PANORG
Physical Activity Nutrition Obesity Research Group

Report:

Weight and weight related behaviours among NSW students from low SES and non-English speaking backgrounds

Secondary Analysis of the NSW Schools Physical Activity & Nutrition Survey 2010

Authors:

Louise Hardy & Lesley King

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SPANS 2010: Report on students' weight and weight-related behaviours by SES and cultural background

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For further information contact us at panorg@health.usyd.edu.au or phone 2 9036 3271.

PANORG
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The Physical Activity Nutrition Obesity Research Group (PANORG) at Sydney University undertakes policy relevant research to promote physical activity, nutrition and obesity prevention. It is funded by NSW Ministry of Health.

1. Introduction

The 2010 SPANS survey showed that the prevalence of overweight and obesity among NSW school students has not increased since 2004, stabilizing at 22.8%. The findings reported in the SPANS Full Report also indicate that many children engage in a range of adverse weight related behaviours and that the prevalence of weight-related behaviours varied according to socioeconomic status (SES) and cultural background. The findings may have implications for policy regarding interventions among school aged children and the design of interventions for different sociodemographic groups.

The purpose of the report is to undertake more detailed data analyses regarding socioeconomic and cultural variations in students' health behaviours, in order to inform the NSW Ministry of Health, Local Health Districts (LHD) and other government and non-government stakeholders.

2. Survey methods

Background

Details of the design and methods of SPANS are described in the Full Report. Briefly, SPANS is a representative school-based cross-sectional survey of school children aged 5-17 years. Schools from each educational sector participated and students invited to participate. The data were collected during Term 1, 2010. The prevalence's reported in this document are based on post stratification weights, in order to allow inferences from students included in the sample to the population from which they were drawn.

Demographic details

All respondents (i.e., parents of children in Kindergarten, Grades 2 and 4 and students in Grades 6, 8 and 10) were asked to record their (or their child's) sex, date of birth, language spoken most at home, Indigenous status, suburb and postcode of usual residence. If parents' of students in Kindergarten, Grade 2 and 4 declined to complete the questionnaire, these data were extracted by a member of the field team from school records.

Socioeconomic status (SES)

Postcode of the students' usual residence was used as a proxy measure of socioeconomic status (SES) based on the Australian Bureau of Statistics (ABS) Index of Relative Socioeconomic Disadvantage (IRSD).

The IRSD describes the socioeconomic aspects of geographic areas and includes indices on income, educational attainment, unemployment, and proportion of people in unskilled occupations. The students' IRSD values were ranked into tertiles of SES using the 2006 ABS SEIFA data.

For this report, students from low SES tertile are compared with students from high SES tertile (reference group).

Cultural background

"Language spoken most at home" was used to categorise students into one of four cultural backgrounds: English-speaking, European (other than British), Middle-Eastern, and Asian based on the ABS Australian System for Classification of Languages.

For this report, students from Asian and Middle-Eastern cultural backgrounds are compared with students from English-speaking backgrounds (reference group).

Analysis

Data were analyzed using SPPS Complex Samples (Version 19 for Windows) to account for the clustered design of the survey and adjust for the standard errors and 95% confidence intervals. Proportions were calculated and stratified by sex, school level (primary v high school) and logistic regression was used to test the associations.

3. Results

3.1 Sociodemographic Characteristics

The sociodemographic characteristics of students' participating in SPANS 2010, by school level (primary, high) are given in Table 1. In primary schools, approximately 30% of students were from the low SES tertile; and approximately one quarter of high school students were from the low SES tertile. Overall, the majority were from English-speaking backgrounds

Table 1 Socio-demographic characteristics of students

Characteristic	Primary school		High	
	Boys (n = 2,530)	**Girls (n = 2,534)**	**Boys (n = 1,661)**	**Girls (n = 1,333)**
Socioeconomic Status (%)				
Low	28.5	29.2	23.8	25.1
Middle	42.8	42.9	35.1	39.1
High	28.6	27.9	41.1	35.8
Cultural background (%)				
English-speaking	85.3	84.6	88.9	90.4
Middle-Eastern	5.6	5.8	1.7	3.0
Asian	9.1	9.6	9.4	6.6

3.2. Socioeconomic status (SES) differences in weight-related behaviours

This section examines the association between SES and selected weight related behaviors. The odds ratios (and 95% confidence intervals), comparing low with high SES tertile students, are presented in Tables 2-5 by school level (primary v high) and sex.

Overall the findings were consistent across school level and sex. Students from low SES backgrounds were more likely to report unfavorable weight-related behaviors compared with their high SES peers.

Overall, compared with high SES students, low SES students in primary school were significantly more likely to:

- be unfit
- exceed the recommended daily screen time (ST)
- have a TV in their bedroom
- not eat breakfast daily (boys)
- drink one or more cups of soft drink daily and,
- be rewarded for good behavior with sweets.

