1. The case for physical activity

1.1 Co-benefits of physical activity promotion – health, social, economic, environmental and other societal gains from building a more active nation

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Suggested citation: Ding M, Nau T, Bauman A, Bellew B. Co-benefits of physical activity promotion – health, social, economic, environmental and other societal gains from building a more active nation; in: Bellew B, Nau T, Smith B, Bauman A (Eds.) Getting Australia Active III. A systems approach to physical activity for policy makers. The Australian Prevention Partnership Centre and The University of Sydney. April 2020.

1.1.1 How does a 'co-benefits' paradigm contribute to a more active society?

The late Professor Jerry Morris once observed that physical activity (PA) could be a '*best buy in public health*'. The year was 1994 and the context was a paper on the prevention of coronary heart disease (CHD) for the west.[1] Globally, physical inactivity is now conservatively estimated to cost INT$54 billion[a] in direct healthcare (2013) of which 57% is incurred by the public sector and an additional INT$14 billion is attributable to lost productivity. Estimates from both high-income, as well as low and middle-income countries (LMICs) indicate that between 1–3% of national health care expenditures are attributable to physical inactivity.[2]

Research describing policy co-benefits from creating a more active society has emerged, especially during the past decade.[3-20] Mayrhofer has discussed the science and politics of policy co-benefits, specifically with respect to climate policy, but identifying important concepts and generic lessons for policy makers focused on health, PA, sport and active recreation.[13] Authors using the term 'co-benefits' have applied it to a wide range of climate-related, economic, environmental, social and political goals. The similar concept of 'syndemics' (cross-portfolio but related epidemics such as obesity, climate change and undernutrition all occurring simultaneously) has also been reported in relation to global and planetary health.[21] Another cluster that has been described as a syndemic is poverty, depression and diabetes.[22]

To date, it is mostly economists that have engaged with the concept of co-benefits, and there is relatively little multi- or trans-disciplinary work undertaken that also looks at the political and institutional aspects of co-benefits, which may slow down progress (through slower incremental approaches to complex problems) and fail to produce the structural changes needed for systems approaches to be optimally realised.[13]

- **An understanding of the 'co-benefits' of a more active society underpins the cross-sectoral systems approach to physical activity recommended in the WHO Global Action Plan on Physical Activity 2018–2030**
- **It is important to identify the cross-sectoral co-benefits explicitly as part of the rationale for cross-sectoral strategies and partnerships to promote PA.**

[a] International dollars – see Glossary.

Co-benefits of PA may be defined as the benefits expected to accrue over and above the health benefits of increased PA, thus producing additional health benefits and added benefits for sectors and settings beyond health alone. This understanding underpins the cross-sectoral systems approach to PA recommended in the WHO *Global Action Plan on Physical Activity 2018–2030* (GAPPA) (see Appendix 4 for an overview of GAPPA).[2] It is important to identify the cross-sectoral co-benefits explicitly as a core element of the rationale for cross-sectoral strategies and partnerships to promote PA. This chapter synthesises the evidence for a range of health and co-benefits of PA that can help to build this rationale.

1.1.2 What is the supporting evidence?

In Chapter 1.1, we discuss the well-known and established benefits of PA, and also highlight the social, economic, environmental and other policy co-benefits of efforts to create a more active Australian population. Evidence is discussed specifically in each of the subsequent sections; here we provide some introductory comments on the overall body of evidence for co-benefits of PA.

Of all the benefits examined, the evidence for health benefits is the most robust for the general adult population (Table 1) and for people with pre-existing medical conditions (Table 2). More definitive evidence is needed for health benefits in the early years of life (0–3 years of age).

There is a substantial body of evidence to showcase the co-benefits of an active society – that designing and creating parks, communities, transportation systems, schools, and buildings that make PA attractive and convenient is also likely to produce a wide range of benefits that contribute towards environmental sustainability, economic prosperity, and multiple dimensions of health.[16] Wide-ranging and international studies show a positive association between PA, sport and social capital; further research can help to refine our understanding of this association and how best to leverage it through policies and programs.

Conversely, there is compelling evidence that an inactive population is very costly in terms of indirect economic loss and lost productivity as well as direct healthcare costs. Notwithstanding methodological heterogeneity and challenges in economic analyses, even modest success in our efforts to create a more active society will prove highly cost effective; the Intergenerational Review of Australian Sport[23] identified at least A$7 returned for every A$1 expended in the sector.[b] Estimates of the annual value to society of sport, PA and active recreation range from A$12.8 billion (ABS 2011–12)[24] to A$16.2 billion (KPMG 2018)[25] to A$83 billion (Intergenerational report, Boston Consulting Group 2017)[23], depending on the comprehensiveness of inclusions, with the Intergenerational report having the most comprehensive coverage.

1.1.3 What are the health benefits of a more active society?

Health benefits – general population

The 2018 US Physical Activity Guidelines Advisory Committee Scientific Report provides a comprehensive update of the evidence for PA-related health benefits. Table 1, derived from that Report,[26] shows the health benefits for the *general population*. This review identified new primary prevention evidence since 2008 including new epidemiological studies; in addition to known areas of prevention (especially CVD, type 2 diabetes, colon and breast cancer prevention) new evidence (shown in *italics* in Table 1) supports the role of PA in reducing the risk of:

- Cancers of the bladder, endometrium, oesophagus, kidney, lung, and stomach
- Dementia
- Excessive weight gain in children, adults, and pregnant women

[b]Combination of direct economic benefits, value of volunteers and not-for-profits, avoided health costs and education benefits.

- Gestational diabetes and postpartum depression
- Risk of fall-related injuries in older people.

In addition, there is increasing evidence that PA is associated with improved quality of life and sleep, reduced feelings of anxiety and depression in healthy people and those with existing clinical syndromes, and improved cognitive function across the life span. Regular PA improves bone health, body composition and weight status in children and adolescents and improves physical function among older people regardless of frailty.

There is no threshold that must be exceeded before benefits begin to accrue; in fact, the greatest benefits are for the least active individuals.[27] Low PA is directly associated with elevated risk of all-cause and cardiovascular mortality, incident CVD and type 2 diabetes, and selected cancer sites.[26]

Health benefits – people with existing medical conditions

People living with chronic disease also benefit from being physically active. For example, PA can lessen the severity of their condition, prevent disease progression and premature death, help manage or reduce symptoms and improve mobility. Table 2 shows the most recent evidence synthesis regarding these secondary and tertiary prevention benefits. The position of PA/exercise in cardiac rehabilitation is now firmly established through numerous clinical trials and meta-analyses.[28,29]

PA is also recognised as an important intervention for those with pre-diabetes and established diabetes[30], and as an adjunctive therapy for those with cancer. Important Australian position statements about PA for the majority of people with cancer were released by the Clinical Oncology Society of Australia[31] and from Exercise and Sports Science Australia.[32]

In addition, Matthews and colleagues have published important findings on the amount and intensity of PA associated with lower cancer risk.[33] Targeted exercise prescription, which includes the provision of behaviour change advice and support, is needed to ensure the greatest benefit (as defined by the patient) in the short and longer term, with low risk of harm.[32]

Table 1. Physical activity health benefits – general population (primary prevention)[a]

Age	Condition	Benefits
3 to <6 years[b]		*Improved bone health and weight status*
6–17 years		• Improved: - *cognitive function* - cardiorespiratory and muscular fitness - bone health - cardiovascular risk factor status - weight gain or adiposity • Fewer symptoms of depression
Adults, all ages	All cause-mortality	Lower risk
	Cardiometabolic conditions	• Lower risk of: - cardiovascular disease and cardiovascular disease mortality (including heart disease and stroke) - hypertension - type 2 diabetes

Age	Condition	Benefits
		• Metabolic benefits for overweight people who are active even if they do not lose weight
	Cancer	• Lower risk of the following cancers: - *bladder* - breast - colon - *endometrium* - *oesophagus* - *kidney* - *stomach* - *lung*
	Brain health	• Reduced: - *risk of dementia* - *risk of depression* - feelings of anxiety and depression in healthy people and those with existing clinical conditions • Improved - *cognitive function following acute bouts of aerobic activity* - *quality of life* - *sleep*
	Weight	• *Reduced risk of excessive weight gain* • An additive effect on weight loss when combined with moderate dietary restriction • Weight loss and the prevention of weight regain when a sufficient dose of moderate-to-vigorous PA is attained
Older adults	Falls	• Reduced risk of: - falls - *fall-related injuries*
	Physical function	*Improved physical function in older adults with and without frailty*
	During pregnancy	• *Reduced risk of:* - *excessive weight gain* - *gestational diabetes* • *No risk to fetus from moderate intensity PA*
	Postpartum	*Reduced risk of postpartum depression*

[a] Only outcomes with strong or moderate evidence of effect are included in this table. Benefits in *italics* are those added in 2018; benefits in normal font are those noted in 2008.

