

OVERWEIGHT/OBESITY, PHYSICAL ACTIVITY AND DIET AMONG AUSTRALIAN SECONDARY STUDENTS – FIRST NATIONAL DATASET 2009-10

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Abstract

There is an increasing prevalence of overweight and obesity among young people, placing them at higher risk of chronic diseases, including some cancers, later in life. Previously in Australia, there has been no standardised monitoring of adolescents' body weight, and dietary and physical activity behaviours across all states and territories and at a national level. To address this gap, Cancer Council Australia and the National Heart Foundation of Australia established the National Secondary Students' Diet and Activity survey. Based on the successful Australian Secondary Students' Alcohol and Drug survey implementation model, the National Secondary Students' Diet and Activity survey was first conducted in 2009-10 with a national representative sample of 12,188 secondary school students from year levels 8 to 11 (ages 12 to 17 years). The main findings from this survey were that, in general, students' patterns of consumption of vegetables and fruit and time spent in physical activity and small screen recreation were less than optimal. Further, just under one in four students were classified as overweight or obese, according to objective height and weight measurements. With government funding support, the National Secondary Students' Diet and Activity survey can become a regular monitoring system and allow Australian adolescents' dietary and physical activity habits and their prevalence of overweight and obesity to be tracked over time.

Obesity is a significant public health challenge facing Australia, as evidenced by the National Preventative Health Taskforce identifying it as one of its three key targets for preventative action, along with tobacco and alcohol, to reduce the burden of chronic disease in the community.¹ Of particular concern is the increasing prevalence of overweight and obesity among young Australians,² placing them at greater risk of developing a number of chronic conditions, most notably some cancers, diabetes and cardiovascular disease.³ Excess weight essentially occurs as a result of energy imbalance, with both dietary behaviour and physical activity important influences.⁴

To effectively tackle the issue of childhood obesity, it is important to first gain a population-based picture of young people's body weight, and dietary and physical activity behaviours. Previous efforts to monitor these health risk factors within the Australian youth population have largely been either state-based (eg. *NSW Schools Physical Activity and Nutrition Survey*,⁵ *WA Children and Adolescent Physical Activity and Nutrition Survey*⁶) or sporadic national surveys with limited sample sizes that do not allow for individual state/territory reporting (eg. 2007 Australian National Children's Nutrition and Physical Activity Survey).⁷ To address this gap in existing data, Cancer Council Australia and the National Heart Foundation of Australia established the National Secondary Students' Diet and Activity (NaSSDA) survey.

The NaSSDA survey was specifically designed to provide a coordinated state/territory and national approach to the collection and reporting of the prevalence of overweight/obesity, as well as eating and physical activity patterns, among Australian adolescents. This model is based on the Australian Secondary Students' Alcohol and Drug (ASSAD) survey, which has been conducted on a triennial basis since 1984.⁸ The success of the ASSAD implementation model in providing state and national trend data regarding adolescent use of tobacco, alcohol and illicit substances has contributed to a strong evidence-base for the advocacy and evaluation of tobacco control policy initiatives at both levels of government. For example, analysis of the ASSAD survey data from 1990-2005 has demonstrated that policies such as clean indoor air laws and increased prices of cigarettes are associated with lower adolescent smoking.⁹

Internationally, there are many examples of ongoing monitoring systems with a focus on youth weight status and related health behaviours. The Health Behaviour in School-aged Children study, conducted every four years in a growing number of countries across Europe and North America, collects data on physical activity and eating behaviours among students aged 11, 13 and 15 years.¹⁰ In the United States, the biennial Youth Risk Behaviour Surveillance System (YRBSS) assesses trends in unhealthy dietary behaviours and physical inactivity among high school students.¹¹ Both surveys also monitor

the prevalence of obesity using self-reported height and weight measurements.^{10,11} The establishment of a similar regular monitoring system in Australia, but which additionally includes anthropometric measures, would be an invaluable resource for future obesity prevention endeavours in this country.

