

Muscle strengthening activities among Australian adults

Appendix

Data sources

The National Health Survey 2017–18

The Australian Bureau of Statistics (ABS) conducts the National Health Survey (NHS) every 3 years. To determine how many Australians are meeting the physical activity guidelines (the Guidelines), the ABS NHS collected information on exercise (for leisure or walking for transport) and workplace physical activity in order to assess whether people met the Guidelines (ABS 2019).

Adults aged 18–64 were considered to have met the Guidelines if:

- they were active on most days of the week
- they had accumulated 150 to 300 minutes of moderate intensity physical activity or 75 to 150 minutes of vigorous intensity physical activity (or an equivalent combination) each week
- they had done muscle strength and toning activities on at least 2 days each week (ABS 2019).

Definitions

Strength and toning exercises were defined in the 2017–18 ABS NHS as:

- activities designed to increase muscle strength or tone, such as lifting weights, resistance training, pull-ups, push-ups, or sit-ups
- includes strengthening and toning activities already mentioned [in response to earlier questions about walking and moderate or vigorous physical activities].

For more information about the physical activity definitions used in the 2017–18 ABS NHS, please see the appropriate section of the User's Guide at <https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4363.0~2017-18~Main%20Features~Physical%20activity~41>.

Muscle strengthening activity question

Strength and toning questions were asked about activity that was deliberately intended to increase muscle strength and tone (referred to here as muscle strengthening activity, or MSA). Time spent carrying out strength and toning activities was not collected separately to minutes of physical activity reported and therefore may not be included in calculations of total physical activity time, or subsequently whether guidelines are met (ABS 2019). The questions about strength and toning in the NHS are as follows:

'Some activities are designed to increase muscle strength or tone, such as lifting weights, resistance training, pull-ups, push-ups, or sit-ups. Including any activities already mentioned [in previous questions about exercising for leisure] in the last week did [you/[first name]] do any strength or toning activities?'

Follow up to yes/no response: 'on how many days last week did [you/[first name]] do any strength or toning activities?'

For more information on the National Health Survey, please see the National Health Survey Users' Guide, 2017–18 at <https://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4363.0Main+Features12017-18?OpenDocument>

AusPlay

AusPlay is a national survey funded by the Australian Sports Commission (ASC) and was designed to address gaps in national sport and physical recreation data, following the Australian Bureau of Statistics' (ABS) decision in 2014 to cease data collection (Analysis and Policy Observatory 2016).

Data are collected for almost 400 different activities that are self-nominated by survey respondents. These activities are then collated into a smaller number of output activities for reporting purposes.

The original objectives for AusPlay did not include measurement of the Department of Health Physical Activity and Sedentary Behaviour Guidelines and the questionnaire was not designed for this purpose.

AusPlay questions

'In the last 12 months, what sports or physical activities have you done? Please start with the ones you have spent the most time doing.'

'What other sports or physical activities have you done for exercise or recreation in the last 12 months? Please include activities even if you've only done them once or twice in the last year.'

When respondent is 'running out of activities', interviewers are instructed to use the probe:

'Please include exercise or activity that you have done 'virtually' through a motion sensing game console such as a Wii, Xbox or PS3Move.'

For each activity recorded (up to 10), respondents were asked:

'Approximately, how many times in total have you done [activity] during the last 12 months (including any practice or training)?'

For more information on the AusPlay survey methodology and survey design, please see <https://www.clearinghouseforsport.gov.au/research/smi/ausplay/method>.

Key differences between the ABS NHS and AusPlay surveys

Some of the key differences between the 2017–18 ABS NHS and AusPlay that may affect the physical activity estimates include:

- Sampling and data collection methods: the ABS NHS was conducted via face-to-face interviews with respondents selected from a stratified multistage area sample of private dwellings. AusPlay was conducted via telephone interview, using an overlapping dual-frame design with 2 random samples of (a) landline phone numbers and (b) mobile phone numbers. As well as the survey mode potentially influencing the responses provided, there is evidence to suggest that some people are more likely to respond to phone surveys than others (e.g. women, older people and people with a long-term disease or disability) (Glass et al. 2015, Hollier et al. 2017). This may result in different groups of people responding to the AusPlay survey than those responding to the ABS NHS.