[b] Insufficient information available for children <3 years.

Source: Powell et al.[26]

Table 2. Physical activity health benefits – people with existing medical conditions[a]

Condition	Mortality and disease progression outcomes	Mortality, development of new chronic condition, quality of life, physical function and disease progression	Physical function	Cognition	Benefit
Breast cancer	✓				*Reduced risk of all-cause and breast cancer mortality*
Colorectal cancer	✓				*Reduced risk of all-cause and colorectal cancer mortality*
Prostate cancer	✓				*Reduced risk of prostate cancer mortality*
Osteoarthritis		✓			• *Decreased pain* • *Improved function and quality of life*
Hypertension		✓			• *Reduced risk of:* - *progression of cardiovascular disease* - *increased blood pressure over time*
Type 2 diabetes		✓			• *Reduced risk of:* - *cardiovascular mortality* - *progression of disease indicators: HbA1c, blood pressure, blood lipids and body mass index*
Recent hip fracture			✓		*Improved walking, balance and activities of daily living*
Frailty			✓		*Improved walking, balance and activities of daily living*
Stroke			✓	✓	• Improved walking, physical fitness and function independence • *Improved cognition*
Spinal cord injury	✓				• Improved physical fitness • *Improved walking and wheelchair skills*
Dementia				✓	*Improved cognition*
Multiple sclerosis		✓		✓	• Improved walking • *Improved strength and physical fitness*

Condition	Mortality and disease progression outcomes	Mortality, development of new chronic condition, quality of life, physical function and disease progression	Physical function	Cognition	Benefit
Parkinson's disease			✓	✓	*Improved walking, balance, activities of daily living and cognition*
Schizophrenia				✓	*Improved quality of life and cognition*
Attention deficit hyperactivity disorder				✓	*Improved cognition*

[a] Only outcomes with strong or moderate evidence of effect are included in this table. Benefits in *italics* are those added in 2018; benefits in normal font are those noted in 2008. Ticks have been placed against the relevant type of outcome/s that describe the benefit in the right-hand column.

Source: Powel et al.[26]

1.1.4 What are the social benefits of a more active society?

Active engagement may increase social wellbeing and social capital

The OECD definition of social capital is *"networks together with shared norms, values and understandings that facilitate co-operation within or among groups"*.[a] Social capital includes citizenship, neighbourliness, social networks, and civic participation. Longitudinal associations between PA and social capital have been reported in studies conducted in Japan[34,35], Belgium[36], Canada[37], China[38] and Sweden[39], and in a multilevel analysis conducted in the Netherlands.[40]

Research undertaken on a large dataset from the UK's Taking Part survey investigated the inter-relationships between sport, general health, social capital and subjective wellbeing (SWB).[41] The research found a relationship between sport and SWB, mediated through general health, which suggests a potential 'multiplier' effect on SWB and general health. To target non-participants of sport, the researchers suggest that PA should be promoted for enjoyment, with health benefits subsequently following.[41] Overall, the evidence points to a consistent association between PA and wellbeing and social capital outcomes, although the underlying studies are observational in nature and thus unable to establish the causal relationship we suspect may exist.

Positive effects on academic performance

Evidence from systematic reviews and meta-analyses are generally supportive of the association between physical education or school-based PA and academic performance in children.[42-51] This position is supported by recent longitudinal data.[52-55] Research and pedagogical questions remain regarding how to best incorporate PA within schools to improve academic achievement.[45,48,56,57]

[a] OECD Glossary.

Crime reduction

There is interest in the relationship between PA and crime reduction, although most of the commentary in this area comes from the sport sector. The Australian Sports Commission's Clearinghouse holds that:[58]

- With the right policy settings, participation in sport can assist to reduce crime in society
- Sport can be effective when combined with programs that seek to address wider personal and social development especially of young offenders
- There are several Government programs at all levels that use sport as a tool for crime minimisation and reintegration for young people in Australia.

While there are strong theoretical arguments, evidence for the effectiveness of large-scale diversionary projects remains elusive. The evidence we do have comes mostly from programs targeted at at-risk young people/rehabilitation programs, rather than from effects in a general population.[59]

Potential for equitable benefits for mental and physical health through outdoor sports

Outdoor sports occur in natural or open-air environments such as hiking, swimming in the natural environment, cycling, skiing, canoeing, surfing, and climbing. Outdoor sports offer the potential for more equitable societal distribution of benefits because many are free or low-cost and broadly accessible to the general population.

A systematic review of the benefits of outdoor sports for society was conducted by researchers in seven European countries.[60] The study suggests that outdoor sports are associated with a range of positive health benefits including better cardiovascular function, improvements in blood pressure, obesity, resting heart rate, and a positive influence on other health markers.[60]

In terms of mental health, activities undertaken in green and blue environments have especially positive effects beyond the benefits of being physically active in a non-natural environment. 'Blue space' or 'blue environments', as defined in the systematic review by Britton and colleagues[61], refers to all visible, outdoor, natural surface waters that have the potential to promote human health and wellbeing. This excludes outdoor swimming pools, garden ponds and fountains, but can include modified and artificially constructed spaces that contain natural surface water such as canals, dammed lakes or urban streams/rivers.

The researchers reported that blue space can have direct benefit for health, especially mental health and psychosocial wellbeing. Similar benefits have been reported for green spaces in the systematic review by Coon and colleagues.[62] In addition, outdoor sports are described as a contributor to bonding capital for families, groups and communities.[61]

The benefits of Open Streets

The phenomenon of *Open Streets* has been well described in an evidence brief by Bird and colleagues for Active Living Research:[63]

> "*Open Streets or Ciclovías temporarily repurpose city streets into car-free spaces for people, complemented by programmed activities fulfilling the intent of the program. These programs include encouraging physical activity, civic engagement, local economic development, community development, recovery and revitalization of public spaces and/or changing transportation behaviour through walking and cycling advocacy…[they] are ultimately a platform for change in any community – whether the goals are to improve community health, engagement, or advocate for more sustainable and human-scale cities*".[63]

Latin American cities that have implemented Open Streets programs have demonstrated increased opportunities for being active, social benefits and increased active transport (AT). Complementary activities are a common characteristic of Open Streets programs in comparison with other street closure festivals.

1.1.5 What are the economic benefits of a more active society?

The costs of inactivity have been described for more than 30 years. These include direct healthcare costs and indirect costs from productivity losses and home- and leisure-based production. Several studies have examined physical inactivity-related costs, whereas others have focused on the costs and benefits of sport or AT. Early estimates indicated the costs of inactivity in Australia to be around $377 million per year in 1999.[64] A subsequent study by Medibank estimated the costs of inactivity in 2008 to be $719 million in direct costs and $9 billion in indirect costs.[65]

A recent systematic review of economic costs of preventable disease and risk factors in Australia was reported in 2019 by Crosland and colleagues.[66] The greatest costs were related to the productivity impacts of preventable risk factors with up to A$15.6 billion in costs due to physical inactivity. These cost estimates were comparable to those attributable to obesity and greater than those due to alcohol or tobacco.[b] Estimates of attributable annual direct healthcare costs ranged from A$681.1 million to A$850 million, mostly due to cardiovascular disease, type 2 diabetes and falls.[66]

In a report to the Australian Government, KPMG assessed the value of community sport infrastructure in 2018.[25] The annual value to the community was estimated to be at least A$16.2 billion, with roughly a third of the costs related to health, another third to social issues and the final third to economic costs and productivity. Other studies showed higher estimates of the value of sport, with one study quantifying the return from the investment in sport in Australia and internationally.[23] They found that sport provides the Australian economy a combined value of A$83 billion in economic, health and education benefits each year[23]; and creates significant value with at least A$7 returned on every dollar expended in the sector. The Australian Bureau of Statistics have reported on the economic Value of Sport in Australia[24], estimating its combined value at A$12.8 billion in 2011–12.

