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Running head: ENERGY INTAKE AND TV VIEWING

Energy intake associated with television viewing in adolescents, a cross sectional study.

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### Abstract

The present study examines the energy intake resulting from eating snacks and drinking energy containing drinks while watching television. 2546 1<sup>st</sup> and 4<sup>th</sup> year students in a random sample of 15 secondary schools in Flanders, Belgium received quantifiable, closed survey questions about average weekly TV viewing volume and about eating 5 types of snacks and drinking 2 types of soft drinks. On average, the respondents watched 22:27 hours of television per week (SD=11:53). Only 3.5 % of the adolescents never eat snacks or drink soft drinks while they watch TV. Estimated daily energy intake accompanying TV viewing amounts to 19 % of the Belgian average energy allowance (AEA) in boys and between 12 and 14 % of AEA in girls. On average one hour of watching television equals the consumption of 653 Kilojoules.

**KEYWORDS:** Television, Obesity, Media Effects

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### Introduction

Television viewing has been linked to obesity by several authors. A study of adults found a relationship between a higher body mass index (BMI) and higher levels of viewing in women (Jeffery & French, 1998). A study of 14 to 18 year olds found a relationship between BMI and TV viewing in both sexes (Eisenmann, Bartee & Wang, 1999). Another study of adolescents found that each additional hour of TV viewing increased the prevalence of obesity by 2 % (Dietz & Gortmaker, 1985) which led one of the authors to speak of an ‘epidemic’ (Dietz, 2001).

Two explanations exist for the relationship between body weight and television viewing. The first explanation is that television viewing decreases energy expenditure. The sedentary nature of watching television means that viewers do not burn enough energy either through increased passivity of the viewer (which displaces more vigorous activities) (Tucker, 1996; Dietz, 1990; Andersen, Crespo, Bartlett, Cheskin & Pratt, 1998) or reduced resting metabolism (Robinson, 2001). The second explanation is that television viewing is often accompanied by increased energy intake (eating snacks and drinking energy containing drinks) (Van den Bulck, 2000; Coon, Goldberg, Rogers & Tucker, 2001). Fast foods (Jeffery & French, 1998), snacking (Francis, Lee & Birch, 2003) and sugar-sweetened drinks (Ludwig, Peterson & Gortmaker, 2001) have all been associated with increased prevalence of obesity. This study tries to estimate the total energy intake associated with snacking and drinking while watching TV.

## Method

### *Subjects*

We used data from the Leuven Study on Media and Adolescent Health (SOMAH). These data were collected by means of a standardized, self-administered questionnaire. Respondents were selected from a representative sample of 1<sup>st</sup> and 4<sup>th</sup> year students in 15 secondary schools in the Flemish Community of Belgium. The study was presented as an omnibus study on the leisure habits of Flemish youngsters and took place in an assembly setting. Research assistants were present to answer any questions.

Total sample size was 3022, but 125 students were either sick or absent on the day of the study. In one school, teachers had informed the students about the real purpose of the study prior to the start of it. As a consequence, all questionnaires collected from that school (n=351) were excluded from the sample. Final sample size was thus 2546. Respondents from the first year had an average age of 13.16 (SD=.43), in the fourth year the average was 16.37 (SD=.71). 50.2 percent of the respondents were first year students, 49.8 percent were in the fourth year. 54.2 percent were boys, 45.8 percent were girls. Table 1 gives an overview of the respondents' self-reported weight, height and Body Mass Index.

TABLE 1 ABOUT HERE

### *Measures*

*Television viewing volume* is notoriously difficult to measure (cf. Van den Bulck, 1995). In most open ended questions respondents tend to overestimate TV

viewing by thinking only of start and end times, without wondering whether they watched continuously. To reduce inaccuracy of estimation, television viewing was measured using an “aided recall” technique. Respondents were given a timeline for each day of the week. The timelines began at 7:00AM and ended at 01:00 A.M. They consisted of 38 checkboxes, each representing a half hour of possible television viewing time. For each day of the week, respondents were asked to mark the period(s) of time on which they normally watch TV on that particular day. Total television viewing time (in hours) per week was obtained by counting the marked checkboxes for each respondent and dividing the result by two.

