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A Population Study of 5 to 15 Year Olds: Full Time Maternal Employment not Associated with High BMI. The Importance of Screen-Based Activity, Reading for Pleasure and Sleep Duration in Children's BMI

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Abstract To describe the relationship between maternal full time employment and health-related and demographic variables associated with children aged 5–15 years, and the factors associated with child overweight/obesity. Data from a chronic disease and risk factor surveillance system were limited to children aged 5–15 years whose mothers responded on their behalf (n = 641). Univariate/multivariate analyses described the differences between mothers who did and did not work full time. The same data were analysed comparing children who are overweight/obese against those with a normal BMI. The children of mothers who worked full time are more likely to be older, live in a household with a higher household income, be an only child or have one sibling or other child in the household, have a sole mother family structure and not spend any time reading for pleasure. No relationship was found between maternal employment and BMI. Compared with children of normal weight, those who were overweight/obese were more likely to spend no time studying, spend more than 2 h per day in screen-based activity and sleep less than 10 h per night. Child BMI status was not related to maternal employment. Although this analysis included eight diet related variables none proved to be significant in the final models.This study has shown that mothers' working status is not related to children's BMI. The relationship between overweight/obesity of children and high levels of screen-based activity, low levels of studying, and short sleep duration suggests a need for better knowledge and understanding of sedentary behaviours of children.

Keywords Children · Maternal employment · Obesity · Self-report · Sleep · Screen-based activity

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Introduction

Rising prevalence rates of obesity in school-aged children is of major concern for health policy professionals and public health promoters and has resulted in the implementation of major research projects and intervention programs. Possible causal pathways and mechanisms for the rising prevalence include societal changes such as increased technology usage, television viewing and other screen based activities [1, 2], heightened security concerns which often limit outdoor physical activity [3, 4], increased processed food consumption and other changes in dietary habits [5–7], and changes in the built environment [8, 9]. Included in the major societal changes that have occurred in recent decades is the increase in mothers undertaking paid work when the children are young. The conflict between work demands and those of home life tends to affect mothers more than fathers and the damage to well-being caused by work-family interference is the subject of much research recently [10]. This change in employment patterns and resultant family home life is cited as a reason,

often the main reason, for the increase in child obesity rates [11–13]. Other studies have found either no relationship, or an inconsistent relationship, between mothers' working status and child obesity or nutritional status [14, 15]. Similar mixed results have been reported in pre-school aged children [16–18]. It has also been shown that the relationship between child obesity prevalence rates and maternal work practices varies for different cultures and societies [19–21].

While research has consistently shown that the rise in obesity rates has coincided over time with the corresponding increase in paid work undertaken by mothers [11], other studies have shown that the actual time mothers spend with their children has remained stable over this same period [22]. What has tended to change in the family home life, as a result of increased maternal workforce participation, are changes in responsibility for domestic chores, a decrease by mothers in volunteer activities and decreases in family sizes [22]. Bianchi [22] has argued that for all the research that has been undertaken trying to find negative relationships between maternal work force participation and children's wellbeing, consistent results are lacking and often the breakdown of the marriage/relationship has more effect than work participation. Previous studies assessing the relationship between maternal work patterns and child wellbeing have mainly focussed on academic success, cognitive development, and emotional problems of the children and it is only in recent years that health effects, such as obesity, have become a focus in research [23, 24].

Longitudinal studies have shown a relationship between maternal employment and hours worked and overweight in their children [11, 13, 18]. Anderson et al. [11] found that higher socio-economic status mothers, whose work demands are often more intense, are more likely to have overweight children. In addition, longitudinal studies reported that hours worked per week is an important predictor of childhood obesity [11, 18]. While it is acknowledged that these studies provide important evidence of associations, cross-sectional studies such as that presented here often add additional insights. Research into the relationship between maternal work patterns and childhood obesity is cited as being relatively limited [8, 11, 18]. Studies often assess individual issues such as nutritional aspects and physical activity patterns without incorporating the wide range of socio-economic, family and other related behavioural indicators. These include important child-related issues such as screen-based activity and sleeping patterns which have also become important in the debate regarding childhood obesity. The aim of this study is to assess these relationships, using a wide range of relevant indicators, on data collected on randomly selected children, their mothers and their household.

