Research Brief:

Energy Drink Consumption and Sleep in Australian Secondary School Students

The National Secondary Students' Diet and Activity (NaSSDA) survey is an important initiative of Cancer Council Australia that provides regular monitoring of young people's beliefs and behaviours surrounding diet and physical activity, as well as their experience of food marketing, to inform obesity prevention policy development and evaluate implemented strategies. This research brief summarises the current prevalence of energy drink consumption and low sleep duration among Australian secondary school students. It also explores the extent to which energy drink consumers are meeting sleep recommendations.

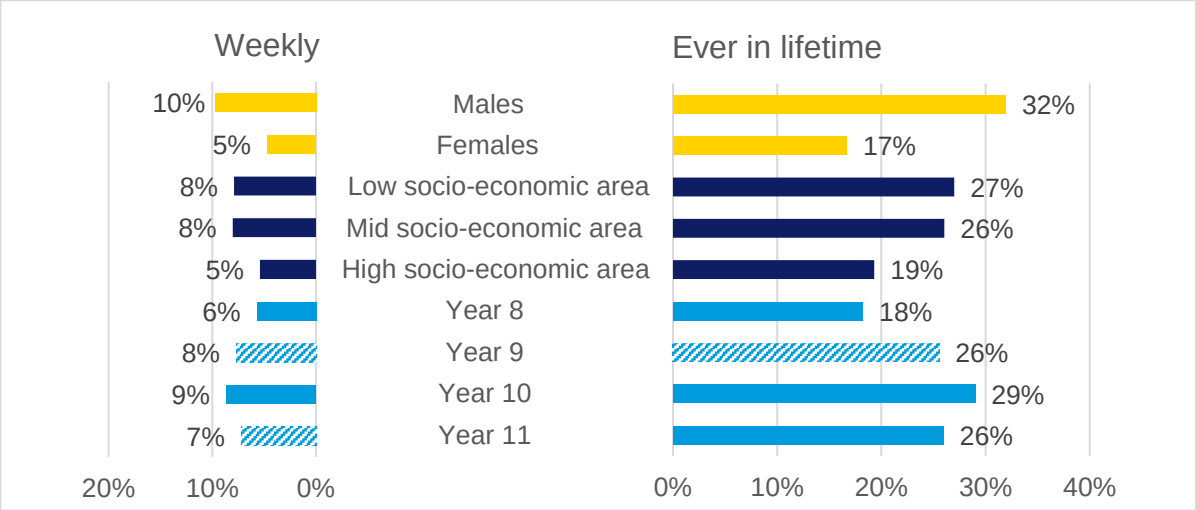
A nationally representative sample of 9,102 Australian secondary school students in year levels 8 to 11 (ages 12 to 17 years) from 104 schools were surveyed in 2018 using a self-report web-based questionnaire. Survey questions and statistical methods are described in the appendices.

Results

Current Prevalence of Energy Drink Consumption

In 2018, 7% of Australian secondary school students reported drinking energy drinks at least once a week and one in four students (25%) had consumed an energy drink at least once.

Males were significantly more likely than females to be weekly energy drink consumers and to have consumed at least one energy drink. Similarly, students residing in low or mid compared to high socio-economic areas were significantly more likely to be weekly consumers and to have ever had an energy drink. Compared to Year 8 students, ever in lifetime energy drink consumption was higher for Year 10 and 11 students while weekly consumption was also higher for Year 10 students. There were no differences in consumption by home location (metropolitan cf. regional/remote).