Overall, compared with high SES students, low SES students in high school were significantly more likely to:

- be unfit
- have a TV in their bedroom
- regularly eat dinner in front of the TV (boys)
- not eat breakfast daily (boys)
- drink one or more cups of soft drink daily and, (girls)
- be rewarded for good behavior with sweets (boys).

Low vs high SES; primary school boys

The prevalence of overweight and obesity and obesity were *significantly higher* among primary school boys from low SES backgrounds, compared with high SES peers.

The odds for low SES primary school boys were *significantly higher*, for being unfit (228%), exceeding the ST recommendation (150%), having a TV in the bedroom (287%), not eating breakfast daily (216%), drinking soft drink daily (169%) and being rewarded for good behavior with sweets (156%), compared with boys from high SES backgrounds.

Table 2 Associations between SES, BMI and selected weight-related behaviors, in primary school boys

Characteristic	**Low SES**	**High SES***	**Odds ratio (95% CI)**
BMI status (%)			
Overweight/obese	29.7*	20.2	1.67 (1.22, 2.28)
Overweight	19.3	15.5	1.31 (0.99, 1.73)
Obese	10.4*	4.7	2.35 (1.33, 4.15)
Physical activity (%)			
Do not meet PA recommendation (Y K/2/4)	58.8	49.5	1.45 (0.83, 2.54)
Do not meet PA recommendation (Y6)	39.1	38.7	1.01 (0.55, 1.86)
Low cardiorespiratory fitness (Y 4&6)	42.6*	24.5	2.28 (1.30, 3.99)
Screen time			
Exceeds ST recommendation	63.1*	53.2	1.50 (1.18, 1.91)
Has a TV in bedroom	38.9*	18.2	2.87 (1.62, 5.09)
Dietary patterns/habits			
Do not meet fruit recommendation	7.4	5.3	1.42 (0.89, 2.28)
Do not meet vegetable recommendation	60.0	56.3	1.16 (0.81, 1.66)
Eats dinner in front of TV (≥3/wk)	34.4	30.8	1.18 (0.93, 1.51)
Does not eat breakfast daily	22.0*	11.5	2.16 (1.45, 3.20)
Drinks ≥ 1 cup/day soft drink	18.3*	11.7	1.69 (1.07, 2.67)
Rewards good behaviour with sweets (Usually/sometimes)	64.7*	54.1	1.56 (1.18, 2.06)

* Reference group; * P < 0.05

Low vs high SES; primary school girls

There were no significant differences in the prevalence of overweight and obesity among primary school girls from low SES backgrounds, compared with high SES peers.

The odds for low SES primary school girls were *significantly higher* for being unfit (282%), not meeting recommended daily intake of fruit (86%), exceeding the ST recommendation (165%), having a TV in the bedroom (234%), drinking soft drink daily (168%) and being rewarded for good behavior with sweets (161%), compared with girls from high SES backgrounds.

Table 3 Associations between SES, BMI and selected weight-related behaviors, in primary school girls

Characteristic	Low SES	High SES	Odds ratio (95% CI)
BMI status (%)			
Overweight/obese	27.8	23.4	1.26 (0.84, 1.88)
Overweight	19.7	17.3	1.17 (0.81, 1.70)
Obese	8.1	6.2	1.35 (0.76, 2.40)
Physical activity (%)			
Do not meet PA recommendation (Y K/2/4)	66.5	59.9	1.33 (0.94, 1.90)
Do not meet PA recommendation (Y6)	46.8	43.3	1.16 (0.58, 2.30)
Low cardiorespiratory fitness (Y 4&6)	37.5*	17.5	2.82 (1.16, 6.89)
Screen time			
Exceeds ST recommendation	54.8*	42.4	1.65 (1.18, 2.31)
Has a TV in bedroom	37.0*	20.0	2.34 (1.23, 4.47)
Dietary patterns/habits			
Do not meet fruit recommendation	5.2*	2.9	1.86 (1.02, 3.38)
Do not meet vegetable recommendation	57.5	55.6	1.08 (0.78, 1.51)
Eats dinner in front of TV (≥3/wk)	36.6	29.8	1.36 (0.95, 1.93)
Does not eat breakfast daily	20.1	15.4	1.38 (0.90, 2.11)
Drinks ≥ 1 cup/day soft drink	16.6*	10.6	1.68 (1.11, 2.54)
Rewards good behaviour with sweets (Usually/sometimes)	64.7*	54.1	1.61 (1.16, 2.25)

* Reference group**; *** P < 0.05

Low vs high SES; high school boys

There were no significant differences in the prevalence of overweight and obesity among high school boys from low SES backgrounds, compared with high SES peers.

The odds for low SES high school boys were *significantly higher* for being inactive (207%), unfit (264%), having a TV in the bedroom (316%), eating dinner in front of the TV (148%), not eating breakfast daily (197%), and being rewarded for good behavior with sweets (198%), compared with boys from high SES backgrounds.