Method

Data on the children and their mothers were collected using the South Australian monitoring and surveillance system (SAMSS), a telephone monitoring system designed to systematically monitor chronic disease, risk factors and other health-related issues on a regular and ongoing basis [25]. A representative cross-sectional sample of approximately 600 people (all ages) is randomly selected each month from all households in South Australia with a telephone connected and the number listed in the electronic white pages. A letter of introduction is sent to the selected household and the person who was last to have a birthday within a 12 month period is chosen for interview. Interviews are conducted by a trained interviewer via a computer assisted telephone interview (CATI) system. Surrogate interviews are undertaken for persons in the household under the age of 16 by the most appropriate person to answer on their behalf. Up to ten call backs are made in an attempt to interview the selected person; there are no replacements for non-respondents.

Although SAMSS has been in operation since 2002, the sample for the current analysis consisted of n = 641 children aged 5 to 15 years for whom a surrogate interview was completed by their mother between March 2008 and December 2009, with March 2008 being the first month that a question assessing soft drink consumption was asked. Respondents for whom body mass index (BMI) information was unavailable were excluded. The monthly response rate for the survey ranged from 60.1 to 69.3% with an average of 63.8%.

Details on the mother included: highest education level achieved, employment status, and number of hours worked per week for those who indicated employment of any kind. Classification as either full-time or part-time employment was determined according to a cut-off of 35 h per week.

Child specific questions included: gender; age; overall health status assessed using a single item (SF-1) from the SF-36 [26]; child weight status assessed using BMI, calculated using self-reported height and weight information using the classification of Cole et al. [27]; current asthma status (doctor diagnosed and symptoms currently present); and mental health problems (defined as 'quite a lot' to 'very much' trouble with emotions, concentration, behaviour or getting on with people).

Child dietary habit questions included daily consumption of: recommended serves of fruit and vegetables [28]; processed meat (meat products such as sausages, frankfurters, devon (fritz), salami, meat pies, bacon or ham); fast food (meals or snacks such as burgers, pizza, chicken or chips from places like McDonalds, Hungry Jacks, Pizza Hut or Red Rooster); potatoes (french fries, fried potatoes or potato crisps); juice (fruit or vegetable juice not

including fruit juice drinks and fruit drinks (e.g. Fruitbox)); water; and soft/sport drink (includes drinks such as coke, lemonade, flavoured mineral water, Powerade or Gatorade). Assessment of physical activity included asking about the time spent per day doing organised sport; reading for pleasure; studying or doing homework; sleeping; and participating in screen-based activities such as watching television (TV), videos or playing video or computer games. Questions related to cultural background were also asked, including the child's country of birth and whether the child was from an Aboriginal or Torres Strait Islander background. However, these questions were not included in the statistical analysis due to small numbers of respondents from culturally and linguistically diverse backgrounds.

Household specific data collected that related to both the mother and the child included: annual household income, socio-economic status (SES) (measured by classifying postcode using the Australian socio-economic index for areas (SEIFA) 2001 index of relative socio-economic disadvantage (IRSD) Quintiles) [29], area of residence, family structure, financial situation, and whether the home was owned or being rented.

Data were re-weighted by age, sex, area and probability of selection in the household to estimated resident population data so that the results were representative of the South Australian population aged 5 to 15 years. Data were analysed using SPSS for Windows Version 17.0 [30].

Two analyses were undertaken. Firstly, associations between full-time working mothers compared to part-time or economically inactive (not employed mothers including home duties), and a range of socio-demographic and health-related variables were determined using univariate analyses. Chi-square tests were undertaken to compare differences. A multivariate logistic regression model was subsequently developed, including all variables with a P-value < 0.25 at the univariate level [31], in order to ascertain independently associated factors. The second set of analyses followed the same procedure but assessed child overweight and obese status with the range of socio-demographic and health-related variables including mother's work status. An alpha level of 0.05 was employed for all statistical tests.

