

Research Article

Overweight and television and computer habits in Swedish school-age children and adolescents: A cross-sectional study

Pernilla Garmy, PhD student, RN, MMS,^{1,3} Eva K. Clausson, PhD, RNT,¹ Per Nyberg, PhD² and Ulf Jakobsson, PhD, RN³

¹Department of Health Science, Kristianstad University, Kristianstad, ²Faculty of Medicine, and ³Center for Primary Health Care Research, Lund University, Lund, Sweden

Abstract

The aim of this cross-sectional study was to investigate the prevalence of overweight and obesity in children and adolescents (6–16 years), and relationships between being overweight and sleep, experiencing of fatigue, enjoyment of school, and time spent in watching television and in sitting at the computer. Trained school nurses measured the weight and height of 2891 children aged 6, 7, 10, 14, and 16, and distributed a questionnaire to them regarding television and computer habits, sleep, and enjoyment of school. Overweight, obesity included, was present in 16.1% of the study population. Relationships between lifestyle factors and overweight were studied using multivariate logistic regression analysis. Having a bedroom television and spending more than 2 h a day watching television were found to be associated with overweight (OR 1.26 and 1.55 respectively). No association was found between overweight and time spent at the computer, short sleep duration, enjoyment of school, tiredness at school, or difficulties in sleeping and waking up. It is recommended that the school health service discuss with pupils their media habits so as to promote their maintaining a healthy lifestyle.

Key words

adolescents, obesity, overweight, school-aged children, television.

INTRODUCTION

Overweight during childhood and adolescence is a growing problem throughout the world (Low *et al.*, 2009; Raj & Kumar, 2010; Waters *et al.*, 2011) and a possible cause of later health problems such as heart and circulatory illnesses and various metabolic complications (Gardner *et al.*, 2008; Friedemann *et al.*, 2012; Lloyd *et al.*, 2012). Being overweight often results in a lower quality of life and lower self-esteem (Griffiths *et al.*, 2010; Russell-Mayhew *et al.*, 2012), and has also been found to be associated with poor performance at school (Florin *et al.*, 2011). According to several studies, overweight children and adolescents, and overweight adults sleep less (Cappuccio *et al.*, 2008; Bell & Zimmerman, 2010; Danielsen *et al.*, 2010; Garaulet *et al.*, 2011). In addition, sedentary behaviour such as spending long periods of time either watching television or sitting at a computer, have been linked to overweight (Tremblay *et al.*, 2011; Jelastopulu *et al.*, 2012).

Accordingly, there is an obvious need for school health services to actively pursue health promotion strategies. According to the Declaration of Ottawa, health promotion is “the process of enabling people to increase control over their health, and to improve it” (World Health Organization, 2009, p. 1). Health education in schools should focus on the individual needs of each pupil in a dialogue which takes into account and respects the opinions and the experiences of the pupils. School health services in Sweden have a very important role to play in promoting pupils’ health. School health services are mandatory for Swedish schools, but pupil participation is voluntary (Fagerholt, 2009).

To our knowledge, there has been no study in Sweden other than this one, which has examined the relationship between overweight and lifestyle factors such as patterns of sleep, school enjoyment, and television and computer use. Effective health promotion requires a knowledge of the prevalence of overweight and the correlation between overweight and lifestyle factors. This study investigates the prevalence of overweight and obesity in school children and adolescents 6–16 years of age, and the relationship between overweight and obesity, and factors such as sleep patterns, experience of fatigue, enjoyment of school, watching television, and time spent at the computer.

Correspondence address: Pernilla Garmy, Department of Health Sciences, Kristianstad University, SE-291 88 Kristianstad, Sweden. Email: pernilla.garmy@hkr.se
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METHODS

Study setting and participants

This cross-sectional study was conducted from August 2008 to June 2009 within the framework of the school health service in a city in southern Sweden of about 100 000 inhabitants. All pupils enrolled in the primary class (6 years) and in grades 1 (7 years), 4 (10 years), 8 (14 years) and 10 (16 years) are offered an individual health visit with the school nurse, and in some cases with the school physician, in line with national policy (The National Board of Health and Welfare, 2004). At the time of the study, about 17% of the population of the city was born in countries other than Sweden. The unemployment rate in the city was 2.4%. About 1.6% of the city's population received financial help from the authorities. Approximately 6% of the adult population had only compulsory education, 26% secondary-school education, and 63% post-secondary education. About 72% of the pupils had parents who lived together (Svärd & Nilsson, 2009).