1.1.6 What are the environmental benefits of a more active society?

A pressing challenge is climate change, pollution and related effects on human health. There is a current imperative for climate action to protect health from the major risks of climate change.[67] Thus, environment improvements are an important concern in coming years, and PA is linked in several ways to environmental improvement. Environmental benefits of a physically active society are predominantly discussed in terms of AT (e.g. walking and cycling) and urban planning to reduce carbon emissions. Improving neighbourhood walkability, quality of parks and playgrounds, and providing adequate AT infrastructure is likely to generate positive impacts on population-level activity in children and adults.[68]

As to parks and greenspace, studies conducted on the influence of greenery on mitigating urban heat island effects have indicated that all green spaces help urban areas adapt to the impact of these effects regardless of whether they are parks, street trees or green roofs.[69,70] The systematic review by Smith and colleagues found that the policy actions and interventions incorporating multiple streetscape components for walking or cycling in particular (e.g. a combination of sidewalk improvements and increased diversity of local destinations) were promising for increasing AT and PA levels in children and adults (refer to Chapter 3.3 for further information about interventions to support PA in the built environment).[68]

These authors reported that the evidence for increasing PA and AT was strongest for multiple streetscape components (adult PA, child AT), installation of fitness equipment (adult PA and AT), temporary road closures and play equipment (child PA), and recreation facility density (adult PA).[68]

Policies promoting AT could have a substantial impact on greenhouse gas emissions and would reduce disease burden by increasing PA.[20] In addition to promoting AT, other measures could contribute to reducing car use such as urban car restraint, parking pricing, car sharing/pooling and integrating bike sharing into public transport

[b] Note that major gains in tobacco control had already occurred, so that tobacco contributes less to cost than physical inactivity only in countries with advanced tobacco control measures such as Australia.

systems.[19] Temporary street closure events, such as the Open Streets initiatives described in Section 1.1.4 above, may also encourage changes to transportation behaviour. The systematic review by Mueller and colleagues reported that AT can provide substantial net health benefits, irrespective of geographical context and strongly outweigh any detrimental effects of traffic incidents and air pollution exposure.[17] Refer to Chapter 3.2 for further information about strategies to promote AT.

1.1.7 How can we categorise these co-benefits of a more active society?

A systems approach to PA requires the engagement of diverse sectors and agencies in order to develop the cross-sectoral strategies needed for PA promotion. A shared agenda is important to facilitate this partnership process. This involves sharing planning and policy agendas relevant to PA and to partner agencies from Government, NGO and private sectors, all of whom have contributions to make towards increasing PA at the population level.

The framing of common agendas may be based around the 'co-benefits of PA'. This concept was described more than a decade ago by the West Australian Physical Activity Taskforce[71] which based its framework for PA on a sharing of inter-governmental agendas, for example around transport and the built environment. Co-benefits that may be of relevance to other sectors include safety/injury prevention, social benefits, economic benefits, and environmental sustainability (focusing on carbon emissions and air pollution).[16]

A typology of potential co-benefits arising from PA-supportive built and social environments is shown in Table 3. Another way of categorising the co-benefits of activity friendly environments may be according to spaces e.g. (i) parks/open space/trails (ii) urban design (iii) transportations (iv) schools and (v) workplaces/buildings, as Sallis and colleagues have done in their detailed examination of co-benefits in a 2015 report[72] and subsequent journal article.[16]

Table 3. Co-benefits of physical activity – supportive built and social environments

Type of co-benefits	Sectoral engagement	Potential sectoral and societal benefits
Physical and mental health	Health	• Reduced risk of non-communicable disease and other disease risk • Improved mental health • Reduced healthcare costs
Social	Urban planning Local government	• Improved neighbourhood cohesion • Psychosocial wellbeing • Social capital
Economic	Urban planning Local government Workplaces	• Workplace productivity • Presenteeism • Reduced workplace healthcare costs • Increased land/property values • Increased retail income
Environmental, climate change	Transport and environment	• Reduced fossil fuel usage • Improved air quality • Increased active transport • Reduced congestion

Type of co-benefits	Sectoral engagement	Potential sectoral and societal benefits
		• Changed urban design including activity focused infrastructure • Increased and enhanced greenspace • Mixed land use
Safety advancement and injury reduction	Workplaces Transport (including roads)	• Reduced car accidents • Traffic calming • Increased safety • Reduced community crime and violence • Improved active transport infrastructure • Workplace health and safety
Creation of liveable community spaces	Parks and recreation Local government	• Improved play areas • Active living park space • Revitalisation of urban design • Public gardens
Academic performance, cognitive skill development and retention	Education	• Academic achievements • Cognitive skill development and retention across the life course including in older years
Functions of daily living and performance of other skills	Sport and recreation	• Community sport participation • Skills development, falls prevention in older people

Source: Adapted from Sallis 2015[16], BeActive WA 2009[71].

1.1.8 What are the recommendations for investment and action?

Three decades after Professor Jerry Morris identified PA as a (health sector) 'best buy' for CHD prevention, we can now identify PA as a multisectoral 'best buy', because of the multiple health and other benefits that accrue from a more active society (Table 3).

PA (including sport, active recreation and AT, in particular) is a 'best buy' for society *not only* because it prevents risk factors for disease (such as high blood pressure and weight gain) and protects against multiple chronic diseases (such as heart disease, stroke, some cancers, type 2 diabetes, and depression). In children, it also improves bone health, cardiorespiratory and muscular fitness, and body composition.

PA benefits people living with chronic disease by lessening the severity of their condition, as well as preventing disease progression and premature death, helping manage or reduce symptoms, and improving mobility. Regular PA is important for healthy growth and psychological development at one end of the lifespan, and at the other, contributes to healthy aging and may delay the onset of cognitive decline in older adults.

Sport itself is also one of the best investments for society and for the wider economy because it returns at least A$7 value on every A$1 expended in the sector, and because it can build social capital and wellbeing. AT has defined economic, social and environmental benefits. Failure to recognise and invest in PA as a societal and cross-sectoral priority would constitute a major missed opportunity. Ongoing inaction would see the direct and indirect costs of physical inactivity continue to rise, contributing to further negative impact on health systems, the environment, economy, community wellbeing and quality of life for all.[2]

1.1.9 What other strategies intersect with this area?

The information in this chapter can be useful for policy makers involved in developing a rationale for embedding PA in strategies or business plans. It can also be used by policy advocates who wish to make their case to elected officials.

In summary, the evidence for co-benefits of more active societies provides pathways that intersect with strategies relating to:

- **Health**: a wide range of physical and mental health benefits for general and special populations
- **Liveability**: planning for more liveable cities and towns
- **Strengthening communities**: boosting neighbourhood and social capital, social wellbeing
- **Environmental sustainability/climate change mitigation**: reduced carbon emissions, improved air quality, lower carbon cities
- **Safety**: injury reduction, infrastructure for active travel
- **Wellbeing**: such strategies are increasing across jurisdictions and PA is a major contributor
- **Economic growth**: sustainable infrastructure, productivity, reduced healthcare costs.

1.1.10 What are the implications for policy?

There is increasing recognition of the *co-benefits* of efforts to create a more active society. These benefits derive from the synergies across the sectors necessarily engaged in a comprehensive whole-of-systems approach to PA. The analysis of co-benefits from the implementation of PA programs and policies has been identified as an area of research where good progress has been made[3–20] but more emphasis is needed.[16,73]

A note of caution regarding the challenges in the area of AT is offered by Taylor and Thompson:[74] most people and households may not undertake any reportable AT usage, despite increasing policy support, education and promotion to encourage uptake. Less than one-quarter of the (Melbourne) population in their research recorded travel on foot and just over 2% by bicycle, although there were differences by gender and age. The implication for policy development and urban design interventions aimed at encouraging greater use of the active modes is that we still have a substantial way to go to achieve the levels of AT uptake necessary to contribute to environmentally sustainable and healthy communities.[74]

The following policy options are recommended with respect to the co-benefits of PA:

- Adopt a *multisectoral or societal perspective* (as distinct from a single-sector perspective, such as health) to promote and leverage the existing evidence of co-benefits from actions to create a more active society, particularly the co-benefits of:
  - Urban planning and infrastructure such as mixed land use and the creation of active spaces, parks and trails
  - Overall transport planning, public transport planning
  - Creating a safe environment for AT through traffic calming and building walking and cycling infrastructure such as bike lanes
- Use a systems science approach to examine, forecast and compare the health, economic and environmental outcomes of policies, programs and interventions designed to increase population-level PA
- Develop and test a dynamic simulation model of the complex system of behavioural, structural, and environmental factors that contribute to population levels of PA in the Australian context
- Develop a whole-of-government investment strategy with long-term funding commensurate with the economic burden of physical inactivity, the returns of investment at the whole-of-society level in terms of health, social and economic benefits as noted in the Intergenerational Review of Australian Sport
- Configure investment to ensure that efforts to achieve an active population, focus on those who are currently the least active and who have the most to gain by undertaking some regular PA of moderate to vigorous intensity; this is linked to an equity and social justice dimension within funding arrangements, noting the inequalities in participation by gender, cultural and linguistic diversity, ability/disability and socioeconomic situation
- Take a whole-of-life course perspective for investments designed to encourage participation, noting the drop-off in participation rates for organised sports among young adults and the need to take a broad, intersectoral perspective on movement solutions that are fit for purpose for the majority of people.