Results

The mean age of the children was 10.15 years (SD = 3.16). Overall, 49.4% were male. The mean number of hours worked per week for mothers reporting employment was 26.11 (SD = 13.02). BMI for children ranged between 6.5 and 54.6 ($M = 18.34$, SD = 4.36), with 24.2% (n = 155) consequently classed as being overweight or obese.

Table 1 details child health status variables grouped by mothers work classification with significant differences by consumption of fruit, daily organised sport activities, and number of hours spent reading for pleasure and sleeping. Table 2 highlights the univariate analysis assessing the range of variables comparing mothers who work full time with a combined category of mothers who work part-time or who do not work. Table 3 details the multivariate model (model $X^2 = 12.77$, $P = 0.12$) with children with full-time employed mothers more likely to be older, live in a household with a higher household income, live in the country, be an only child or one of two children in the household, have a sole mother family structure and not spend any time reading for pleasure.

The second univariate and multivariate analyses determining the variables associated with children classified as overweight or obese, are highlighted in Tables 4 and 5. In the final multivariate model (model $X^2 = 38.17$, $P < .001$), compared with children of normal weight, those who were overweight or obese were more likely to spend no time studying, spend more than 2 h per day in screen-based activity and sleep less than 10 h per night.

Discussion

This study has shown that children whose mother's are working full time, as compared with children whose mothers work part time or not at all, are not more likely to be overweight or obese. In terms of behaviours, these children are less likely to be reading for pleasure. When the same data were analysed to assess the best joint predictors of a child who is overweight or obese compared to normal BMI children, full time maternal work status was again not one of the variables in the final model. The overweight or obese child was more likely to spend at least 2 h a day on screen based activities and undertake no studying per day outside of school hours and sleep less than 10 h per night.

The prevalence of overweight/obesity in children found in this study of 24.2% is consistent with other Australian studies. Booth et al. [32] reported rates of 25.7% for younger boys (7 years), 26.1% for older boys (15 years) and corresponding rates of 24.8 and 19.8% for girls in a 2004 study. Waters et al. [33] reported 31% of ethnic children aged 4–13 years overweight/obese in a Melbourne setting and earlier 1995 figures Magarey et al. [34] reported overweight/obesity figures for 7 to 15 year old Australian children of 20–21%. Cretikos et al. [35] reported 29.6% of nearly 13,000 children, who visited a doctor in Australian general practices and who had their height and weight measured, were overweight or obese.

We acknowledge several weaknesses in this cross-sectional study. The self-report nature of the data collection

Table 1 Child (aged 5 to 15 years) health factors by maternal work status, South Australia

	Full time employed		Part time employed		Economically Inactive	
	n	%	n	%	n	%
Overweight or obese						
No	96	74.3	265	76.4	124	75.5
Yes	33	25.7	82	23.6	40	24.5
Overall health status						
Excellent/Very good/Good	128	98.2	334	97.7	155	94.1
Fair/Poor	2	1.8	8	2.3	10	5.9
Current asthma						
No	114	88.0	321	92.7	145	88.1
Yes	16	12.0	25	7.3	20	11.9
Mental health problems						
No	112	86.1	316	91.2	141	85.8
Yes	18	13.9	30	8.8	23	14.2
Consuming recommended daily intake of vegetables						
Yes	47	35.8	132	38.2	69	42.0
No	83	64.2	214	61.8	95	58.0
Consuming recommended daily intake of fruit						
Yes	74	**56.7**↓	232	66.9	121	**73.7**↑
No	56	**43.3**↑	115	33.1	43	**26.3**↓
French fries, fried potato or crisps consumption[a]						
One a week or less (inc. never)	66	50.4	200	57.6	93	56.4
More than once a week	64	49.6	146	42.2	71	43.3
Processed meat consumption[a]						
One a week or less (inc. never)	55	42.0	165	49.5	76	46.0
More than once a week	75	58.0	181	52.4	89	54.0
Fast food consumption[a]						
Less than once a week (inc. never)	73	56.3	221	63.7	110	67.0
Once a week or more	57	43.7	125	36.1	54	33.0
Water consumed per day[a]						
Less than 8 glasses	114	87.4	313	90.5	152	92.1
8 glasses or more	16	12.6	30	8.7	12	7.3
Juice consumed per day[a]						
None	66	51.2	176	50.7	92	55.7
Some	63	48.6	168	48.6	73	44.3
Soft drink consumed per day[a]						
None	98	75.5	287	82.9	128	77.6
Some	31	24.2	54	15.5	36	21.7
Daily organised sport[a]						
None	25	19.2	70	20.1	50	**30.3**↑
Less than 0.5 h	55	42.1	151	43.6	79	47.9
More than 0.5 h	50	38.3	121	34.9	33	**19.7**↓
Daily reading for pleasure[a]						
None	34	**26.1**↑	59	17.1	22	13.6
Less than 0.5 h	60	45.8	176	50.8	72	43.9
More than 0.5 h	37	28.1	106	30.5	70	**42.5**↑
Daily time spent studying[a]						
None	13	10.0	37	10.8	22	13.4
Less than 0.5 h	68	52.0	190	54.8	86	51.9