Instruments

The information was gathered by school nurses (all of them female) who had additional training in child and adolescent health and in public health. The nurses were informed both orally and in writing about the study procedures. The weight of the pupils, while wearing light clothing, was measured to the nearest 0.1 kg on a standard digital scale (annually calibrated). Their height without shoes was measured to the nearest 0.1 cm using a manual height board. Their BMI (body mass index, kg/m²) was also calculated. Because of the changes in the average BMI levels of growing children, the international age and gender specific BMI cut-off points for children and adolescents developed by Cole *et al.* (2000) were used to define overweight and obesity. Those with BMI values above the percentile values corresponding to a BMI of 25 kg/m² were classified as overweight, and those with a BMI corresponding to 30 kg/m² as obese.

A questionnaire, the validity and reliability of which had been tested earlier and found to be satisfactory (Garmy *et al.*, 2012a), was distributed to the children and adolescents at the time of the health visit. It comprised 11 questions concerning the presence of a television set in the bedroom (yes/no), the time spent each day watching television, the time spent sitting at a computer (hours and minutes in both cases), the pupil's enjoyment of school (very much, fairly well, not much at all), tiredness at school (never, seldom, often, every day), difficulties in getting up (never, seldom, often, every morning), and length of sleep (hours and minutes). Gender and year of birth were also registered. All the continuous variables in the questionnaire (bedtime, time for getting ready for bed, length of sleep on weekdays and at weekends, and time spent watching television or at the computer) showed reasonable to excellent test-retest agreement, 63.8–90.4% (Garmy *et al.*, 2012a). The kappa values for having a television in the bedroom, difficulty in falling asleep, tiredness at school, difficulty in waking up, and enjoyment at school showed reasonable to excellent agreement (Altman, 1991). Three aspects of the

validity of the questionnaire were examined: its face validity, content validity, and construct validity (Garmy *et al.*, 2012a).

Ethical issues

The school nurses were informed, both in writing and orally, that they should be sensitive in their approach and not try to persuade any of the potential respondents to participate, leaving the matter entirely up to the respondents themselves. The respondents and their parents were informed that participation was voluntary. Those who participated gave their informed consent. They were also informed that there were no right or wrong answers. The study obtained the approval of the administrative head and the chief physician of the schools involved. It was also approved by the Advisory Committee on Research Ethics in Health Education (VEN 34-09) at Lund University.

Data collection

The school nurses involved ($n = 32$) were asked to distribute the questionnaire to the children and adolescents at the time of the regular school health visit, and to weigh the pupils and measure their height. In the case of the youngest children, aged 6 and 7, the questionnaires were filled out by the parents, whereas in each of the other classes they were filled out by the pupils themselves. The potential study population consisted of a total of 4692 pupils, although the questionnaires were in fact distributed to 3011 pupils (64.9% of those theoretically available). There were 569 participating pupils from the primary and grade 1 classes, 635 from grade 4, 782 from grade 8 and 1025 from grade 10. Girls comprised 49.7% of the cohort. The reasons for the questionnaires not being distributed to some pupils were: (i) not all the pupils attended the healthcare visit that was offered; (ii) the school nurse did not have enough time necessary to offer the pupils a health visit; (iii) some school nurses forgot to offer the questionnaire as a result of a lack of time. Of those given the opportunity to complete the questionnaire, only 1.3% declined. Weight and height measurements were available for 2891 (95.9%) of the pupils who participated.

Data analysis

Children with BMI values above the international age and gender specific BMI cut-off points developed by Cole *et al.* (2000) were classified as overweight or obese (scored as 1); those who were not overweight were scored as 0. The other independent variables, such as tiredness at school, difficulty in falling asleep, and difficulty in waking up, were all treated as dichotomous, and were scored as 0 when occurring seldom or never, and as 1 when occurring often or every day. Enjoyment of school very much was scored as 0, and moderate or no enjoyment as 1. Spending > 2 h at the computer or > 2 h watching television each day were scored as 1 and doing so for a shorter period of time as 0, in line with the recommendations of the American Academy of Pediatrics (2001). Sleeping less than the median length of time for the relevant age group was classified as 1, and sleeping for the median

length of time or longer as 0, whereas having a bedroom television was a true dichotomy (yes 1, no 0). Multiple logistic regression (enter) was used for analyzing relationships between factors associated with being overweight or obese (Norman & Streiner, 2008). The Hosmer and Lemeshow goodness-of-fit test and the Nagelkerke R^2 test were used as measures of the quality of the regression model. P -values of ≤ 0.05 were considered statistically significant. All the statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS Version 17.0).