- **Co-benefits of PA accrue to sectors and settings beyond health and show the need for a cross-sectoral systems approach to PA recommended in the WHO GAPPA**
- **The co-benefits include:**
  - **Economic growth: sustainable infrastructure, productivity, reduced healthcare costs**
  - **Resilient communities: boosting neighbourhood and social capital, social wellbeing**
  - **Liveability: more liveable cities and towns**
  - **Environmental stewardship: climate change mitigation, reduced carbon emissions, improved air quality**
  - **Community health: a wide range of health benefits for general and special populations**
  - **Community safety: injury reduction, better infrastructure for active travel.**
- **Co-benefits must be explicitly identified to encourage growth of cross-sectoral strategies and partnerships to promote PA.**

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1.2 Are Australians active? Prevalence, trends and correlates of meeting physical activity guidelines

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Suggested citation: Bauman A. Are Australians active? Prevalence, trends and correlates of meeting PA guidelines; in: Bellew B, Nau T, Smith B, Bauman A (Eds.) Getting Australia Active III. A systems approach to physical activity for policy makers. The Australian Prevention Partnership Centre and The University of Sydney. April 2020.

1.2.1 Introduction

The purpose of this chapter is to describe the prevalence of physical activity (PA) among Australians. This involves understanding current PA guidelines and using population data to identify the proportion of people that meet those guidelines. If repeat population surveys are carried out in an identical fashion, then trends in PA can be monitored.

1.2.2 Purpose of monitoring and physical activity guidelines

Measures of population levels of PA are usually conducted through representative cross-sectional surveys that assess the prevalence of meeting PA guidelines. These are discussed, and the guidelines are also presented as part of a PA surveillance system (Chapter 5).

PA guidelines for Australian adults recommend a minimum of 150 minutes per week of at least moderate intensity activity[1,2], with recent updates to the evidence suggesting that benefits accrue across the range of 150 and 300 minutes per week. In addition, the adult guidelines recommend at least twice weekly strength training, and PA to improve balance, particularly among older adults where falls prevention is an important component of PA promotion. The guidelines for school-aged children and adolescents are 60 minutes a day of at least moderate intensity activity, with guidelines also for the 0–5 age group.[3]

There are several challenges in monitoring population levels of PA. The first is changes to the way PA is measured, with changes to the questions asked to assess PA. Even small changes to these questions result in large differences in the prevalence of meeting PA guidelines in the population[4], much larger than changes attributable to implementing optimal policy. As questionnaires evolve (e.g. by assessing new dimensions and domains of PA and adding measures of sedentary time and sleep to summate to a '24-hour movement continuum') there is substantial pressure to include these 'improved questions' in population surveys. This may preclude assessment of trends, and 'starting again with a new series using these better questions' has been unhelpful in assessing PA policy translation.[5] This area has become more complicated with the advent of device-based measures for assessing PA including accelerometers, other fitness trackers, step counters and motion sensing devices, integrated devices including heart rate responsiveness, GPS and smart phones, and even measures of direct observation or laboratory assessment of direct energy expenditures.[6,7]

Challenges to PA monitoring in Australia:

- Variations in questions between and within jurisdictions over time
- Changes to PA guidelines (e.g. amount of recommended PA; addition of new dimensions such as strength training)
- Variability in interpretation of PA guidelines (i.e. what amounts to 'sufficient PA' and how that is determined).

The second challenge is that our scientific knowledge has not remained static and neither has our science-based PA guidelines. Initial guidelines in the 1980s recommended aerobic activities (vigorous PA) three times a week for at least 20 minutes on each occasion. These were updated following the US Surgeon General's report on PA in 1996 to include consideration of moderate intensity activity, and the recommendation to accumulate 30 minutes a day of total daily PA. This was expressed slightly differently in different countries, but one Australian interpretation was "*5 times a week for at least 30 minutes on each occasion*". Included in this guideline was the concept of a minimum threshold, thought to be at least 10 minutes of continuous activity in order to derive a health benefit.

Updated 2018 PA evidence reviews have removed this minimum threshold.[8] Recent reviews have revised the PA guidelines to recommend "*at least 150 minutes a week*" (without the need for the number of sessions or number of days) and in some countries including an optimal range for adults, namely 150–300 minutes per week of at least moderate intensity activity. These differences have created confusion across jurisdictions in Australia, with different estimates based on using different guidelines (see box below for possible variants). Guidelines have become more complicated including dimensions of strength training and balance training, also thought to contribute to health in adults, but particularly difficult to measure in populations.

Possible variants of the adult PA guidelines currently in use in Australia

i. Meeting the current WHO aerobic PA guideline of 150 minutes/week of at least moderate PA (or 75 minutes of vigorous, or combinations thereof)

ii. Meeting the 2014 Australian interpretation of the WHO aerobic PA guideline – range between 150–300 minutes of at least moderate intensity PA (with increased benefits at the upper end of this range)

iii. Meeting the previous aerobic PA guideline – at least 150 minutes of moderate PA 5x/week (or its variant, 5x30 minutes)

iv. Meeting the strength-based guideline (resistance activities) – training 2x/week

v. Meeting the 150 minutes aerobic guideline (or variant) **and** the strength-based guideline

vi. Meeting a combination of the:

- 150 minutes aerobic and the strength-based guideline
- Sedentary behaviour guideline
- Balance guideline.

Note: Sedentary behaviour and balance are seldom reported; the threshold for sedentary behaviour is not clear for adults, and measurement problems limit the balance guideline.

Thus, the choice of guidelines poses challenges to prevalence estimation, which in turn contributes to different rates reported in different jurisdictions. Furthermore, estimates of the burden of disease attributable to physical inactivity are dependent on the prevalence of inactivity in population, which will be quite different given different ways of assessing it, which in turn will influence the relative importance of physical inactivity as a risk factor for poor health outcomes.

The above challenges are fundamental for policy makers, as they result from different population surveys that monitor PA. The speed of population change may be overestimated; for example, it would be of little use to have

five-year timeframes for a particular measure if one considers that it would take 10 to 20 years to influence PA with optimal policy focused initiatives. Therefore, several recommendations underpin this section:

1. Maintain consistent PA monitoring measures over a prolonged period, the length of the period being determined by the time in which change is considered plausible and feasible (for example, up to the WHO target of a 15% reduction in inactivity by 2030)
2. Use consistent measures and survey methods that can be compared across jurisdictions over time
3. Report which PA guideline is being used as the primary indicator of 'sufficiently active' and if necessary, report other secondary guideline-derived thresholds in order to monitor trends.

1.2.3 Measures used in monitoring the proportion achieving 'physical activity guidelines' with a focus on Australia

Self-report measures have been developed in different decades, and typically reflect the measurement needs of that period. For example, in the 1980s when there was an aerobic 3x20 recommendation for health, questions were asked about 'exercise and sport' typically of a vigorous nature.

These questions were used in the Australian Bureau of Statistics' (ABS) National Health Surveys from 1989 until 2011, with almost exact comparability in questions over this timeframe. Careful analysis adjusting for population and demographic changes during this period enabled trend assessment among adult Australians meeting PA recommendations, or trends in doing very little PA (less than 30 minutes per week).[9]

Subsequent surveys made changes to the National Health Survey questions including the addition of new questions to measure walking and other dimensions of active travel (AT), strength training and sedentary/sitting time, leading to a range of diverse ABS estimates of the proportion meeting PA recommendations. It is recommended that the original 1989 PA questions be used continuously in future National Health Surveys, and are asked first, such that estimates can be compared over longer timeframes.

The history of PA population measurement in Australia started following the 1996 US Surgeon General's report on PA and health. The Australian Institute of Health and Welfare (AIHW) commissioned the development of a new measure for self-report PA that took account of these new guidelines; this became known as the Active Australia survey.[10]

The Active Australia survey asked about the number of sessions and total time in the past week that people did: (a) vigorous PA; (b) walking; and (c) moderate PA. At about the same time, international measures for population PA were being developed – the IPAQ and GPAQ (International and Global PA questionnaires respectively). The short IPAQ was generic, included occupational PA, and provided higher estimates of PA prevalence than previous measures. GPAQ provided domain specific estimates, for both moderate and vigorous activity, which could be used to estimate AT, exercise recreation and sport, and domestic/occupational PA, but it was substantially longer than the short IPAQ.

At the state and territory level in Australia, different interpretations of the Active Australia (AA) survey and IPAQ/GPAQ measures were made and sometimes changed over time as improvements to the questions were suggested. This has made comparability difficult and suggests the need for standardisation and harmonisation of PA monitoring at the state and territory level.

The indicators for PA population surveys are based on the PA guidelines, revised in Australia in 2014. Note that there are still different ways of expressing these indicators. The purpose of Tables 4–6 is to illustrate the range of ways that meeting recommendations can be characterised, as described by the different ways in which questions are asked in existing population surveys.