Table 1 continued

	Full time employed		Part time employed		Economically Inactive	
	n	%	n	%	n	%
More than 0.5 h	49	38.0	115	33.1	57	34.4
Daily screen based activity[a]						
None to 0.5 h	14	10.9	43	12.4	16	9.5
0.5 h to 1 h	40	31.0	115	33.1	51	30.9
1 h to 2 h	44	34.2	124	35.7	58	35.2
More than 2 h	31	23.9	65	18.7	39	23.9
Daily time spent sleeping[a]						
Up to 8 h	44	**34.1**↑	73	21.0	31	18.8
8 to 9 h	32	24.6	72	20.7	35	21.2
9 to 10 h	28	**21.8**↓	105	30.3	53	32.5
More than 10 h	25	19.6	92	26.5	45	27.5

[a] 'Don't know' option not reported

↓↑Statistically significantly higher or lower ($P < 0.05$) compared to other maternal employment categories combined

could result in socially desirable responses or problems with recall. While an English study reported that parents overestimated their children's physical activity considerably [36], there is little evidence of socially desirable responses in this study with many of the findings not necessarily in the direction of acceptable social norms. Notwithstanding, self-reported height and weight has been shown to be an issue due to a problem with recall [37] and there is no reason to suspect that this was any different in this study. A further weakness is the exclusion of interviews where the child's height and weight were not known by the mother. No details are available to indicate the BMI of these children.

Additional bias could also be expected based on that fact that while the mother may be classified as having a certain work status at the time of the survey, no details on the time in that status were obtained and the mother in our analyses may have been working full time for a short duration only. Other important indicators that could affect BMI status of the child such as breastfeeding and birth weight were also not available. The response rate of nearly 64% is acceptable but nevertheless it could be that busy working mothers might be non-responders and hence add to the possible bias of results. Notwithstanding, the strength of this study includes the random nature of the sample and the large number and variety of the associated variables.

The findings in the initial multivariate analysis that the children of full time working mothers are more likely to be older, that the more children a mother has, the less likely she is to work full time, and that the household has a higher household income are not surprising. Interestingly, included in the model related to maternal employment was the variable that assessed the amount of reading undertaken for pleasure, with the children of mothers who worked full time significantly more likely to report no reading after school hours. Leatherdale and Wong [38] reported that 48.1% of high school students spent less than 1 h per week reading although it has been shown that the amount of time patents spent listening to their young children (8–9 year olds) was related to reading accuracy and comprehension [39]. Perhaps, in the busy lives of full time working mothers, this is one area that is being overlooked and could be a potentially important area of intervention for schools, childcare facilities and after and before school care services.

Although this analysis included eight diet related variables none proved to be significant in the final model assessing the best joint predictors associated with full time maternal employment. The lack of a relationship between broad based diet quality and maternal employment has also been reported by Johnston et al. [16] although their study group was younger children (aged 2 to 5 years).

