PANORG
Physical Activity Nutrition Obesity Research Group

Report:

Weight and weight related behaviours among NSW Kindergarten children

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

THE UNIVERSITY OF SYDNEY

NSW GOVERNMENT Health

SPANS 2010: Weight and weight related behaviours among NSW Kindergarten children

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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 findings from the 2010 NSW Schools Physical Activity and Nutrition Survey (SPANS) show that the prevalence of combined overweight and obesity among Kindergarten children has significantly increased at a rate of 0.17% per annum between 2004 and 2010, from 17.7% to 18.7%, respectively. The rate of increase in combined overweight and obesity has been stronger among boys compared with girls (0.25% pa vs 0.10% pa, respectively).

With one-in-five NSW children entering school overweight or obese there is a need for preventive interventions during early childhood and preschool years. The purpose of the report is to inform the NSW Ministry of Health on the weight status and associated behaviours of children in their first year of school.

2. Survey methods

Background

Prior to 2010, SPANS only collected demographic characteristics and height/weight/waist circumference on Kindergarten children, prohibiting assessment of change in weight related behaviors. In 2010, parents of children in Kindergarten were asked to complete questionnaires asking about their child's physical activity (including school travel), sedentary behaviours and, dietary patterns and habits.

Details of the design and methods of SPANS are published elsewhere. Briefly, SPANS is a representative school-based cross-sectional survey of school children aged 5-17 years. Schools from each educational sector participated and children invited to participate. The data were collected during Term 1, 2010.

The primary school response rate was 61% and student response rate for Kindergarten was 62% (n = 1,141). The prevalence's reported in this document are based on post stratification weights, in order to allow inferences from children included in the sample to the population from which they were drawn.

Comparisons were conducted for each variable of interest and stratified by sex, locality (urban/rural) socioeconomic tertiles, cultural background (English-speaking, European, Middle-Eastern and Asian) and BMI categories (Underweight (Grade 1), healthy weight, overweight, obese).

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 and logistic regression was used to test the associations.

3. Results

3.1 Sociodemographic Characteristics

The sociodemographic characteristic of Kindergarten children participating in SPANS 2010 are given in Table 1. Less than one third of children were from low SES tertile, the majority were from English-speaking backgrounds and from urban households.

Table 1 Demographic characteristics of sample

Characteristic	Boys	Girls	All
Age (mean/ years)	5.4	5.3	5.3
Urban households *(%)*	88.4	89.7	89.0
Socioeconomic Status (%)			
Low	31.4	27.2	29.4
Middle	41.9	40.9	41.4
High	26.7	31.9	29.2
Cultural background (%)			
English-speaking	81.4	80.8	81.1
European	0.7	0.9	0.8
Middle-Eastern	6.1	6.8	6.4
Asian	9.3	8.3	8.8
Other	2.5	3.2	2.8

3.2 Weight status

Overall, the prevalence of combined overweight and obesity in 2010 was 18.7% among Kindergarten children. The prevalence of overweight and of obesity were higher among girls, but the differences were not statistically significant. Table 2 shows the prevalence distribution by BMI category.

Table 2 Prevalence of thinness (Grade 1), healthy weight, overweight, obesity and combined overweight and obesity, by sex (%)

BMI category	Boys	Girls	All
Thinness (Grade 1	7.3	8.0	7.6
Healthy weight	76.3	70.9	73.7
Overweight	12.0	15.5	13.8
Obese	4.3	5.6	4.9
Overweight + obese	16.4	21.1	18.7

***** Indicates statistically significant difference at P < 0.0. Comparisons are within sex and are between underweight, or overweight/obesity compared with healthy weight.

Change in overweight & obesity: 2004-2010

Table 3 shows the trends in the prevalence of thinness (Grade 1), healthy weight, overweight, obesity and combined overweight and obesity between 2004 and 2010, and the average annual change in the prevalence of combined overweight and obesity between surveys for boys and girls in Year K.

Overall, the prevalence of combined overweight and obesity significantly increased between survey years, at an annual rate of 0.17%. The prevalence of overweight increased among boys but remained stable among girls while the prevalence of obesity decreased among boys and increased among girls.

The prevalence of combined overweight and obesity increased between survey years at an annual rate of 0.25% for boys and 0.10% for girls, which was only statistically significant for boys. At both survey times the prevalence of combined overweight and obesity was higher among girls compared with boys.

Table 3 Prevalence of BMI status in the 2004 and 2010, and the average annual change in the prevalence of overweight/obesity(%)