*Control variables:* included year of study (1<sup>st</sup> or 4<sup>th</sup> year) and gender.

*Energy intake:* Respondents were asked to indicate how often they consumed five types of snacks and two types of drinks while watching TV on a five point scale (1=never, 2=less than once a week; 3=once or twice a week; 4=three to four times a week and 5=nearly every day). They were then asked to give an estimate of the average portion they consumed on a day on which they had the snack or the drink. The five categories of snacks were 1. Potato chips (crisps) or peanuts; 2. Fried snacks such as chicken wings, chicken fingers or cheese-croquettes; 3. Cookies, biscuits, chocolate or candy bars; 4. Ice-cream; 5. Fast foods such as hamburgers, fries, meat rolls, egg rolls or pizza. The two drinks were regular sodas (such as colas or lemonades) and “light” or “diet” versions of the same. The definition of ‘an average portion’ was different for the categories examined. For every snack in the questionnaire, a clearly described measure was used (e.g. a glass of soda, one chicken wing or one hamburger, a bag of crisps,...). The European Union obliges manufacturers to indicate the energy value of foods and drinks. The calories indicated on the packages of snacks sold in most supermarkets were used to compute an

estimate of the energy value of the various snacks and drinks. An estimate of total energy intake per week was computed by combining amount and frequency and summing all variables. To obtain estimated daily energy intake while watching TV the variable was divided by 7. The outcome of this division was divided by the respective Belgian Average Energy Allowance for boys or girls of the corresponding age (Hoge Gezondheidsraad, 2000; Heimburger & Weinsier, 1997). This produced an estimate of the percentage of the Belgian Average Energy Allowance (AEA) which TV viewing provides. To obtain an estimate of hourly intake total weekly energy intake was divided by total estimated weekly viewing volume.

### *Analysis*

Energy intake associated with TV viewing was analyzed for boys and girls in both study years separately. All statistical procedures were conducted using the Statistical Package for Social Sciences (SPSS) software program.

## Results

### *Television viewing*

On average, the respondents in our sample watched 22:27 hours of television per week (SD=11:53). These numbers are comparable with other research in Belgium. In a recent study of 2127 adolescents, Eggermont (2004), for instance, found an average of 21:36 (SD=11:02).

A categorical variable was made by combining gender and study year. Means and standard deviations for the television viewing variable were computed for gender and year and a one way analysis of variance was conducted to analyze whether television viewing differed significantly for year and/or gender by means of a post hoc Tukey Test, which tests whether the means for the values of the independent variable differ at the  $p < .05$  level. Table 3 shows that boys watch significantly more

TV than girls do. This is true in both year groups, even though first year students watch significantly more TV than fourth year students do.

TABLE 2 ABOUT HERE

### *Energy intake*

96.5 percent of the respondents ate snacks and drank soft drinks while viewing television at least occasionally.

On average snacking and drinking which accompanies TV viewing adds about 11724 kJ to a Flemish adolescent's weekly diet or about 1675 kJ a day. In Girls, however, energy intake is significantly lower than in boys and in first year boys it is significantly lower than in fourth year boys. TV viewing adds an average of 2227 kJ to a fourth year boy's daily diet (the group with the highest average energy intake) and 1080 kJ to a fourth year girl's diet (the group with the lowest average energy intake). This means that eating snacks and drinking soft drinks while viewing TV provides energy which is the equivalent of an average of 17 % of the Average Energy Allowance. There is a significant difference between boys and girls in this respect. Boys' TV viewing equals 19 % of their AEA, while it represents the equivalent of 12 tot 14 % for girls.