In the second analysis undertaken to determine the best joint predictor of overweight/obese children, no demographic variables were included in the final model. The SES specific variable included in the analyses (SEIFA) was also not significant in this final multivariate model. The three behaviour related variables included in the final model were more than 2 h of screen-based activities per day, no time spent studying out of school hours, and sleeping less than 10 h per night. Although previous research has shown a relationship between increased screen-based activities and an unhealthy BMI in children [40–42] the relationship between increased screen-based activity and inactivity is less convincing [2]. TV viewing has been shown to be the favourite leisure time activity for

Table 2 Univariate odds ratios of socio-demographic and health factors associated with children aged 5 to 15 whose mothers work full-time as compared to part-time or economically inactive

	n	%	OR	95% CI	*P* value
Sex					
Female	61/325	18.8	1.00		
Male	69/316	21.8	1.21	(0.82–1.78)	0.337
Age					
5 to 7 year olds	14/166	8.7	1.00		
8 to 11 year olds	53/234	22.4	3.04	(1.63–5.66)	**<0.001**
12 to 15 year olds	63/240	26.2	3.74	(2.03–6.89)	**<0.001**
Household income					
Up to $40,000	6/92	6.6	1.00		
$40,001 to $60,000	20/114	17.2	2.94	(1.13–7.66)	**0.027**
$60,001 to $80,000	21/122	17.4	3.00	(1.16–7.74)	**0.023**
$80,001 or more	77/267	28.9	5.78	(2.43–13.75)	**<0.001**
Not stated	6/47	12.4	2.01	(0.61–6.68)	0.253
SEIFA					
Low	15/98	14.9	1.00		0.524
Lowest	31/132	23.4	1.74	(0.88–3.46)	0.114
Middle	23/125	18.3	1.28	(0.62–2.62)	0.504
High	29/129	22.5	1.66	(0.83–3.31)	0.154
Highest	32/157	20.7	1.49	(0.76–2.94)	0.247
Area					
Metropolitan	75/424	17.8	1.00		
Country	54/217	25.1	1.55	(1.04–2.30)	**0.030**
Children in the household					
3 or more	22/193	11.2	1.00		
2 children	59/302	19.5	1.93	(1.13–3.28)	**0.016**
1 child	49/145	34.1	4.11	(2.34–7.23)	**<0.001**
Maternal highest educational achievement					
No schooling to secondary	49/296	16.5	1.00		
Trade/certificate/diploma	41/188	22.0	1.42	(0.90–2.26)	0.134
Degree or higher	40/157	25.4	1.72	(1.07–2.76)	**0.025**
Family structure					
Child or children living with biological parents	97/523	18.5	1.00		
Sole mother	20/84	23.7	1.36	(0.79–2.36)	0.268
Other (step/blended/shared)	13/33	38.6	2.76	(1.33–5.74)	**0.007**
Financial status					
Can save a bit/a lot	85/393	21.7	1.00		
Just enough to last until next pay/spend whatever left over	34/206	16.7	0.73	(0.47–1.12)	0.150
Spend more than earn	8/33	25.1	1.21	(0.53–2.75)	0.647
Dwelling status					
Rented	11/62	18.0			
Owned or being purchased	118/574	20.5	1.18	(0.60–2.32)	0.638
Other	1/5	16.5	0.90	(0.08–10.67)	0.932
Current asthma					
No	114/580	19.7	1.00		
Yes	16/61	25.8	1.42	(0.77–2.61)	0.261