Overview of NaSSDA survey methods

The inaugural NaSSDA survey was conducted in 2009–10 with a nationally representative sample of 12,188 secondary school students from year levels eight to 11 (ages 12 to 17 years). As per the ASSAD model, the sampling procedure was a stratified two-stage probability design, with schools randomly selected at the first stage of sampling and classes selected within schools at the second stage. Within each state and territory, schools were stratified by the three education sectors (government, Catholic and independent) and randomly selected from each sector. Where possible, at least one class group comprising a relatively random group of students (ie. not formed on the basis of selective criteria) was selected from each of the year levels eight to 11. Additional classes were selected where class sizes were small.

Data on students' eating, physical activity and sedentary behaviours were collected via a web-based self-report questionnaire completed in the classroom. Online administration of surveys has significant advantages over the more traditional paper modality, including improved data quality due to greatly reduced missing data and minimisation of invalid responses.¹² It also provides the portability required for a large national survey, and represents a cost-effective and sustainable approach to data collection that is well-accepted by schools and students.

The NaSSDA survey methods and measures were developed with input from a Technical Advisory Group comprising eight Australian researchers with specific expertise in conducting surveys on diet and activity in young people, particularly in school settings. Where possible, the student survey used existing and validated measures. For example, usual daily vegetable and fruit consumption was assessed using short dietary questions adapted from the 1995 National Nutrition Survey, which have reasonable validity when compared with 24-hour recall of vegetable and fruit intake for adults.¹³ Physical activity was assessed using the 60-minute *Moderate-Vigorous Physical Activity* screening measure, which provides a reliable and valid estimate of adolescents' overall physical activity behaviour and correlates well with an objective measure of physical activity.¹⁴ A subscale of the *Adolescent Sedentary Activity Questionnaire*, which has high reliability, was used to assess students' time spent in small screen recreation on both school days and the weekend.¹⁵

In addition to these behavioural measures, the student survey examined potential influences on adolescent eating habits and physical activity patterns such as perceived social and environmental barriers and facilitators, as well as exposure to media and marketing. Such questions have not been included in previous national nutrition and physical activity surveys, yet provide important insights

into the range of factors which may be affecting young people's food and activity choices. A further key aspect of the NaSSDA survey was the inclusion of a school questionnaire to assess features of the school food and activity environment, such as the availability of sports facilities and the presence of vending machines.

An anthropometric component was incorporated in the NaSSDA survey, with students' height, weight and waist circumference taken in accordance with standardised protocols.¹⁶ Despite the collection of this data adding increased complexity to the survey model, using actual measurements produces more reliable overweight/obesity prevalence estimates than self-report measurements which are subject to reporting bias.¹⁷ Height and weight measurements were used to calculate body mass index (weight/height²), which was classified into weight categories using age and sex specific cut-off points based on definitions of child overweight and obesity and grade one thinness (referred to as underweight).^{18,19}

Active parent/carer and student consent was required for participation in each component of the study, enabling students to opt-out of being measured while still completing the online questionnaire. Although the use of an active consent procedure had implications for the student response rate – 54% for the questionnaire component and 47% for anthropometric measurements – this limitation is common to most school-based surveys given the strict requirements of ethics committees and education authorities. The response rate achieved was comparable to similar state-based surveys recently undertaken in Australia.^{5,6}

Data were analysed using Stata SE 11.1 (StataCorp, Texas), and weighted by state, education sector, year level and sex to the population of students enrolled in Australia.²⁰ All analyses also adjusted for school level clustering.

Main findings

Body weight

While the majority of students were a healthy weight (72%), just under one in four students was classified as overweight (18%) or obese (5%). Five per cent of all students were underweight. Among males, 19% were categorised as overweight with a further 5% obese. Seventeen per cent of females were overweight and 5% were obese. These results are comparable with recent national surveys that utilised smaller samples and different methods.^{7,21}

Vegetable and fruit consumption

Students' daily patterns of vegetable and fruit consumption are highlighted in figure 1. *The Australian Guide to Healthy Eating* recommends that adolescents eat at least four serves of vegetables and at least three serves of fruit each day.²² Overall, only 24% of students reported eating recommended daily quantities of vegetables, while 41% reported meeting the recommended daily serves of fruit. However, the proximity of many students to achieving these targets was encouraging. For example, around one-quarter of students need to increase their daily vegetable

Figure 1: Usual number of daily serves of vegetables and fruit.

