How physically active are senior Australians? Evidence from national data

July 2015

Productive Ageing Centre

National Seniors Australia

Publisher: National Seniors Australia ABN 89 050 523 003 ISBN 978-0-9925994-6-1

Suggested citation: Adair T. How physically active are senior Australians? Evidence from national data. Melbourne: National Seniors Productive Ageing Centre: 2015.

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About National Seniors Productive Ageing Centre

National Seniors Australia (National Seniors) is a not-for-profit organisation that gives voice to issues that affect Australians aged 50 years and over. It is the largest membership organisation of its type in Australia with more than 200,000 members and is the fourth largest in the world.

National Seniors Productive Ageing Centre (NSPAC) is an initiative of National Seniors and the Australian Government. NSPAC's aim is to improve quality of life for people aged 50 and over by advancing knowledge and understanding of all aspects of productive ageing.

NSPAC's key objectives are to:

- Support quality consumer-oriented research informed by the experience of people aged 50 and over
- Inform government, business and the community on productive ageing across the life course
- Raise awareness of research findings that are useful for older people
- Be a leading centre for research, education and information on productive ageing in Australia.

For more information visit productiveageing.com.au or call 03 9296 6800.

Acknowledgements

The author of this report is Dr Tim Adair of NSPAC. The author thanks Emma Lourey for providing valuable comments on a draft of the report and Sarah Aird for assistance in conducting the literature review.

National Seniors and NSPAC gratefully acknowledge the financial and other support provided by the Australian Government Department of Social Services to the NSPAC project. The opinions, comments and/or analyses expressed in this document are those of the author and do not necessarily represent the views of the Minister for Social Services, and cannot be taken in any way as expressions of government policy.

Executive summary

Background and purpose

Physical activity is vital for people aged 50 years and over to assist their physical and mental health and help them remain independent as they age. Physical inactivity is one of the leading causes of ill health among senior Australians. Being physically active can reduce risk of death and illness from a range of causes including cardiovascular diseases, diabetes, colon and breast cancers, dementia and depression. *Australia's Physical Activity and Sedentary Behaviour Guidelines* recommend that adults aged between 18 and 64 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 both moderate and vigorous activity) each week. The guidelines recommend that people 65 years and over should accumulate at least 30 minutes of moderate intensity physical activity on most days.[1]

To assess the physical activity of Australia's seniors, this report seeks to answer the following research questions:

1. What is the prevalence of sufficient physical activity among seniors, based on self-reported data and measurements from a pedometer?
2. To what extent do seniors engage in each type of physical activity?
3. Which population groups (socio-economic, geographic etc.) are most likely to be physically active, after controlling for health status?

Data and methods

The data in this report are taken from the 2011–2012 National Nutrition and Physical Activity Survey (NNPAS), part of the 2011–2013 Australian Health Survey (AHS) conducted by the Australian Bureau of Statistics (ABS). There were 4,371 respondents who were aged 50 years and over in the survey. Physical activity was measured in the following ways:

- Self-reported – respondents were asked to report the duration and number of sessions of physical activity in the previous week. Physical activity was measured according to *Australia's Physical Activity and Sedentary Behaviour Guidelines*. Physical activity was classified as:
  - Sufficient physical activity to gain health benefits – participated in at least a total of 150 minutes of physical activity spread over five separate sessions per week, with the number of minutes of vigorous activity multiplied by a factor of two
  - Insufficiently active – people who are not inactive (see below) but did not meet the threshold for sufficient physical activity in a week
  - Inactive – did not do any physical activity in the week before the interview.
- Used a pedometer – a sample of respondents volunteered to have their physical activity measured using a pedometer. The ABS measured sufficient physical activity as a respondent taking, on average, a minimum of 10,000 steps per day.

Bivariate and multivariate analyses were conducted to assess the relationship among the measures of physical activity and socio-economic and demographic characteristics.

[1] Department of Health, (2015). *Australia's Physical Activity and Sedentary Behaviour Guidelines*. http://www.health.gov.au/internet/main/publishing.nsf/content/health-pubhlth-strateg-phys-act-guidelines#chba

Key findings

According to the self-reported data, 38% of senior Australians were sufficiently active to gain health benefits (as per the national guidelines), 36% were insufficiently active and 26% were inactive. A higher proportion of people aged 50–64 (42%) and with no health condition (43%) were sufficiently active to gain health benefits. Multivariate analysis showed that factors that significantly predict being sufficiently active to gain health benefits included living in a major city, being in the highest household income quintile, not being employed, and having finished year 12 and/or having a non-school qualification. Predicted probabilities from the regression results showed that almost one-third (31%) of people aged 60, with no health condition, who had not finished Year 12 and who did not have a non-school qualification, who were in the lowest household income quintile and lived in Outer Regional and Remote regions were inactive. In contrast, 12% of people aged 60 and with no health condition, but who had finished Year 12 and had a non-school qualification, who were in the highest household income quintile and lived in a major city were inactive.

Analysis of the type of exercise undertaken by seniors showed that people living in a major city spent more minutes, on average, per week on moderate exercise, walking for fitness, and sport and recreation than people living in in Outer Regional and Remote regions. There was also significantly higher participation in both vigorous and moderate exercise by those in the highest Index of Relative Disadvantage and household income quintiles compared with those in lower quintiles.

Results from the pedometer measurement of physical activity showed that only 15% of seniors met the threshold of, on average, 10,000 steps per day. Some of the findings from the binary logistic regression model of meeting the 10,000 steps per day contradicted the findings from the self-reported physical activity measure; living in Outer Regional and Remote regions and being employed predicted a higher likelihood of meeting the threshold. There was, however, some discordance between the two measures of physical activity. Just 24% of seniors who reported that they were sufficiently active to gain health benefits averaged 10,000 steps per day as measured by the pedometer.

Conclusion

Only a minority of senior Australians were meeting the recommended level of physical activity, based on their reports of activity in the week before their interview. The discordance between the measures of physical activity that were self-reported and those measured by a pedometer could be due to a number of reasons including that:

- A significantly lower proportion of seniors met the pedometer threshold of sufficient physical activity when compared to the self-reported data
- There may have been bias in the self-reported data
- The measure based on self-reported data accounted for the intensity of exercise rather than just the number of steps.

A number of interventions to improve physical activity among seniors recommended in the Heart Foundation Blueprint for an Active Australia include aerobic fitness, muscle strength and flexibility programs at health clubs and recreation centres, community-based programs such as walking groups or swim clubs, and programs for people who are housebound or living in an aged care facility.[2] As Australia's population continues to age, an increasing proportion of people will need to be physically active to improve their quality of life.

[2] Brown WJ, van Uffelen JGZ. Action area 10: Older people. In: Blueprint for an active Australia. 2nd edition. Melbourne: National Heart Foundation of Australia, 2014. p. 69.

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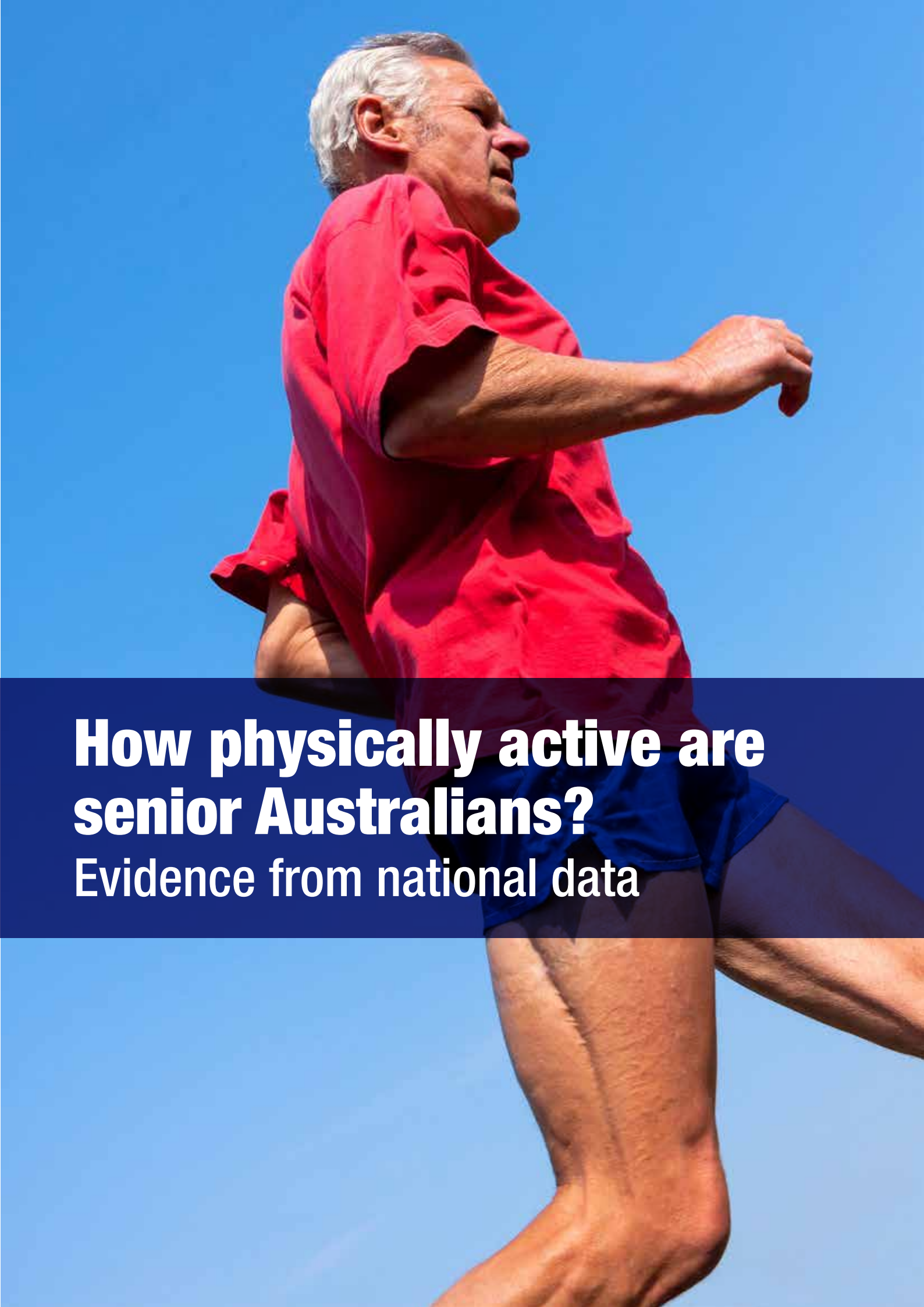


How physically active are senior Australians?