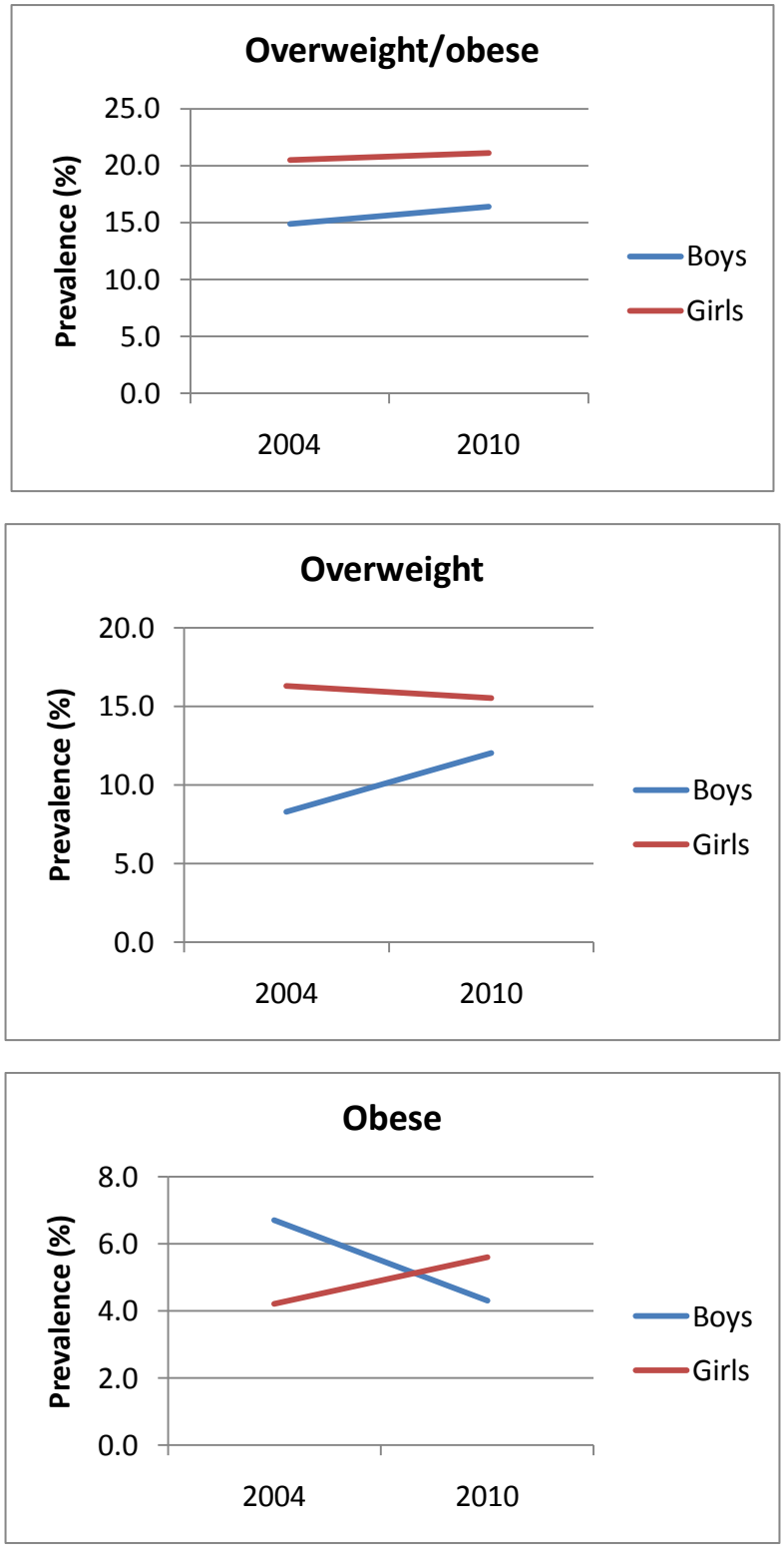
Boys	**Thinness (Grade 1)**	**Healthy weight**	**Overweight**	**Obese**	**Overweight + Obese**	**Average change per annum (%)**
2004	12.0	73.1	8.3	6.7	14.9	
2010	7.3	76.3	12.0*	4.3*	16.4*	0.25
Girls						
2004	8.4	71.1	16.3	4.2	20.5	
2010	8.0	70.9	15.5*	5.6*	21.1	0.10
All						
2004	10.2	72.1	12.3	5.4	17.7	
2010	7.6	73.7	13.8*	4.9*	18.7*	0.17

* = statistically significant between 2004 and 2010

Figure 1 illustrates the change in overweight/obesity, overweight and obesity, by sex. For boys, the prevalence of overweight significantly increased between survey years (p = 0.00) while the prevalence of obesity significantly decrease (p=0.00). Conversely, for girls the prevalence of overweight significantly decreased between survey years (p = 0.02) while the prevalence of obesity significantly increased (p=0.00).

The prevalences suggest a divergent shift across BMI categories in children entering school. That is, for girls, there was little change in thinness and healthy weight categories, however changes are seen in the upper BMI distribution with girls shifting from overweight to obese category (ie potentially, overweight girls are getting bigger).

Figure 1 Prevalence of combined overweight and obesity (top panel) overweight (middle panel) and obesity (bottom panel) for 2004 and 2010 (%)



BMI by sociodemographic characteristics

Table 4 shows the prevalence of combined overweight and obesity by sex and sociodemographic characteristics. The prevalence was significantly higher among urban girls and was significantly and consistently higher among children from low, compared with high SES tertile.

Table 4 Prevalence of combined overweight and obesity by sex and sociodemographic characteristics (%)

	Boys	Girls	All
Rurality			
Urban	16.3	22.1	19.1
Rural	16.8	12.8*	15.0
Socioeconomic Status			
Low	25.8*	29.0*	27.3*
Middle	11.3	21.4	16.2
High	13.5	14.1	13.8
Cultural background			
English-speaking	14.4	20.9	17.6
European	32.7	25.9	28.8
Middle-Eastern	22.6	18.0	20.2
Asian	25.2	23.7	24.5

***** Indicates statistically significant difference at $P < 0.05$. Comparisons are within each sex and are between: rural and urban; low and middle SES compared with high SES; European, Middle-Eastern and Asian cultural backgrounds compared with English-speaking cultural background.

Parents' perceived perception of their child's weight status

Table 5 shows the prevalence of parents' perceived perception of their child's weight status compared with the child's actual weight status (BMI category). Almost 90% of parents of overweight children perceived their child to be about the right weight, and approximately 45% of parents of obese children perceived their child to be about the right weight.

Table 5 Prevalence of Year K parents' perception of their child's weight status versus actual weight status (%)

	Parents' perception of their child's weight status				
Measured BMI	**Very under weight**	**Slightly under weight**	**About the right weight**	**Slightly over weight**	**Very over weight**
Boys					
Thinness	6.5	41.1	52.4	0	0
Healthy weight	1.2	13.6	85.0	0.2	0
Overweight	0.	5.4	86.1	8.5	0
Obese	0	3.0	**42.8**	54.2	0
Girls					
Thinness	1.3	31.1	67.6	0	0
Healthy weight	0.8	10.5	88.1	0.6	0
Overweight	0	1.6	87.8	10.8	0
Obese	0	0	**45.6**	54.4	0

3.3 Weight related behaviours

The following section presents the findings on weight related behaviours including dietary patterns and habits, physical activity, school transport and sedentary behaviours and screen time.