Table 4 Associations between SES, BMI and selected weight-related behaviors, in high school boys

Characteristic	Low SES	High SES*	Odds ratio (95% CI)
BMI status (%)			
Overweight/obese	25.7	19.3	1.45 (0.95, 2.21)
Overweight	19.6	15.2	1.36 (0.87, 2.14)
Obese	6.1	4.1	1.53 (0.64, 3.66)
Physical activity (%)			
Does not meet PA recommendation	43.4*	27.0	2.07 (1.26, 3.41)
Low cardiorespiratory fitness (Y 4&6)	42.5*	21.8	2.64 (1.65, 4.23)
Screen time			
Exceeds ST recommendation	82.6	75.2	1.56 (0.99, 2.47)
Has a TV in bedroom	58.6*	30.9	3.16 (2.14, 4.65)
Dietary patterns/habits			
Do not meet fruit recommendation	59.1	52.6	1.30 (0.88, 1.93)
Do not meet vegetable recommendation	78.9	75.2	1.24 (0.78 1.97)
Eats dinner in front of TV (≥3/wk)	46.3*	36.9	1.48 (1.09, 2.00)
Does not eat breakfast daily	36.0*	22.2	1.97 (1.37, 2.83)
Drinks ≥ 1 cup/day soft drink	16.7	13.5	1.28 (0.80, 2.04)
Rewards good behaviour with sweets (Usually/sometimes)	44.0*	28.5	1.98 (1.48, 2.64)

* Reference group; * P < 0.05

Low vs high SES; high school girls

The prevalence of obesity was *significantly higher* among high school girls from low SES backgrounds, compared with high SES peers.

The odds for low SES high school girls were *significantly higher* for being, unfit (266%), not meeting recommended daily intake of fruit (60%), having a TV in the bedroom (208%), not eating breakfast daily (145%), and drinking soft drink daily (178%), compared with girls from high SES backgrounds.

Table 5 Associations between SES, BMI and selected weight-related behaviors, in high school girls (%)

Characteristic	Low SES	High SES*	Odds ratio (95% CI)
BMI status (%)			
Overweight/obese	22.1	17.8	1.31 (0.87, 1.99)
Overweight	15.1	16.4	0.91 (0.57, 1.44)
Obese	7.1*	1.5	5.12 (1.92, 13.71)
Physical activity (%)			
Does not meet PA recommendation	44.9	35.2	1.50 (0.95, 2.37)
Low cardiorespiratory fitness (Y 4&6)	43.5*	22.5	2.66 (1.47, 4.8)
Screen time			
Exceeds ST recommendation	70.6	61.7	1.49 (0.96, 2.31)
Has a TV in bedroom	40.3*	24.5	2.08 (1.25, 3.47)
Dietary patterns/habits			
Do not meet fruit recommendation	59.1*	52.6	1.60 (1.05, 2.42)
Do not meet vegetable recommendation	84.5	79.7	1.39 (0.85, 2.26)
Eats dinner in front of TV (≥3/wk)	32.4	31.7	1.03 (0.78, 1.37)
Does not eat breakfast daily	45.9	36.8	1.45 (0.95, 2.22)
Drinks ≥ 1 cup/day soft drink	12.7*	7.6	1.78 (1.02, 3.10)
Rewards good behaviour with sweets (Usually/sometimes)	47.1	39.7	1.61 (0.88, 2.07)

* Reference group; * P < 0.05

3.3. Cultural differences in weight-related behaviours

This section examines the associations between BMI status and selected weight related behaviors for students from Middle-Eastern and Asian cultural backgrounds. The odds ratios (and 95% confidence intervals), comparing Middle-Eastern and Asian students (separately), with students from English-speaking backgrounds (reference group) are presented in Tables 7-13 by school level (primary v high) and sex.

Middle-Eastern vs English-speaking

Based on the *Language spoken most at home,* students from Middle-Eastern cultural backgrounds were mainly:

Language spoken most at home (%)	
Arabic	81.4
Persian	4.6
Turkish	4.3
Other Middle Eastern	10.7

Overall, compared with students from English-speaking backgrounds, Middle-Eastern primary school students were significantly more likely to;

- be obese
- be inactive
- be unfit (girls)
- exceed the recommended daily ST (girls)
- regularly eat dinner in front of the TV (girls)
- not eat breakfast daily and,
- be rewarded for good behavior with sweets.

Middle-Eastern high school students were significantly more likely to;

- be inactive (girls)
- be unfit (girls)
- regularly eat dinner in front of the TV (girls) and,
- drink one or more cups of soft drink daily (girls)

Middle-Eastern vs English-speaking; primary school boys

The prevalence's of overweight and obesity were *significantly higher* among primary school boys from Middle-Eastern cultural backgrounds, compared with English-speaking peers.

The odds of Middle-Eastern boys were *significantly higher* for being inactive (10 fold for Year K/2/4,), (121%), not eating breakfast daily (316%), and, being rewarded for good behavior with sweets (245%), compared with English-speaking peers.