Evidence from national data

Introduction

Background

Physical activity is vital for people aged 50 years and over to help them enjoy good health and quality of life. Given the increasing size of Australia's senior population, it is becoming more important that this group is encouraged to be sufficiently physically active to assist their physical and mental health and help them remain independent. Not only can physical activity benefit individuals, it can also lower the potential health care costs associated with an ageing population.

Evidence shows that a lack of physical activity is one of the leading causes of ill health among senior Australians aged 50 years and over. Physical inactivity was responsible for 7% of the total burden of disease in Australia in 2003, the fourth largest contribution of any risk factor.[3,4,5] The consequences of physical inactivity are most pronounced among Australians aged 45 and over, being attributable to 9% of the total burden of disease in this age group.[6]

Physical inactivity increases the risk of death and illness from a range of causes. The largest impact on health in Australia is caused by cardiovascular diseases and diabetes, and numerous studies have demonstrated the benefits of physical activity on reducing the risk of heart disease, stroke, high blood pressure, diabetes and obesity, including in older populations.[7,8,9,10,11,12,13,14] Sufficient physical activity (see Box 1) has been found to lower the risk of colon and breast cancers.[15,16,17] Physical activity, including strength training, has also been found to improve muscle strength and bone density in older people, prevent falls and assist older people to perform their daily activities.[18,19]

3 Begg, S., Vos, T., Barker, B. et al. (2007). *The burden of disease and injury in Australia 2003*. Canberra: AIHW.

4 Physical inactivity was classified in *The burden of disease and injury in Australia 2003* study as a four-level categorical variable comprising 'highly active' (three sessions of at least average 40 minutes vigorous and a total of at least 1500 standard metabolic equivalent minutes per week), 'sufficiently active' (three sessions of at least average 20 minutes vigorous or five sessions of 30 minutes moderate or 600 standard metabolic equivalent minutes per week), 'insufficiently active' (some activity but not meeting the 'sufficiently active' level), and 'inactive' (no activity). Begg, S., Vos, T., Barker, B. et al. (2007). *op. cit.*, p.184.

5 The fourth largest contribution of risk factors after tobacco, high blood pressure and high body mass.

6 Begg, S., Vos, T., Barker, B. et al. (2007). *op. cit.*

7 Thompson, P.D., Buchner, D., Pina, IL, et al. (2003). Exercise and physical activity in the prevention and treatment of atherosclerotic cardiovascular disease: a statement from the Council on Clinical Cardiology (Subcommittee on Exercise, Rehabilitation, and Prevention) and the Council on Nutrition, Physical Activity, and Metabolism (Subcommittee on Physical Activity). *Circulation*. 107:3109–3116.

8 Ellekjær, H., Holmen, J., Ellekjær, E. et al. (2000). Physical activity and stroke mortality in women: Ten-year follow-up of the Nord-Trøndelag Health Survey, 1984–1986. *Stroke*. 31(1):14–8.

9 Blair, S.N., Cheng, Y. & Holder, J.S. (2001). Is physical activity or physical fitness more important in defining health benefits? *Medicine and Science in Sports and Exercise*. 33:S379–99.

10 Lee, I.M. & Paffenbarger, R.S. (1998). Physical activity and stroke incidence: the Harvard Alumni Health Study. *Stroke*. 29(10):2049–54.

11 Sesso H.D., Paffenbarger R.S. & Lee, I.M. (2000). Physical activity and coronary heart disease in men: The Harvard Alumni Health Study. *Circulation*. 102(9):975–80.

12 O'Donova, G., Blazevich, A.J., Boreham, C., et al. (2010). The ABC of physical activity for health: a consensus statement from the British association of sport and exercise sciences. *Journal of Sports Sciences*. 28(6):573–591.

13 Wing, R.R. & Hill, J.O. (2001). Successful weight loss maintenance. *Annu Rev Nutr*. 21: 323–341.

14 Knowler, W.C., Barrett-Connor, E., Fowler, S.E., et al. for the Diabetes Prevention Program Research Group. (2002). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med*. 346:393–403.

15 Thune, I. & Furberg, A.S. (2001). Physical activity and cancer risk: dose-response and cancer, all sites and site-specific. *Medicine and Science in Sports and Exercise*. 33:S530–50.

16 Slattery, M.L. (2004). Physical activity and colorectal cancer. *Sports Med*. 34(4):239–52.

17 Breslow, R.A., Ballard-Barbash, R., Munoz, K., et al. (2001). Long-term recreational physical activity and breast cancer in the National Health and Nutrition Examination Survey I epidemiologic follow-up study. *Cancer Epidemiol Biomarkers Prev*. 10:805–808.

18 Nikander, R., Sievänen, H., Heinonen, A., et al. (2010). Targeted exercise against osteoporosis: A systematic review and meta-analysis for optimising bone strength throughout life. *BMC Medicine*, 8:47.

19 Chin, A., van Uffelen J., Riphagen I., et al. (2008). The functional effects of physical exercise training in frail older people: a systematic review. *Sports Med*. 38(9):781-93.

In more recent years there has been increasing evidence of the role of physical activity in preventing dementia, with around 13% of global cases of Alzheimer's disease (over 4 million) due to physical inactivity.[20,21] Australian research has found that a 5% decline in the physical inactivity rate would reduce dementia by 11% by 2051.[22] Research has also shown that physical inactivity is associated with higher levels of depression.[23] Further, social and psychological benefits of participation in sport have been identified, with people who participate in regular activity reporting higher life satisfaction than inactive people.[24,25]

Australia's Physical Activity and Sedentary Behaviour Guidelines have been developed for adults age between 18 and 64 years, and older adults age 65 years and over (Box 1).[26] Despite the many benefits of physical activity, evidence in Australia has shown that a significant proportion of seniors are physically inactive. In 2007–2008, 36% of people age 55–64 did not do any exercise in the two weeks prior to the National Health Survey.[27] Because of its accessibility, walking has been identified as the most common type of physical activity among seniors. Women, on average, walked on fewer occasions than men, but for longer periods of time and more than half of respondents in a Victorian study walked three or more times per week.[28]

[20] Barnes, D.E. & Yaffe, K. (2011). The projected effect of risk factor reduction on Alzheimer's disease prevalence. *Lancet Neurology*.10(9):819–828.

[21] Farrow, M. & Ellis, K. (2013). *Physical Activity for Brian Health and Fighting Dementia*. Paper 36. Canberra: Alzheimer's Australia.

[22] Nepal, B., Brown, L. & Ranmuthugala, G. (2010). Modelling the impact of modifying lifestyle risk factors on dementia prevalence in Australian population aged 45 years and over, 2006-2051. *Australasian Journal of Ageing*. 29(3):111–116.

[23] Cassidy, K., Kotynia-English, R., Acres, J., et al. (2004). Association between lifestyle factors and mental health measures among community-dwelling older women. Aust N Z J Psychiatry. 38: 940–7.

[24] Eime, R., Yaoung, J.A., Harvey, J.T. et al. (2013). A systematic review of the psychological and social benefits of participation in sport for adults: informing development of a conceptual model of health through sport. *International Journal of Behavioral Nutrition and Physical Activity*. 10:135.

[25] Rejeski, W.J. & Mihalko, S.L. (2001). Physical activity and quality of life in older adults. *J Gerontol A Biol Sci Med Sci*. 56 Spec No 2:23–35.

[26] Department of Health, (2015). *Australia's Physical Activity and Sedentary Behaviour Guidelines*. http://www.health.gov.au/internet/main/publishing.nsf/content/health-pubhlth-strateg-phys-act-guidelines#chba

[27] Australian Bureau of Statistics. (2009). 4364.0 – *National Health Survey: Summary of Results, 2007-2008* (Reissue). Canberra: Australian Bureau of Statistics.

[28] Sims, J., Hill, K., Davidson, S., et al. (2007). A snapshot of the prevalence of physical activity amongst older, community dwelling people in Victoria, Australia: patterns across the 'young-old' and 'old-old'. *BMC Geriatrics*. 7(4).

Box 1: *Australia's Physical Activity and Sedentary Behaviour Guidelines*[29]

For adults age 18–64 years:

- Doing any physical activity is better than doing none. If you currently do no physical activity, start by doing some, and gradually build up to the recommended amount.
- Be active on most, preferably all, days every week.
- Accumulate 150 to 300 minutes (2 ½ to 5 hours) of moderate intensity physical activity or 75 to 150 minutes (1 ¼ to 2 ½ hours) of vigorous intensity physical activity, or an equivalent combination of both moderate and vigorous activities, each week.
- Do muscle strengthening activities on at least two days each week.