Table 2 continued

	n	%	OR	95% CI	*P* value
Mental health problems					
No	112/569	19.7	1.00		
Yes	18/72	25.1	1.37	(0.77–2.43)	0.279
Overweight or obese					
No	96/486	19.9	1.00		
Yes	33/155	21.5	1.10	(0.71–1.72)	0.663
Consuming recommended daily intake of vegetables					
Yes	47/248	18.7	1.00		
No	83/393	21.2	1.17	(0.78–1.74)	0.446
Consuming recommended daily intake of fruit					
Yes	74/427	17.3	1.00		
No	56/214	26.2	1.70	(1.15–2.53)	**0.008**
French fries, fried potato or crisps consumption					
Once a week or less (inc. never)	66/358	18.3	1.00		
More than once a week	64/282	22.8	1.32	(0.9–1.94)	0.157
Processed meat consumption					
Once a week or less (inc. never)	55/295	18.5	1.00		
More than once a week	75/346	21.8	1.23	(0.83–1.81)	0.301
Fast food consumption					
Less than once a week (inc. never)	73/404	18.1	1.00		
Once a week or more	57/236	24.0	1.43	(0.97–2.12)	0.073
Water consumed per day					
Less than 8 glasses	114/579	19.6	1.00		
8 glasses or more	16/59	27.9	1.59	(0.87–2.91)	0.135
Juice consumed per day					
None	66/334	19.9	1.00		
Some	63/304	20.7	1.05	(0.72–1.55)	0.798
Soft/sport drink consumed per day					
None	98/513	19.1	1.00		
Some	31/121	26.0	1.49	(0.94–2.36)	0.093
Daily organised sport					
None	25/144	17.3	1.00		
Less than 0.5 h	55/285	19.2	1.14	(0.68–1.92)	0.624
More than 0.5 h	50/203	24.5	1.55	(0.91–2.66)	0.108
Daily reading for pleasure					
More than 0.5 h	37/212	17.2	1.00		
Less than 0.5 h	60/308	19.4	1.16	(0.73–1.82)	0.535
None	34/115	29.3	2.00	(1.17–3.41)	**0.012**
Daily time spent studying					
None	13/72	17.9	1.00		
Less than 0.5 h	68/343	19.7	1.12	(0.58–2.17)	0.727
More than 0.5 h	49/221	22.4	1.32	(0.67–2.61)	0.421
Daily screen based activity					
None to 0.5 h	14/73	19.5	1.00		
0.5 h to 1 h	40/206	19.6	1.01	(0.51–1.98)	0.981
1 h to 2 h	44/226	19.6	1.01	(0.52–1.97)	0.975
More than 2 h	31/135	23.0	1.24	(0.61–2.50)	0.556

Table 2 continued

	n	%	OR	95% CI	*P* value
Daily time spent sleeping					
More than 10 h	25/163	15.6	1.00		
8 to 10 h	60/326	18.5	1.23	(0.74–2.04)	0.430
Up to 8 h	44/148	29.9	2.30	(1.33–3.99)	**0.003**

Data source: SAMSS March 2008–December 2009

Bold indicates statistically significant at $P < 0.05$

Table 3 Multivariate odds ratios of socio-demographics and health factors independently associated with children aged 5 to 15 whose mothers work full-time as compared to part-time or economically inactive

	OR	95% CI	*P* value
Age			
5 to 7 year olds	1.00		
8 to 11 year olds	3.46	1.76–6.81	**<0.001**
12 to 15 year olds	2.93	1.50–5.71	**0.002**
Household income			
Up to $40,000	1.00		
$40,001 to $60,000	8.02	2.58–24.94	**0.001**
$60,001 to $80,000	12.78	3.94–41.45	**0.001**
$80,001 or more	27.25	8.68–85.53	**<0.001**
Not stated	3.51	0.94–13.13	0.062
Area			
Metropolitan	1.00		
Country	1.93	1.23–3.03	**0.004**
Children in the household			
3 or more	1.00		
2 children	2.13	1.19–3.83	**0.011**
1 child	5.25	2.68–10.29	**<0.001**
Family structure			
Child or children living with biological parents	1.00		
Sole mother	4.64	2.02–10.57	**<0.001**
Other (step/blended/shared)	2.85	1.23–6.57	0.14
Daily reading for pleasure			
More than 0.5 h	1.00		
Less than 0.5 h	1.15	0.69–1.91	0.598
None	2.21	1.20–4.08	**0.011**

Data source: SAMSS March 2008–December 2009

Bold indicates statistically significant at $P < 0.05$

adolescent boys on both weekends and weekdays [43] and other studies have highlighted the playing of computer games and other technology based activity being lower for girls [2, 44]Studies have shown positive results in studies and intervention aimed at reducing TV viewing in children [45–47]· Russ et al. [48] reported that each additional hour of TV viewing was associated with greater odds of overweight/obesity although others have reported that it is more likely the advertising on TV rather than the sedentary behaviours that is associated with obesity [49].

Leatherdale and Wong [38] have previously highlighted the relationship between unhealthy weight and less time spent on homework in their Canadian study of high school students. They also reported the relationship between high levels of screen-based activity, low levels of studying and overweight/obesity and suggest a need for better knowledge and understanding of sedentary behaviours of this priority population.