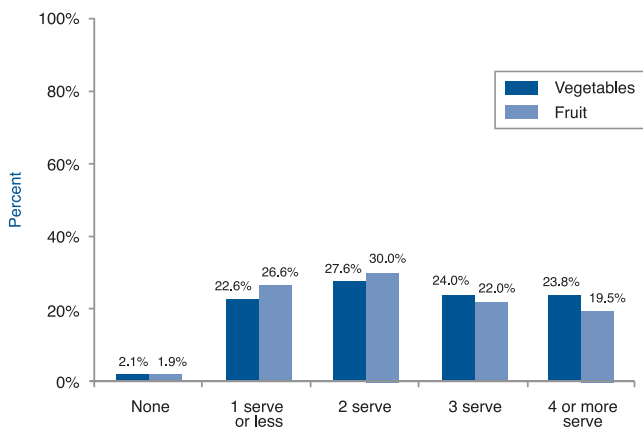


Figure 2: Number of days that students were physically active for at least 60 minutes over the previous week.

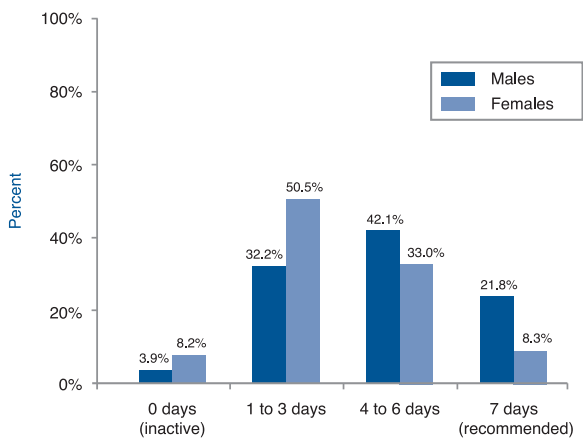
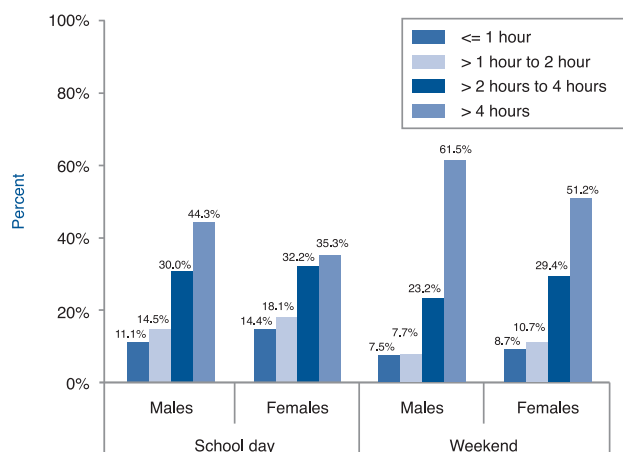


Figure 3: Usual number of hours of electronic media use for entertainment on school days and on the weekend.



intake by just one serve, while a similar one serve increase would see a further 30% of students eating sufficient daily amounts of fruit.

Nonetheless, there is a notable proportion of Australian adolescents falling well short of these dietary recommendations. Specifically, 25% of students reported eating none or one serve or less of vegetables each day, and 29% reported eating none or one serve or less of fruit each day.

Physical activity levels

Australia's Physical Activity Recommendations for 12-18 year-olds are that adolescents engage in at least 60 minutes of moderate to vigorous physical activity every day.²³ Overall, 15% of students reported meeting this physical activity recommendation over the previous week. Thirty-eight per cent of students were sufficiently active on four to six days, while 41% were sufficiently active on one to three days. Six per cent were not active for at least 60 minutes on any of the previous seven days.

Figure 2 shows patterns of physical activity over the previous week for males and females separately. Nearly two-thirds of male students were either engaging in recommended levels of physical activity (22%) or sufficiently active for four to six days in the week (42%). In contrast, more than half of all female students were sufficiently active for only one to three days (51%) or were deemed to be inactive (8%).