For older adults age 65 years and over:

- Older people should do some form of physical activity, no matter what their age, weight, health problems or abilities.
- Older people should be active every day in as many ways as possible, doing a range of physical activities that incorporate fitness, strength, balance and flexibility.
- Older people should accumulate at least 30 minutes of moderate intensity physical activity on most, preferably all, days.
- Older people who have stopped physical activity, or who are starting a new physical activity, should start at a level that is easily manageable and gradually build up to the recommended amount, type and frequency of activity.
- Older people who continue to enjoy a lifetime of vigorous physical activity should carry on doing so in a manner suited to their capability into later life, provided they adhere to recommended safety procedures and guidelines.

Past research has identified how physical activity varies among different population groups. Although physical activity understandably declines at the oldest ages, evidence has shown physical activity is not lower among people in their 60s compared to when they were in their 50s.[30] Lower levels of physical activity have been found among women compared with men, people with lower income and lower levels of education, and people who have English as a second language.[31,32,33] More strenuous activities (e.g. some types of gardening) are more common among men than women.[34]

[29] Department of Health, (2015). *Australia's Physical Activity and Sedentary Behaviour Guidelines*. http://www.health.gov.au/internet/main/publishing.nsf/content/health-pubhlth-strateg-phys-act-guidelines#chba

[30] Armstrong, T., Bauman, A. & Davies, J. (2000). *Physical activity patterns of Australian adults. Results of the 1999 National Physical Activity Survey*. Canberra: Australian Institute of Health and Welfare.

[31] Taylor. W.C., Baranowski, T. & Young D.R. (1998). Physical activity interventions in low-income, ethnic minority, and populations with disability. *Am J Prev Med*. 15(4):334–43.

[32] Abby, C. & King, J. (2001). Interventions to Promote Physical Activity by Older Adults. *Gerontol A Biol Sci Med Sci*. 56 (suppl 2): 36-46.

[33] Sun, F., Norman, I.J. & White, A.E. (2013). Physical activity in older people: a systematic review. *BMC Public Health*. 13:449.

[34] Sims, J., Hill, K., Davidson, S., et al. (2007). *op. cit.*

Purpose

Given the importance of physical activity in improving physical and mental health, it is timely to look at recent data from Australia to assess prevalence of physical activity and to identify which population groups have the lowest likelihood of being physically active. This report seeks to answer the following research questions:

1. What is the prevalence of sufficient physical activity among seniors, based on self-reported data and measurements from a pedometer?
2. To what extent do seniors engage in each type of physical activity?
3. Which population groups (socio-economic, geographic etc.) are most likely to be physically active, after controlling for health status?

Data and Methods

Data

The data in this report are taken from the 2011–2012 National Nutrition and Physical Activity Survey (NNPAS), part of the 2011–2013 Australian Health Survey (AHS) conducted by the Australian Bureau of Statistics (ABS).[35] The NNPAS collected information including physical activity data and demographic and socio-economic characteristics.

A total of 12,153 individuals from 9,519 households were surveyed in the NNPAS, which was equivalent to 77% of households approached. This report analysed the data collected from the 4,371 people aged 50 years and over who participated in the survey. People living in very remote areas, some Aboriginal and Torres Strait Islander communities, and people living in non-private dwellings such as hotels and hospitals were excluded from the survey. Dwellings were selected for inclusion in the survey using a multistage sample design. One adult per dwelling was randomly selected for inclusion in the survey. Selected respondents were interviewed by trained ABS interviewers. The data were accessed using the Remote Access Data Laboratory (RADL) and were analysed using Stata 11.2.[36,37]

This report used the following data:

- Physical activity – self-reported
- Physical activity – measured by pedometer
- Socio-economic and demographic characteristics.

Physical activity – self-reported

Respondents were asked to report the duration and number of sessions of physical activity in the previous week. Physical activity included:[38]

- Vigorous physical activity – this type of activity makes a person breathe hard (e.g. jogging, cycling, aerobics, competitive tennis)
- Moderate physical activity – this type of physical activity was not reported as vigorous (e.g. gentle swimming, social tennis, golf)
- Walking for transport – walking for a minimum of 10 minutes continuously for the purpose of getting to places
- Walking for sport, recreation or fitness – walking for a minimum of 10 minutes continuously to improve fitness
- Strength and toning – e.g. lifting weights, push ups, sit ups
- Vigorous gardening – gardening or heavy work that causes a person to breathe hard.

The classification by the ABS of the level of physical activity is consistent with the *Australia's Physical Activity and Sedentary Behaviour Guidelines*. Physical activity comprises walking for sport, recreation or fitness, walking for transport, moderate physical activity and vigorous physical activity (but excluding strength and toning and vigorous gardening).

[35] Australian Bureau of Statistics. (2013). *4364.0.55.004 – Australian Health Survey: Physical Activity*, 2011-12. Canberra: Australian Bureau of Statistics.

[36] Australian Bureau of Statistics. (2015). *Remote Access Data Laboratory (RADL)*. Canberra: Australian Bureau of Statistics.

[37] Stata. (2009). Stata/IC 11.2. College Station, TX: StataCorp.

[38] Australian Bureau of Statistics. (2013). *op. cit.*

[39] Australian Bureau of Statistics. (2013). *4363.0.55.001 – Australian Health Survey: Users' Guide*, 2011-13. Canberra: Australian Bureau of Statistics.

Depending on the activity level in the previous week, respondents were categorised according to the following:[39]

- Sufficient physical activity to gain health benefits – participated in at least a total of 150 minutes of physical activity spread over five separate sessions per week, with vigorous activity multiplied by a factor of two
- Insufficiently active – people who are not inactive (see below) but did not meet the threshold for sufficient physical activity in a week
- Inactive – did not do any physical activity in the week before the interview.

Physical activity – measured by pedometer

A sample of respondents volunteered to have their physical activity measured using a pedometer. Respondents were issued with a pedometer to wear for eight consecutive days and recorded the number of steps they had taken each day on a daily activity sheet.[40] A telephone interview was used to collect data from the respondents. Only the results of respondents who reported data for at least four days, with a minimum of one week day and one weekend day, had their data collected by the ABS. Overall, 56% of people aged 50 and over who were surveyed participated in the pedometer component and met the reporting threshold. The ABS measured sufficient physical activity as a respondent taking, on average, a minimum of 10,000 steps per day, which was based on thresholds found in published studies.[41]

Socio-economic and demographic characteristics

The NNPAS and AHS provide a range of socio-economic and demographic variables, at the individual, household and geographic level, and this is used to compare physical activity across population groups.

The variables used in this report are:[42]

- Age
- Sex
- Region – classified as major city, Inner Regional, and Outer Regional and Remote
- Index of Relative Disadvantage quintile – a summary measure of a local area's income, education, employment and workforce skills. It is one of the ABS's Socio-Economic Indexes for Areas (SEIFA)[43]
- Equivalised household income quintile – the total household income allowing for differences in household size and composition
- Living arrangement
- Language spoken at home
- Employment status
- Highest level of education
- Self-rated health – the respondent's rating of their own health, from excellent to poor
- Health condition – whether a respondent has been told they have a health condition and they currently have this condition.

[40] Australian Bureau of Statistics. (2013). *op. cit.*

[41] Australian Bureau of Statistics. (2013). *op. cit.*

[42] Australian Bureau of Statistics. (2013). *op. cit.*

[43] Australian Bureau of Statistics. (2013). 2033.0.55.001 – *Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia, 2011*. Canberra: Australian Bureau of Statistics.

Methods of analysis

Both bivariate and multivariate analyses were conducted to assess the relationship among measures of physical activity and socio-economic and demographic characteristics. Multinomial logistic regression was used to analyse whether there was sufficient physical activity. The two relationships examined were 'insufficiently active' versus 'inactive' and 'sufficiently active' versus 'inactive'. The resultant coefficients signified the direction and magnitude of the relationship between the variable category and the relationship being examined (i.e. a coefficient greater than zero indicated a positive relationship, and a coefficient less than zero indicated a negative relationship).

It was clear that both age and health status were important variables in predicting sufficient physical activity. Regression models of the level of physical activity included either self-rated health or the presence of a health condition as variables. Regressions to assess whether certain socio-economic or demographic variables have a different relationship within different age groups were initially conducted to include all respondents aged 50 years and over, and then separately for the age groups 50–64 and 65+.

A bivariate analysis was conducted for the average minutes spent on each type of physical activity. Tests of significance were conducted to see if the average minutes for a particular category was statistically significantly different from the reference category.

A logistic regression was used to analyse whether the physical activity threshold of 10,000 pedometer steps was reached, because this was a dichotomous outcome variable. Again, regressions were conducted separately for the age group 50–64 and 65+.

For each regression model, a test for multi-collinearity of explanatory variables was conducted to see whether, for example, household income quintile and the area Index of Relative Disadvantage quintile were highly correlated. However, no multi-collinearity was found in any of the models.

Findings

According to self-reported physical activity data, 38% of senior Australians were sufficiently active (as per national guidelines), 36% were insufficiently active and 26% were inactive (*Figure 1a*). As expected, a higher proportion of people aged 50–64 were sufficiently active (42%) when compared with those 65 and over (33%), and a lower proportion were inactive (22% of those 50–64, and more than 31% of those 65 and over). Bivariate results showed that sufficient physical activity was highest among people in the highest Index of Relative Disadvantage quintile and, in particular, the highest household income quintile. Regionally, people in major cities had the highest proportion of seniors who were sufficiently active, while people in Inner Regional and Outer Regional and Remote regions had higher levels of inactivity. Sufficient physical activity was also highest among employed people, those with higher levels of education and those with no health condition (43% with no health condition were sufficiently active for health purposes) and better self-rated health (*Figure 1b*).