Table 6 Associations between Middle-Eastern and English-speaking students', BMI and selected weight-related behaviors, in primary school boys

Characteristic	Middle-Eastern	English-speaking*	Odds ratio (95% CI)
BMI status (%)			
Overweight/obese	37.6*	21.3	2.23 (1.38, 3.61)
Overweight	24.7*	16.1	1.71 (1.07, 2.72)
Obese	12.9*	5.2	2.71 (1.47, 4.99)
Physical activity (%)			
Do not meet PA recommendation (Y K/2/4)	88.9*	43.9	10.19 (6.49, 16.00)
Do not meet PA recommendation (Y6)	50.7	35.1	1.90 (0.84, 4.29)
Low cardiorespiratory fitness (Y 4&6)	40.5	28.7	1.69 (0.84, 3.40)
Screen time			
Exceeds ST recommendation	66.5	59.5	1.35 (0.96, 1.90)
Has a TV in bedroom	32.6	28.5	1.21 (0.88, 1.66)
Dietary patterns/habits			
Do not meet fruit recommendation	3.9	5.0	0.78(0.44, 1.34)
Do not meet vegetable recommendation	61.4	58.0	1.24 (0.95, 1.67)
Eats dinner in front of TV (≥3/wk)	36.7	32.8	1.19 (0.87, 1.62)
Does not eat breakfast daily	31.3*	12.6	3.16 (2.20, 4.54)
Drinks ≥ 1 cup/day soft drink	22.3	14.4	1.70 (0.98, 2.97)
Rewards good behaviour with sweets (Usually/sometimes)	75.3*	55.5	2.45 (1.81, 3.31)

Middle-Eastern vs English-speaking; primary school girls

The prevalence of obesity was *significantly higher* among primary school girls from Middle-Eastern cultural backgrounds, compared with English-speaking peers.

The odds for Middle-Eastern girls were *significantly higher* for being inactive (508% for Year K/2/4), unfit (730%), exceed ST recommendations (153%),eating dinner in front of the TV (156%), not eating breakfast daily (270%), and being rewarded for good behavior with sweets (253%), compared with girls from English-speaking backgrounds.

Table 7 Associations between Middle-Eastern and English-speaking students', BMI and selected weight-related behaviors, in primary school girls

Characteristic	Middle-Eastern	English-speaking*	Odds ratio (95% CI)
BMI status (%)			
Overweight/obese	33.6	23.6	1.64 (0.99, 2.72)
Overweight	21.2	17.2	1.30 (0.89, 1.89)
Obese	12.4*	6.5	2.05 (1.01, 4.17)
Physical activity (%)			
Do not meet PA recommendation (Y K/2/4)	85.1*	52.9	5.08 (2.51, 10.29)
Do not meet PA recommendation (Y6)	63.3	43.2	2.27 (0.97, 5.36)
Low cardiorespiratory fitness (Y 4&6)	66.3*	21.2	7.30 (3.41, 15.63)
Screen time			
Exceeds ST recommendation	59.5*	49.0	1.53 (1.13, 2.07)
Has a TV in bedroom	22.3	27.3	0.77 (0.39, 1.49)
Dietary patterns/habits			
Do not meet fruit recommendation	2.4	3.5	0.66 (0.25, 1.78)
Do not meet vegetable recommendation	56.5	54.1	1.10 (0.79, 1.54)
Eats dinner in front of TV (≥3/wk)	40.4*	30.3	1.56 (1.14, 2.14)
Does not eat breakfast daily	32.0*	14.8	2.70 (1.64, 4.46)
Drinks ≥ 1 cup/day soft drink	15.2	12.3	1.27 (0.77, 2.11)
Rewards good behaviour with sweets (Usually/sometimes)	79.3*	60.3	2.53 (1.70, 3.75)

* Reference group**; *** P < 0.05

Middle-Eastern vs English-speaking; high school boys

There were no significant differences in the prevalence of weight and weight-related behaviours among high school boys from Middle-Eastern cultural backgrounds, compared with English-speaking peers.

Table 8 Associations between Middle-Eastern and English-speaking students', BMI and selected weight-related behaviors, in high school boys

Characteristic	Middle-Eastern	English-speaking*	Odds ratio (95% CI)
BMI status (%)			
Overweight/obese	36.8	24.4	1.81 (0.91, 3.61)
Overweight	23.5	18.2	1.38 (0.56, 3.39)
Obese	13.3	6.2	2.34 (0.71, 7.68)
Physical activity (%)			
Does not meet PA recommendation	34.7	30.6	1.21 (0.58, 2.52)
Low cardiorespiratory fitness	45.0	33.3	1.64 (0.77, 3.49)
Screen time			
Exceeds ST recommendation	82.5	80.0	1.18 (0.51, 2.73)
Has a TV in bedroom	34.6	48.0	0.57 (0.31, 1.06)
Dietary patterns/habits			
Do not meet fruit recommendation	40.3	58.2	0.49 (0.18, 1.28)
Do not meet vegetable recommendation	68.4	77.2	0.64 (0.34, 1.21)
Eats dinner in front of TV (≥3/wk)	54.1	42.3	1.60 (0.72, 3.57)
Does not eat breakfast daily	40.9	26.1	1.96 (0.92, 4.17)
Drinks ≥ 1 cup/day soft drink	13.5	17.1	0.75 (0.24, 2.33)
Rewards good behaviour with sweets (Usually/sometimes)	47.3	39.3	1.39 (0.77, 2.51)