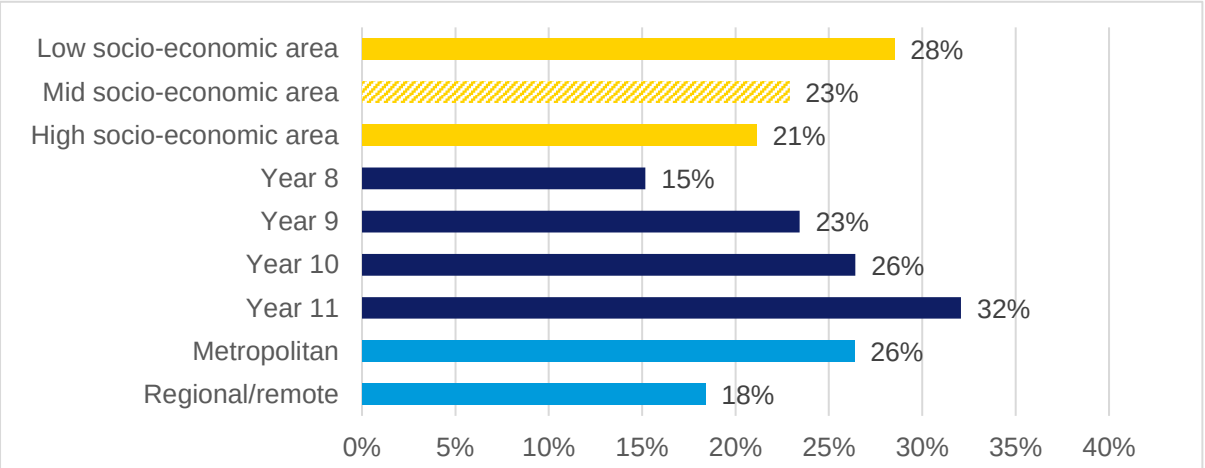


Prevalence of weekly and ever in lifetime energy drink consumption by sex, socio-economic area and year level.

Note: Filled bars denote significant difference compared to males, high socio-economic area or Year 8 at $p<0.01$.

Current Prevalence of Low Sleep Duration

In 2018, almost one in four students (24%) reported sleeping less than the recommended eight hours on a usual school night. Students residing in low compared to high socio-economic areas were significantly more likely to have low levels of sleep. Compared to students in Year 8, the proportion of students reporting low sleep duration was greater among all other year levels. Students residing in metropolitan areas were significantly more likely to report low levels of sleep compared to students residing in regional or remote areas. The prevalence of low sleep duration did not vary by sex.