Multinomial logistic regression enabled identification of how each of the socio-economic and demographic variables predicted the level of physical activity, controlling for other variables in the model. The multinomial logistic regression data in Table 1 includes all people age 50 and over. The Model 1 columns show the results when self-rated health data were included in the model. The Model 2 columns show the results when data about whether a respondent had a health condition were included. Factors that significantly and positively predicted being sufficiently active versus inactive were living in a major city (region), being in the highest household income quintile, being unemployed (this is the reverse of the finding in Figure 1b, and most likely occurred because the bivariate finding was biased by age), having finished year 12 and/or having a non-school qualification (especially if a person had both) and, in Model 2, speaking English at home. Being older, having poorer self-rated health and having a health condition reduced the likelihood of being sufficiently active. Gender, living arrangement and Index of Relative Disadvantage (in contrast to bivariate findings) were all not significant factors to predict whether a person had sufficient physical activity. Other findings show that being of older age, having poorer health, living in Outer Regional and Remote regions and having low education reduced the likelihood of being insufficiently active versus inactive.

There were some differences between the regression model of people aged 50–64 compared with the regression model of those 65 and over (*Table 2*). Age was not a factor in predicting the physical activity level for people aged 50–64 but it was a factor for people 65 and over, signifying that physical activity declined after this age. Living alone, which was not a significant factor in Table 1, was a predictor of a higher level of physical activity in people aged 65 and over. Having a health condition was a factor that predicted lower physical activity for people aged 50–64 but it did not impact people aged 65 and over, although a lower self-rated health did predict lower physical activity for this group (*Table A.2*). Being in the highest household income quintile and in the higher education category (especially if a person had a non-school qualification and had finished Year 12) were factors that significantly predicted that a person was being sufficiently active. For people aged 65 and over, being unemployed and speaking English at home were factors that predicted they were sufficiently active.

Figure 1a: *Level of physical activity in previous week (%), by socio-economic and demographic characteristics*

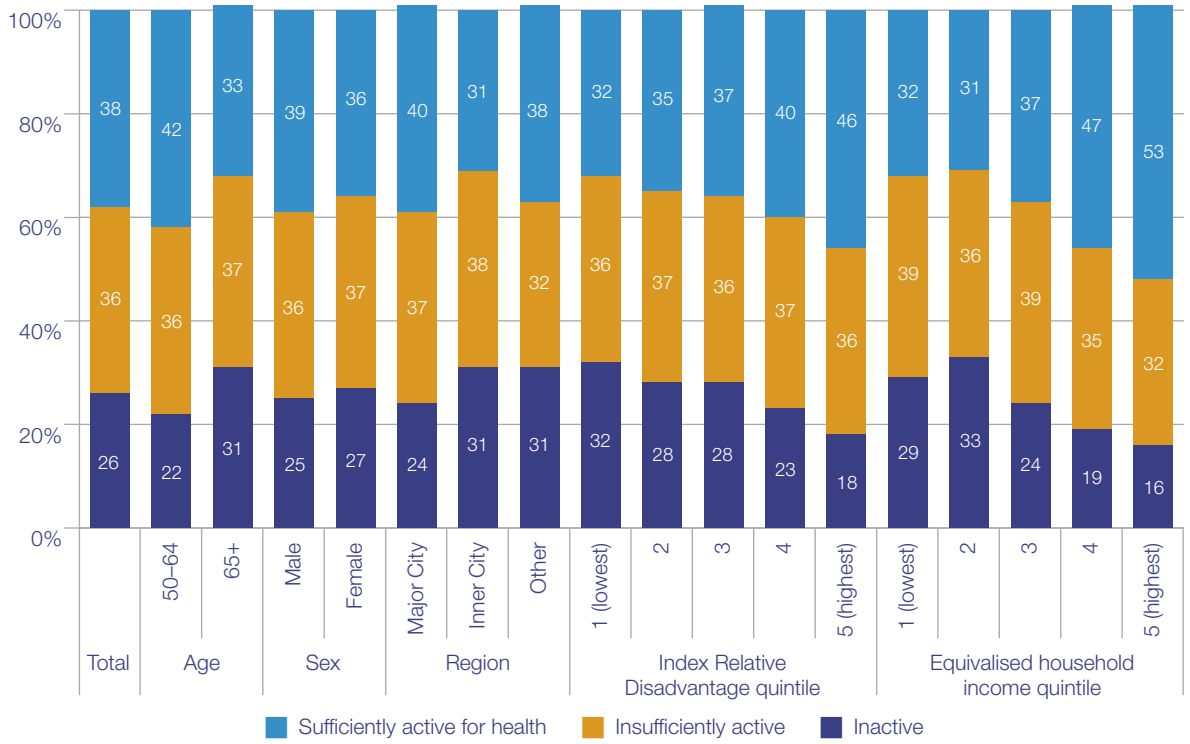
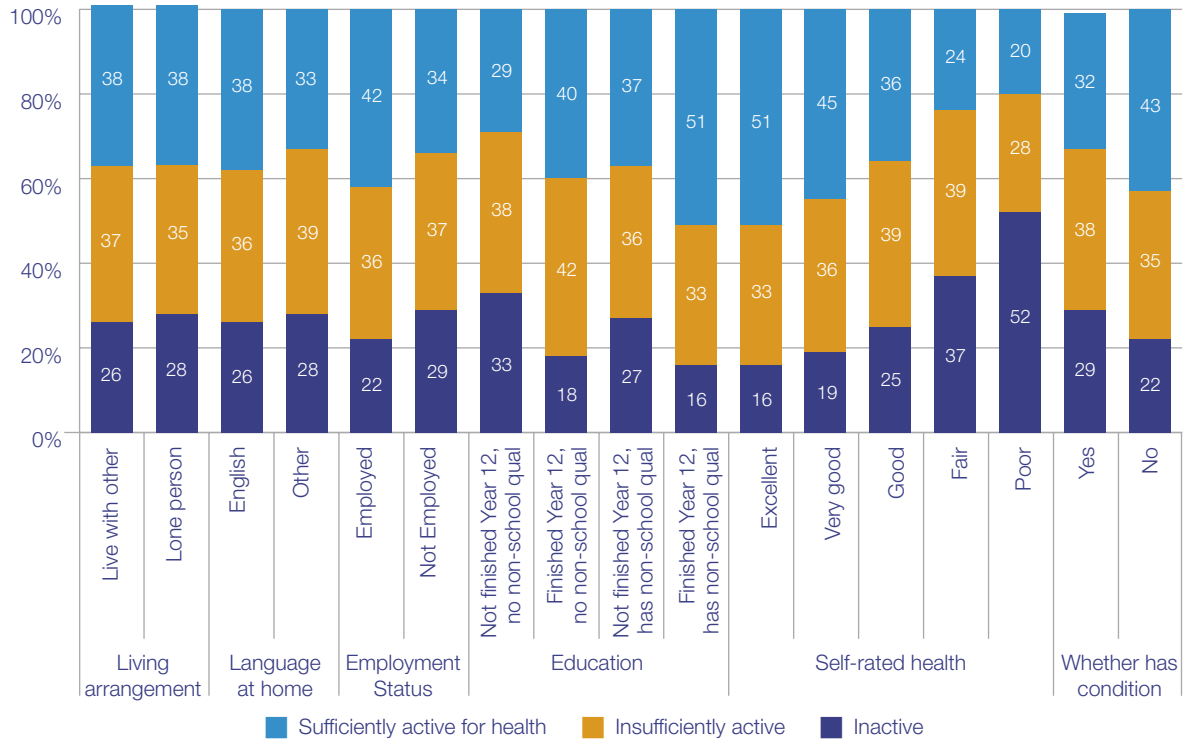


Figure 1b: *Level of physical activity in previous week (%), by socio-economic and demographic characteristics*



Qual.: Qualification

Table 1: *Multinomial logistic regression of level of physical activity in previous week, people aged 50 and over*