Table 4. Adult physical activity (PA) guidelines and how they are operationalised in Australia

Descriptor from the PA adult guidelines for ages 18–64 years	How this is measured in Australian population surveys
"Be active on most, preferably all, days every week"	This cannot be operationalised as the PA questions in Australia typically ask about the number of sessions, not the number of days that activity was reported. Using GPAQ or IPAQ could estimate this. Sometimes, "five *sessions* and 150 minutes per week" is used to characterise this indicator.
Accumulate 150 to 300 minutes of moderate intensity physical activity or 75 to 150 minutes of vigorous intensity physical activity, or an equivalent combination of moderate and vigorous activities, each week	The lower limit here, 150 minutes per week, is the WHO 2010 guideline. The upper limit of 300 minutes per week, and incorporation of vigorous minutes can be easily computed. By convention, and consistent with physiology, vigorous minutes are multiplied by two and then added to moderate minutes and walking minutes. Note: Some surveys, the ABS NHS 1989–2011, asked only about moderate and vigorous exercise. State-based surveys often ask about walking as well (from the Active Australia survey), and sometimes include walking for recreation or leisure, and separately walking to get to or from places (AT).
"Do muscle-strengthening activities on at least 2 days each week"	Specific National Health Survey questions have been introduced since 2014 asking about this indicator, but the validity of self-report is not known.
Minimise the amount of time spent in prolonged sedentary time/sitting (or break up sitting)	This is an overall general guideline for adults. Note that the epidemiological evidence is not yet clear enough to produce a highly specific threshold or cut point for adults.

Table 5. Children and adolescent physical activity (PA) guidelines and how they are operationalised in Australia

Descriptor from the PA guidelines for children and adolescents 5–17 years	How this is measured in Australian population surveys
Accumulate at least 60 minutes of moderate to vigorous physical activity every day	This is measured through a range of different questions in the national health survey and in state-based surveys. The prevalence of NOT meeting this guideline is generally high for adolescents, typically ranging from 70 to 85% not meeting this guideline.[11]
Limit sedentary recreational screen time to no more than 2 hours per day	In some jurisdictions there are efforts to measure the screen time guideline, which is less than two hours a day for adolescents.

Table 6. Preschool aged children physical activity (PA) guidelines and how they are operationalised in Australia

Descriptor from the PA guidelines for preschool aged children	How this is measured in Australian population surveys
At least 180 minutes/day of PA [1–2 and 3–5 year olds]	This is described as 180 minutes of total daily activity, with at least 60 minutes being "*energetic*".
Sedentary screen time should be ≤ 1 hour total through each 24-hour period	Screen time should be in bouts of no more than an hour. Recent guidelines also added sleep recommendations [which differ by age], to summate to total 24-hour movement guidelines [activity + sedentary time + sleep time]

1.2.4 Population data and trends in adult physical activity participation in Australia

National Health Surveys (1989–90 to 2017–18)

The ABS National Health Survey are conducted every few years on a sample of households that are representative of the Australian population. Data over the past four surveys are shown in Figure 1, indicating the proportion of adults aged 18 to 64 years who met PA guidelines (referred to as PAG in this figure). The reference to meeting PA guidelines in Figure 1 refers to those who achieved at least 150 minutes of moderate to vigorous PA on five or more days per week. The definition of PA here included walking for fitness, recreation, or sport; walking to get to or from places; moderate exercise; and vigorous exercise (multiplied by 2) reported for the week prior to interview. Rates were age standardised to the 2001 Australian population.

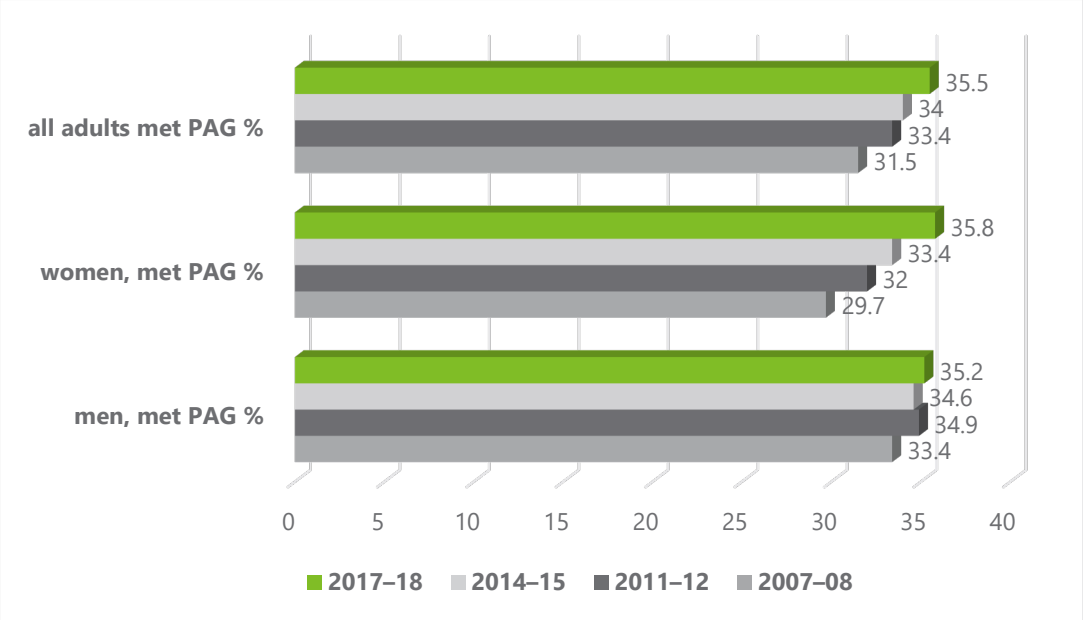

Figure 1. How active are Australians over time from ABS National Health Surveys 2007/8 – 2017/8 [based on % meeting 5x150 PA guidelines]

Source: AIHW analysis of ABS 2019; ABS 2016; ABS 2014 and ABS 2010.
PAG = physical activity guidelines

Overall, 47.8% of working age adults met this definition of the PA guidelines (light grey in Figure 2), with 43.6% if all adults are included (i.e. including those aged over 65 years) (dark grey).

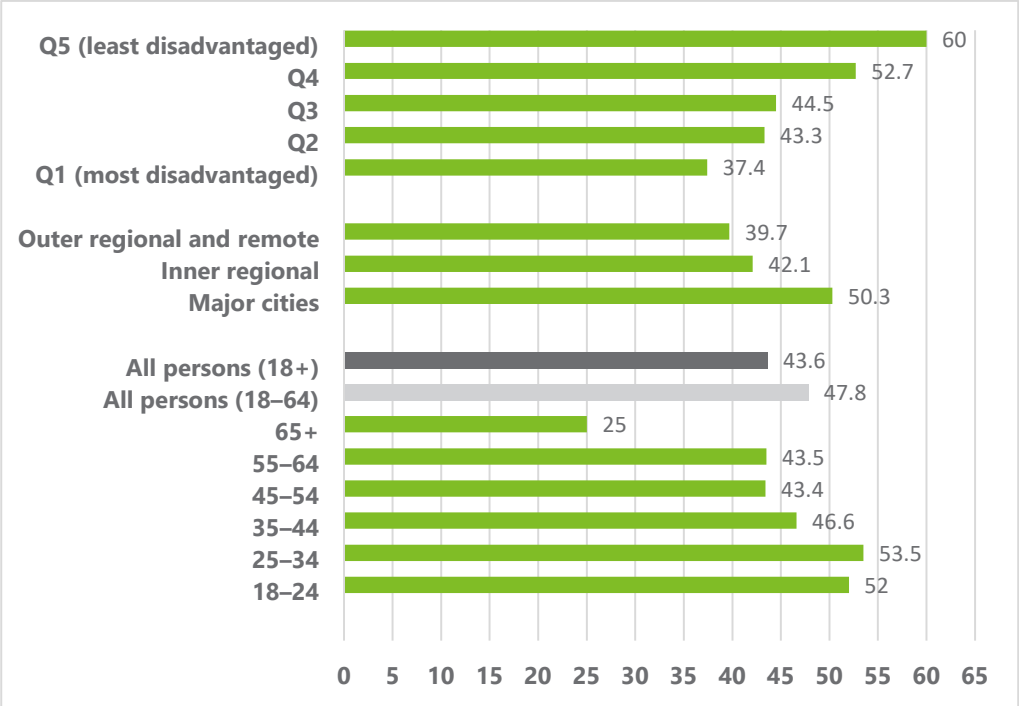

Figure 2. Variation in physical activity by subgroups, ABS National Health Survey 2014–15

Meeting the PA guidelines decreases with age, especially over the age of 65 years (Figure 2). There is also a lower rate of meeting PA guidelines in rural and remote areas, compared to cities, and a strong relationship with measures of social disadvantage. Those in the most advantaged regions are much more likely to meet the PA guidelines (60%), compared to 37.4% in the most disadvantaged regions.