* Reference group**; *** P < 0.05

Middle-Eastern vs English-speaking; high school girls

There were no significant differences in the prevalence of overweight and obesity, among high school girls from Middle-Eastern cultural backgrounds, compared with English-speaking peers.

The odds for Middle-Eastern high school girls were *significantly higher* for being inactive(281%), unfit (203%) eating dinner in front of the TV (140%) and daily soft drink consumption (197%), compared with English-speaking peers.

Conversely, Middle-Eastern high school girls were less likely to not meeting daily fruit recommendations (48%), compared with English-speaking peers.

Table 9 Associations between Middle-Eastern and English-speaking students', BMI and selected weight-related behaviors, in high school girls

Characteristic	Middle-Eastern	English-speaking*	Odds ratio (95% CI)
BMI status (%)			
Overweight/obese	13.8	20.1	0.64 (0.31, 1.30)
Overweight	11.2	16.0	0.66 (0.32, 1.36)
Obese	2.6	4.0	0.66 (0.17, 2.46)
Physical activity (%)			
Does not meet PA recommendation	63.7*	38.4	2.81 (1.77, 4.48)
Low cardiorespiratory fitness	49.3*	32.4	2.03 (1.25, 3.29)
Screen time			
Exceeds ST recommendation	59.9	67.6	0.71 (0.34, 1.50)
Has a TV in bedroom	27.9	36.8	0.66 (0.34, 1.28)
Dietary patterns/habits			
Do not meet fruit recommendation	43.7*	60.5	0.52 (0.29, 0.89)
Do not meet vegetable recommendation	82.1	82.8	0.96 (0.52, 1.75)
Eats dinner in front of TV (≥3/wk)	40.2*	32.4	1.40 (1.01, 1.95)
Does not eat breakfast daily	65.2	41.3	2.36 (0.87, 6.41)
Drinks ≥ 1 cup/day soft drink	18.7*	10.4	1.97 (1.16, 3.36)
Rewards good behaviour with sweets (Usually/sometimes)	48.6	44.2	1.19 (0.65, 2.19)

* Reference group; * P < 0.05

Asian vs English-speaking

Based on the *Language spoken most at home,* students from Asian cultural backgrounds were mainly:

Language spoken most at home (%)	
East Asian	35.9
South Asian	31.6
South-east Asian	32.5

Overall, compared with English speaking peers Asian primary school students were significantly more likely to;

- be obese (boys)
- be inactive
- be unfit (boys)
- not meet recommended daily intake of vegetables
- to regularly eat dinner in front of the TV
- not eat breakfast daily
- be rewarded for good behavior with sweets (girls).

Asian high school students were significantly more likely to;

- be inactive
- exceed the recommended daily screen time (girls) and
- *less likely* to have a TV in the bedroom,
- *less likely* to drink soft drink daily (boys) and,
- *less likely* to be reward with sweets for good behavior (boys)

Asian vs English-speaking; primary school boys

The prevalence of obesity was *significantly higher* among primary school boys from Asian cultural backgrounds, compared with English-speaking peers.

The odds for Asian primary school boys were *significantly higher* for being inactive (446% for Years K, 2 & 4 and 349% for Year 6), unfit (222%), not meeting recommended daily intake of vegetables (171%), eating dinner in front of the TV (164%), and not eating breakfast daily (210%), compared with English-speaking peers.

Table 10 Associations between Asian and English-speaking primary school boys' BMI and selected weight-related behaviors

Characteristic	Asian background	English-speaking*	Odds ratio (95% CI)
BMI status (%)			
Overweight/obese	33.3*	21.3	1.85 (1.28, 2.67)
Overweight	18.7	16.1	1.20 (0.89, 1.61)
Obese	14.6*	5.2	3.42 (1.75, 5.66)
Physical activity (%)			
Do not meet PA recommendation (Y K/2/4)	77.7*	43.9	4.46 (2.49, 7.97)
Do not meet PA recommendation (Y6)	65.4*	35.1	3.49 (1.75, 6.94)
Low cardiorespiratory fitness (Y 4&6)	47.2*	28.7	2.22 (1.08, 4.52)
Screen time			
Exceeds ST recommendation	53.9	59.5	0.80 (0.60, 1.05)
Has a TV in bedroom	24.0	28.5	0.79 (0.56, 1.12)
Dietary patterns/habits			
Do not meet fruit recommendation	7.2	5.0	1.41 (0.78, 2.76)
Do not meet vegetable recommendation	69.4*	55.8	1.71 (1.11, 2.90)
Eats dinner in front of TV (≥3/wk)	44.4*	32.8	1.64 (1.09, 2.48)
Does not eat breakfast daily	23.2*	12.6	2.10 (1.39, 2.17)
Drinks ≥ 1 cup/day soft drink	9.7	14.4	0.64 (0.30, 1.36)
Rewards good behaviour with sweets (Usually/sometimes)	62.2	55.5	1.32 (0.92, 1.91)