	Model 1				Model 2			
	Insufficiently active vs Inactive		Sufficiently active vs Inactive		Insufficiently active vs Inactive		Sufficiently active vs Inactive	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
Age (continuous)	-0.018**	0.001	-0.034**	0.000	-0.013*	0.013	-0.026**	0.000
Sex (Ref.=Male)	Ref.		Ref.		Ref.		Ref.	
Female	-0.008	0.930	-0.066	0.470	0.045	0.602	0.017	0.844
Region (Ref.=Major city)	Ref.		Ref.		Ref.		Ref.	
Inner Regional	-0.153	0.165	-0.328**	0.004	-0.147	0.176	-0.319**	0.004
Outer Regional and Remote	-0.449**	0.000	-0.491**	0.000	-0.451**	0.000	-0.495**	0.000
Index Relative Disadvantage quintile (Ref.=1 Lowest)	Ref.		Ref.		Ref.		Ref.	
2	0.012	0.923	0.001	0.993	0.031	0.801	0.052	0.681
3	-0.057	0.671	-0.085	0.540	-0.012	0.926	-0.010	0.944
4	0.133	0.346	-0.057	0.697	0.188	0.174	0.039	0.786
5 Highest	0.197	0.213	0.147	0.362	0.259	0.097	0.251	0.112
Equivalised h/hold income quintile (Ref.=1 Lowest)	Ref.		Ref.		Ref.		Ref.	
2	-0.120	0.298	-0.111	0.361	-0.073	0.519	-0.047	0.691
3	-0.004	0.978	0.020	0.891	0.104	0.458	0.173	0.233
4	-0.033	0.840	0.315	0.054	0.081	0.609	0.476**	0.003
5 Highest	0.085	0.639	0.492**	0.007	0.231	0.196	0.715**	0.000
Living arrangement (Ref.=Lives with others)	Ref.		Ref.		Ref.		Ref.	
Lone person	0.005	0.958	0.145	0.123	-0.027	0.766	0.105	0.252
Language spoken at home (Ref.=English)	Ref.		Ref.		Ref.		Ref.	
Other	0.027	0.879	-0.320	0.094	-0.077	0.649	-0.456*	0.014
Employment status (Ref.=Employed)	Ref.		Ref.		Ref.		Ref.	
Not employed	0.213	0.087	0.535**	0.000	0.069	0.569	0.359**	0.004
Education (Ref.= Not finished Year 12, no non-school qual.)	Ref.		Ref.		Ref.		Ref.	
Finished Year 12, no non-school qualification	0.383*	0.031	0.549**	0.003	0.386*	0.028	0.590**	0.001
Not finished Year 12, has non school qualification	0.084	0.431	0.290**	0.009	0.137	0.194	0.391**	0.000
Finished Year 12, has non-school qualification	0.464**	0.000	0.924**	0.000	0.499**	0.000	1.006**	0.000
Self-rated health (Ref.=Excellent)	Ref.		Ref.		-	-	-	-
Very good	0.166	0.301	-0.181	0.239	-	-	-	-
Good	-0.094	0.551	-0.603**	0.000	-	-	-	-
Fair	-0.559**	0.001	-1.283**	0.000	-	-	-	-
Poor	-1.261**	0.000	-1.901**	0.000	-	-	-	-
Has health condition (Ref.=No)	-	-	-	-	Ref.		Ref.	
Yes	-	-	-	-	-0.145	0.103	-0.281**	0.002
N	**3,825**				**3,825**			

*Ref.=Reference group, Coef.=Coefficient, H/hold=Household, N=Sample size, * p<0.05, ** p<0.01*

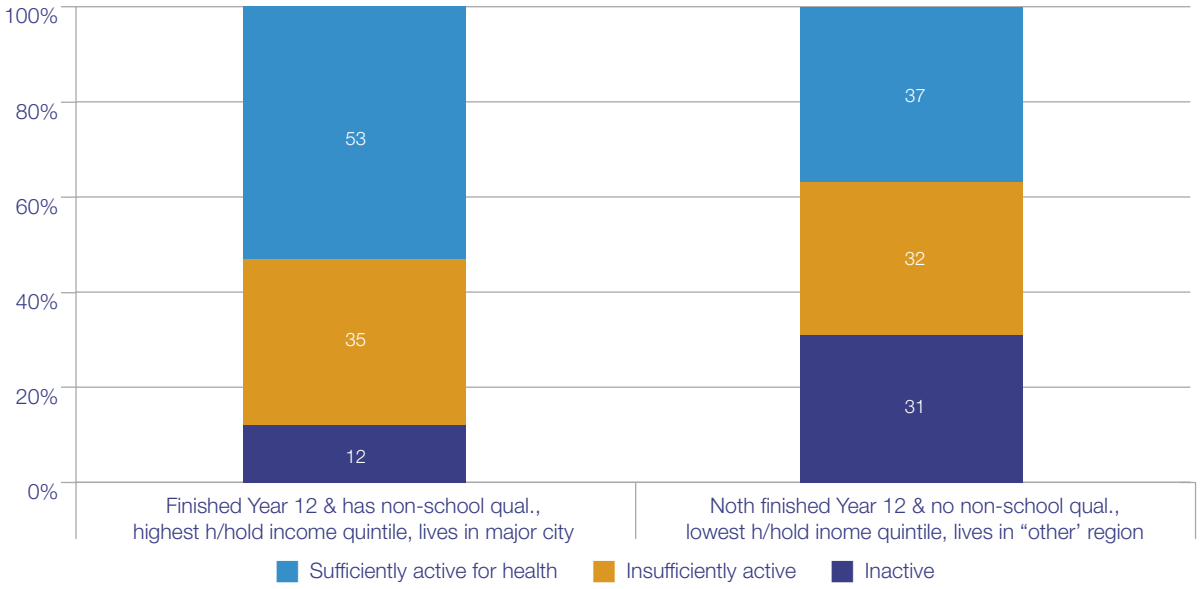
Table 2: *Multinomial logistic regression of level of physical activity in previous week, people aged 50–64 and 65 and over*

	50–64				65+			
	Insufficiently active vs Inactive		Sufficiently active vs Inactive		Insufficiently active vs Inactive		Sufficiently active vs Inactive	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
Age (continuous)	0.012	0.423	0.010	0.515	-0.045**	0.000	-0.078**	0.000
Sex (Ref.=Male)	Ref.		Ref.		Ref.		Ref.	
Female	0.201	0.106	0.184	0.138	-0.132	0.298	-0.199	0.133
Region (Ref.=Major city)	Ref.		Ref.		Ref.		Ref.	
Inner Regional	-0.091	0.568	-0.253	0.113	-0.203	0.178	-0.382*	0.017
Outer Regional and Remote	-0.203	0.204	-0.314*	0.049	-0.727**	0.000	-0.703**	0.000
Index Relative Disadvantage quintile (Ref.=1 Lowest)	Ref.		Ref.		Ref.		Ref.	
2	0.161	0.376	0.331	0.072	-0.087	0.605	-0.231	0.194
3	0.023	0.905	0.127	0.516	-0.059	0.750	-0.157	0.418
4	0.315	0.120	0.199	0.335	0.095	0.622	-0.067	0.741
5 Highest	0.273	0.228	0.473*	0.035	0.224	0.308	-0.022	0.923
Equivalised h/hold income quintile (Ref.=1 Lowest)	Ref.		Ref.		Ref.		Ref.	
2	-0.031	0.880	-0.125	0.556	-0.115	0.402	-0.042	0.777
3	0.049	0.817	0.025	0.909	0.218	0.287	0.340	0.110
4	0.175	0.433	0.488*	0.028	-0.064	0.804	0.326	0.211
5 Highest	0.381	0.109	0.690**	0.003	-0.074	0.829	0.790*	0.016
Living arrangement (Ref.=Live with others)	Ref.		Ref.		Ref.		Ref.	
Lone person	-0.263	0.051	-0.044	0.738	0.272**	0.033	0.383**	0.004
Language spoken at home (Ref.=English)	Ref.		Ref.		Ref.		Ref.	
Other	-0.142	0.611	-0.344	0.227	-0.047	0.829	-0.584*	0.020
Employment status (Ref.=Employed)	Ref.		Ref.		Ref.		Ref.	
Not employed	0.088	0.587	0.169	0.300	-0.073	0.710	0.512*	0.015
Education (Ref.= Not finished Year 12, no non-school qual.)	Ref.		Ref.		Ref.		Ref.	
Finished Year 12, no non school qualification	-0.002	0.995	0.384	0.103	0.846**	0.002	0.833**	0.003
Not finished Year 12, has non school qualification	0.162	0.287	0.370	0.016	0.073	0.628	0.350*	0.024
Finished Year 12, has non school qualification	0.637**	0.000	1.121**	0.000	0.279	0.133	0.779**	0.000
Has health condition (Ref.=No)	Ref.		Ref.		Ref.		Ref.	
Yes	-0.165	0.191	-0.409**	0.001	-0.150	0.241	-0.157	0.237
N	**1,984**				**1,841**			

*Ref.=Reference group, Coef.=Coefficient, H/hold=Household, N=Sample size, * p<0.05, ** p<0.01*

Predicted probabilities in Figure 2 show the proportion of seniors, based on the regression results in Model 2 (*Table 1*), that were predicted to have participated in a certain level of physical activity given their individual, household and geographic characteristics. Almost 31% of people aged 60, who do not have a health condition, who have not finished Year 12 and do not have a non-school qualification, who are in the lowest household income quintile and live in Outer Regional and Remote regions are inactive. Thirty-seven per cent of people in these groups were sufficiently active to gain health benefits. Twelve per cent of people aged 60, who do not have a health condition, who have finished Year 12 and have a non-school qualification, and who are in the highest household income quintile and live in a major city are inactive. Fifty-three per cent of people in these groups were sufficiently active.

Figure 2: *Predicted probabilities from regression analysis of the level of physical activity in the previous week, people aged 60 with no health condition*



H/hold=Household, Qual.=Qualification

The differences in the number of minutes spent on each type of physical activity provided insight into why certain population groups have higher levels of overall activity compared with others. Figures 3a–3d show the average number of minutes spent on each activity among different population groups in the last week before interview.[44]

The average number of minutes spent on moderate exercise was progressively higher, and the average number of minutes spent on vigorous exercise was progressively lower as age increased from 50–54 to 65–69 (*Figure 3a*). For those in the older age groups (70–74, 75–79, 80+), the time spent on each activity decreased. Males spent a greater number of minutes on each type of activity compared with women, with significant differences being found in the vigorous exercise, moderate exercise and walking-for-transport categories. Compared with those living in a major city, people in Inner Regional areas spent, on average, fewer minutes on vigorous exercise and walking for fitness, sport or recreation, while those in Outer Regional and Remote regions spent less time on moderate exercise and walking for fitness, sport or recreation.

[44] Figures 3a and 3b show the types of physical activity that comprise the 'Level of physical activity' measure used above.