3.3.1 Dietary patterns and habits

Fruit and vegetables

The Australian Guide to Healthy Eating recommends that Kindergarten children consume at least one serve of fruit per day and at least two serves of vegetables daily. Table 6 show the prevalence of children meeting these recommendations, respectively. Over 95% of children consume the recommended fruit, but only 55% met the recommended daily serves of vegetables.

Given the prevalence of meeting the recommended daily serves of vegetables is low, Table 7 shows the prevalence by sociodemographic characteristics and BMI category. The prevalence was significantly lower among Asian children and boys from Middle-Eastern cultural backgrounds, compared with English-speaking peers.

Table 6 Prevalence of meeting recommended daily serves of fruit and vegetables (%)

	Met recommended fruit serves	Met recommended vegetable serves
Boys	95.7	53.4
Girls	98.0	57.1
All	96.8	55.2

***** Indicates statistically significant difference at P < 0.05 between boys and girls

Table 7 Prevalence of consumption of recommended number of serves of vegetables per day by sociodemographic characteristics and BMI category (%)

	Boys	Girls	All
Prevalence	53.4	57.1	55.2
Rurality			
Urban	53.3	57.1	55.2
Rural	53.4	57.5	55.3
Socioeconomic Status			
Low	49.8	50.1	49.9
Middle	53.0	60.2	56.4
High	58.1	58.7	58.5
Cultural background			
English-speaking	56.4	59.7	58.0
European	71.7	32.5	50.4
Middle-Eastern	40.4*	57.4	49.2
Asian	29.1*	30.6*	29.8*
BMI Category			
Thinness	47.0	56.8	52.0
Healthy weight	56.9	59.0	57.9
Overweight	50.5	56.2	53.7
Obese	51.7	45.3	47.9

***** Indicates statistically significant difference at P < 0.05. Comparisons are within each sex and are between: rural and urban; low and middle SES compared with high SES; European, Middle-Eastern and Asian cultural backgrounds compared with English-speaking cultural background.

Milk

The Australian Guide to Healthy Eating recommends that Kindergarten children consume at least two tothree serves of dairy foods per day. This includes milk. The Australian Dietary Guidelines for Children and Adolescents suggests that reduced fat milk should be encouraged among children aged 2-years and above. Table 8 shows that only one-in-five children consume reduced/low fat milk options.

Table 8 Type of milk usually consumed (%)

Milk	Boys	Girls	All
Whole	70.3	69.3	69.8
Low/reduced fat and skim	20.1	21.2	20.7
Soy [a]	3.6	2.8	3.2
Other [b]	2.4	2.1	2.2
None	3.3	3.8	3.5
Don't know	0.3	0.8	0.6

[a] soy includes full-fat and reduced-fat varieties; [b] other includes evaporated or sweetened condensed milk, rice or goat milk

Fruit juice

Excess fruit juice consumption can detract from a well-balanced diet and contribute to a high energy intake resulting in weight gain and obesity. The Dietary Guidelines for Children and Adolescents in Australia suggest that one serve of fruit can be substituted for a small glass of fruit juice (125 ml). Table 9 shows that approximately 34% of children drink one or more cups of fruit juice daily.

Table 9 Usual consumption of fruit juice (%)

Fruit juice	Boys	Girls	All
1 cup or less per week	23.5	24.6	24.1
2 to 6 cups per week	42.7	40.9	41.8
1 cup per day	23.8	27.6	25.7
2 or more cups per day	10.0	6.9	8.5

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.[1]

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. Accordingly, the consumption of one or more cups per day of soft drink is considered high.

Tables 10 shows soft drink consumption, by frequency and sex. The majority of children drank one or less cups per week, and almost one-in-seven drank one or more cups per day.

Table 10 Usual consumption of soft drinks (%)

Soft drink*	Boys	Girls	All
1 cup or less per week	59.9	64.0	61.9
2 to 6 cups per week	23.3	24.5	23.9
1 cup per day	12.4	8.7	10.6
2 or more cups per day	4.4	2.7	3.6

*one cup = 250 mls

High consumption: one or more cups per day

Table 11 shows the prevalence for consuming one or more cups per day of soft drink by sociodemographic characteristics.The prevalence of drinking ≥1 or more cups a day was significantly higher among boys compared with girls. There were no other significant associations between children drinking one or more cups of soft drink a day and other sociodemographic factors.

Table 11 Prevalence of consumption of one or more cups of soft drinks per day by sociodemographic characteristics and BMI category (%).

	Boys	Girls	All
Prevalence	16.8	11.4*	14.2
Rurality			
Urban	17.0	12.3	14.7
Rural	15.8	3.3	10.2
Socioeconomic Status			
Low	21.7	19.5	20.7
Middle	17.1	10.8	14.0
High	10.8	5.5	8.0
Cultural background			
English-speaking	17.1	11.5	14.4
European	n	n	n
Middle-Eastern	29.6	3.5	15.4
Asian	7.3	14.3	10.6
BMI Category			
Thinness	17.1	5.7	11.3
Healthy weight	16.3	10.4	13.6
Overweight	12.0	17.2	15.1
Obese	17.1	20.4	19.1

***** Indicates statistically significant difference at $P < 0.05$. Comparisons are within each sex and are between: rural and urban; low and middle SES compared with high SES; European, Middle-Eastern and Asian cultural backgrounds compared with English-speaking cultural background. n = numbers too small

Fried potato products

The Australian Guide to Healthy Eating recommends that fried potato products are eaten sometimes, in small amounts, or not at all. Accordingly, the consumption of three or more times per week of fried potato products is considered high.Table 13 shows the prevalence of consuming fried potato products ≥3 time per week by sociodemographic characteristics and BMI category.