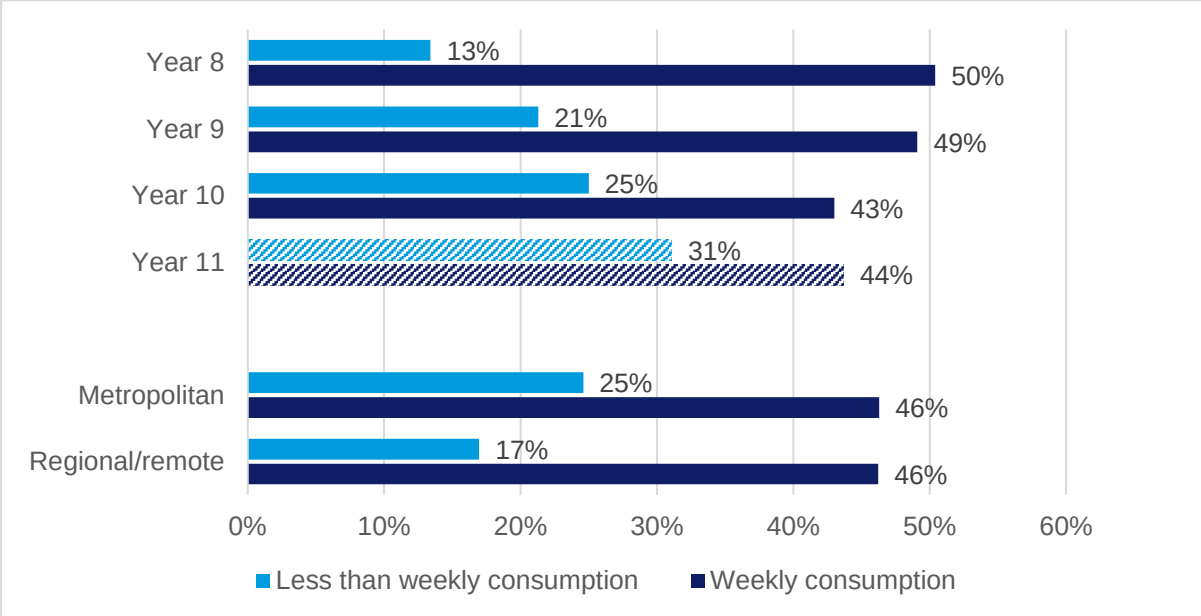


Prevalence of low sleep duration (<8 hrs per school night) by socio-economic area, year level and home location.

Note: Filled bars denote significant difference compared to high socio-economic area, Year 8 or metropolitan area at $p<0.01$.

Association Between Energy Drink Consumption and Sleep

Students who reported consuming energy drinks at least weekly were significantly more likely to be sleeping less than eight hours on a usual school night compared to those consuming energy drinks at a lesser frequency or not at all (46% cf. 22%). The strength of this association was similar among males and females and did not vary by socio-economic area. However, the association between weekly energy drink consumption and low sleep duration tended to be stronger for students in lower compared to higher year levels and for students residing in regional/remote compared to metropolitan areas.



Prevalence of low sleep duration (<8 hrs per school night) among less than weekly and weekly energy drink consumers by year level and home location.

Note: Filled bars denote significant difference compared to less than weekly energy drink consumption at $p<0.01$.

Summary

- In 2018, around one in fourteen Australian secondary school students consumed energy drinks on a weekly basis, while one in four had ever consumed an energy drink.
- Students residing in low or mid compared to high socio-economic areas were more likely to report consuming energy drinks, as were males compared to females.
- In 2018, nearly one quarter of students reported not getting the recommended minimum eight hours of sleep on a usual school night.
- Low sleep duration was more prevalent among students who consumed energy drinks at least once a week, which is concerning given the importance of adequate sleep for adolescents' mental and physical health and development[1]. There is also strong evidence of a significant association between low sleep duration in adolescence and overweight/obesity later in life[2].
- The association between energy drink consumption and low sleep duration was stronger for students in lower compared to higher year levels and for students residing in regional/remote compared to metropolitan areas.

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Gascoyne C, Scully M, Wakefield M, Morley B. (2019). Energy drink consumption and sleep in Australian secondary school students. Research brief, prepared for: Cancer Council Australia. Melbourne, Australia: Centre for Behavioural Research in Cancer, Cancer Council Victoria.

[1] Paruthi, S., Brooks, L. J., D'Ambrosio, C., et al. (2016). Consensus statement of the American Academy of Sleep Medicine on the recommended amount of sleep for healthy children: methodology and discussion. *Journal of Clinical Sleep Medicine, 12*(11): 1549-1561.

[2] Fatima, Y., Doi, S. A. R., Mamun, A. A. (2015). Longitudinal impact of sleep on overweight and obesity in children and adolescents: a systematic review and bias-adjusted meta-analysis. *Obesity Reviews, 16*(2): 137-149.

Appendices

Methods

Questionnaire

Consumption of energy drinks was assessed by asking students "How much non-alcoholic energy drinks (like Red Bull, V, Mother) do you usually drink? (1 cup = 250ml, one small can of non-alcoholic energy drink = 1 cup)." Response options included: 'I don't drink non-alcoholic energy drinks'; 'less than one cup a month'; 'about 1-3 cups a month'; 'about 1-3 cups a week'; 'about 4-6 cups a week'; 'about 1-2 cups a day'; 'about 3-4 cups a day'; and '5 cups or more a day'. Students who indicated they consumed one or more cups per week of energy drinks were classified as "weekly consumers", while those who reported consuming energy drinks 'less than one cup a month' to '5 cups or more a day' were categorised as "ever in their lifetime consumers".