There was significantly higher participation in both vigorous and moderate exercise at the highest Index of Relative Disadvantage and household income quintiles. Time spent on all types of physical activity was significantly higher for people with the highest levels of education (e.g. 49 minutes was spent on vigorous exercise if the person finished Year 12 and had a non-school qualification compared with 14 minutes if the person had not finished Year 12 and did not have a non-school qualification).

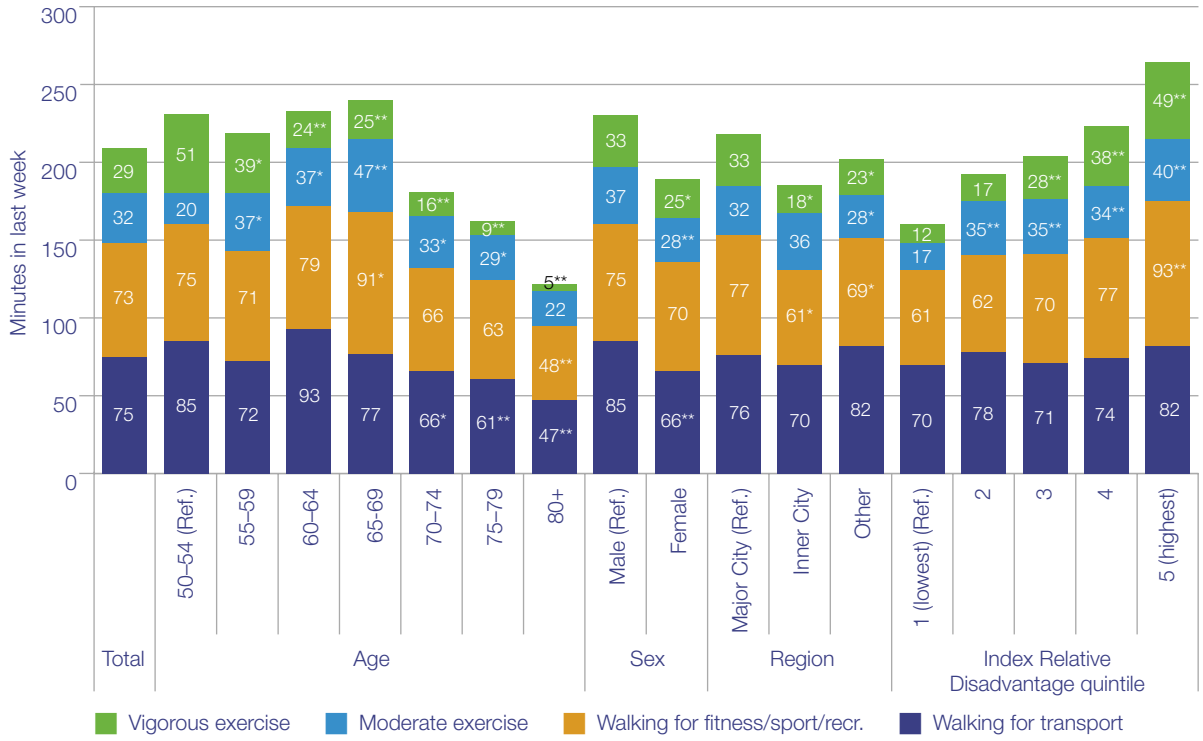
The average number of minutes of vigorous gardening and strength and toning activity undertaken by seniors in the week before the interview are shown in Figures 3c and 3d. Vigorous gardening was more common among males, among people aged 65–69, among those living in Outer Regional and Remote areas, among those who did not live alone, among those who spoke English at home and, as expected, among those people who were in better health. People with higher levels of education and income, and younger people spent more time participating in strength and toning training.

Results from the pedometer measurement of average steps per day provided a different perspective on physical activity. Not all survey respondents participated in the pedometer measurement. Only 56% participated in this component of the survey (*Table 3*). The participation rate was similar across all population groups. The lowest participation rate occurred in the group of people who spoke a language other than English at home (43%). Overall, only 15% of seniors met the threshold of, on average, 10,000 steps per day. Bivariate results showed that meeting this threshold was highest among people in the highest Index of Relative Disadvantage quintile and household income quintile, among those who were younger (although only 18%), among those employed, among those with a higher level of education and among people without a health condition. After controlling for other variables in the binary logistic regression model, living in Outer Regional and Remote regions, being in the fourth highest household income quintile, being employed, being of younger age and not having a health condition predicted a higher likelihood of meeting the threshold of 10,000 steps per day as measured by the pedometer. The results for employment and region contradict the findings from the self-reported physical activity measures.

When the model was restricted to those who were aged 50–64, the health condition of the person was the only factor that was significant. The age of the person was not a significant factor. However, at ages 65 and over, most of the significant variables in the 50 and over model remained significant (except for region), while speaking a language other than English at home increased the likelihood of meeting the steps threshold.

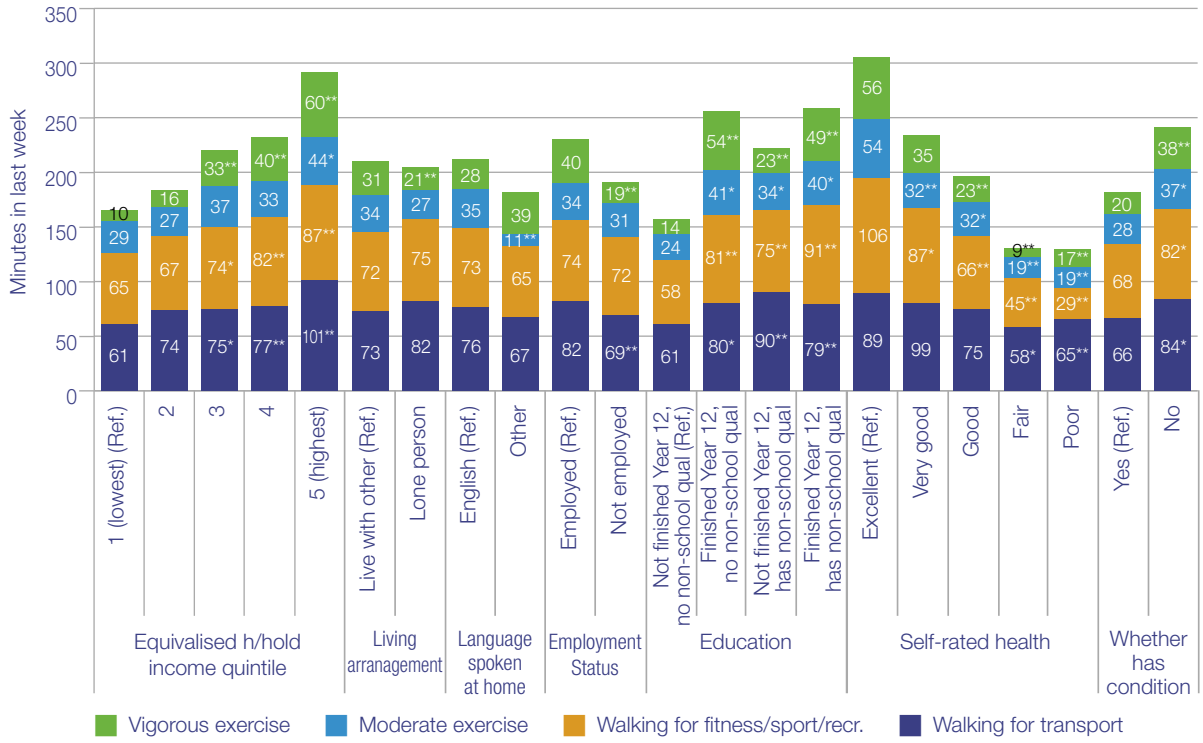
Comparison of the measurements of physical activity from self-reported and pedometer data can provide insight into their concordance. Twenty-four per cent of seniors who reported that they were sufficiently active to gain health benefits averaged 10,000 steps per day as measured by the pedometer (*Table 4*). Further, 65% of people who averaged 10,000 steps per day reported that they were sufficiently active to gain health benefits.

Figure 3a: *Type of physical activity in previous week (average minutes), by socio-economic and demographic characteristics*