Figure 3 shows the gender difference by age group; these differences between men and women are similar across different surveys and different definitions of meeting PA guidelines. Except for middle-aged adults, 3–6% more men achieve the PA guidelines compared to women.

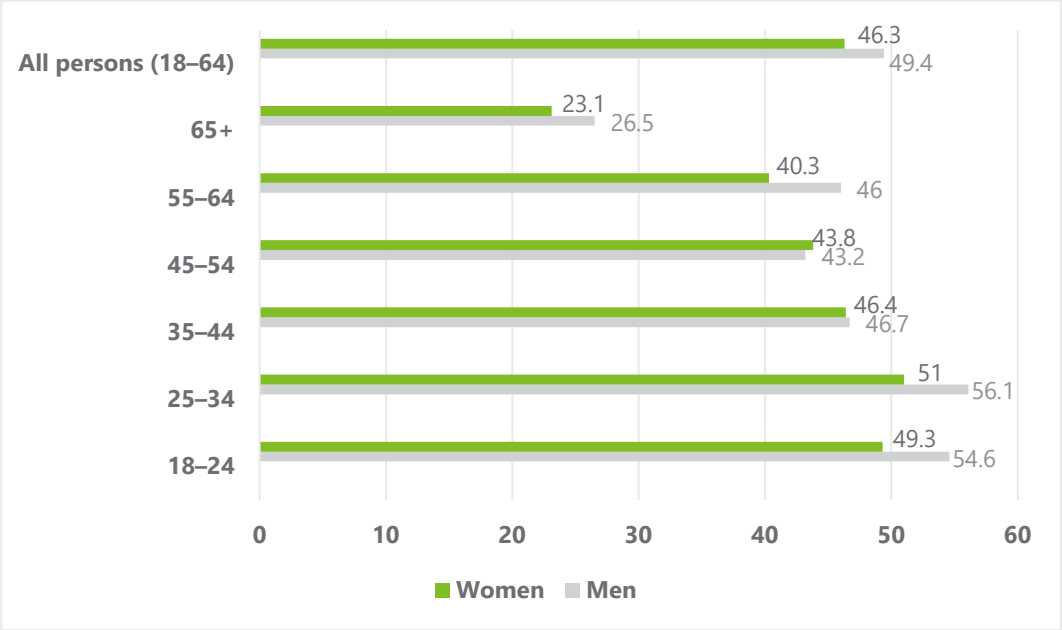

Figure 3. ABS National Health Survey 2014–15 Meeting physical activity guidelines by gender and age

Source: AIHW analysis of ABS microdata, NHS 2014–15.

Note: The analyses above reported the prevalence of '150 minutes AND 5 days/sessions' as meeting the PA guideline. More recently, the WHO PA Guideline specifies 'achieving 150 minutes of moderate activity, or 75 minutes of vigorous activity or a combination thereof', with no criterion of days/sessions.[1] Data for meeting this guideline are shown in Figure 4, and report an increase between 2007–08 and 2014–15, but minimal difference between 2011–12 and 2014–15.

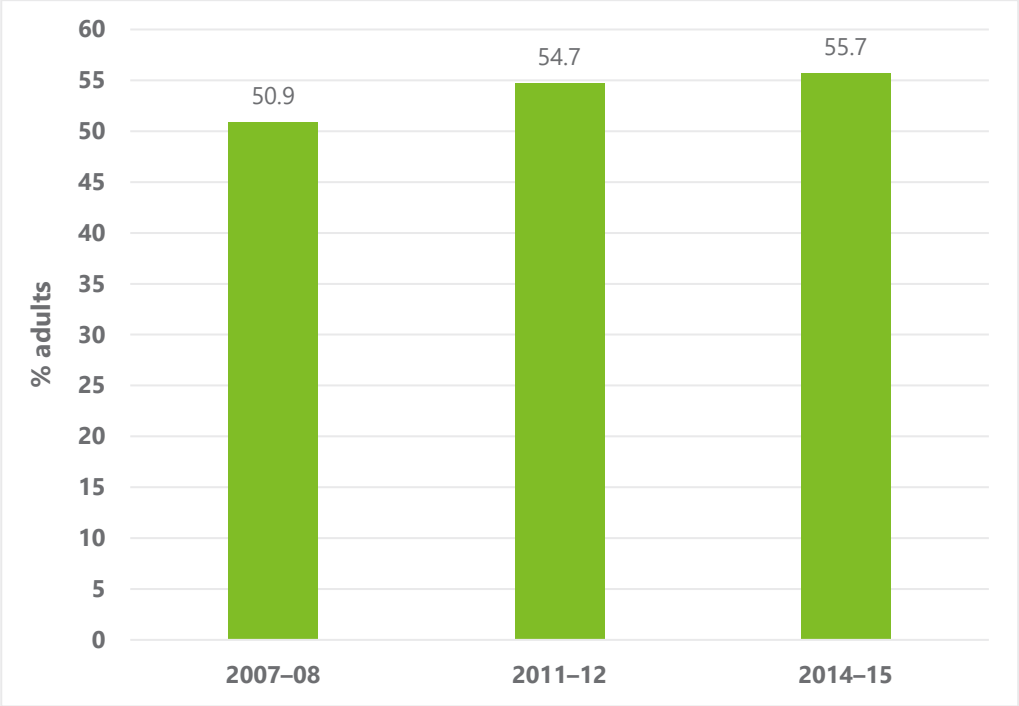

Figure 4. Trends in meeting the "150 minutes" recommendation [without the 5 days/sessions constraint] using the ABS National Health Surveys

NSW state-level trends using Population Health Surveys (2002–2018)

Data from NSW are presented because that state has, since 2002, collected annual telephone-based population data from representative samples of the NSW population using the same questions across survey years, as taken from AA. These surveys use a continuous rolling sampling schedule across the year, and since about 2015 included mobile phones in the sampling frame. 'Sufficient PA' is defined as ≥ 150 minutes/week over five separate occasions.

Comparisons with ABS National Health Survey

There are some differences in the approaches used by NSW and the ABS National Health Survey. For example, the NSW survey analysis includes all people aged at least 16 years, a slightly broader age range than the National Health Survey which report on data from adults aged 18 years and over. The NSW survey uses the exact AA questions, so their walking question incorporates walking for exercise and AT, whereas the National Health Survey asks about walking for AT separately from walking for exercise. Both surveys do not count gardening or household activity towards their calculation of sufficient PA, consistent with the surveillance approach recommended by AA. However, whereas walking is specifically excluded from the National Health Survey questions for moderate and vigorous PA (along with gardening and household activity), only gardening and household activity are specifically excluded from the moderate and vigorous PA questions in the NSW survey.

Some of these variations may account for the difference in prevalence estimates for meeting PA recommendations, which for example in 2014–15 were around 5% higher under the NSW survey than the same period using the ABS National Health Survey. A more likely reason for these variations is that the samples were obtained through

different modes of survey administration, with telephone-based surveys in NSW, and the ABS National Health Survey employing a random household-based sample.

Data trends in different groups

Examining the trends in PA in different groups has facilitated state-level population targeting of policy and programs.

NSW data trends in meeting guidelines are shown in Figures 5a and 5b, with the overall NSW rate described by the thicker dark grey line. The upper panel (Figure 5a) shows the trends at the appropriate scale; the lower panel (Figure 5b) zooms in on the trends by using a smaller range on the y-axis so that variation can be more easily seen.

Notably, people from a non-English speaking background showed similar rates of meeting PA guidelines to NSW as a whole. Aboriginal adults, shown in the light green line, showed substantial variability because of the smaller sample sizes each year, but were not substantively different to non-Aboriginal adults.

The most socially disadvantaged group, shown in the dark green reported consistently lower rates of meeting the PA guideline.

All groups showed an increase in meeting guidelines between 2002 and 2018, with the relative increase similar in high and low socioeconomic areas. Much of this increase appears attributable to increases in reported walking across all sociodemographic groups.[12] There seem to be two probable periods of increase, between 2003 and 2006, and then again in the period since 2013, attributable to changes in reported walking behaviour with no substantive changes in reported moderate or vigorous activity.