Approximately 12% of children reported consuming fried potato products three or more times a week. The prevalence was significantly higher among children from low, compared with high SES tertiles, and among children from Middle-Eastern cultural backgrounds, compared with English-speaking peers.

Table 12 Prevalence of consuming fried potato products ≥3 times/week by sociodemographic characteristics and BMI category (%)

	Boys	Girls	All
Prevalence	12.8	12.2	12.5
Rurality			
Urban	13.1	11.8	12.5
Rural	11.2	15.4	13.1
Socioeconomic Status			
Low	17.6	19.8*	18.6*
Middle	11.2	10.9	11.1
High	10.1	7.7	8.8
English-speaking	11.4	10.3	10.8
European	-	-	-
Middle-Eastern	25.0*	29.4*	27.3*
Asian	17.4	14.6	16.1
BMI Category			
Thinness	5.5	7.3	6.4
Healthy weight	13.6	11.8	12.8
Overweight	6.1	20.3	14.1
Obese	11.4	8.2	9.6

***** Indicates statistically significant difference at P < 0.05. Comparisons are within each sex and are between: rural and urban; low and middle SES compared with high SES; European, Middle-Eastern and Asian cultural backgrounds compared with English-speaking cultural background. n = numbers too small

Salty snacks, confectionary and ice-creams

The Australian Guide to Healthy Eating recommends that energy-dense nutrient poor foods including salty snacks, confectionary and ice-creams are eaten sometimes, in small amounts, or not at all. ccordingly, the consumption of three or more times a week of these EDNP food products is considered high.

Table 13 shows the prevalence by frequency of consuming these food products. Approximately one-third of Kindergarten children reportedly consume salty snack products and confectionary ≥3 times a week and almost 45% reported eating ice-creams ≥3 times a week.

Table 13 Prevalence of the frequency of consuming salty snacks, confectionary and ice-cream

	Salty snacks		Confectionary		Ice-cream	
	Boys	Girls	Boys	Girls	Boys	Girls
Never/rarely	36.2	35.5	25.2	19.4	15.9	11.1
1-2 times per week	29.2	34.8	40.5	45.3	40.4	44.6
3-6 times per week	25.1	21.9	25.2	27.8	33.7	34.7
Once a day or more	9.4	7.7	9.1	7.4	10.0	9.6

Salty snacks ≥3 times a week

Table 14 shows that approximately one-third of children consume salty snacks ≥3 times a week and, that there was a significant difference between low and high SES girls, obese compared with healthy weight girls and Middle-Eastern children compared with English-speaking children.

Table 14 Prevalence of consuming salty snacks ≥3 times a week (%)

	Boys	Girls	All
Prevalence	34.6	29.7	32.2
Rurality			
Urban	35.5	29.0	32.3
Rural	27.7	35.0	31.2
Socioeconomic Status			
Low	44.0	43.8*	43.9*
Middle	30.9	26.7	28.9
High	29.7	22.1	25.6
Cultural background			
English-speaking	33.8	27.1	30.5
European	n	n	n
Middle-Eastern	58.5	58.9	58.7
Asian	28.2	31.8	29.8
BMI Category			
Thinness	35.9	17.2	35.9
Healthy weight	30.8	29.0	29.9
Overweight	43.0	36.6	39.4
Obese	37.2	46.4*	42.7

***** Indicates statistically significant difference at $P < 0.05$. Comparisons are within each sex and are between: rural and urban; low and middle SES compared with high SES; European, Middle-Eastern and Asian cultural backgrounds compared with English-speaking cultural background. n = numbers too small

Confectionary ≥3 times a week

Table 15 shows that approximately one-third of children consume confectionary ≥3 times a week and, that there was a significant difference between rural and urban boys, Middle-Eastern children compared with English-speaking children and thin compared with healthy weight children.

Table 15 Prevalence of the frequency of confectionary ≥3 times a week (%)

	Boys	Girls	All
Prevalence	34.4	35.2	34.8
Rurality			
Urban	35.7	35.4	35.5
Rural	24.5*	33.7	28.8
Socioeconomic Status			
Low	36.4	39.4	37.7
Middle	30.8	32.7	31.7
High	37.9	35.0	36.4
Cultural background			
English-speaking	32.3	33.8	33.0
European	n	n	n
Middle-Eastern	66.6*	61.1*	63.8*
Asian	28.7	39.9	33.9
BMI Category			
Thinness	46.9	45.5	46.2*
Healthy weight	32.2	33.9	33.0
Overweight	35.2	43.2	39.7
Obese	38.5	30.8	34.0

***** Indicates statistically significant difference at $P < 0.05$. Comparisons are within each sex and are between: rural and urban; low and middle SES compared with high SES; European, Middle-Eastern and Asian cultural backgrounds compared with English-speaking cultural background. n = numbers too small

Ice-cream ≥3 times a week

Table 16 shows that approximately two-fifths of children consume ice-cream or ice-blocks ≥3 times a week and, that there was a significant difference between Middle-Eastern girls compared with English-speaking girls.

Table 16 Prevalence of the frequency of consuming ice-cream ≥3 times a week (%)

	Boys	Girls	All
Prevalence	43.6	44.3	43.9
Rurality			
Urban	43.5	43.6	43.5
Rural	44.5	50.2	47.1
Socioeconomic Status			
Low	41.5	51.1	45.8
Middle	46.2	41.8	37.5
High	41.9	41.9	41.9
Cultural background			
English-speaking	43.0	43.0	43.0
European	41.6	41.6	41.6
Middle-Eastern	48.5	67.3*	58.3*
Asian	43.8	39.9	42.0
BMI Category			
Thinness	40.0	45.8	43.0
Healthy weight	43.4	44.8	44.1
Overweight	50.3	47.7	48.8
Obese	45.0	41.7	43.1

***** Indicates statistically significant difference at $P < 0.05$. Comparisons are within each sex and are between: rural and urban; low and middle SES compared with high SES; European, Middle-Eastern and Asian cultural backgrounds compared with English-speaking cultural background.

