult’s time (Figure 1).

**Australians are Sedentary**

50-70% OF HOURS AWAKE OR 08-12 HOURS EVERY DAY

**Figure 1:** Typical Breakdown of an Australian Adult’s Waking Hours

Source: Healy et al 2008, AusDiab study
Sitting at work or in educational settings and watching TV are the main ways Australians spend time being sedentary. Being on the internet and playing electronic games (e-games) also contribute, especially for people aged 18-24. Watching TV dominates the sedentary behaviours of those over 65 \(^{11}\) (Figure 2). Adults spend an average of 5.2 hours per week sitting for transport, slightly higher among those aged 35-44 and slightly lower among those over the age of 65.

**FIGURE 2: AVERAGE TIME SPENT IN DIFFERENT FORMS OF SEDENTARY BEHAVIOUR**

Source: Data from the Australian Health Survey: Physical Activity, 2011–12.

Note: Other includes sitting or lying down to do other social or leisure activities.
Children

Compared with adults, children spend less time sitting. Among children 6-11 years of age, the average sitting time is 7-8 hours. However, time spent sitting increases with age and a 17-18 year old may spend as much time sitting as an adult.4,7,12-14

Research has focussed on what is called screen time, which includes watching TV, playing e-games and using tablets and smartphones (Figure 3). Children in Australia spend an average of 2-4 hours per day in front of screens,15,16 with younger children spending less time in front of screens than teenagers, which is similar to data from many other countries.17 Screen time is higher on weekends than on weekdays.

Time spent watching TV varies little by age and gender. Boys spend more time than girls on e-games. Time spent on the internet increases with age. Travelling to and from school contributes to sedentary time for an increasing number of children. It is estimated that over three quarters of Australian schoolchildren aged 5-14 are driven to and from school.18

Australian children who are socioeconomically disadvantaged report more screen time than those who have higher incomes, and urban children are more sedentary than rural children.16

**FIGURE 3:** TIME SPENT ON SEDENTARY SCREEN-BASED ACTIVITY (CHILDREN AND ADOLESCENTS)

Source: Data from the Australian Health Survey: Physical Activity, 2011–12. Note: Computer/internet (other) excludes electronic games
Trends

There are single surveys that have started to describe sedentary behaviours at the national level, but no Australian data are yet available that monitor trends in sedentary behaviour. However previous research in Australia, Norway and the USA indicates that people are spending substantially more time sitting when this is tracked over the past four decades.

Adults

Overall, the amount of energy Australians adults expend each day is slowly declining.\textsuperscript{19,20} Sedentary leisure time among Australian adults increased slightly between 1992 and 2006, probably due to increases in time spent sitting for transport and in front of screens.\textsuperscript{21,22}

These trends reflect widespread changes in society. Fifty years ago most people used a lot of energy at work, doing household chores and getting from one place to another.\textsuperscript{20,23} Car travel, computers, automation and labour-saving devices have changed our daily patterns of activity, meaning people spend less energy each day just living.

Also, fewer people work in agriculture and manufacturing, and more in service-related and financial industries, meaning people spend less energy at work. A change in society, along with personal preference, has meant that many people drive instead of walking or cycling.

Children

Children are becoming more sedentary. In NSW, boys spent slightly more time being sedentary in 2010 than in 2004. There was no change for girls.\textsuperscript{16}

There has been a steep decline over the past 30 years in the proportion of Australian children who walk or ride their bikes to school,\textsuperscript{24} with many more children being driven to school.\textsuperscript{16}

Time spent watching TV is declining slightly among young people, but is being replaced by a rise in internet, social media and e-games use over the past 20 years.\textsuperscript{25}
WHAT ARE THE HEALTH EFFECTS OF BEING TOO SEDENTARY?

There is emerging evidence that being too sedentary has negative health effects. These occur because sitting for long periods results in reduced use of the large muscles in the back, trunk and legs. These large muscles consume much of the body’s intake of sugars and fats. So not using these muscles when sitting down, means there are higher than normal levels of blood glucose and fats, increasing risk of a range of health conditions.

Adults

People who spend too much time being sedentary have a higher mortality rate than people who are less sedentary, and are more likely to develop type 2 diabetes and cardiovascular disease.

Prolonged periods being sedentary increases the risk of dying early and developing diabetes.

People who sit for prolonged periods are more likely to be overweight than others. However, it is not clear whether being sedentary causes a person to become overweight, or whether overweight people are sedentary for longer periods than non-overweight people, or whether both are true.

These increased risks of sedentary behaviour, death, diabetes, cardiovascular disease and possibly becoming overweight, seem to be independent of whether a person is physically active or not. They also seem to be independent of other risk factors for chronic disease such as smoking, alcohol use and level of education.

Sitting for prolonged periods each day, no matter what else people do, impairs health. Evidence suggests that being sedentary for more than 11 hours a day impairs health and it is possible that being sedentary for more than 8 hours a day impairs health. As this is an emerging area of research, it is not yet clear whether it is best to reduce the total amount of sitting time or to interrupt sitting time by 2-3 minutes per hour or both. However, it is clear that we need to reduce our sitting time.

Children

Children who are sedentary for prolonged periods are less fit than others. In addition, too much screen time is associated with being overweight and obese. Some studies have found that cholesterol and blood pressure are also higher among sedentary children than among those who are less sedentary.

It is known that spending more than 2 hours per day in front of screens impairs children’s health, and the Australian physical activity and sedentary guidelines reflect this. Some of this health effect comes through being sedentary, and some through the poor diet that is often associated with watching TV. It is likely that being sedentary as a child sets up patterns of this behaviour that will lead to poorer health in adult life.