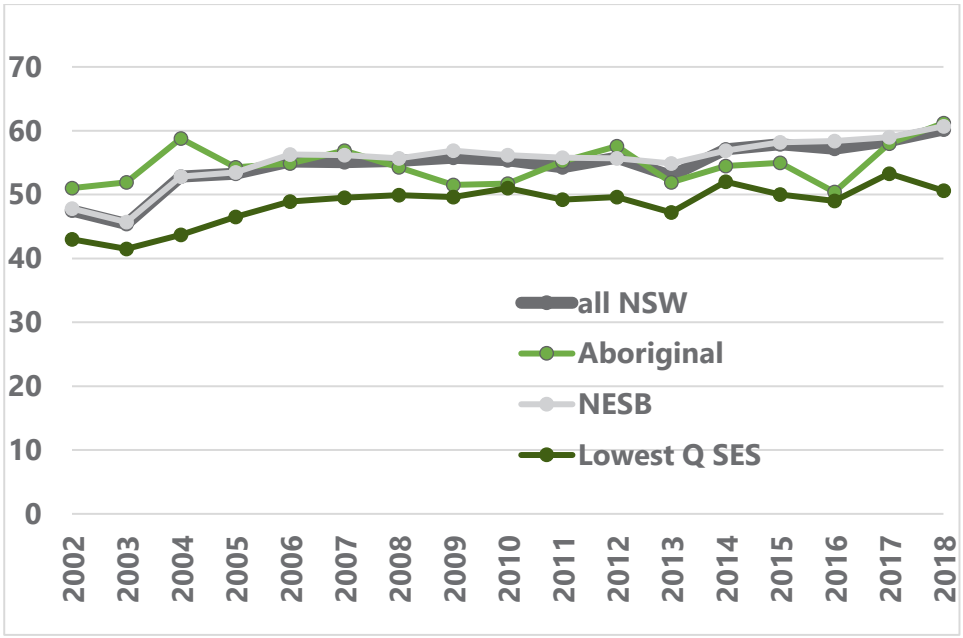

Figure 5a. NSW trends for adults 16+ years meeting PA guidelines of 5 x 150 minutes/week, Active Australia survey [usual Y axis scale]
PAG = physical activity guidelines; NESB = non-English speaking background; Lowest Q SES = lowest SES quartile

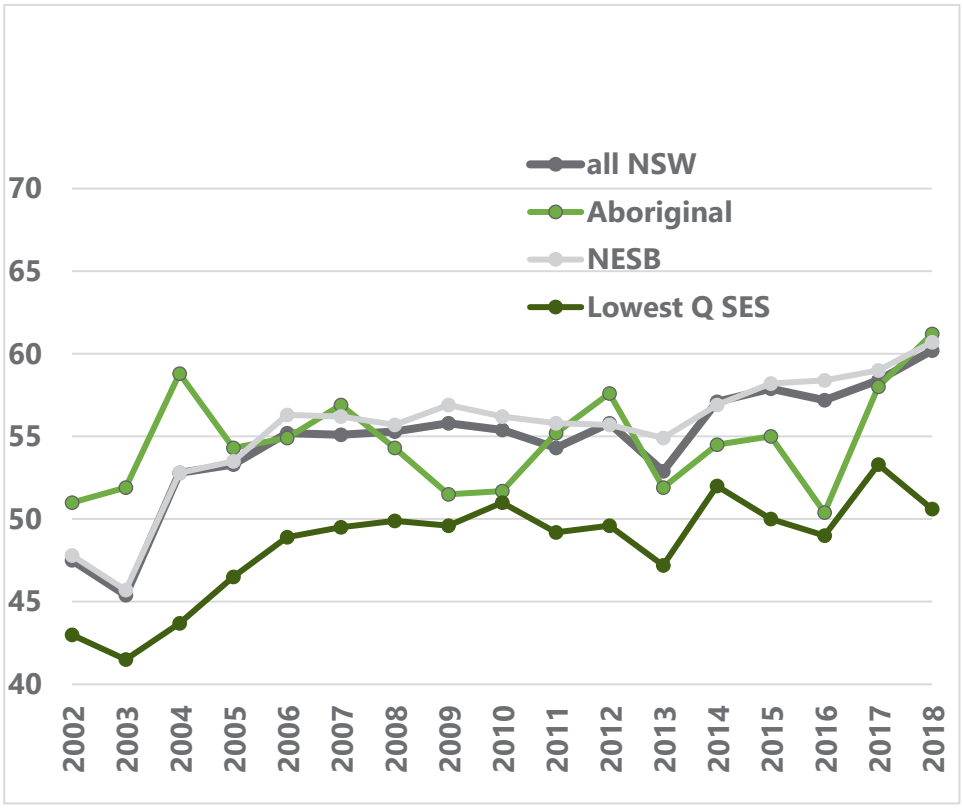

Figure 5b. NSW trends for adults 16+ years meeting PA guidelines of 5 x 150 minutes/week, Active Australia survey, 5 x 150 minutes/week [smaller y axis scale]
PAG = physical activity guidelines; NESB = non-English speaking background; Lowest Q SES = lowest SES quartile

1.2.5 Children and adolescents' physical activity in Australia

Overview of monitoring systems and guidelines

There are several different monitoring systems for assessing PA among children and adolescents (Table 5). The national PA guidelines recommend 60 minutes daily of moderate to vigorous PA for school aged children 5–17 years, and less than two hours/day of non-essential screen time.[3] In addition, the guidelines suggest muscle and bone strengthening activity three times per week, and recommend healthy guidelines for sleep.

Summary guidelines across the whole day are described as 24-hour movement guidelines and have been released for preschool age groups.[13] These reflect all activity, sedentary/sitting time and sleep across a 24-hour continuum. There are specific guidelines for younger infants and children aged 0–5 years[13]; for example, among children aged 3–5 years, these guidelines suggest three hours of total movement per day (of which 60 minutes should be "*energetic*"), limiting sedentary time to periods up to one hour, and 10–13 hours per day of good quality sleep.

The situation is more complex than among adults, with different questions used to assess children's and adolescents' PA in diverse population surveys across Australia. While these surveys all used representative samples, the use of different questions provide different estimates of the prevalence of children and adolescents meeting guidelines.[14] There are no regular population data collected on infants and young children as part of surveillance systems to date.

ABS National Health Survey

ABS National Health Survey data asked for parental report of their children's PA.[15] The National Health Survey 2011–12 indicated that around 39% of children aged 2–5 years did less than the recommended three hours/day of activity. Three-quarters of children aged 5–12 years, and 92% of adolescents aged 13–17 years did not meet the

recommended 60 minutes of PA every day. Further, two-thirds of children exceeded the recommended limit of two hours of screen time.[15,16] These data are shown in Figure 6 below.

The guidelines further recommend children and adolescents undertake muscle strengthening activities at least three times a week; this was only asked of 15–17 year old adolescents, of whom 22% of boys and 8% of girls met this guideline (16% overall in this age group). Boys were more active than girls, but the socioeconomic differentials in PA seen in adults in the National Health Survey and in AusPlay data were not present in these National Health Survey data. Aboriginal and Torres Strait Islander children were more physically active than non-Aboriginal children at both primary school ages (60% meeting guidelines) and adolescents (45% met guidelines).

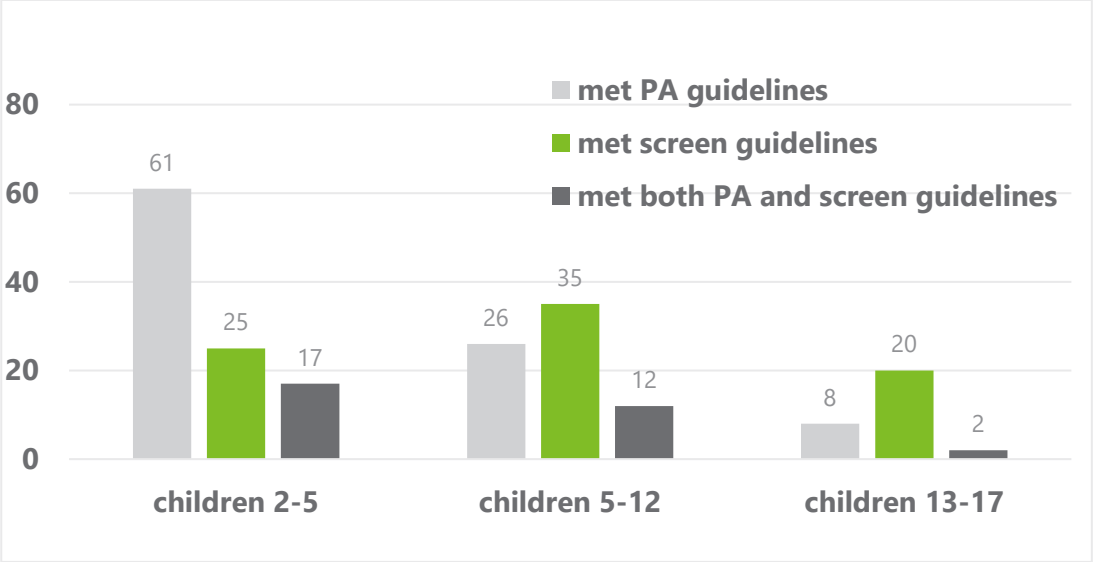

Figure 6. National Health Survey 2011–12 Percent meeting age-specific physical activity guidelines – Australian children and adolescents

AusPlay surveys

Another large-scale population survey is the representative AusPlay surveys, carried out by Sport Australia.[17] Data obtained in 2016 and 2017 comprised 7000 parents reporting on their children's participation in PA and sport outside of school in the previous 12 months.[18] Between 70 and 74% in 2016 and 2017 respectively participated in any activities in the previous year. Although not a health-specific indicator, the AusPlay survey reported "*regular participation of three times a week or more*" as an indicator for sport, and this was reported by 20% in 2016 and 25% in 2017.

