



Physical activity and sedentary behaviour

Evidence summary

Encouraging regular physical activity is one of five strategic imperatives in the VicHealth Action Agenda for Health Promotion. VicHealth recognises the many health benefits that an active lifestyle can provide.

About this summary

Regular physical activity contributes to good health across all life stages, whereas inactivity is one of the most significant contributors to the global burden of disease (Lee et al. 2012). Sedentary behaviour, including time spent sitting each day, is emerging as an independent risk factor for health (Owen et al. 2010). Moving more and sitting less is important for physical and mental health and wellbeing, and delivers a range of other economic, social and environment benefits.

This evidence summary outlines current physical activity and sedentary behaviour levels in Australia and in Victoria. It provides an overview of the impacts of physical activity and sedentary behaviour, as well as barriers to and enablers of active lifestyles. It has been informed by a literature review, which drew evidence from systematic reviews and meta-analyses published between 2009 and June 2014, recent studies, and relevant government and non-government agency reports.

This evidence summary draws upon the best available evidence and expert opinion, while recognising the challenges in measuring physical activity and sedentary behaviour, including different sources and availability of significant trend data.

ONLINE RESOURCES

For information on VicHealth's physical activity programs, research and initiatives, visit www.vichealth.vic.gov.au.



Definitions

Active travel – refers to non-motorised transport between destinations such as walking, cycling, scooting and skateboarding (VicHealth 2014).

Physical activity – defined as any bodily movement produced by skeletal muscles that results in energy expenditure (Caspersen et al. 1985) and is accumulated in four main domains: leisure/recreation; transport; occupational/school; and household. Physical activity includes 'exercise' (planned, structured and repetitive activity with a fitness goal), sport (organised, club and social), unstructured/incidental physical activity (such as gardening), active play and walking (for recreation and transport).

Physical inactivity – defined as a lack of physical activity (WHO 2015).

Screen-time – the time spent using a screen-based device such as television, computer, or electronic gaming device.

Sedentary behaviour – defined as any waking activity characterised by low energy expenditure (≤ 1.5 metabolic equivalents) and a sitting or reclining posture (Sedentary Behaviour Research Network 2012). It includes sitting at work or school, car travel, and screen-time (television viewing, video game playing, computer use for leisure).

Sport – defined as a human activity capable of achieving a result requiring physical exertion and/or physical skill which, by its nature and organisation, is competitive and is generally accepted as being a sport (Australian Sports Commission n.d.).

National guidelines for physical activity and sedentary behaviour

The table below summarises Australia's Physical Activity and Sedentary Behaviour Guidelines, which were last updated in 2014 (Department of Health 2014a).

Age group	Physical activity	Sedentary behaviour
Early childhood 0–5 years	<ul style="list-style-type: none"> • 3 hours of light- to vigorous- intensity activity every day 	<ul style="list-style-type: none"> • No screen-time for children under 2 years of age • Less than 1 hour of screen-time per day for children aged between two and five • No more than 1 hour of being sedentary or inactive at a time, except when sleeping, for all children aged birth to 5 years
Children and youth 5–17 years	<ul style="list-style-type: none"> • At least 1 hour of physical activity every day • Bone and muscle strengthening activities at least 3 days each week 	<ul style="list-style-type: none"> • Minimise sedentary time every day • Less than 2 hours of screen-based entertainment per day • Break up long periods of sitting as often as possible
Adults 18 years and over	<ul style="list-style-type: none"> • Between 2½ and 5 hours of moderate intensity physical activity, or between 1¼ and 2½ hours of vigorous intensity physical activity, each week • Activity on most, and preferably all, days • Muscle strengthening activities at least 2 days each week 	<ul style="list-style-type: none"> • Minimise prolonged sitting • Break up long periods of sitting as often as possible
Older adults 65 years and over	<ul style="list-style-type: none"> • At least 30 minutes of moderate intensity physical activity on most, preferably all, days • Activity each day, in as many ways as possible, doing a range of physical activities • Incorporate activities that promote fitness, strength, balance and flexibility 	

Physical activity – outcomes and impacts

Physical activity is associated with many physical and mental health benefits, as well as social, economic and environmental benefits.

Across all age groups, physical activity is related to lower obesity risk and better fitness, bone health and cognitive performance (Lee et al. 2012, Okely et al. 2013).