3.3.2 Physical activity

Australia's National guidelines for physical activity recommend that children aged 5 to 18 years should participate in at least 60 minutes every day of moderate-to-vigorous physical activities (MVPA) that are developmentally appropriate, enjoyable, and involve a variety of activities.[2]

For SPANS 2010, parents of children in Kindergarten were asked to report their child's participation in physical activity using a modified version of questions developed by the NSW Ministry of Health.[3;4] These questions ask the parent to report the time and frequency their child spent in organised and non-organised physical activity outside of school hours separately, for week days and weekend days. The validity of these questions has not been tested.

The parents do not report the actual activity; therefore, it is not possible to determine whether these children meet the recommended physical activity guidelines' prescription of MVPA, but only to estimate if they spent 60 minutes per day being 'active'.

Daily physical activity

Table 17 shows children spent approximately 2 hours on weekdays and almost 2.5 hours on weekend days in organised and non-organised physical activity. Table 18 shows the median daily minutes seperately for organised and non-organised physical activities on a usual weekday and weekend day

Table 17 Mean daily minutes spent in physical activity on a usual week day and weekend day

	Weekdays	Weekends
Boys	120.5	153.4
Girls	122.4	138.9
All	121.4	146.6

***** Indicates statistically significant difference at P < 0.05 between boys and girls

Table 18 Median times (minutes/day) spent in organised and non-organised physical activity on a usual week day and weekend day

	Organised activities		Non- organised activities	
	Weekdays	Weekends	Weekdays	Weekends
Boys	47	20	58	114
Girls	50	0	59	113
All	51	24	59	113

Awareness of recommended physical activity

Parents were ask to report the number of minutes recommended for children to spend in physical activity. The reponse was open, or 'don't know'. Table 19 shows the proportion of parents who reported they did not know how much time is recommended for children to spend each day in physical activity. Two out of five parents reported that they 'did not know' the recommendation for physical activity for children.

Table 19 Prevalence of parents who did not know recommended daily physical activity guidelines

	Parents: do not know PA recommendation
Boys	37.7
Girls	42.9
All	40.2

***** Indicates statistically significant difference at $P < 0.05$ between boys and girls

Meeting national physical activity recommendations

Table 20 shows that only two-in-five children met the daily physical activity recommendation. The prevalence for spending 60 or more minutes per day in physical activity were significantly higher among rural girls compared with urban girls and significantly lower among Middle-Eastern children and Asian girls, compared with English-speaking peers.

Table 20 Prevalence of spending ≥60 minutes per day in physical activity (%)

	Boys	Girls	All
Overall prevalence	44.4	42.7	43.7
Rurality			
Urban	42.6	40.7	41.7
Rural	58.2	59.8*	59.5
Socioeconomic Status			
Low	38.6	36.6	38.3
Middle	50.2	51.1*	50.4
High	41.9	36.7	39.2
Cultural background			
English-speaking	49.0	48.8	48.9
European	0.0	0.0	-
Middle-Eastern	10.3*	14.0*	12.3
Asian	27.0	10.6*	19.8
BMI Category			
Thinness	35.1	44.0	40.9
Healthy weight	48.2	45.3	46.8
Overweight	36.4	33.5	35.6
Obese	34.3	30.0	31.4

***** Indicates statistically significant difference at $P < 0.05$. Comparisons are within each sex and are between: rural and urban; low and middle SES compared with high SES; European, Middle-Eastern and Asian cultural backgrounds compared with English-speaking cultural background.

3.3.3 Sedentary behaviours

The quantity of time spent sitting that is associated with adverse health consequences in young children is not known. What is known is that sedentary behaviours are associated with the development of chronic diseases including osteoporosis, type 2 diabetes mellitus, unhealthy weight gain and cardiovascular disease. Furthermore, there is strong evidence that sedentary behaviours adopted during childhood track into adult life[5]. 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.

Some sedentary activities (eg reading, talking with friends) are considered essential to the social and cognitive development of a child, while other activities, especially screen time (eg TV/DVD/ recreational computer use) are associated with overweight and obesity.[6]

Tables 21 and 22 show the median hours that 5-year olds spent in sedentary activities on a usual weekday and weekend day, (respectively) by sociodemographic characteristics.

Weekdays

On weekdays, outside school hours, Kindergarten children spend approximately 2.7 hours in sedentary behaviours. Children from low SES tertiles spent significantly more time sedentary, compared with high SES peers. Children from Middle-Eastern cultural backgrounds spent significantly more time sedentary compared with English-speaking peers, and obese boys and overweight girls were also reported to spend more time sedentary than their healthy weight peers.

Weekend days

On weekends, children spend approximately 5.5 hours per day in sedentary behaviours. On weekend days, significantly higher times spent in sedentariness were observed among low SES girls and obese boys.

Table 21 Mean hours spent on a usual *weekday*, outside of school hours, in sedentary behaviour by sociodemographic characteristics and BMI category

	Boys	Girls	All
Prevalence	2.7	2.7	2.7
Rurality			
Urban	2.8	2.7	2.7
Rural	2.5	2.5	2.5
Socioeconomic Status			
Low	3.0*	3.4*	3.1
Middle	2.7*	2.5	2.6*
High	2.4	2.4	2.4
Cultural background			
English-speaking	2.7	2.6	2.6
European	1.6*	3.0*	2.7
Middle-Eastern	3.8*	3.1*	3.4*
Asian	2.8	2.7	2.8
BMI Category			
Thinness	2.6	2.5	2.5
Healthy weight	2.6	2.6	2.6
Overweight	3.0	3.1*	3.0*
Obese	3.6*	3.0	3.2*

***** Indicates statistically significant difference at $P < 0.05$. Comparisons are within each sex and are between: rural and urban; low and middle SES compared with high SES; European, Middle-Eastern and Asian cultural backgrounds compared with English-speaking cultural background.