* Reference group; * P < 0.05

Asian vs English-speaking; primary school girls

The prevalence of obesity was significantly lower among Asian primary school girls compared with girls from English-speaking backgrounds.

The odds for Asian primary school girls were *significantly higher* for being inactive (473% for Year K/2/4), not meeting recommended daily intake of vegetables (187%), for eating dinner in front of the TV (150%), and being rewarded for good behavior with sweets (173%), compared with girls from English-speaking backgrounds.

Conversely, Asian primary school girls were less likely to exceed screen time recommendations (41%), compared with English-speaking peers.

Table 11 Associations between Asian and English-speaking primary school girls' BMI and selected weight-related behaviors

Characteristic	Asian background	English-speaking*	Odds ratio (95% CI)
BMI status (%)			
Overweight/obese	23.1	23.6	0.90 (0.69, 1.17)
Overweight	19.2	17.2	1.15 (0.86, 1.54)
Obese	2.6*	6.5	0.38 (0.19, 0.76)
Physical activity (%)			
Do not meet PA recommendation (Y K/2/4)	84.2*	52.9	4.73 (3.03, 7.40)
Do not meet PA recommendation (Y6)	46.9	43.2	1.16 (0.47, 2.847)
Low cardiorespiratory fitness (Y 4&6)	21.2	21.2	1.01 (0.46, 2.22)
Screen time			
Exceeds ST recommendation	36.0*	49.0	0.59 (0.41, 0.83)
Has a TV in bedroom	21.7	27.3	0.74 (0.41 1.35)
Dietary patterns/habits			
Do not meet fruit recommendation	5.0	3.5	1.38 (0.78, 2.66)
Do not meet vegetable recommendation	70.1*	54.1	1.87 (1.37, 2.90)
Eats dinner in front of TV (≥3/wk)	39.5*	30.3	1.50 (1.10, 2.04)
Does not eat breakfast daily	16.5	14.8	1.07 (0.83, 1.56)
Drinks ≥ 1 cup/day soft drink	8.9	12.3	0.70 (0.38, 1.27)
Rewards good behaviour with sweets (Usually/sometimes)	72.4*	60.3	1.73 (1.18, 2.55)

* Reference group; * P < 0.05

Asian vs English-speaking; high school boys

There were no significant differences in the prevalence of overweight and obesity, among high school boys from Asian cultural backgrounds, compared with English-speaking peers.

The odds Asian high school boys were *significantly higher* for being inactive (182%), compared with boys from English-speaking backgrounds.

Conversely, Asian high school boys were less likely to have a TV in the bedroom (65%), not meet daily fruit recommendations (41%), and drink soft drinks daily (60%) and be rewarded for good behavior with sweets (53%), compared with English-speaking peers.

Table 12 Associations between Asian and English-speaking high school boys' BMI and selected weight-related behaviors

Characteristic	Asian background	English-speaking*	Odds ratio (95% CI)
BMI status (%)			
Overweight/obese	18.8	24.4	0.72 (0.46, 1.12)
Overweight	15.6	18.2	0.82 (0.43, 1.57)
Obese	3.1	6.2	0.12 (0.03, 1.09)
Physical activity (%)			
Does not meet PA recommendation	44.4*	30.6	1.82 (1.07, 3.09)
Low cardiorespiratory fitness	31.7	33.3	0.93 (0.46, 1.89)
Screen time			
Exceeds ST recommendation	81.3	80.0	1.09 (0.57, 2.08)
Has a TV in bedroom	24.4*	48.0	0.35 (0.16, 0.76)
Dietary patterns/habits			
Do not meet fruit recommendation	43.9*	58.2	0.59 (0.39, 0.82)
Do not meet vegetable recommendation	77.7	77.2	1.03 (0.65, 1.64)
Eats dinner in front of TV (≥3/wk)	42.1	42.3	0.99 (0.61, 1.61)
Does not eat breakfast daily	28.5	26.1	1.13 (0.73, 1.75)
Drinks ≥ 1 cup/day soft drink	7.6*	17.1	0.40 (0.20, 0.79)
Rewards good behaviour with sweets (Usually/sometimes)	23.4*	39.3	0.47 (0.29, 0.76)

* Reference group; * P < 0.05

Asian vs English-speaking; high school girls

There were no significant differences in the prevalence of overweight and obesity, among high school girls from Asian cultural backgrounds, compared with English-speaking peers.