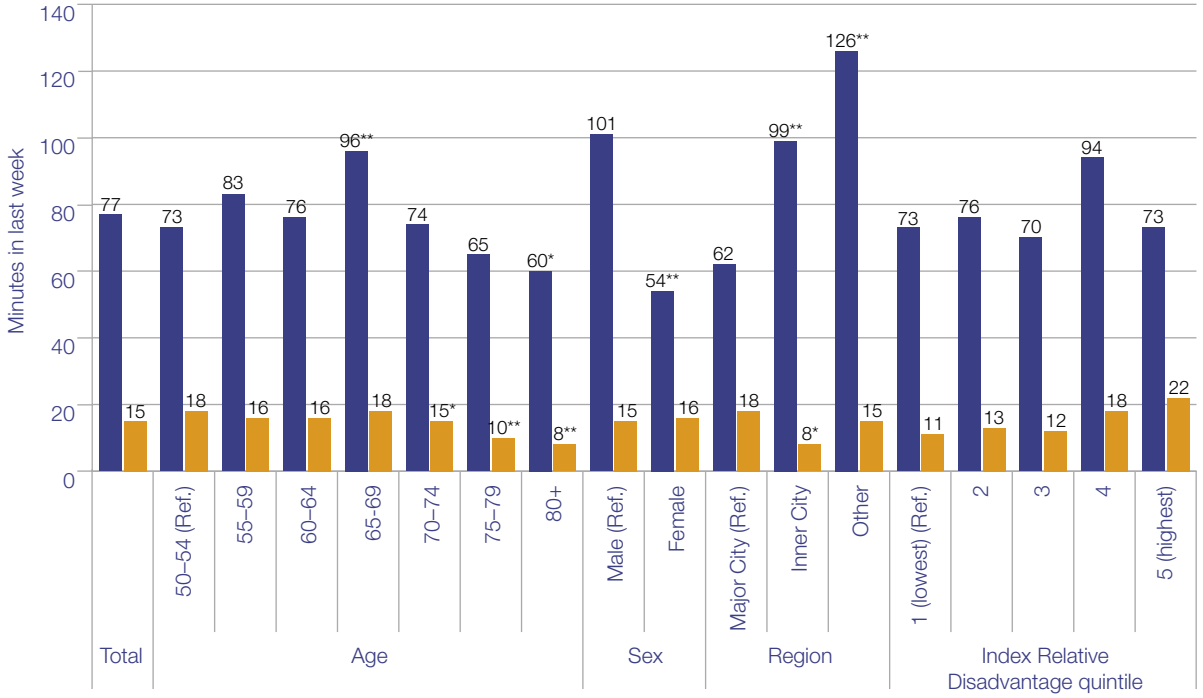
*Ref.=Reference group, H/hold=Household, * p<0.05, ** p<0.01. Asterisk(s) indicate where the average for a type of physical activity is statistically significant from the reference category (shown by 'Ref.').*

Figure 3b: *Type of physical activity in previous week (average minutes), by socio-economic and demographic characteristics*



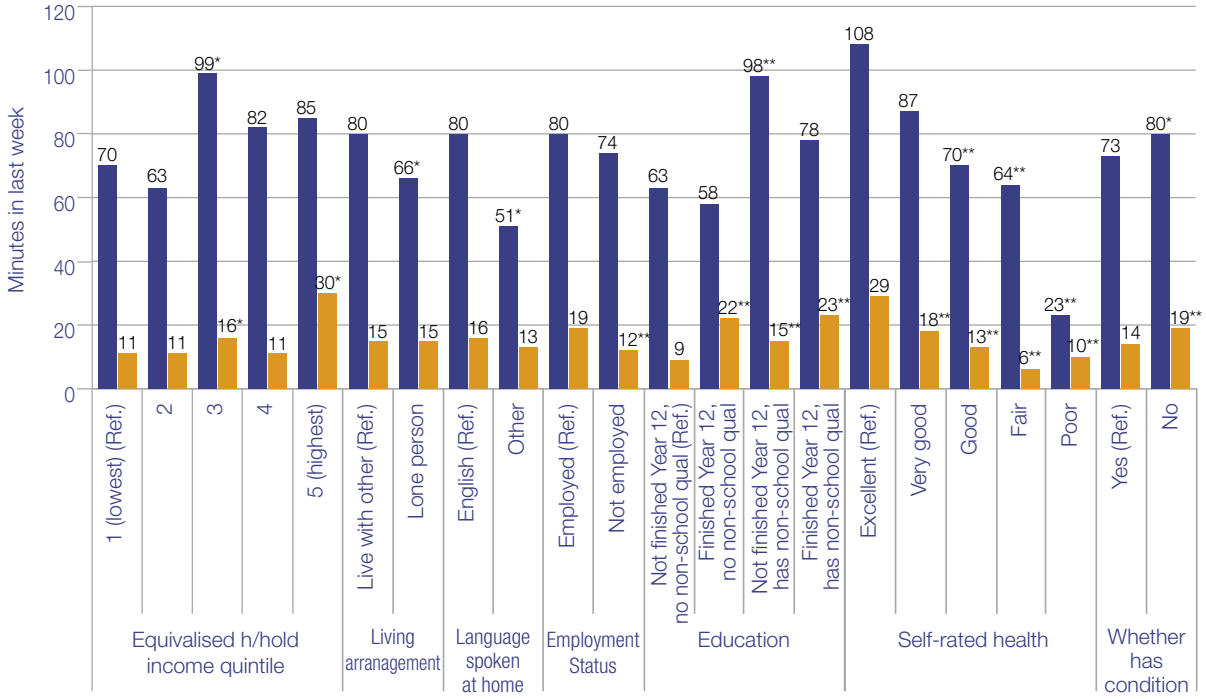
*Ref.=Reference group, H/hold=Household, Qual.=qualification, * p<0.05, ** p<0.01. Asterisk(s) indicate where the average for a type of physical activity is statistically significant from the reference category (shown by 'Ref.').*

Figure 3c: *Type of physical activity in previous week (average minutes), by socio-economic and demographic characteristics*



** p<0.05, ** p<0.01. Asterisk(s) indicate where the average for a type of physical activity is statistically significant from the reference category (shown by 'Ref.').*

Figure 3d: *Type of physical activity in previous week (average minutes), by socio-economic and demographic characteristics*



*Qual.=qualification, * p<0.05, ** p<0.01. Asterisk(s) indicate where the average for a type of physical activity is statistically significant from the reference category (shown by 'Ref.').*

Table 3: *Pedometer measurement (%), people aged 50 and over, 50–64 and 65 and over*

	50+				50–64		65+	
	% partic.	% met 10K steps/ day	Model Coef.	Model p-value	Model Coef.	Model p-value	Model Coef.	Model p-value
50+	55.6	14.7						
50–64	56.7	18.4	-	-	-	-	-	-
65+	54.0	9.2	-	-	-	-	-	-
Age (continuous)	-	-	-0.027**	0.005	-0.004	0.854	0.100**	0.000
Sex (Ref.=Male)	55.7	15.3	Ref.		Ref.		Ref.	
Female	55.5	14.1	-0.137	0.300	0.028	0.862	-0.408	0.109
Region (Ref.=Major city)	54.7	15.0	Ref.		Ref.		Ref.	
Inner Regional	60.2	14.6	0.245	0.146	0.268	0.192	0.215	0.485
Outer Regional and Remote	51.9	13.0	0.359*	0.041	0.362	0.080	0.479	0.163
Index Relative Disadvantage quintile (Ref.=1 Lowest)	56.4	10.6	Ref.		Ref.		Ref.	
2	53.9	12.9	0.112	0.590	-0.067	0.789	0.583	0.146
3	56.2	17.6	0.234	0.272	-0.087	0.740	0.996*	0.011
4	55.8	14.1	-0.153	0.505	-0.189	0.480	-0.046	0.924
5 Highest	55.8	18.3	0.223	0.327	0.091	0.739	0.465	0.292
Equivalised h/hold income quintile (Ref.=1 Lowest)	50.5	9.7	Ref.		Ref.		Ref.	
2	62.0	8.7	0.279	0.202	0.280	0.366	0.410	0.203
3	60.7	10.1	0.149	0.535	0.051	0.870	0.336	0.400
4	59.8	24.2	0.666**	0.004	0.539	0.068	1.091**	0.007
5 Highest	61.7	21.2	0.389	0.119	0.432	0.162	0.156	0.773
Living arrangement (Ref.=Live with others)	57.4	14.6	Ref.		Ref.		Ref.	
Lone person	49.2	15.2	0.248	0.078	0.320	0.058	0.138	0.612
Language spoken at home (Ref.=English)	57.0	14.8	Ref.		Ref.		Ref.	
Other	42.9	14.1	0.484	0.093	0.309	0.396	0.967*	0.047
Employment status (Ref.=Employed)	58.1	21.6	Ref.		Ref.		Ref.	
Not employed	53.3	8.0	-0.492**	0.005	-0.392	0.072	-0.669*	0.020
Education (Ref.= Not finished Year 12, no non-school qualification)	49.9	11.2	Ref.		Ref.		Ref.	
Finished Year 12, no non-school qualification	56.6	17.8	0.217	0.389	0.338	0.266	-0.045	0.925
Not finished Year 12, has non-school qualification	60.6	13.8	0.078	0.651	0.299	0.165	-0.416	0.182
Finished Year 12, has non-school qualification	59.4	18.7	0.137	0.438	0.239	0.273	-0.039	0.904
Has health condition (Ref.=No)	55.5	19.5	Ref.		Ref.		Ref.	
Yes	55.7	10.0	-0.509**	0.000	-0.497**	0.003	-0.609*	0.012
N				**2,151**		**1,168**		**983**

*Ref.=Reference group, Coef.=Coefficient, H/hold=Household, Partic.=Participated in pedometer measurement, N=sample size, * p<0.05, ** p<0.01*

Table 4: *Whether met pedometer threshold of 10,000 steps per day (%) in previous week by level of physical activity in previous week (%), people aged 50 and over*

	Inactive	Insufficiently active	Sufficiently active	Total
% of people with each level of physical activity				
Met 10,000 steps/day	6.1	10.2	23.5	14.7
Did not meet 10,000 steps/day	93.9	89.8	76.5	85.3
Total	100.0	100.0	100.0	100.0
% of people who had met or not met the pedometer threshold				
Met 10,000 steps/day	9.2	25.6	65.1	100.0
Did not meet 10,000 steps/day	24.4	38.7	36.8	100.0
Total	22.2	36.8	41.0	100.0

Discussion

This report has found that only a minority of senior Australians are meeting the recommended level of physical activity, based on their reports of activity in the week prior to being interviewed. Just under 38% were sufficiently active to gain health benefits; 43% of those with no health condition were sufficiently active to gain health benefits and 42% of those aged 50–64 were sufficiently active to gain health benefits. Worryingly, 25% were inactive, that is they did not do any physical activity in the week before the interview. Even among those people without a health condition, 22% were inactive. Findings from the use of a pedometer to measure respondents' average daily steps showed that only 15% took the recommended 10,000 steps per day. Again, a low number of people (20%) with no health condition took the recommended 10,000 steps per day. However, there was discordance between the two measures, with approximately more than 30% of people who had met the 10,000 steps per day threshold not sufficiently active to gain health benefits.