Physical health

Physical inactivity is responsible for more than five million deaths globally per year (Lee et al. 2012).

Being active lowers the risk of colon cancer, type 2 diabetes and cardiovascular disease in adults (Boyle et al. 2012, Lee et al. 2012).

Sport and recreation participation is related to reduced overweight or obesity and improved physical fitness (Khan et al. 2012).

Active travel contributes to lower obesity risk and premature cardiovascular disease mortality among adults, and improved fitness in children and youth (Larouche 2014a, Larouche et al. 2014b, Xu et al. 2013).

Reducing the prevalence of physical inactivity among Australian adults by 10 per cent would reduce:

- deaths attributed to physical inactivity by 15 per cent per year
- disability adjusted life years lost by 14 per cent
- new cases of physical inactivity-related diseases by 13 per cent per year (Cadilhac et al. 2011).

Mental health

Participation in sport and recreation is associated with fewer depressive symptoms, better mental and social health, teamwork skills, social interaction and friendships and feelings of belongingness among children and adolescents (Eime et al. 2013).

Walking can deliver a community benefit by increasing social connections and public safety (Burke et al. 2014).

Active children and youth are more socially active, have reduced symptoms of depression and anxiety and have better academic performance (Eime et al. 2013, Hoare et al. 2014, Singh et al. 2012).

Being active enhances psychosocial wellbeing and cognitive performance in adults (Reed & Buck 2009, Smith et al. 2010).

Economic

Household spending on sporting goods and services contributes \$8.4 billion to the Australian economy each year, and employment in the sport sector contributes another \$442 million (Australian Bureau of Statistics 2011).

In 2008, the total annual economic cost of physical inactivity in Australia, including healthcare, productivity and mortality costs, was estimated at \$13.8 billion (Medibank 2008).

Reducing physical inactivity in Australia by 10 per cent is estimated to reduce health sector costs by \$96 million per year, and increase:

- leisure-based productivity by \$79 million
- home-based productivity by \$71 million
- workforce productivity by \$12 million (Cadilhac et al. 2011).

Environmental

Replacing car trips with walking trips can result in less pollution, reduced greenhouse gas emissions and decreased traffic congestion, as well as financial savings through reduced fuel consumption (Burke et al. 2014).

Physical activity levels and trends

Adults

Australia

- In 2011–12, less than a third of Australians aged 15 years and over were getting enough physical activity to benefit their health. Over two-thirds (67 per cent) were either sedentary or had low levels of exercise (Australian Bureau of Statistics 2012a).
- In 2014–15, around half (56 per cent) of Australians aged 18 to 64 years participated in sufficient physical activity in the last week, whereas nearly one in three (30 per cent) were insufficiently active and 15 per cent were inactive, doing no exercise in the last week (Australian Bureau of Statistics 2015b).
- Adult physical activity levels decline with age, with more 18–24 year olds (59 per cent of males and 48 per cent of females) taking part in enough physical activity to benefit their health, compared with only 30 per cent of males and 20 per cent of females aged 75 or over (Australian Bureau of Statistics 2013b).
- Females of all ages generally have lower physical activity rates than males (Australian Bureau of Statistics 2012a).
- In 2013–14, 60 per cent of Australians aged 15 years and over participated in sport and physical recreation at least once over the past year, compared to 65 per cent in 2011–12 (Australian Bureau of Statistics 2015a).
- In 2011–12, participation in non-organised sport and physical recreation participation was significantly higher than organised participation (Australian Bureau of Statistics 2013c).
- Walking for transport has increased among Australian adults, from 33 per cent in 1997 to 36 per cent in 2007 (Merom et al. 2010).

Victoria

- Analysis of the levels of physical activity among Victorian adults varies widely by source. The Victorian Population Health Survey, which provides detailed Victorian data, indicates that 64 per cent of Victorian adults met the physical activity guidelines in 2011–12 (Department of Health 2014b).
- In terms of sport and physical recreation participation, in 2011–12, two-thirds (66 per cent) of Victorians aged 15 years and over participated in sport and physical recreation at least once a year (Australian Bureau of Statistics 2013c).