Table 22 Median hours spent on a usual *weekend days,* outside of school hours, in sedentary behaviour by sociodemographic characteristics and BMI category

	Boys	Girls	All
Prevalence	5.2	5.5	5.3
Rurality			
Urban	5.3	5.5	5.5
Rural	4.9	5.4	5.4
Socioeconomic Status			
Low	5.2	6.4*	6.0*
Middle	5.3	5.2	5.2
High	5.2	5.4	5.3
Cultural background			
English-speaking	5.1	5.5	5.3
European	3.7	5.2	5.1
Middle-Eastern	5.5	6.3	6.1*
Asian	6.6	5.2	5.9
BMI Category			
Thinness	5.7	5.0	5.1
Healthy weight	5.2	5.5	5.4
Overweight	5.8	5.9	5.9*
Obese	6.9*	5.9	6.4

***** Indicates statistically significant difference at P < 0.05. Comparisons are within each sex and are between: rural and urban; low and middle SES compared with high SES; European, Middle-Eastern and Asian cultural backgrounds compared with English-speaking cultural background.

Screen time

Screen time (ie watching TV, DVDs playing e-games, using the computer for fun) is the most popular sedentary behaviour among children.[7] In Australia, the national guidelines recommend that children aged 2-18 years should spend no more than 2 hours a day in front of screens for recreational purposes and to limit screen time during daylight hours.[2]

Table 23 shows that one-third of children exceed the recommended screen time on weekdays. The prevalence was higher among boys and children from low SES, Middle-Eastern boys, Asian children, obese boys and overweight children.

Table 23 Prevalence of ≥ 2 hours/day screen time on weekdays by sociodemographic characteristics and BMI category (%)

	Weekday		
	Boys	**Girls**	**All**
Prevalence	37.7	30.2*	34.1
Rurality			
Urban	38.5	30.1	34.4
Rural	32.3	31.3	31.8
Socioeconomic Status			
Low	44.3*	44.5*	44.4*
Middle	36.6	27.9	32.4
High	32.1	21.8	26.6
Cultural background			
English-speaking	35.9	28.9	32.5
European	n	78.1	42.4
Middle-Eastern	59.8*	32.3	45.5*
Asian	44.3	39.8	42.3*
BMI Category			
Thinness	35.6	18.1	26.6
Healthy weight	34.6	30.0	32.4
Overweight	47.1	41.6	44.0*
Obese	64.5*	31.6	46.0

***** Indicates statistically significant difference at $P < 0.05$. Comparisons are within each sex and are between: rural and urban; low and middle SES compared with high SES; European, Middle-Eastern and Asian cultural backgrounds compared with English-speaking cultural background. n= low numbers

Table 24 shows that three-quarters of children exceed the recommended screen time on weekend days. The prevalence was lower among European boys and higher among obese children.

Table 24 Prevalence of ≥ 2 hours/day screen time on weekend days by sociodemographic characteristics and BMI category (%)

	Weekend day		
	Boys	**Girls**	**All**
Prevalence	77.9	75.5	76.8
Rurality			
Urban	77.6	75.1	76.4
Rural	80.5	78.9	79.7
Socioeconomic Status			
Low	79.1	78.9	79.0
Middle	79.4	72.9	76.3
High	74.3	76.1	75.2
Cultural background			
English-speaking	78.8	77.6	78.2
European	41.6*	78.1	61.4
Middle-Eastern	84.6	66.1	75.0
Asian	67.6	65.4	66.6
BMI Category			
Thinness	77.3	62.7	69.8
Healthy weight	75.2	75.4	75.3
Overweight	77.7	84.5	81.6
Obese	100.0	85.9	92.1*

***** Indicates statistically significant difference at $P < 0.05$. Comparisons are within each sex and are between: rural and urban; low and middle SES compared with high SES; European, Middle-Eastern and Asian cultural backgrounds compared with English-speaking cultural background. n= low numbers

Parental awareness of screen time recommendation

Table 25 shows that more than half of the parents of Kindergarten children reported they 'did not know' the screen time recommendation for children.

Table 25 Prevalence of parents of Kindergarten children who reported they were not aware of the national guideline for screen time use (%)

	Parents not aware of screen time recommendation
Boys	49.9
Girls	55.6
All	52.6

TVs in the bedroom

Children with a TV in their bedroom are at greater risk of developing overweight and obesity,[8] have lower academic performance,[9] and have more trouble falling asleep and therefore decreased sleep duration.[5;6] Further children who have a TV in their bedroom are more likely to spend more time viewing TV.[10] This is highlighted in Table 25 which shows two-thirds of children who exceed screen time recommendations have a TV in their bedroom

Table 25 Prevalence of children who spend ≥ 2 hrs/day screen time and the presences of a TV in the bedroom (%)

≥ 2 hrs/day screen time	TV in the bedroom	
	No	Yes
Boys	45.0	65.6
Girls	36.3	64.5
All	40.7	65.1

Table 26 shows the prevalence and the sociodemographic distribution of children with a TV in their bedroom. The prevalence was significant higher among girls from low SES and obese children and lower among thin children.

Table 26 Prevalence of TVs in the bedroom by sociodemographic characteristics and BMI category (%)

	TV in bedroom (%)		
	Boys	**Girls**	**All**
Overall prevalence	21.0	20.0	20.5
Rurality			
Urban	19.8	20.2	20.0
Rural	30.1	18.0	24.5
Socioeconomic Status			
Low	26.3	30.4*	28.2*
Middle	22.3	17.9	20.2
High	13.4	14.3	13.8
Cultural background			
English-speaking	22.0	19.6	20.9
European	41.6	10.6	24.8
Middle-Eastern	20.6	28.6	25.0
Asian	11.5	16.9	13.9
BMI Category			
Thinness	3.8*	7.1	5.4*
Healthy weight	20.7	18.7	19.7
Overweight	27.3	32.2	30.1
Obese	43.7*	34.0*	37.8*

***** Indicates statistically significant difference at $P < 0.05$. Comparisons are within each sex and are between: rural and urban; low and middle SES compared with high SES; European, Middle-Eastern and Asian cultural backgrounds compared with English-speaking cultural background.