The strength and direction of the relationship between socio-economic and demographic characteristics and physical activity differed between the self-reported and pedometer data. Regression results, where age and health status were controlled for, showed that living outside a major city predicted less self-reported physical activity, but conversely predicted a greater likelihood of reaching the 10,000 steps per day threshold. Similarly, while having at least finished Year 12 or having a non-school qualification predicted greater self-reported physical activity, it was not significant in predicting whether a person walked 10,000 steps per day. Also, speaking a language other than English at home and employment status also provided inconsistent results between the two measures. Household income, however, strongly predicted self-reported sufficient physical activity and, for the second highest quintile only, reaching the 10,000 steps threshold. Notably, vigorous exercise and strength/toning exercise were higher among higher income groups.

Gender was not a significant predictor in any of the models, however, consistent with past research, males participated in moderate and vigorous exercise and vigorous gardening for a greater average number of minutes per week compared with women. Age negatively predicted physical activity after age 65 but not within the 50–64 age group, demonstrating that physical activity levels do not decline until at least 65. An encouraging finding was that living alone predicted higher self-reported physical activity, suggesting that this group who are at risk of social isolation may be benefitting socially from being physically active.

There are some possible explanations for the differing results between the self-reported data and those measured by the pedometer. As previously reported, there is discordance between the two measures. The proportion of seniors reaching the threshold level of 10,000 steps (15%) (as measured by the pedometer) was significantly less than the proportion of people who were sufficiently active to gain health benefits according to self-reported data (38%). It is possible that the predictors of having a higher level of physical activity (i.e. in the top one-seventh of seniors) were different to being in a less exclusive category (i.e. in the top two-fifths of seniors). Secondly, the two methods measured different types of activity. While the self-reported data measured walking for fitness, walking for transport and moderate and vigorous exercise, the pedometer measured all steps that were taken by the respondent. Walking while at work, for example, was more likely to be recorded by the pedometer compared with the self-reported data.

This is likely to explain why not being employed predicted higher physical activity based on self-reported data, but being employed predicted higher physical activity based on the pedometer measurement. Also, the measure of sufficient physical activity from self-reported data accounts for the intensity of exercise, with vigorous exercise being given a higher weighting than other forms of exercise; the pedometer measure does not do this. Finally, an advantage of the pedometer measurement is that it was an objective measure and was not subject to potential biased measures from people who may have reported what they know is the recommended level of physical activity. It is possible that the strength of education in predicting sufficient physical activity from the self-reported data, but not predicting whether a person met the threshold of 10,000 steps as measured by the pedometer, could be influenced by such bias. However, it was not possible to quantify this bias from these data.

A range of interventions exists to improve physical activity among seniors. The Heart Foundation Blueprint for an Active Australia recommends a range of interventions at different locations tailored to the different needs of seniors. These recommendations include aerobic fitness, muscle strength and flexibility programs at health clubs and recreation centres, community-based programs such as walking groups or swim clubs, and programs for people who are housebound or living in an aged care facility.[45] An example of a physical activity program is the Heart Foundation Walking program, a free community-based walking project that aims to encourage regular physical activity among people who are not usually active.[46] Another intervention is the Healthy Ageing Quiz, developed by the National Ageing Research Institute with funding from NSPAC, which is a self-assessment quiz used to help seniors determine whether their lifestyle choices, including physical activity, are helping them age well.[47] Notwithstanding the drawbacks of the self-reported data, this report's findings can inform the targeting of interventions given that its measure of physical activity is consistent with *Australia's Physical Activity and Sedentary Behaviour Guidelines*. Interventions should focus on areas outside major cities, where physical activity levels are lower, and also where possible, in lower income households.

As Australia's population continues to age, it will be very important to encourage seniors to be more physically active to reduce their risk of cardiovascular disease, dementia and mental illness, and improve their overall quality of life. Not only can sufficient physical activity have individual benefits, it can also lower the health care costs associated with an ageing population.

[45] Brown WJ, van Uffelen JGZ. Action area 10: Older people. In: Blueprint for an active Australia. 2nd edition. Melbourne: National Heart Foundation of Australia, 2014. p. 69.

[46] Heart Foundation. (2015). *Heart Foundation Walking program*. http://walking.heartfoundation.org.au/

[47] Vrantsidis, F., Cyarto, E., Dow, B. et al. (2010). *Healthy Ageing Quiz: Practical tips for ageing well*. Canberra: National Seniors Productive Ageing Centre.

Appendix

Table A.1: *Univariate statistics of socio-economic and demographic characteristics*

Variable	%	Variable	%
Age		*Language spoken at home*	
50–64	58.1	English	90.0
65+	41.9	Other	10.0
Sex		*Employment status*	
Male	48.3	Employed	47.3
Female	51.7	Not employed	52.7
Region		*Education*	
Major city	67.4	Not finished Year 12, no non-school qualification	39.8
Inner Regional	21.8	Finished Year 12, no non-school qualification	8.4
Outer Regional and Remote	10.8	Not finished Year 12, has non-school qualification	26.2
Index Relative Disadvantage quintile		Finished Year 12, has non-school qualification	25.7
1 (Lowest)	20.1	*Self-rated health*	
2	21.2	Excellent	13.8
3	20.0	Very good	31.9
4	18.7	Good	31.8
5 (Highest)	20.1	Fair	15.9
Equivalised h/hold income quintile		Poor	6.7
1 (Lowest)	27.9	*Has health condition*	
2	21.1	Yes	50.4
3	16.5	No	49.6
4	16.7		
5 (Highest)	17.8	**Total**	**100.0**
Living arrangement			
Lives with others	78.4		
Lone person	21.6		

H/hold: Household

Table A.2: *Further multinomial logistic regressions of level of physical activity in previous week, people age 50–64 and 65 and over*

	50–64				65+			
	Insufficiently active vs Inactive		Sufficiently active vs Inactive		Insufficiently active vs Inactive		Sufficiently active vs Inactive	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
Age (continuous)	0.004	0.791	-0.001	0.942	-0.044**	0.000	-0.074**	0.000
Sex (Ref.=Male)	Ref.		Ref.		Ref.		Ref.	
Female	0.153	0.230	0.082	0.520	-0.177	0.170	-0.249	0.066
Region (Ref.=Major city)	Ref.		Ref.		Ref.		Ref.	
Inner Regional	-0.138	0.392	-0.328*	0.044	-0.191	0.212	-0.343*	0.035
Outer Regional and Remote	-0.187	0.249	-0.282	0.083	-0.761**	0.000	-0.723**	0.000
Index Relative Disadvantage quintile (Ref.=1 Lowest)	Ref.		Ref.		Ref.		Ref.	
2	0.185	0.319	0.320	0.089	-0.132	0.440	-0.305	0.095
3	0.035	0.859	0.093	0.641	-0.149	0.430	-0.271	0.171
4	0.276	0.179	0.129	0.539	0.048	0.807	-0.171	0.413
5 Highest	0.239	0.298	0.400	0.080	0.149	0.504	-0.151	0.520
Equivalised h/hold income quintile (Ref.=1 Lowest)	Ref.		Ref.		Ref.		Ref.	
2	-0.080	0.703	-0.203	0.351	-0.152	0.277	-0.084	0.579
3	-0.083	0.705	-0.188	0.399	0.126	0.545	0.254	0.241
4	0.008	0.972	0.269	0.242	-0.086	0.746	0.286	0.285
5 Highest	0.190	0.439	0.406	0.098	-0.178	0.605	0.632	0.059
Living arrangement (Ref.=Live with others)	Ref.		Ref.		Ref.		Ref.	
Lone person	-0.199	0.146	0.032	0.813	0.263*	0.042	0.363**	0.008
Language spoken at home (Ref.=English)	Ref.		Ref.		Ref.		Ref.	
Other	-0.084	0.768	-0.221	0.448	0.052	0.818	-0.441	0.089
Employment status (Ref.=Employed)	Ref.		Ref.		Ref.		Ref.	
Not employed	0.287	0.091	0.374*	0.029	0.010	0.958	0.642**	0.003
Education (Ref.= Not finished Year 12, no non-school qual.)	Ref.		Ref.		Ref.		Ref.	
Finished Year 12, no non-school qualification	0.022	0.929	0.338	0.162	0.822**	0.002	0.791**	0.006
Not finished Year 12, has non-school qualification	0.117	0.449	0.236	0.135	0.026	0.864	0.282	0.076
Finished Year 12, has non-school qualification	0.585**	0.001	0.989**	0.000	0.262	0.163	0.757**	0.000
Self-rated health (Ref.=Excellent)	Ref.		Ref.		Ref.		Ref.	
Very good	-0.161	0.476	-0.405	0.059	0.570*	0.015	0.094	0.680
Good	-0.203	0.368	-0.878	0.000	0.067	0.767	-0.277	0.204
Fair	-0.720**	0.004	-1.389**	0.000	-0.309	0.194	-1.084**	0.000
Poor	-1.615**	0.000	-2.042**	0.000	-0.864**	0.002	-1.627**	0.000
N	**1,984**				**1,841**			

Ref.=Reference group, Coef.=Coefficient, H/hold=Household, N=Sample size, p<0.05, ** p<0.01*

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