RESULTS

Overweight, obesity included, was found to be present in 16.7% of the study population (Table 1). For the children aged 6 and 7 years, 17.6% were found to be overweight, and the percentages for those aged 10, 14, and 16 were 18.4, 16.9, and 15.1%, respectively. The frequency of obesity alone was

found to be 3.2% in the pupil cohort, varying between 2.8 and 3.8% for the separate age groups. Gender differences at different grade levels are shown in Table 2. For the girls, overweight was found to be significantly more common among the 6–7 year olds ($P = 0.012$), whereas for the boys it was found to be significantly more common among the 16 year olds ($P = 0.001$).

The relationship between the lifestyle factors considered and overweight was analysed using multivariate logistic regression analysis: see Table 3. No significant gender difference was found. Having a television in the bedroom and spending more than 2 h a day watching television were found to be linked to overweight (OR 1.26 and 1.55 respectively), but there appeared to be no correlation between spending more than 2 h a day at the computer and overweight. No association was found between overweight and short sleep duration, enjoyment of school, tiredness at school, or difficulties in sleeping and/or in waking up.

Table 1. Prevalence of overweight and obesity at the different grade levels

Grade (median age, range)	Sample size (n)	Frequency of overweight and obesity [n (%)]	Frequency of overweight [n (%)]	Frequency of obesity [n (%)]
Primary school class for children aged 6 or school grade 1 (7 years, 6–8 years)	527	93 (17.6)	73 (13.9)	20 (3.8)
School grade 4 (10 years, 9–11 years)	620	114 (18.4)	95 (15.3)	19 (3.1)
School grade 8 (14 years, 13–15 years)	744	126 (16.9)	81 (10.9)	25 (3.4)
School grade 10 (16 years, 15–18 years)	1000	151 (15.1)	123 (12.3)	28 (2.8)
Total	2891	484 (16.7)	372 (12.9)	92 (3.2)

Table 2. Prevalence of overweight and obesity shown by grade and sex

Grade	Sample size (n)	Overweight [n (%)]		Obesity [n (%)]	
		Girls	Boys	Girls	Boys
Primary school/grade 1 (median age 7 years)	527	44 (18.0)	29 (10.2)	12 (4.9)	8 (2.8)
School grade 4 (median age 10 years)	620	50 (16.3)	45 (14.3)	7 (2.3)	12 (3.8)
School grade 8 (median age 14 years)	744	38 (10.1)	43 (11.8)	12 (3.2)	13 (3.6)
School grade 10 (median age 16 years)	1000	51 (10.3)	72 (14.2)	5 (1.0)	23 (4.5)

Table 3. Factors associated or not with overweight in school children and adolescents ($n = 2790$) in the logistic regression analysis

Variables	Odds ratio	95% CI for OR	P -values
Tired in school	0.82	0.63–1.06	0.121
Difficulties falling asleep	1.21	0.91–1.62	0.187
Difficulties waking up	0.85	0.68–1.08	0.185
Having a bedroom television	1.26	1.01–1.57	0.038
Spending > 2 h watching television	1.55	1.25–1.92	0.001
Spending > 2 h at the computer	0.93	0.74–1.16	0.518
Little sleep (less than the median for one's grade)	0.95	0.75–1.20	0.664
Enjoying school	0.90	0.71–1.14	0.378

Hosmer and Lemeshow goodness-of-fit test $P = 0.406$, Nagelkerke $R^2 = 0.019$.

DISCUSSION

The prevalence of overweight, obesity included, found in 17.6% of the children aged 6 and 7, and the 3.8% obesity rate for this age category are consistent with the results of another study concerning Swedish children aged 7 and 8 (Sjöberg *et al.*, 2011). Also, the results showing the prevalence of overweight in the children aged 10 (overweight, obesity included, being 18.4, and of obesity alone 3.1%) are consistent with the results of studies conducted in recent years within six Swedish municipalities (Sjöberg *et al.*, 2008; Sundblom *et al.*, 2008; Lager *et al.*, 2009). Data from nine countries, including Sweden, suggest that childhood overweight is no longer increasing appreciably, but rather plateauing (Olds *et al.*, 2011). This could explain the higher rates of overweight found five years earlier (overweight 24% and obesity 6%) for 10 year old children (Garmy & Sivberg, 2007) in the municipality where the present study took place. Since then, the municipality has strengthened the nutritional guidelines for the meals served at the school, which are breakfast, lunch, and 3 pm snack.