The relationship between short sleep duration and overweight/obesity has been consistently shown in epidemiological cross-sectional studies [50, 51] highlighting the fact that children who have short sleep duration are at increased risk of being overweight/obese. This may be related to metabolic disturbance [50] with a corresponding increase in appetite and caloric intake [51]. It has also been suggested that short sleep duration, especially in adults,

Table 4 Univariate odds ratios of socio-demographic and health factors associated with overweight and obese children as compared with normal weight children, aged 5 to 15

	n	%	OR	95% CI	*P* value
Sex					
Female	80/325	24.5	1.00		
Male	76/316	24.0	0.97	(0.68–1.40)	0.881
Age					
12 to 15 year olds	54/240	22.4	1.00		
8 to 11 year olds	59/234	25.0	1.15	(0.75–1.76)	0.513
5 to 7 year olds	43/166	25.9	1.21	(0.76–1.91)	0.423
Maternal employment status					
Unemployed/economically inactive	40/165	24.5	1.00		
Part-time employed	82/346	23.6	0.95	(0.62–1.46)	0.816
Full-time employed	33/130	25.7	1.07	(0.63–1.81)	0.813
Household income					
$80,001 or more	58/267	21.8	1.00		
$60,001 to $80,000	23/122	18.5	0.82	(0.47–1.40)	0.461
$40,001 to $60,000	32/114	28.4	1.42	(0.86–2.35)	0.168
Up to $40,000	29/92	31.9	1.68	(0.99–2.85)	0.053
Not stated	13/47	28.4	1.42	(0.71–2.87)	0.324
SEIFA					
Highest	28/157	17.9	1.00		
High	33/129	25.7	1.59	(0.90–2.80)	0.111
Middle	38/125	30.3	1.99	(1.14–3.49)	**0.015**
Low	29/132	21.7	1.27	(0.71–2.28)	0.417
Lowest	27/98	28.0	1.78	(0.98–3.25)	0.060
Area					
Metropolitan	100/424	23.5	1.00		
Country	56/217	25.7	1.13	(0.77–1.64)	0.539
Children in the household					
3 or more	43/193	22.2	1.00		
2 children	74/302	24.4	1.13	(0.73–1.73)	0.581
1 child	39/145	26.8	1.28	(0.78–2.12)	0.329
Maternal highest educational achievement					
Degree or higher	28/157	17.7	1.00		
Trade/certificate/diploma	49/188	26.3	1.66	(0.99–2.81)	0.057
No schooling to secondary	78/296	26.5	1.68	(1.03–2.73)	**0.036**
Family structure					
Child or children living with biological parents	117/523	22.4	1.00		
Sole mother	30/84	35.0	1.87	(1.14–3.06)	**0.013**
Other (step/blended/shared)	9/33	26.3	1.24	(0.56–2.75)	0.603
Financial status					
Can save a bit/a lot	88/393	22.3	1.00		
Just enough to last until next pay/spend whatever left over	56/206	27.3	1.30	(0.89–1.92)	0.179
Spend more than earn	11/33	32.2	1.65	(0.77–3.56)	0.198
Dwelling status					
Owned or being purchased	137/574	23.8	1.00		
Rented	18/62	29.1	1.31	(0.74–2.35)	0.357
Other	1/5	14.0	0.52	(0.04–6.75)	0.619