On average one hour of TV viewing represents about a 653 kJ. This figure is lowest in first year girls (about 465 kJ) and highest in fourth year boys (about 900 kJ). There is no significant difference between girls in the first and girls in the fourth year. First year boys do not differ from fourth year girls. Both first year boys and fourth year girls have a significantly energy intake per hour of TV viewing than boys in the fourth year.



### Discussion

The adolescents in this study watched between 19 and 25 hours of television a week. Only about 3.5 % of them generally abstain from eating snacks or sweets or drinking soft drinks while they watch TV. It seems therefore safe to state that watching television is generally accompanied by the intake of food and snacks. The added energy intake is considerable. In boys it is close to 20 % of their daily average energy allowance, in girls it is a little less than 15 %. Dividing the total estimated energy intake accompanying TV viewing by the total estimated viewing volume suggests that watching an hour of TV is associated with the intake of an average of 653 kJ (or 156 kCal).

These figures suggest avenues for intervention which future studies might look at. Previous studies looked at reducing TV viewing (Robinson, 1999), promoting playing (Dietz, 2001) or increasing physical exercise levels (Faith, Berman, Heo, Pietrobelli, Gallagher & Epstein, 2001). While these measures appeared to be effective and led to reductions in body mass, they are cumbersome and may require a lot of effort on the part of both the adolescent and of supervising adults. Furthermore, it has been shown that attempts by parents to restrict media use often lead to an increase in the use of other media (Van den Bulck & Van den Bergh, 2000). Media use appears to gratify a particular need of young people. Restricting one kind of media use might not automatically make them give up sedentary entertainment. It is most likely that in average households they will only look for other, compensatory forms of media use.

The question then becomes whether restricting energy intake while watching television might be a solution. If snacking and drinking energy containing drinks is a need similar to watching television, then restricting this behavior during television viewing will only result in a shift in snacking and drinking behavior. In such a case adolescents would find other times and other ways to indulge in them. It has, however, been suggested that children may learn to associate television viewing and eating from a very early age when parents put children and even babies in front of the television set with food to distract them while they do other household chores (Lemish, 1987). This is an avenue worth investigating. If the extra energy intake is behavior specifically associated with watching television, then this might offer opportunities for intervention.

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Table 1

Means and (standard deviations) of weight, height and body mass index (BMI)

	1 <sup>st</sup> year				4 <sup>th</sup> year			
	boys		girls		boys		girls	
	mean	SD	mean	SD	mean	SD	mean	SD
weight	45.46	9.96	45.48	9.24	63.98	11.27	56.11	8.00
height	1.58	.10	1.57	.07	1.77	.14	1.67	.06
BMI	18.26	3.35	18.32	3.01	20.42	3.10	20.16	2.61

Table 2

Means and (standard deviations) of television viewing and energy intake when watching television

	1 <sup>st</sup> year				4 <sup>th</sup> year				Total	
	boys		girls		boys		girls			
	M	SD	M	SD	M	SD	M	SD	M	SD
television viewing <sup>1</sup>	25 a	12	21 b	10	23 c	11	19 d	11		
% never	4.8%		4.9%		2.3%		2.1%		3.5%	
kJ / day	1985a	1972	1260b	1495	2227c	2311	1080b	1156	1675	1884
AEA <sup>2</sup> kJ	10216		8960		1141		8939			
kCal <sup>3</sup>	2440		2140		2730		2135			
% of AEA	.19 a	.19	.14 b	.17	.19 a	.20	.12 b	.13	.17	.19
kJ/hour of TV	615 a	741	465 b	6921	900 c	1357	590 ab	1244	653	1059

Note. Means without the same letter differ at the  $p < .05$  level (Tukey test) across rows.

<sup>1</sup> In hours per week

<sup>2</sup> Belgian Average Energy Allowance (Hoge Gezondheidsraad, 2000)

<sup>3</sup> 1 kcal= 4.187 kJ