The odds for Asian high school girls were *significantly higher* for being inactive (378%), exceeding the ST guideline (172%), and eating dinner in front of the TV (174%), compared with girls from English-speaking backgrounds.

Conversely, Asian high school girls were less likely to have a TV in the bedroom (58%), compared with English-speaking peers.

Table 13 Associations between Asian and English-speaking high school girls' BMI and selected weight-related behaviors

Characteristic	Asian background	English-speaking*	Odds ratio (95% CI)
BMI status (%)			
Overweight/obese	14.1	20.1	0.65 (0.36, 1.19)
Overweight	13.6	16.0	0.83 (0.43, 1.57)
Obese	0.5	4.0	0.12 (0.01, 1.09)
Physical activity (%)			
Does not meet PA recommendation	70.2*	38.4	3.78 (2.29, 6.25)
Low cardiorespiratory fitness	31.9	32.4	0.98 (0.58, 1.66)
Screen time			
Exceeds ST recommendation	78.2*	67.6	1.72 (1.09, 2.70)
Has a TV in bedroom	19.8*	36.8	0.42 (0.23, 0.76)
Dietary patterns/habits			
Do not meet fruit recommendation	43.0	60.5	0.86 (0.52, 1.43)
Do not meet vegetable recommendation	84.9	82.8	1.17 (0.53, 2.55)
Eats dinner in front of TV (≥3/wk)	45.5*	32.4	1.74(1.04, 2.90)
Does not eat breakfast daily	47.9	41.3	1.30 (0.82, 2.08)
Drinks ≥ 1 cup/day soft drink	6.6	10.4	0.61 (0.29, 1.29)
Rewards good behaviour with sweets (Usually/sometimes)	47.0	44.2	1.12 (0.60, 2.08)

* Reference group**; *** P < 0.05

4. Discussion and conclusions

Overall, there were significant differences in weight status and certain weight-related behaviours of NSW school students according to SES and cultural background. The findings presented here may be useful to guide obesity prevention programs in children and families of low SES and from Middle-Eastern and Asian cultural backgrounds.

SES differences (low vs high)

With the exception of high school girls, who were more likely to be obese (7.1% v 1.5%) there were no significant differences in the prevalence of overweight and obesity between students from low, compared with high SES backgrounds.

The findings however do indicate that certain weight related behaviours are more prevalent among students from low, compared with high SES backgrounds.

Low cardiorespiratory fitness.

Students from low SES backgrounds were more likely to have low cardiorespiratory fitness. The foundations for cardiovascular disease (e.g., atherosclerosis) begin during childhood and there is some evidence that higher levels of cardiorespiratory fitness during childhood and adolescence may contribute towards a healthier cardiovascular profile later in life.[1] Lower levels of cardiorespiratory fitness is a risk factor for the development of cardiovascular diseases[2;3], insulin resistance[4], type 2 diabetes[5], lower psychological factors associated with wellbeing[6] and all-cause mortality.[7]

Interestingly, it has been suggested that a decline in cardiorespiratory fitness from childhood to adulthood is a stronger predictor of adult obesity and insulin resistance (a precursor to type 2 diabetes) than lower levels of cardiorespiratory fitness in childhood.[4;8]. This finding is important because we know that physical activity and consequently cardiorespiratory fitness declines during late childhood and adolescence.

Older children and adolescents who perform at least 60 minutes of moderate-to-vigorous physical activity daily are more likely to have a healthy cardiorespiratory fitness level, independent of their BMI category.[6] Therefore, it is important that schools promote physical activity and cardiorespiratory fitness to prevent unfavourable cardiovascular profiles later in life.

The findings indicate that there is scope for assisting school based programs in low SES schools to improve physical activity and cardiorespiratory fitness levels.

Household practices

Many of the weight-related behaviours that were measured are, however, within the jurisdiction of the home environment, so social marketing messages which raise parents' awareness and strategies to support changes in the home environment should be considered.

TV in children's bedrooms

Students from low SES backgrounds were more likely to have a TV in their bedroom. Children with a TV in their bedroom are at greater risk of developing overweight and obesity,[9] have lower academic performance,[10] and have more trouble falling asleep and therefore decreased sleep duration.[11;12]

There are no studies which explain why parents put a TV in their child's bedroom, however, anecdotal explanations suggests that when families upgrade their TV the old TV is placed in children's bedrooms.

Studies indicate that having a TV in the room where a child sleeps is a major predictor of TV use,[9;13] and that once there, TVs are not often removed.[14] This points to the utility of early intervention strategies to limit TV, discourage parents from putting TVs in their children's bedrooms, or removing the TVs if they are already there.