Children

- Among children and young people, levels of physical activity vary greatly by age, due to factors including their level of independence.
- Most countries around the world report that less than 40 per cent of children take part in recommended levels of physical activity – although the levels vary widely between countries (Tremblay et al. 2014).
- The level of participation in sport among youth has increased in many countries over recent years (Tremblay et al. 2014). However, this is offset by a consistent decline across countries in the level of active travel among children (Booth et al. 2015).

Australia and Victoria

- In 2011–12, only one in five (19 per cent) of five to 17 year olds did enough physical activity to meet the Australian guidelines of 60 minutes every day (Australian Bureau of Statistics 2013b).
- In 2009, participation in any organised sport by children aged six to 14 years was 70 per cent (Australian Bureau of Statistics 2012b).
- In 2013, around one in five Australian children walked or rode to school (18 per cent walked and 3 per cent rode a bike) (Australian Bureau of Statistics 2013d). Victorian figures are slightly higher – with one in four children walking or riding to school (20 per cent walk, and 4 per cent ride a bike) (Australian Bureau of Statistics 2013d).
- These figures have fallen markedly since the early 1970s. The percentage of five to nine year old children who walk to school declined from three in five children (58 per cent) in 1971 to one in four children (26 per cent) in 1999–2003. The percentage of 10 to 14 year olds walking to school also declined over this period (from 44 to 21 per cent) (van der Ploeg et al. 2008).

Physical activity across population groups

Rates of physical inactivity and sedentary lifestyles are not evenly distributed across the population, with particularly strong evidence of a social gradient in leisure time physical activity (VicHealth 2015b).

Different physical activity levels are commonly associated with different population groups – although the patterns of difference are not always as expected.

Socioeconomic status

- At least from early adulthood onwards, Australians with lower levels of education, on lower incomes or living in socioeconomically disadvantaged neighbourhoods are less likely than better-educated and more advantaged Australians to participate in physical activity and more likely to live sedentary lifestyles (VicHealth 2015b).
- Adults living in areas of greatest disadvantage are less likely to be sufficiently active – 34 per cent compared with 52 per cent of those in areas of the least disadvantage (Australian Bureau of Statistics 2013b). They also walk less for recreation than those in more advantaged areas – 49 minutes per week compared with 72 minutes (Australian Bureau of Statistics 2013b).
- Those who held manual or blue collar jobs tended to become less active upon retirement than those who worked in sedentary, white collar occupations (Barnett et al. 2012).
- Adults with higher levels of education have greater use of active travel and levels of walking for recreation (Australian Bureau of Statistics 2013b) and their children are more likely to take part in organised sport (Stalsberg & Pedersen 2010). However, children in higher income households are less likely to engage in active travel (Pont et al. 2009).

Metropolitan and regional communities

- Adults living in regional and remote areas of Australia are less physically active than those living in metropolitan areas (Australian Institute of Health and Welfare 2008).
- However, Victorian adults living in rural Victoria were found to be more sufficiently active than those in metropolitan areas (66 per cent compared to 63 per cent) (Department of Health 2014b).

Culturally and linguistically diverse communities

- Physical inactivity is common and is a key contributing risk factor to chronic disease among Australian adults from culturally and linguistically diverse migrant groups (Caperchione et al. 2009).
- There is not enough evidence to provide figures about physical activity among people from different cultural backgrounds.

Indigenous Australians

- Indigenous Australians are less likely to be physically active than non-Indigenous Australians (Australian Bureau of Statistics 2008, Pink & Albon 2008).
- More than 60 per cent of Indigenous Australians aged 15 years and over living in non-remote areas report being sedentary or exercising at low levels (Australian Bureau of Statistics 2013a).

Australians with a disability

- In 2010, 68 per cent of Australian adults who identify as having a disability reported participating in sport or physical recreation activities, lower than the 79 per cent of people without a disability (Australian Bureau of Statistics 2012c).
- Australians aged 15–64 who report a severe or profound disability are more likely to do very low level or no exercise, compared to those without a disability (Australian Institute of Health and Welfare 2010).

Sedentary behaviour – outcomes and impacts

A growing body of evidence indicates that time spent sitting is consistently associated with premature mortality, type 2 diabetes, and risk factors for cardiovascular disease, irrespective of time spent being active. Prolonged sitting is a risk factor for poor health and early death, even among those who meet, or exceed, national physical activity guidelines (VicHealth 2012b).