Students were asked to record the time they usually go to bed and turn the lights out on a school night and the time they usually wake up on a school day. Sleep duration was then derived by calculating the difference between students' usual wake-up time and bedtime. Students who slept for less than the recommended minimum of eight hours[3] on a usual school night were identified as having 'low sleep duration'.

Students recorded their sex, year level and residential postcode. A measure of socio-economic area was determined using the Socio-Economic Index for Areas (SEIFA) Index of Relative Socio-economic Disadvantage based on student's residential postcode[4]. Using the national deciles to create quintiles, students were categorised into low (first and second quintiles), mid (third and fourth quintiles) and high (fifth quintile) socio-economic area groups. Postcode of residence was also used to classify home location as metropolitan or regional/remote according to the Australian Statistical Geography Standard Remoteness Structure[5].

[3] Paruthi, S., Brooks, L. J., D'Ambrosio, C., et al. (2016). Recommended amount of sleep for pediatric populations: a consensus statement of the American Academy of Sleep Medicine. *Journal of Clinical Sleep Medicine, 12*(6): 785-786.

[4] Australian Bureau of Statistics (2018). Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia, 2016. Catalogue no. 2033.0.55.001. Canberra: Australian Bureau of Statistics.

[5] Australian Bureau of Statistics (2018). Australian Statistical Geography Standard (ASGS): Volume 5 – Remoteness Structure, July 2016. Catalogue no. 1270.0.55.005. Canberra: Australian Bureau of Statistics.

Data Analyses

Data were analysed using Stata/MP 14.2 and weighted by state, education sector, year level and sex to bring the sample in line with the population of students enrolled in Australia[6]. Clustering of students within each school was adjusted for in all analyses.

Logistic regression analyses were conducted to test for significant differences in current national prevalence estimates of weekly and ever in lifetime consumption of energy drinks and low sleep duration by sex, socio-economic area, year level and home location. A logistic regression model was also run to examine the association between energy drink consumption and low sleep duration. An interaction term was added to this model to determine whether the association varied by sex, socio-economic area, year level or home location respectively.

A significance level of $p<0.20$ was accepted for interaction tests[7]. A conservative significance level of $p<0.01$ was accepted for all other analyses. All models controlled for sex, year level, socio-economic area, home location and education sector.

Supplementary Tables

Table 1. Weighted proportion of students not meeting sleep recommendations by consumption of energy drinks.

[6] Australian Bureau of Statistics (2019). Schools Australia, 2018. Catalogue no. 4221.0. Canberra: Australian Bureau of Statistics.

[7] Kirkwood B, Sterne J. (2003). Essential medical statistics. (2nd ed). Malden, Massachusetts: Blackwell Science.

Table 1. Weighted proportion of students not meeting sleep recommendations by consumption of energy drinks.

	Low sleep duration (%)					
	< Weekly consumption^	Weekly consumption	Adj OR†	95% CI	*p*-value	Interaction *p*-value‡
Total	22.2	46.3	2.77	2.11-3.64	**<0.001**	
Year level						**0.001**
8	13.4	50.4	5.69	3.36-9.62	**<0.001**	
9	21.3	49.1	3.25	1.65-6.42	**0.001**	
10	24.9	43.0	2.35	1.35-4.08	**0.003**	
11	31.1	43.7	1.50	0.72-3.14	0.272	
Home location						**0.166**
Metropolitan	24.6	46.3	2.52	1.89-3.35	**<0.001**	
Regional/remote	17.0	46.2	3.96	2.11-7.43	**<0.001**	

Note: Unadjusted prevalence estimates are reported. Bold values denote statistical significance at the $p<0.01$ level for logistic regressions and $p<0.20$ for interaction tests. Sex and socio-economic area not displayed due to non-significant interactions.
^Reference category in logistic regression models.
†Odds ratios adjusted for sex, year level, socio-economic area, home location and education sector.
‡Energy drink consumption x Year level or home location respectively.