Although overweight has been found to be associated with short sleep duration (Cappuccio *et al.*, 2008; Bell & Zimmerman, 2010; Danielsen *et al.*, 2010; Garaulet *et al.*, 2011), this was not found to be the case in our study. Overweight was also not found to be associated with less enjoyment of school. Further longitudinal studies of both these matters would appear to be necessary.

Having a television set in the bedroom and watching television for 2 h or more a day were found to be associated with overweight. These results agree with those of other studies (Sisson *et al.*, 2011; Tremblay *et al.*, 2011; Jelastopulu *et al.*, 2012; Kristiansen *et al.*, 2013). An explanation of the results obtained may be that watching television is often accompanied by the intake of food and drink. The fact that having a television set in the bedroom was found to be associated with overweight, suggests that this practice increases the time spent watching television. Watching television for long periods of time and having a television set in the bedroom may possibly be more prevalent in groups from lower socioeconomic levels, where overweight tends to occur more frequently (Jelastopulu *et al.*, 2012; Kristiansen *et al.*, 2013). In the present study, overweight was found to be as common among children spending much time at the computer as among those spending less. This is consistent with the results of the study of Sisson *et al.* (2011) in which watching television for long periods of time was found to be associated with overweight, whereas sitting at the computer for long periods was not. This could possibly be explained by the fact that working at the computer is a mentally more active undertaking than watching television. However, Jelastopulu *et al.* (2012) have found overweight to be associated with spending large amounts of time sitting at the computer. Clearly, there is a need for further research in this area. It may be a good idea, with the present state of knowledge, for health professionals to ask children and adolescents not only about the time spent watching television but also about the time spent at the computer, in an effort to help them achieve a healthy lifestyle. Spending more than 2 h a day at the com-

puter has earlier been found to be associated with short sleeping hours and feelings of tiredness at school (Garmy *et al.*, 2012b).

Limitations

Calculation of the pupils' BMI was carried out by trained school nurses. Some 4.1% of the pupils, particularly in grade 8, declined to have their height and weight measured. The school nurses reported that this applied mainly to children who appeared to be overweight. Since a cross-sectional study, such as the present one, does not deal directly with questions of cause and effect, there is clearly a need for longitudinal studies as well. Although overweight is somewhat more common in children and adolescents from the lower socioeconomic groups (Sundblom *et al.*, 2008), questions pertaining to socioeconomic level were not asked, partly for ethical reasons and partly because of time limitations. There are of course other questions possibly related to overweight, that pupils could have been asked, but since the types and amounts of food children and adolescents eat have already been examined in considerable detail in other studies (Welsh & Cunningham, 2011; Arcan *et al.*, 2012), the present study dealt primarily with the lifestyle factors mentioned earlier. The validity and reliability of the questionnaire employed had been studied previously (Garmy *et al.*, 2012a) and both the pupils and the parents involved found it easy to complete. Although only 64.9% of the children in the study population were given the opportunity to complete the questionnaire, the failure analysis did show that the pupils who were not offered the questionnaire did not differ from those who were, from the point of view of gender and geographical location. Of those given the opportunity to complete the questionnaire, only 1.3% declined.

CONCLUSIONS AND IMPLICATIONS FOR PRACTICE

Overweight and obesity, were found to be present in 16.7% of the study population, and the percentage for obesity alone was 3.2%. A television in the bedroom and watching television for more than 2 h a day were found to be associated with overweight. Parents who place a television set in a child's bedroom may be well intentioned, although it would appear that on health grounds this practice should be avoided. Since, during the first year of school most parents do not place a television set in the child's bedroom, much can be gained by encouraging parents to maintain this arrangement when the child gets older. It is surely far easier for parents not to place a television set in a child's room than to remove one they have already placed there. According to Cole *et al.* (2006), successful interventions aimed at helping overweight children and adolescents should involve cooperation between the school health service, teachers, and the family. School nurses meet almost all the children, as well as the children's parents, during the first year the child attends school, checking both the child's health and the child's sense of well-being at school (Clausson & Berg, 2008). Therefore they have an

excellent opportunity, through engaging in a health dialogue with pupils and with their parents, to promote health and prevent obesity.

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CONTRIBUTIONS

Study Design: PG, PN.

Data Collection and Analysis: PG, PN, UJ.

Writing of Manuscript: PG, UJ, EC, PN.

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