Children and young people who spend prolonged periods of time in sedentary behaviour have poorer physical, mental, social and academic profiles (Hinkley et al. 2014, Okely et al. 2013). These impacts are largely associated with 'screen-time', in particular time spent watching television.

Higher levels of sedentary behaviour among children and young people are associated with:

- greater risk of obesity and cardiovascular disease risk factors
- greater risk of depressive symptoms
- higher overall energy intake and consumption of energy-dense food and drinks, and lower intake of fruit and vegetables
- lower academic performance, delayed cognitive development and poor school performance
- reduced psychosocial wellbeing and self-worth
- poor prosocial behaviour (eg. aggression and behavioural problems)
- poor sleep patterns (eg. short or delayed sleep and sleep disturbance).

(Busch et al. 2014, Tremblay et al. 2011, Costigan et al. 2013, Cain & Gradisar 2010, Hoare et al. 2014, Pearson & Biddle 2011, Hinkley et al. 2014).

Among adults, sedentary behaviour is related to premature death from all causes and from cardiovascular disease, higher risk of type 2 diabetes and certain cancers, higher overall energy intake, and being overweight or obese (Grøntved & Hu 2011, Kalle & Ekelund 2013, Lynch 2010, Pearson & Biddle 2011).

Sedentary behaviour levels and trends

As an emerging health risk factor, little is known about global trends in sedentary behaviour. However, there is strong speculation that workplace sitting has risen in recent decades (VicHealth 2012b).

In the US, evidence suggests sedentary time increases during the transition from primary to secondary school and older adolescents are the second most sedentary group after older people (Matthews et al. 2008).

Adults

- Australian adults sit for nearly nine hours per day with a considerable proportion of sitting time accumulated in sustained bouts of 30 minutes or more (Tanamas et al. 2013). Key sedentary behaviours include spending:
 - 22 hours a week sitting at work and during travel (Australian Bureau of Statistics 2013b).
 - an average of four hours a day in leisure-time sedentary behaviour (Australian Bureau of Statistics 2013b).
- More than a third of Victorian men (37 per cent) and a quarter (28 per cent) of women report sitting for seven hours or more each day (VicHealth 2012a) and around half (48 per cent) of Victorian adult employees report mostly sitting at work (Department of Health 2014b).
- Among adults, the most common leisure-time sedentary behaviour is television viewing, especially among older adults (Australian Bureau of Statistics 2013b). Older adults' television viewing time has increased from 3.2 hours per day in 1992, to 5 hours per day in 2014 (Australian Bureau of Statistics 1995, Nielsen Australia 2014).
- Among young adults, television viewing time has fallen from 2.1 hours per day in 2004 to 1.8 hours per day in 2014 (Screen Australia 2004, Screen Australia 2014); however, watching videos on the internet or on mobile phones is higher than the adult population (Ozdam et al. 2013).

Children

- Less than one-third (29 per cent) of children aged between five to 17 years, and one-quarter (26 per cent) of younger children (aged two to four), meet their respective recommendations for daily screen-time limits (Australian Bureau of Statistics 2013b).
- Children's sedentary travel has increased significantly, with the proportion of children aged between five and nine who travel by car to school increasing from 23 per cent in 1991 to 67 per cent in 2008 (van der Ploeg et al. 2008). In 2013, around half (46 per cent) of children in Australia travelled to school by car (Australian Bureau of Statistics 2013d).

Sedentary behaviour across population groups

- Higher levels of sitting occur among the highest income group, although this group also spent more time in physical activity (Australian Bureau of Statistics 2013b). In contrast, higher socioeconomic status is associated with less screen-time among children and youth (Morley et al. 2012).
- Among adults, higher levels of education are associated with more computer use and conversely, less television viewing time (Rhodes et al. 2012).
- Caucasian and non-migrant young children and adolescents tend to spend less time in front of screens compared with children from non-Caucasian or migrant families (Hoyos Cillero & Jago 2010, Pate et al. 2011).

Factors impacting levels of physical activity and sedentary behaviour

Individual factors

A range of individual factors are important influences on physical activity levels.

- Adults who have physical activity goals and high perceived competence (that is, feel they have the necessary skills) are more likely to engage in physical activity than others (Teixeira et al. 2012).
- Physical activity levels among children and young people are influenced by the individual's history of physical activity, belief in how easy or difficult it is to be physically active, perceived competence and confidence in their ability to be active in diverse situations (such as when it is raining or when they are feeling tired) (Craggs et al. 2011).
- More time spent outdoors is associated with higher amounts of physical activity among children (Cleland et al. 2010).