Table 27 shows the proportion of children whose parents reported that they never set rules on their childs screen time. The prevelaence of parents never seting screen time rules was significantly higher among girls.

Table 27 Prevalence of parents never seting screen time rules for their child by sociodemographic characteristics and BMI category (%)

	No screen time rules (%)		
	Boys	**Girls**	**All**
Prevalence	5.9	10.3*	8.1
Rurality			
Urban	5.9	10.5	8.2
Rural	6.0	8.9	7.4
Socioeconomic Status			
Low	6.6	11.8	8.9
Middle	6.7	11.2	8.8
High	4.0	8.0	6.1
Cultural background			
English-speaking	6.4	10.0	8.1
European	n	41.6	22.6
Middle-Eastern	1.8	7.4	4.7
Asian	5.0	10.2	7.4
BMI Category			
Thinness	9.9	5.7	7.8
Healthy weight	5.8	11.2	8.4
Overweight	3.1	8.4	6.1
Obese	8.8	15.4	12.7

***** Indicates statistically significant difference at P < 0.05. Comparisons are within each sex and are between: rural and urban; low and middle SES compared with high SES; European, Middle-Eastern and Asian cultural backgrounds compared with English-speaking cultural background. n= low numbers

3.3.4 School travel

Aside from the health benefits which school aged children can accrue from walking and cycling to school, there are other good reasons to promote children's active travel to and from school. Schools are a significant generator of localized traffic congestion, contributing to morning and afternoon traffic peaks. As a result, the traffic flow on the streets near schools may create hazardous conditions for children and adults travelling by non-motorized means.[11] Further, a US report on the relative risks of school travel found that pedestrians and bicyclists travelling to school have the highest rate of injury and fatality on a per-kilometre basis.[12]

In recognition of the health potential associated with active commuting trips to and from school, and the need to reduce car-dependency among children, SPANS describes the travel mode of children' trips to schools.

Four modes of school transport (active travel only, public transport only, car only and mixed mode). The findings are based on those children who reported using each travel mode five days a week.

Communting categories

Active travel only	Respondents who only reported either walking, cycling, skateboard or scooter.
Public transport only	Respondents who only reported train, bus, ferry, or other.
Car only	Respondents who reported only travelling by car.
Mixed mode	Children who reported multiple modes of travel (ie active travel, and/or public transport, and/or car).

Tables 28 and 29 show the prevalence, mode of travel and trip time among Kindergarten chi ldren going to and from school, respectively. Less than one-in-five children actively communted to and from school. Over half of children were driven exclusively to and from school, with a median car trip time around 11-13 minutes.

Table 28 Prevalence and trip time (minutes per day) spent travelling *to* school by travel mode among boys by Year group

Boys (N= 537)	Active travel only[1]	Public transport only[2]	Car only[3]	Mixed mode[4]
Number (n)	(100)	(27)	(303)	(107)
Prevalence (%)	18.3	5.0	55.6	21.0
Mean trip time (mins/day)	13.4	23.2	10.9	26.5
Median trip time (mins/day)	9.6	17.0	8.6	20.3
Girls(N = 550)				
Number (n)	(108)	(44)	(286)	(112)
Prevalence (%)	20.2	8.4	51.4	20.1
Mean trip time (mins/day)	10.9	25.1	13.0	28.8
Median trip time (mins/day)	8.5	17.5	9.5	24.3

Table 29 Prevalence and trip time (minutes per day) spent travelling home *from* school by travel mode among boys by Year group

Boys (N= 537)	Active travel only[1]	Public transport only[2]	Car only[3]	Mixed mode[4]
Number (n)	(99)	(29)	(310)	(98)
Prevalence (%)	18.2	4.8	57.9	19.0
Mean trip time (mins/day)	13.5	23.9	11.0	27.3
Median trip time (mins/day)	9.7	14.1	8.6	19.0
Girls(N = 550)				
Number (n)	(99)	(42)	(287)	(120)
Prevalence (%)	17.8	8.3	52.5	21.4
Mean trip time (mins/day)	12	26.2	12.9	29.4
Median trip time (mins/day)	9.0	16.9	9.5	24.1

[1]**Active travel only:** Respondents who only reported either walking, cycling, skateboard or scooter.
[2]**Public transport only:** Respondents who only reported train, bus, ferry, or other.
[3]**Car only:** Respondents who reported only travelling by car.
[4]**Mixed mode**: Children who reported multiple modes of travel (ie active travel, and/or public transport, and/or car).

4. Discussion

The purpose of this report was to describe the weight and weight-related behaviours of NSW children entering their first year of school (ie Kindergarten). Potentially, the weight and weight-related behaviours of children in Kindergarten reflect behaviours adopted during the preschool years. Examining the prevalence and distribution of these behaviours will help inform interventions in the early childhood setting and ensure they are appropriately targeted to those children who are at greatest risk of being overweight or obese and engaging in weight-related behaviours.

There are a range of jurisdictions which can offer opportunities to communicate to parents about reducing or eliminating these behaviours including social marketing campaigns, early childhood sector (orientation to preschool settings, information kits), supported playgroups, health professions using brief advise during child health checks (immunization, 4-year old check).

Overweight and obesity

The findings show that almost one-in-five NSW children enter school overweight/obese and that 5% are obese. BMI status tracks through childhood,[13] so efforts are needed to reduce the current incidence of overweight and obesity among children before they enter school.