Small screen recreation

Recommendations suggest adolescents spend no more than two hours per day using electronic media for entertainment.²³ This includes time spent watching television, videos and DVDs, playing video games and using the computer for fun. Overall, 71% of all students reported spending, on average, more than two hours in small screen recreation on a usual weekday, while 83% of all students reported exceeding the daily recommendation on the weekend. However, of greater concern were the proportions of students spending more than four hours using electronic media for entertainment on an average school day (40%) and weekend day (57%). Few students were found to be limiting their daily time spent in small screen recreation to one hour or less on school days (13%) or the weekend (8%). As indicated in figure 3, male students reported spending higher amounts of time in small screen recreation compared with female students on both school days and the weekend.

Importance of the NaSSDA survey data

The results from the 2009-10 NaSSDA survey highlight that the eating and activity patterns of Australian adolescents are less than optimal. Specifically, they are not consuming adequate amounts of vegetables and fruit, and are spending too much time in front of the television and computer and not enough time being physically active. Further, while the majority of students are within a healthy weight range, the proportion that fall outside of this is of concern, given that obesity in adolescence predicts obesity in adulthood,²⁴ and the potential implications of excess weight for health.

With the increased focus on obesity prevention at a government level, the NaSSDA survey data is an important source of information for policy makers and program evaluators. A strength of the study is the intention for it to be an ongoing monitoring system of Australian adolescents' body weight, and dietary and physical activity behaviours using a standardised approach. This will enable the prevalence estimates from the 2009-10 NaSSDA survey to act as a baseline through which to track these health behaviours over time.

Although the first NaSSDA survey was funded entirely by Cancer Council Australia and the National Heart Foundation of Australia, the rising costs associated with running a large national survey are such that a funding model wholly dependent on non-government organisation resources is not sustainable. Thus, the long-term viability of the NaSSDA survey will be contingent on the ability to secure additional funding support from government. For example, funding partnerships have been formed with state and territory government health departments to ensure the continuation of the survey in 2012-13. This is a mutually beneficial arrangement which will provide governments with access to a rich amount of data on child obesity issues (ie. diet, physical activity, sedentary behaviour). It also represents a more efficient approach to the collection of these data by reducing potential survey overlap.

As the NaSSDA survey becomes more established and the national obesity prevention agenda progresses, there will likely be opportunities to include supplementary questions in future survey rounds to both inform policy debate and evaluate implemented policy initiatives. Indeed, a notable feature of the ASSAD survey has been its capacity to address topical tobacco control policy issues that have arisen overtime such as the introduction of graphic health warnings on cigarette packs.²⁵ However, it will be necessary to make sure that any secondary aims do not compromise the core aim of the survey which is to monitor trends.

Finally, while the NaSSDA survey is an important platform from which to improve the evidence base regarding obesity prevention in adolescence, it is just one part of what needs to be a comprehensive approach to obesity prevention in Australia. To maximise the survey's utility and ultimately reduce the burden of disease attributable to high body mass for current and future generations, other key action areas identified by the National Preventative Health Taskforce should also be prioritised.

NaSSDA Study Team

The NaSSDA Study Team comprises Cancer Council Victoria: Belinda Morley, Maree Scully, Melanie Wakefield; Technical Advisory Group: Louise Baur (Chair), Anthony Okely, Iain S Pratt, Jane Bowen, Jo Salmon, Victoria Flood, David Crawford, Anthony Worsley.

References

1. Australian Government. Obesity in Australia: a need for urgent action. Technical report no.1. Prepared for the National Preventative Health Taskforce by the Obesity Working Group; 2009 [online] [Accessed 2011 June 6]. Available from: <http://www.preventativehealth.org.au/internet/preventativehealth/publishing.nsf/Content/tech-obesity>