Table 4 continued

	n	%	OR	95% CI	*P* value
Current asthma					
No	139/580	24.0	1.00		
Yes	16/61	26.8	1.16	(0.64–2.11)	0.632
Mental health problems					
No	134/569	23.6	1.00		
Yes	21/72	29.4	1.35	(0.78–2.32)	0.280
Recommended consumption of vegetable serves					
Yes	57/248	22.9	1.00		
No	99/393	25.1	1.13	(0.78–1.64)	0.518
Recommended consumption of fruit serves per day					
Yes	103/427	24.3	1.00		
No	52/214	24.2	1.00	(0.68–1.46)	0.993
French fries, fried potato or crisps consumption					
Once a week or less (inc. never)	88/358	24.5	1.00		
More than once a week	68/282	24.0	0.97	(0.68–1.40)	0.891
Processed meat consumption					
Once a week or less (inc. never)	69/295	23.3	1.00		
More than once a week	87/346	25.1	1.10	(0.77–1.59)	0.591
Fast food consumption					
Less than once a week (inc. never)	87/404	21.6	1.00		
Once a week or more	68/236	28.8	1.47	(1.02–2.12)	**0.041**
Water consumed per day					
Less than 8 glasses	136/579	23.6	1.00		
8 glasses or more	19/59	32.6	1.57	(0.88–2.80)	0.126
Juice consumed per day					
Some	64/304	21.0	1.00		
None	91/334	27.4	1.42	(0.98–2.04)	0.063
Soft/sport drink consumed per day					
None	117/513	22.8	1.00		
Some	35/121	29.0	1.38	(0.89–2.15)	0.155
Daily organised sport					
More than 0.5 h	45/203	22.0	1.00		
Less than 0.5 h	67/285	23.5	1.09	(0.71–1.67)	0.707
None	40/144	27.9	1.37	(0.84–2.25)	0.207
Daily reading for pleasure					
More than 0.5 h	52/212	24.6	1.00		
Less than 0.5 h	68/308	22.1	0.87	(0.58–1.31)	0.506
None	33/115	28.5	1.22	(0.73–2.03)	0.451
Daily time spent studying					
More than 0.5 h	48/221	21.8	1.00		
Less than 0.5 h	79/343	23.1	1.08	(0.72–1.62)	0.719
None	27/72	37.4	2.15	(1.21–3.81)	**0.009**
Daily screen based activity					
None to 0.5 h	13/73	18.1	1.00		
0.5 h to 1 h	35/206	17.0	0.93	(0.46–1.87)	0.841
1 h to 2 h	57/226	25.0	1.51	(0.77–2.95)	0.226
More than 2 h	51/135	37.5	2.72	(1.36–5.43)	**0.005**

Table 4 continued

	n	%	OR	95% CI	*P* value
Daily time spent sleeping					
More than 10 h	26/163	15.9	1.00		
8 to 10 h	89/326	27.4	2.00	1.23–3.25	**0.005**
Up to 8 h	39/148	26.3	1.89	1.08–3.29	**0.026**

Data source: SAMSS March 2008–December 2009

Bold indicates statistically significant at $P < 0.05$

Table 5 Multivariate odds ratios of socio-demographic and health factors independently associated with overweight and obese children as compared to normal weight children, aged 5 to 15

	OR	95% CI	*P* value
Daily time spent studying			
More than 0.5 h	1.00		
Less than 0.5 h	1.27	0.83–1.94	0.269
None	2.68	1.46–4.94	**0.001**
Daily screen based activity			
None to 0.5 h	1.00		
0.5 h to 1 h	0.95	0.47–1.94	0.896
1 h to 2 h	1.55	0.79–3.07	0.203
More than 2 h	2.65	1.31–5.37	**0.007**
Daily time spent sleeping			
More than 10 h	1.00		
8 to 10 h	2.25	1.35–3.75	**0.002**
Up to 8 h	2.00	1.10–3.62	**0.022**

Data source: SAMSS March 2008–December 2009

Bold indicates statistically significant at $P < 0.05$

may be a marker of inappropriate lifestyle characteristics again highlighting the need for early intervention.

The duality of being a mother of a school aged child or children and being a paid full time employee rests heavily for many mothers [10]. In this analysis, whether analysed from a maternal work status point of view or when assessing school aged children who are overweight or obese, the relationship between weight issues and maternal work status did not prove significant in the final multivariate models. The fact that the children of fulltime working mothers were less likely to be reading for pleasure might be a concern for both parents and education policy makers. What was interesting was the level of screen-based activity and sleeping patterns associated with overweight/obese children. This leaves open the opportunity for targeted interventions that should perhaps look beyond the family as the focus. This study has added to the debate regarding full time working mothers and has found that there is no relationship between maternal full time work and child BMI. Notwithstanding some important areas of concern (reading for pleasure, sleeping patterns and screen based activity) have been shown to be important indicators and interventions should be considered before these 'un-healthy' relationships set the scene for adult behaviours and manifests into increased health care costs.

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