- Survey questions: the AusPlay survey asked respondents to report all sports and physical activities they had participated in in the past 12 months, and interviewers probed respondents with examples to aid their recall (Clearinghouse for Sport 2016). The ABS NHS asked respondents specifically whether they had done any *muscle strengthening* activities in the last week, and gave some examples of what these might be (ABS 2018). These differences could potentially influence the activities that respondents reported.
- Response rate: the response rate for the ABS NHS in 2017–18 was 76% (ABS 2018) and the response rate for AusPlay for the same period was 23% (Hughes 2018). This difference in response rates may be attributed to a range of factors, including the different collection methodologies and respondent-engagement techniques. These differences in response rates may impact the generalisability of the data. Both surveys have been weighted to be representative of the Australian population (that were in scope of each survey).

Methods

AusPlay activities

AusPlay respondents were asked which activities they had participated in during the last 12 months. Each of these activities (known as ‘input activities’) from the AusPlay data were grouped with similar activities to form ‘output categories’. For example, if a respondent reported taking classes at the gym, gym workouts and boot camp as their ‘input activities’, these would be grouped into the output category of ‘gym/fitness.’

Survey respondents were also asked how many times they had done each ‘input activity’ in the last 12 months. However, the data item available to the AIHW for analysis was the sum of the 12 month frequencies for all input activities reported by the respondent that corresponded to an output category.

In order to group the activities from the AusPlay survey into the classifications used in the current study (Box 1 in main report), the methodology from the Health Survey for England (NHS Digital 2017) was adapted and applied to the AusPlay data.

In the Health Survey for England, for activities that were considered potentially muscle strengthening, a follow-up question was asked to establish whether the activity was sufficiently strenuous to have built up muscles:

‘During the past four weeks, was the effort of [name of activity] usually enough to make your muscles feel some tension, shake or feel warm?’

However, this question was not asked in AusPlay, so this condition cannot be applied to determine how many people may have performed ‘potentially MSA’ to a sufficient extent to be counted.

Instead, results were presented for AusPlay activities that were considered ‘definitely MSA’ (including resistance training), and using a combined list of ‘definitely or potentially MSA’ (which is expected to be an overestimate of actual MSA).

The Health Survey for England also only included bouts of activities that were at least 10 minutes in length. AusPlay asks about the duration of the most recent session, but the requirement for each session in the year analysed to be for at least 10 minutes cannot be applied in this analysis.

Calculating frequency of each classification of activity

Each input activity was classified as either 'definitely muscle strengthening', 'potentially muscle strengthening' or 'not muscle strengthening', according to the classification adapted from the UK definitions. This involved applying similar classifications to sports recorded in AusPlay that were not specifically mentioned in the UK definitions. For example, while Australian Football was not specifically mentioned in the Health Survey for England Study, rugby was classified as potentially muscle strengthening in that study. As rugby is a reasonably similar activity to Australian Football, the same classification of potentially muscle strengthening was applied to this input activity. For the MSA classification applied to each activity in AusPlay, see Table A1 below.

As a frequency variable was not available for individual input activities for each respondent, input activities were considered to have a frequency equal to the total frequency for the output category divided by the number of input activities a respondent did for that output category. For example, if a respondent reported yoga and running as their two input categories, and the frequency for the respondent was listed as 100, both yoga and running would be considered to have a frequency of 50. However, nearly all output categories (97%) had a single input activity so this approximation should only have a minor influence.

Subsequently, the frequencies of all input activities that were 'resistance training activities', 'definitely MSA', and 'potentially MSA' were summed separately for each respondent.

Classification of MSA levels

The frequency of each of the following classifications of MSA were calculated:

- total frequency of 'resistance training activities' over the last 12 months
- total frequency of 'definitely MSA' over the last 12 months
- total frequency of 'definitely or potentially MSA' over the last 12 months.

For each of these frequencies, individuals were classified as having done no MSAs, insufficient MSAs or sufficient MSAs. If the total frequency over the last 12 months was greater than or equal to 104, then they were considered to have sufficiently met the muscle strengthening guideline. If the total frequency was greater than 0 but less than 104, they were considered to have done insufficient MSAs to meet the guideline. A frequency of 0 was considered as inactive and having done no MSAs in the last 12 months.

For this analysis, it was assumed that sessions of MSAs took place on separate days (as per the recommendation in the Guidelines that MSAs be done on 2 or more days per week).