Furthermore, the prevalence of overweight and obesity among children entering the first year of school has significantly increased between 2004 and 2010. Overall, the prevalence increased at an average annual rate of 0.17% and 0.25% for boys and girls, respectively. There were significant sex differences; overweight significantly increased among boys between survey years while the prevalence of obesity significantly decreased. Conversely, for girls, the prevalence of overweight significantly decreased between survey years while the prevalence of obesity significantly increased. There are no clear reasons to explain the sex differences in the change in prevalence of overweight and of obesity.

The prevalence of overweight and obesity was significantly higher among children from low SES areas, compared with their high SES peers. Although the prevalence of overweight and obesity was lower among children from English-speaking backgrounds compared with other cultural groups these differences were not significant.

An important finding was the misperception of children's actual weight status by their parents. Almost nine out of 10 parents of overweight children perceived their child to be about the right weight, while two in five parents of obese children perceived their child to be about the right weight. This finding is concerning as messages to parents about health risks associated with overweight and obesity during early childhood have the potential to fail if parents do not perceive their child is overweight or obese.

Weight-related behaviours

The findings show that many children start school already engaging in many adverse weight-related behaviours. Further, there were also SES and cultural difference in weight status and weight- related behaviours. The findings are useful to guide health promotion activities and may have implications for policy regarding interventions among preschool aged children and the design of interventions for different sociodemographic groups.

The list below summarises key weight-related behaviours among Kindergarten children which may be contributing to the increase in the prevalence of overweight and obesity observed between 2004 and 2010.

Dietary habits and patterns

- Insufficient serves of vegetables
- Consumption of full-fat rather than reduced fat milk
- Excessive amounts of fruit juice and sugar-sweetened drinks being consumed
- Too frequent consumption of fried potato products
- Too frequent consumption of salty snack foods, confectionary and ice-cream

Physical activity

- Many children not spending at least 60 minutes being physically active each day
- Most parents unaware of physical activity recommendations for children

Screen time behaviours

- Unacceptable proportion of children have a television in their bedroom
- Three-quarters of children exceed screen time recommendation on weekend days
- Parents not setting rules and limits on screen time for their children, particularly for daughters
- Most parents unaware of screen time recommendations for children

Active transport

- Most children being driven to school, even for short journeys

Socio-cultural differences in weight and weight related behaviours

The list below summarises socio-cultural differences in weight and weight related behaviours which may be contributing to the incidence of overweight and obesity among Kindergarten children.

Overweight and obesity

- Higher among children from low SES areas

Dietary habits and patterns

- Insufficient serves of vegetables among Asian children and Middle-Eastern boys
- High soft drink consumption among boys
- Low SES and Middle-Eastern children have a high frequent consumption of fried potato products
- Low SES and Middle-Eastern children have a high frequent consumption of salty snacks
- Middle-Eastern and thin children have a high frequent consumption of confectionary
- Middle-Eastern girls have a high frequent consumption of ice-creams

Physical activity

- Few Middle-Eastern children and Asian girls meet the physical activity recommendation

Sedentary behavior

- Higher on week days among low SES, Middle-Eastern and overweight children
- Higher on weekend days among low SES, Middle-Eastern and overweight children and obese boys

Screen time

- On weekdays, screen time was higher among boys, low SES, Middle-Eastern Asian and overweight children and obese boys.
- On weekend days, screen time was higher among obese boys and lower among European boys.
- Low SES and obese children are more likely to have a TV in the bedroom and thin children less likely to have a TV in the bedroom.

5. Conclusions

The prevalence of overweight and obesity among Kindergarten children has increased between 2004 and 2010. The findings reported here show that many NSW children are entering school already engaging in adverse weight-related behaviours, and that there is some evidence of socio-cultural differences across weight-related behaviours. Further, the findings indicate the importance of ensuring the implementation of relevant programs and policies in early childhood settings – to ensure children start school equipped with healthy lifestyle behaviours.

Potentially, because obesity prevention interventions in the early childhood sector have a lag time between implementation and behavior change, examining the weight and weight-related behaviours of children as they transition into school provides a proxy estimate of investments during the preschool years.

In 2008 the NSW Ministry of Health commenced the statewide roll out of *Munch and Move* – a healthy eating and physical activity program for the early childhood education and care sector that was developed in collaboration with the early childhood sector, Department of Education and Communities and the Ministry of Health (http://www.healthykids.nsw.gov.au/campaigns-programs/about-munch-move.aspx). Briefly, *Munch and Move* comprises training for early childhood educators working in centre-based care services (preschools and long day care) and the family day care sector. Follow up support is provided by health promotion staff from Local Health Districts. Early evaluation showed the program was effective in improving children's fundamental movement skills.[14]

In light of the findings within this report, it may be timely to review the key messages of *Munch and Move* and the family engagement strategies used within the program to ensure that they align and address the behaviours and attitudes identified within this report. The roll-out and support of the *Munch and Move* program is a long term commitment of NSW Health with the program being included within the NSW Healthy Children's Initiative, which is funded by the Ministry of Health and the National Preventative Partnership up until 2017/18. This will allow continuing support to be provided to the early childhood sector to ensure delivery fidelity.

It is also important to note, that not all preschool children attend an early education and care service and that a range of concurrent activities are required to reach children who are not exposed to programs run in the early childhood settings.

The findings of socio-cultural differences in children's weight related behaviours suggest that there is scope for specifically targeted initiatives. It is, however, important to ensure programs and policies reach low SES and culturally diverse communities; and that programs and policies are perceived as relevant and culturally appropriate.

Initiatives to access hard-to-reach groups will require on-going support to ensure delivery and reach. For example, *Support Playgroups* which aim to provide opportunities for parents and children who would not normally access a playgroup to enhance their relationship in a supportive environment, increase their skills and confidence, and to develop valuable social and family support networks. The findings also highlight the need for activities which target children from culturally and linguistically diverse backgrounds, especially Middle-Eastern communities.

Finally, future directions need to consider qualitative research among low SES and culturally and linguistically diverse families to understand the high prevalence of weight-related behaviours among children before entering school.

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