Sedentary behaviour is also influenced by specific individual factors.

- Time spent in sedentary behaviours increases as we age, from early childhood to adulthood (Pate et al. 2011, Rhodes et al. 2012).
- Adults who spend more time in sedentary behaviours are less physically active, although this is often not the case for children (Rhodes et al. 2012).
- Individuals who are in the unhealthy weight range spend more time in sedentary pursuits (Pate et al. 2013, Rhodes et al. 2012).

Family and home factors

Family and home-related factors appear to be most influential on the sedentary behaviour of children and young people (Hoyos Cillero & Jago 2010, Pate et al. 2011).

- A child's sedentary behaviour is influenced by the amount of television watched by parents, watching television as a family and easy access to electronic media in the home and in the child's bedroom (Pate et al. 2011).
- Devices in the home that limit television operation to a set duration may act as barriers to sedentary behaviour among children (Maitland et al. 2013).
- The availability of educational toys and time spent reading to children within the home may reduce sedentary behaviour in children under three years of age (Duch et al. 2013).

Social factors

Parent, family and peer support are particularly important influences on children's physical activity levels (Craggs et al. 2011, De Craemer et al. 2012, Limstrand 2008).

- Parents in particular act as gatekeepers to their child's physical activity, provide emotional and logistical support to enable physical activity participation and set rules and restrictions that may restrict physical activity (Craggs et al. 2011, De Craemer et al. 2012, Limstrand 2008, VicHealth 2015a).
- Peer support can reinforce physical activity (Limstrand 2008).

- Victorian parents of nine to 15 year olds who were more concerned about safety in general and harm from strangers in particular reported that their children were less likely to play and travel independently in the community (La Trobe University 2015).
- Broader social factors, such the presence of rubbish, graffiti and vandalism, have been shown to be associated with lower levels of physical activity participation (Ding et al. 2011).
- Crime-related safety can be a barrier to total physical activity and walking among adolescents and older adults (Ding et al. 2011, Van Cauwenberg et al. 2011) but less so among other adults (Arango et al. 2013).

Built environment factors

The built environment refers to the parts of environments that are created or modified by humans. The neighbourhood environment in particular includes walking and recreation opportunities, sport and active recreation facilities, homes and workplaces.

- Neighbourhoods that have high 'walkability' (high residential density, mixed land uses and connectivity of streets) support walking and active travel among both adults (Saelens & Handy 2008) and children (Ding et al. 2011).
- Access to footpaths and cycling infrastructure, and the availability of parks and open space are important facilitators of physical activity among children and youth (Ding et al. 2011).
- Long distances between home and school, recreational facilities, parks and shops are a barrier to active travel for children (Wong et al. 2011).

Few studies have examined the influence of neighbourhood environments on sedentary behaviour.

- Australian data indicates that crime and a lack of quality sporting facilities or options close to home is related to higher levels of television viewing in children and adolescents (Timperio et al. 2012).
- Television viewing is higher among adults who live in areas with low walkability (Sugiyama et al. 2007).
- Limited public transport availability, disconnected streets and low population density contribute to time spent sitting in cars (Sugiyama et al. 2012).

Conclusion

Against a global backdrop of declining physical activity levels and the significant health, social and environmental benefits of leading a physically active lifestyle that are being missed, increasing physical activity participation among people of all ages is critical for a broad range of health and societal benefits. In contrast, sedentary behaviour has become an independent risk factor and is associated with many detrimental health outcomes.

Action at all levels is needed to address the complex individual, social and environmental barriers to and enablers of physical activity and sedentary behaviour. These actions must be supported by efforts to improve daily living conditions among those who are most disadvantaged to ensure that everyone has the opportunity to be active and reduce sitting time as often and in as many ways as possible.

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ACKNOWLEDGEMENTS

VicHealth acknowledges Deakin University's Institute for Physical Activity and Nutrition Research (I-PAN), specifically Alfred Deakin Professor Jo Salmon, and Professor Anna Timperio for preparation of a literature review on physical activity and sedentary behaviour, and for review of this summary document.



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VicHealth acknowledges the support of the Victorian Government.

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April 2016 P-PA-238