Determining the most common activities for all adult respondents to the AusPlay survey who reported doing MSAs

The proportions calculated for the most common activities use all responses from adults who performed activities classified as 'definitely MSA' at least once in the last 12 months, even if they did fewer than 2 sessions per week on average (or 104 per year). This included some respondents who had not met the MSA guideline. The total subpopulation was used as the denominator for each proportion (e.g. all men, women or people in that age group).

Weights and sampling error

The scope of this report is restricted to people aged 18 to 64 at the time that they were surveyed.

All estimates have been produced using the weights provided by Sport Australia to represent the Australian population. This report uses annual estimates, so the quarterly weights have been divided by 4 to properly represent the population of each year.

Estimates of the standard error and margin of error were calculated using linear interpolation based on the values from the standard error tables for adults in the AusPlay methodology reports (Hughes 2018). These margin of error estimates were used to construct the 95% confidence intervals provided in the supplementary tables.

The statistical significance of any difference in estimates between subpopulations has been assessed using 95% confidence intervals of the difference.

Definitions

Health Survey for England MSA inclusions

According to the methodology for the Health Survey for England, activities were classified in the following manner:

- Activities were counted as muscle strengthening only if carried out in bouts of 10 minutes or more.
- The following activities were always included as muscle strengthening activities, regardless of whether or not participants indicated in a follow-up question that the effort of that activity was usually enough to make their muscles feel some tension, shake or feel warm: canoeing, climbing, field athletics, horse riding, kayaking, rowing, sailing, skiing or snowboarding, tai chi, water skiing, wind surfing.
- The following activities were included as muscle strengthening activities for participants who reported that the effort of that activity was usually enough to make their muscles feel some tension, shake or feel warm: aqua aerobics or aquafit, aerobics, basketball, body boarding, bowls, exercise (press-ups, sit-ups etc.) cricket, curling, golf, hillwalking, hockey, ice skating, martial arts other than tai chi, netball, Pilates, rambling, surfing, tenpin bowling, volleyball, workout at a gym (e.g. exercise bike, weight training), yoga.
- For some activities, the question about whether the effort of that activity was usually enough to make their muscles feel some tension, shake or feel warm was not asked. These activities were always included as muscle strengthening activities, and include: badminton, cycling, dancing, football, rugby, running or jogging, squash, swimming, tennis.

For more information on the Health Survey for England methodology, please see <http://healthsurvey.hscic.gov.uk/media/63730/HSE16-Adult-phy-act.pdf>.

Table A1: MSA classifications applied to AusPlay data

Resistance training	Definitely MSA <small>(also includes 'resistance training' activities)</small>	Potentially MSA
Bodybuilding	Australian football/AFL	Adventure racing
Boot camp	Badminton	Baseball
Calisthenics	BMX	Basketball
Circuits	Canoeing/kayaking (including outrigger canoe, paddle sports)	Bocce/boules/bowls
CrossFit	Cycling	Boxing
Gym workouts	DanceSport	Bushwalking
Powerlifting	Dancing (recreational)	Cricket
Weight training	Dragon boat racing	Floorball
Weightlifting	Equestrian (including campdrafting, horse racing and pony club)	Golf
	Football/soccer	Gymnastics (trampolining)
	Gridiron	Hockey
	Gymnastics (except trampolining)	Ice hockey
	Kitesurfing/kiteboarding	Ice skating
	Mountain biking	Lacrosse
	Oztag	Lifesaving
	Parkour	Martial arts (including Judo, Jujitsu, Karate, Kendo, Kung fu wushu, Muay Thai and Taekwondo)
	Polo/Polocrosse	Mixed martial arts
	Rock climbing/abseiling/caving (including sport climbing)	Netball
	Rodeo	Orienteering

(continued)

Table A1 (continued): MSA classifications applied to AusPlay data

	Rowing	Other fitness/gym (includes gym classes, exercise at home and others)
	Rugby league	Pilates
	Rugby union	Rope skipping
	Running and athletics	Skating
	Sailing	Softball
	Skiing & snowboarding	Surfing
	Squash	Tenpin bowling
	Swimming	Volleyball
	Synchronised swimming	Wrestling
	Tennis	Yoga
	Touch football	
	Triathlon	
	Underwater sports	
	Water polo	
	Waterskiing/wakeboarding	
	Wheelchair rugby	
	Wood chopping	

References

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