2. Australian Bureau of Statistics. Australian social trends, September 2009: children who are overweight or obese. Catalogue No. 4102.0. Canberra: Australian Bureau of Statistics; 2009.
3. World Health Organization. Diet, nutrition and the prevention of chronic diseases: report of a joint WHO/FAO expert consultation. WHO Technical Report Series; 916. Geneva: World Health Organization. 2003.
4. International Agency for Research on Cancer. Weight control and physical activity. Lyon: World Health Organization; 2002.
5. Hardy LL, King L, Espinel P, Okely AD, Bauman A. Methods of the NSW Schools Physical Activity and Nutrition Survey 2010 (SPANS 2010). *J Sci Med Sport*. 2011;14:390-6.
6. Martin K, Rosenberg M, Miller M, French S, McCormack G, Bull F, et al. Move and Munch final report: trends in physical activity, nutrition and body size in Western Australian children and adolescents: the Child and Adolescent Physical Activity and Nutrition Survey (CAPANS) 2008. Perth: Western Australian Government. 2010.
7. Department of Health and Ageing, Australian Food and Grocery Council, Department of Agriculture, Fisheries and Forestry. 2007 Australian National Children's Nutrition and Physical Activity Survey: main findings. Prepared by CSIRO, Preventative Health National Research Flagship, and the University of South Australia. 2008.
8. White V, Smith G. Australian secondary school students' use of tobacco, alcohol, and over-the-counter and illicit substances in 2008. Report prepared for Drug Strategy Branch, Australian Government Department of Health and Ageing. Melbourne: Cancer Council Victoria. 2009.
9. White V, Warne C, Spittal M, Durkin S, Purcell K, Wakefield M. What impact have tobacco control policies, cigarette prices and tobacco control program funding had on Australian adolescents' smoking? *Addiction*. 2011;106:1493-1502.
10. Roberts C, Currie C, Samdal O, Currie D, Smith R, Maes L. Measuring the health and health behaviours of adolescents through cross-national survey research: recent developments in the Health Behaviour in School-aged Children (HBSC) study. *J Public Health*. 2007;15:179-186.
11. Brener ND, Kann L, Kinchen SA, Grunbaum JA, Whalen L, Eaton D, et al. Methodology of the youth risk behavior surveillance system. *MMWR Recomm Rep*. 2004;53:1-13.
12. Morley B, Scully M, Dixon H, Wakefield M. National Secondary Students' Diet and Activity (NaSSDA) Survey, Pilot 2008. Prepared for NaSSDA Technical Advisory Group. Melbourne: Cancer Council Victoria. 2009.
13. Rutishauser IHE, Webb K, Abraham B, Allsopp R. Evaluation of short dietary questions from the 1995 National Nutrition Survey. Canberra: Australian Food and Monitoring Unit. 2001.
14. Prochaska JJ, Sallis JF, Long B. A physical activity screening measure for use with adolescents in primary care. *Arch Pediatr Adolesc Med*. 2001;155:554-9.
15. Hardy LL, Booth ML, Okely AD. The reliability of the Adolescent Sedentary Activity Questionnaire (ASAQ). *Prev Med*. 2007;45:71-4.
16. Davis P, Roodveldt R, Marks G. Standard methods for the collection and collation of anthropometric data in children. National Food and Nutrition Monitoring Surveillance Project. Canberra: Commonwealth of Australia. 2001.
17. Shery B, Jefferds ME, Grummer-Strawn LM. Accuracy of adolescent self-report of height and weight in assessing overweight status: a literature review. *Arch Pediatr Adolesc Med*. 2007.161:1154-61.
18. Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ*. 2000;320:1-6.
19. Cole TJ, Flegal KM, Nicholls D, Jackson AA. Body mass index cut offs to define thinness in children and adolescents: international survey. *BMJ*. 2007;335:194-201.
20. Australian Bureau of Statistics. Schools Australia, 2009. Catalogue No. 4221.0. Canberra: Australian Bureau of Statistics. 2010.
21. Australian Bureau of Statistics. 2007-08 National Health Survey: summary of results. Catalogue No. 4364.0. Canberra: Australian Bureau of Statistics. 2009.
22. Smith A, Kellett E, Schmerlaib Y. The Australian guide to healthy eating: background information for nutrition educators. Canberra: Commonwealth Department of Health and Family Services. 1998.
23. Department of Health and Ageing. Australia's Physical Activity Recommendations for 12-18 year olds. Canberra: Commonwealth Department of Health and Ageing. 2004.
24. Whitaker RC, Wright JA, Pepe MS, Seidel KD, Dietz WH. Predicting obesity in young adulthood from childhood and parental obesity. *N Engl J Med*. 1997;337:869-73.
25. White V, Webster B, Wakefield M. Do graphic health warnings have an impact on adolescents' smoking-related beliefs and behaviours? *Addiction*. 2008;103:1562-71.