There is emerging evidence that too much screen time affects other aspects of child development and is associated with low self-esteem, poor social behaviours, poor results at school and slower development of the brain.
WHAT INFLUENCES HOW SEDENTARY WE ARE?

Adults

Many factors influence how much we sit. They can be grouped broadly into:

- individual factors
- occupational factors
- physical environment
- societal trends
- other

Individual factors include:

- age – younger adults (around 18) and older adults (>65) report the highest amounts of daily sedentary behaviour
- gender – males before age 30 years are more sedentary than females, but this pattern may be reversed after the age of 60
- poor health – having a chronic illness is associated with increased levels of sedentary behaviour
- education – adults with higher levels of education are the most sedentary due to sitting at work

Occupational factors include the type of work and the organisation of the workplace. For example, people in occupations that require desk-based or computer work generally sit more than those in service industries, with manual labourers and farm workers sitting even less.

The physical environment includes issues such as low residential density, poorly connected streets and limited land use diversity, limited public transport and lower population density, which probably contribute to increased TV viewing and car use.

Societal trends include the move towards urbanisation, car use, mechanisation and the increasing use of technology for everyday tasks that involve sitting.

Fundamental changes to the pattern of family life due to work commitments, the need for care outside of the home and the lowering of the age range for early childhood education has resulted in a reduced tolerance of children having a ‘freer range’ of independent mobility. Parental concern about safety and stranger danger may have also contributed to reduced walking or cycling to school.

Children

For children, much of the research has focused on time spent viewing TV and other screen time. It is clear that children are strongly influenced by their parents’ behaviour around TV. Parents who watch a lot of TV and who have it on during meals are likely to have children who watch a lot of TV. Children with TVs or computers in their bedroom are likely to use them more than the recommended limit of 2 hours per day. Also, households with rules around restricting TV viewing have children who watch less TV.

But there is a lot more to understand about what influences children, such as the environment in which they live, and the importance of the behaviour of their parents and friends.
CAN WE REDUCE SEDENTARY TIME?

It is clear from the research that sedentary time should be reduced,\textsuperscript{17,21,67} and that it would have health benefits. It is also clear that it can be reduced, although it is not yet clear about the best ways to do this. While research is in the early stages, there are some promising results.

**Adults**

Most research in adults has been carried out in workplaces, partly because they are readily modifiable.\textsuperscript{61} One approach has been to use adjustable sit-stand workstations, in which workers can raise or lower their desks depending on whether they want to stand or sit.\textsuperscript{68,69} A second approach is to use computer-based reminders to encourage workers to get up and walk around every hour or two.\textsuperscript{70,71} Other approaches use offices designed to encourage standing and light activity.\textsuperscript{72}

There has been some research on reducing sedentary behaviour in adults in home environments using individualised behaviour-change programs,\textsuperscript{73} although it may be more difficult to reduce sedentary behaviours in this setting.

There has been some initial success in reducing sedentary time, particularly in workplace environments. However, definitive recommendations are not possible at this time since few interventions have been tried in non-work environments, or have assessed the duration of effect.

**Children**

Most research regarding children’s sedentary behaviour has been done in homes.\textsuperscript{17} In general, rules around TV viewing and computer use reduce screen time,\textsuperscript{16} and support from electronic timers has been useful in reducing screen time.\textsuperscript{74,75}

Results from research in schools\textsuperscript{76-78} and pre-school settings\textsuperscript{79} have been mixed, with no single approach showing consistent positive results.

Overall, while many studies have shown that it is possible to reduce the time children spend being sedentary, research does not provide consistent guidance on how best to do this.
WHAT WE NEED TO UNDERSTAND BETTER

There is much we need to understand better. It is clear that being sedentary harms health, but there are many outstanding questions which include:

- How much sedentary time each day is acceptable before it becomes harmful?
- Does this threshold differ for different groups of people and at different ages?
- Does being physically active counteract the effects of being sedentary?
- Does being sedentary contribute to conditions like osteoporosis, mental health issues and some types of cancer?
- How could sitting time be reduced at work without compromising productivity?
- How can we increase population levels of active travel to work and school, and encourage adults and children to walk more or cycle, rather than using a car?

There are no data for Aboriginal and Torres Strait Islander adults or children on sedentary behaviours, nor for culturally and linguistically diverse populations and these data should be collected in future population surveys.

In terms of trends, we need to understand better how people spend their time each day, and regularly follow the changes in that use of time.
CONCLUSION

Although the concept of sedentary behaviour is still relatively new, measurement of sedentary behaviour is possible and it is clear that Australians, both adults and children, spend considerable time being sedentary. Changes in society are driving us towards being more sedentary. **Reversing these trends would be beneficial for individual and population health.**

Although the exact point when sedentary behaviour starts to become harmful is not known, there is little doubt that encouraging people to be less sedentary would reduce the risk of sedentary behaviour related chronic disease risks.

Policies developed to reduce sedentary behaviours should take into account the range of factors that encourage them, including individual, societal, occupational and the physical environmental factors. Examples include changing the physical environment to encourage more people to walk, ride bikes and use public transport.

Clear and appropriate evidence-based guidelines exist around screen time for children. As research and more evidence is accumulated it will be possible to provide specific guidance around sedentary time for both adults and children. The key challenge is implementing large scale interventions and policies that address the risks posed by sedentary behaviours.
REFERENCES


42. Banks E Lim L et al. Relationship of obesity to physical activity, domestic activities, and sedentary behaviours: cross-sectional findings from a national cohort of over 70,000 Thai adults. BMC Public Health 2011 11: 762.


49. van Uffelen JG, Watson MJ et al. Sitting time is associated with weight, but not with weight gain in mid-aged Australian women. Obesity (Silver Spring) 2010 18(9): 1788-1794.


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