High screen time

Primary school students from low SES backgrounds were more likely to exceed the recommended ST. In 2004 the Department of Health and Ageing published National guidelines for children's use of electronic media, or small screen recreation (i.e., watching television, videos, DVDs, using computers for fun, and e-games).[15] Accordingly, the guidelines recommend that children aged 2- 18 years should not spend more than two hours per day using electronic media for entertainment, particularly during daylight hours.

There is evidence that different sedentary behaviours track during childhood and adolescence in to adulthood.[16] Therefore, encouraging young people not to spend extended periods sitting or lying around has the potential to reduce the risk of developing chronic disease during adulthood. In terms of the national guideline for ST, there is good evidence which shows that young people who exceed the recommended time of two hours are at risk of lower fitness[17] and, for boys, insulin resistance.[18]

Strategies to reduce screen time need to start while children are young and include removing TVs from children bedrooms, switch TVs off when not being watched, setting rules around TV time, not eating meals in front of the TV and parents monitoring their own ST.

Soft drink consumption

Students from low SES backgrounds were more likely to report consuming one or more cups a day of soft drink. Soft drinks, cordials, and sports drinks are sugary beverages that, apart from sugar, kilojoules and fluid, provide little other nutritional value. A high consumption of such beverages has been associated with obesity, type 2 diabetes, dental caries, and bone fractures.[19] The Australian Guide to Healthy Eating recommends that soft drinks and other sugary drinks be consumed only occasionally, in small amounts, or not at all.

In 2007 vending machines which sold sugar sweetened beverages, including soft drinks, were banned from NSW government schools. Although the effects of this policy on children's

overall consumption is yet to be determined, this policy appears to be widely accepted in schools. SPANS shows that a third of children reported that soft drinks were usually available at home and approximately 15% usually consume soft drink with meals at home.[20] The availability of soft drink (and other 'junk food') in the home is acknowledged by students, who suggest parents should limit the amount they buy in order to reduce their consumption.[21;22]

Skipping breakfast

Boys from low SES backgrounds were more likely to report not eating breakfast every day. There is good evidence that daily breakfast consumption is associated with a healthier diet pattern among children and adolescents, including higher intakes of fruit and vegetables and lower intakes of unhealthy snack foods.[23;24] Children and adolescents who regularly eat breakfast also have a lower BMI and are at reduced risk of becoming overweight or obese.[25;26]

Generally it is girls who are more likely to skip breakfast, especially during their teen age years and incorrectly perceive this practice as a weight loss strategy[27-29] so the current finding that the prevalence is higher among boys may potentially herald changing behaviours among boys.

A common reason for schools establishing a breakfast program is when students present to school without eating an adequate breakfast. An evaluation on the Western Australian breakfast program, Foodbank WA, indicates that the provision of breakfast to children has a significant impact on the child's health and well being and improvements in academic performance.[30]

Rewarding good behavior with sweets

Students from low SES backgrounds were more likely to be usually rewarded with sweets for good behavior. Although there are no data on what defined sweets, there are good reasons to discourage parents using sweets to reward their child for good behaviour. Using food as a reward has been positively associated with children's snacking habits and food preferences particularly those for the reward food. Potentially, children who are reward with sweets for good behaviour may devalue other healthier food and the practice has been associated with a decrease in children's preference for healthier foods. [31;32]

Cultural differences

Approximately one-third of Middle-Eastern students and Asian boys were overweight/obese, in comparison with 24% of English-speaking students. The prevalence remained high among Middle-Eastern high school boys, but not their female peers. The low rate among Middle-Eastern high school girls cannot be explained, but may reflect response bias among Middle-Eastern girls with higher BMI status. The difference in the prevalence of overweight/obesity among Asian primary school boys and girls is also difficult to explain. Qualitative research is

required to understand the sex difference between primary school children as the sex difference attenuates in Asian high school students.

In general, students from Asian and Middle-Eastern cultural backgrounds were more likely to be inactive and Middle-Eastern girls unfit, compared with English-speaking peers.

Interestingly, Middle-Eastern and Asian girls were more likely to exceed the ST recommendation; a behavior which is generally associated with boys.[20]

While students from Asian cultural backgrounds were more likely to eat dinner in front of the TV on a regular basis, not eating breakfast daily and having parents that usually reward good behavior with sweets were more likely among both Asian and Middle-Eastern children, compared with English-speaking peers.

Conclusions

The findings reported here indicate that there are differences among NSW school children according to their SES and cultural backgrounds.

- Indicates the importance of ensuring programs and policies reach schools and communities from low SES and non-English speaking cultural backgrounds, and that they are perceived as relevant and culturally appropriate. Suggests scope for specifically targeted initiatives.
- Qualitative research is required to understand the high prevalence of weight-related behaviours (e.g., not eating breakfast daily and frequently eating dinner in front of the TV) among children from low SES and non-English-speaking cultural backgrounds. This work should also include information about migrant family's acculturation, including whether there are generational differences in the prevalence and adoption of weight related behaviours.

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