Boys were slightly more active than girls in all ages in childhood and adolescence, except for preschool-aged children (0–4 years). Organised PA were more commonly reported by more advantaged socioeconomic families, and by urban residents (compared to remote residents). Children from non-English speaking cultural backgrounds were less active than those from English speaking backgrounds. An important limitation is that AusPlay describes organised PA, which is a subset of all PA in children and adolescents, as the AusPlay survey excludes some incidental activities including AT, active play and non-organised informal activity.

Active Kids Healthy Kids monitoring

A worldwide comparative research project has monitored policy and prevalence of PA among children and adolescents.[19] This project, the Active Kids Healthy Kids (AKHK) Global Matrix project, has collected data from 49 countries and provided ratings from A to F for indicators of policy and progress supporting children and adolescent PA. Overall, the AKHA report (2018) [20] rated Australian PA levels as a D–, indicating a low level of children and adolescents meeting PA guidelines, compared to other countries. This was unchanged from the ratings awarded in the earlier 2016 report card, where sedentary behaviour was also awarded a D– grade (AKHK

2016)[21] and a D– in 2014[22]. This was further confirmed in an updated worldwide scan of adolescent PA, which positioned Australian adolescents as among the least active in the world.[11] For screen time, Australian children and adolescents scored a D– rating, which was also awarded for AT to/from school. Access to a PE teacher scored a B+ rating, and having access to parks, playgrounds and living in safe neighbourhoods scored an A– rating. Investment and policy initiatives scored a D, but were released before Sport Australia released the *National Sport Plan* in 2018 (see Appendix 1 for a summary of this Plan). Australian children typically rated a B score for sport participation, which indicates reasonably good rates of sport participation, but sport alone may be insufficient to drive overall proportions meeting PA guidelines.[22]

Other monitoring systems

Other data systems exist [references available on request]. These include state-based systems, which sometimes collect children's PA data by parental report. Other population surveys, such as the triennial Australian Secondary Students' Alcohol and Drug Survey, have additional modules for PA and other health behaviour. In NSW, there were serial Schools Physical Activity and Nutrition surveys (SPANS) up to 2015 which measured PA objectively, tracking measures of fitness and fundamental movement skills over time.

There are also several cohort studies, such as the Longitudinal Study of Australian Children (LSAC), that are assessing PA over time in large samples of children from birth to adolescence and beyond. These different systems measure PA in different ways, so produce different prevalence estimates, and occasionally change questions to 'improve the validity of measures used', but at the expense of losing information on trends over time.

1.2.6 Physical activity prevalence in special populations

Special populations and variations in physical activity within subgroups

Numerous population studies have suggested that men are more active than women, and although this is consistent in self-report measures, data from the pedometer-based ABS National Health Survey in 2011–12 showed less gender variation among middle-aged adults in mean step counts by gender.[23] From self-report surveys, this is likely due to underestimation of household and incidental PA among women, or omission of these domains in mainstream studies. The gender divide starts in childhood, and by early adolescence, objective studies suggest that girls are less active than boys throughout adolescence.[23] This highlights the importance of gender specific strategies in this period, as they also are in cultural groupings through adolescence where activity is different for girls and boys.

PA decreases with age, initially after young adulthood, leading to the middle aged 'slump' in activity due to work and family responsibilities that take up more time. Subsequent declines occur especially after late middle age (50s), with all dimensions of PA declining substantially in the late 60s and 70s, whether measured by self-report or objectively. A few international exceptions exist, but in Australian populations this is the usual pattern.

PA is also distributed by other parameters, including rurality (overall, remote rural adults are less active), language spoken at home (people from diverse cultural backgrounds may be less active, especially those from South Asia, East Asia and the Middle East), and socioeconomic gradients occur in most PA measures, with the lowest activity and lowest organised sport participation among the most disadvantaged.

Other factors associated with low PA at the population level include aspects of the built environment and transportation systems, social isolation, and those with chronic health problems including mental health.

Specific details below relate to two important groups for chronic disease prevention, Aboriginal and Torres Strait Islander people, and people with disability.

Aboriginal and Torres Strait Islander peoples

PA prevalence among Aboriginal and Torres Strait Islander peoples has been collected by special ABS surveys in 2012–13[24] (with the only example of trend data publicly available shown in Figures 5a and 5b from NSW surveys). These results focused on non-remote Aboriginal populations. Adults aged 18 years and over reported an average of 39 minutes/day of PA, with 38% meeting the 5x150 minutes PA guideline in 2012–13.

Among the sample of remote living residents, 55% met the PA guideline, especially through walking, but also through traditional activities. A subsample of the non-remote residents participated in the objective pedometer assessment, and an average of about 7000 steps/day recorded. These data were compared by ABS with non-Aboriginal adults, and showed that age-adjusted, non-remote resident Aboriginal and Torres Strait Islander adults were slightly less likely to meet PA guidelines (rate ratio 0.8), and slightly less likely report any PA (rate ratio 0.9).

Aboriginal and Torres Strait Islander children and adolescents aged 5–17 years in non-remote areas reported around two hours per day on PA, substantially more than non-Aboriginal children and adolescents. Around 48% met the 60 mins/day PA guideline, compared to 35% among non-Aboriginal children. Among Aboriginal children from remote areas, even more (82%) reported meeting the PA guideline. The Aboriginal children and adolescents in the objectively measured pedometer study averaged 9500 steps/day. Aboriginal toddlers and preschoolers (aged 2–4 years) in non-remote areas were reported to spend around 6.6 hours/day being active, with more outdoor time than non-Aboriginal children.

Australians with disability

Rates of PA participation are substantially lower among people with disability compared to people without disability.[25] Meeting PA guidelines was lower among working aged adults with disability (34.6% compared to 50% of non-disabled people). People who were classified as having severe disabilities had even lower rates (typically less than half as active as the non-disabled population). Among older adults aged 65 and over with disabilities, 17.2% met the PA guidelines compared to 37.8% of those without disabilities.

1.2.7 Policy implications of prevalence data for adults and children

There are challenges to assessing the proportion of Australians that are physically active, among both adults and children. It seems that somewhere between 30 and 55% of adults achieve the minimum PA guideline recommended by the WHO and by the Australian Government Department of Health, but this variation is determined by different interpretations of the guidelines, and by different survey questions used. Most survey systems use the most recent '150 minutes/week' of moderate-vigorous activity as in the current WHO recommendation, others use the slightly older '5 days x150 minutes' criterion. Some surveys ask about strength training 2x/week and include that in the proportion 'meeting recommendations', resulting in fewer than 20% achieving the 'total PA recommendation'.

It is important to maintain consistent survey methods and measures over a prolonged time period to determine trends in the proportion of those meeting guidelines. The timeframe for consistent monitoring should be determined by the estimated period that optimum policy implementation will take to produce the required increases in PA.

Australia is a signatory to the WHO global monitoring framework, which targets a 15% reduction in physical inactivity by 2030[a], suggesting exactly comparable, consistent measures to 2030 should be sought. Survey reports

[a] This was described as a 10% reduction by 2025 (see www.who.int/nmh/global_monitoring_framework/en/) but has been updated to coincide with the Sustainable Development goals with the target adjusted to a 15% relative reduction in physical inactivity by 2030 [see the WHO Global Action Plan on Physical Activity (WHO 2018)[2]].

should identify exactly which interpretation or combination of PA guidelines are being measured by the indicator chosen, so the differences in prevalence can be understood more easily.

An example of PA measurement consistency occurs in the US, through the Behavioral Risk Factor Surveillance System (BRFSS). Identical questions are asked to collect data at state level, with the measures and methods overseen by the national Centers for Disease Control. This provides agreed national data collection, which can be compared across jurisdictions, as well as providing detailed state-level estimates. Changes to the PA are agreed nationally (and have occurred once since 1986). Overall, the system has enabled clear assessment of trends, regional gaps, and national correlates to be established and monitored.

This approach to standardisation of measures will require substantial cross jurisdictional effort, policy congruence and methodological convergence. Such harmonisation would be possible given a national PA plan, as this would inform the monitoring component.

Key recommendations:

- **Maintain consistent PA monitoring measures over a suitably long period (e.g. to 2030)**
- **Use consistent and identical measures and survey methods to enable comparability across and within jurisdictions over time**
- **Report which guideline is being used to derive the 'sufficiently active' indicator.**

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