

## Television viewing behaviour and associations with food habits in different countries

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### Abstract

**Objective:** Several environmental factors influence adolescents' food habits and television (TV) viewing is thought to be one of these factors. The purpose of the present study was to describe sociodemographic differences in TV viewing and to examine associations of TV viewing with the consumption of sweets, soft drinks, fruit and vegetables in different countries.

**Methods:** Data were collected from 162 305 young people completing the 2001/02 Health Behaviour in School-Aged Children survey, a World Health Organization cross-national study on health and health behaviours among 11-, 13- and 15-year-old school pupils. Analyses of variance were used to examine sociodemographic differences in TV viewing and logistic regression analyses to examine associations between TV viewing and food habits.

**Results:** Large differences were found between countries in reported daily TV viewing time, from an average of 2.0 h in Switzerland to 3.7 h in Ukraine. The results indicate that those most likely to watch TV are boys, 13-year-olds and pupils of lower socio-economic status. Those who watched more TV were more likely to consume sweets and soft drinks on a daily basis and less likely to consume fruit and vegetables daily, although the latter associations were not so apparent among Central and Eastern European countries.

**Conclusions:** Given the high TV viewing rates among adolescents and the association with less healthy food options, many young people are at increased risk of overweight or obesity. Interventions to modify TV viewing behaviour are needed. The findings underscore the importance of tackling socio-economic differences.

**Keywords**  
Television  
Adolescents  
Fruit  
Vegetables  
Soft drinks  
Sweets

Recent results of the 2001/02 Health Behaviour in School-Aged Children (HBSC) survey, a World Health Organization (WHO) cross-national study on health and health behaviours among adolescents in 35 countries and regions, indicate that some 30% of 11–15-year-old boys and 37% of 11–15-year-old girls consume fruit on a daily basis, 34% of girls and 28% of boys consume vegetables daily and 32% of boys and 25% of girls consume soft drinks daily<sup>1</sup>. Many individual, social and environmental factors are thought to influence young people's eating habits, one of which is television (TV) viewing<sup>2</sup>.

TV viewing has been shown to coincide with extra calorie intake during viewing<sup>3</sup>. As reported by Gerbner *et al.*, 'One thing viewers do while watching is eat'<sup>4</sup>. Moreover, while watching TV one is exposed to an increasing number of advertisements<sup>5</sup> of food high in fat, sugar and salt, whereas food items such as fruit and vegetables are seldom advertised<sup>6,7</sup>. Additionally, the marketing strategies used in TV commercials may lead to

misconceptions about the nutritional value of the foods<sup>8</sup> and are often more focused on psychological and emotional needs rather than hunger and other food characteristics<sup>7,9</sup>. According to Coon *et al.*<sup>6</sup> and Boynton-Jarrett *et al.*<sup>8</sup>, it is possible that these marketing strategies may force less popular foods out of a typical diet in the long term. Coon and colleagues demonstrated that children from families with TV on during two or more meals a day consumed fruit and vegetables less frequently and pizza/salty snacks more frequently than did children from families in which the TV was either not on at meals or on for just one meal. They suggest that families who turn the TV off during meals are separating the act of eating from the food culture promoted on TV and are less likely to consume convenience foods which generally contain less fruit and vegetables.

Several studies have documented the increased intake of snack foods and calories among adolescents who watch more TV<sup>3,10–13</sup>. The relationship with fruit and vegetable

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consumption is, however, less clear. For example, Lowry *et al.*<sup>14</sup> found strong associations between TV viewing and eating insufficient fruit and vegetables for white students. No associations were found for black students and an inverse association was found for Hispanic male students, suggesting that the influence of TV on food habits could be gender-, race- or culture-specific.

The 2001/02 HBSC offers the possibility to further investigate whether the associations between TV viewing and food are country-specific or whether general patterns exist. The present paper describes these associations, having first presented prevalence of, and sociodemographic patterns in, TV viewing behaviour.

## Methods

### Subjects

Data were obtained from the 2001/02 HBSC survey, a WHO collaborative cross-national study conducted in an increasing number of European countries and regions, the USA, Canada and Israel. The overall goal of the study is to gain new insights into, and to increase understanding of, health behaviours, lifestyles and their context in young people. The questionnaire consists of a number of mandatory items, which are identical in all participating countries, and optional items, which countries can include if interested. Items relating to sociodemographics, TV viewing and eating habits are mandatory and available for all countries. The consistency in measures, sampling and fieldwork procedures of the HBSC study provides the opportunity to allow between-country comparisons of key behaviours and relationships.

In each country cluster sampling was used, where the cluster was the school class (or school in the absence of a sampling frame of classes). These national samples were selected to be representative for 11-, 13- and 15-year-old schoolchildren. A regional sample was selected in Germany (Berlin, Hessen, North Rhine-Westphalia and Saxony). The recommended minimum sample size for each country was 1536 students per age group. As the population of Greenland is relatively small, a census of the school population was taken and all children registered at school within the target age groups were surveyed. The data were collected by means of standardised questionnaires, administered in school classrooms according to the instructions in the international protocol<sup>15</sup>.

### Variables used in our analyses

TV viewing was assessed by asking pupils how many hours a day they usually watched TV (including videos) in their free time on a weekday (Monday to Friday) and at the weekend (Saturday and Sunday). Response categories for both questions were 'none at all', 'about half an hour a day', 'about 1 hour a day', 'about 2 hours a day', 'about 3 hours a day', 'about 4 hours a day', 'about 5 hours a day', 'about 6 hours a day' and 'about 7 or more hours a day'.

The items were combined into a single variable ( $(5 \times \text{TV viewing time on a weekday} + 2 \times \text{TV viewing time on a weekend day})/7$ ) representing the approximate average number of hours of TV watching per day. Very few respondents reported watching TV 'about 7 or more hours a day', so the underestimation of hours is minimal. A second variable was created to distinguish those pupils who report watching TV for 2 h or less each day (as recommended by the American Academy of Pediatrics)<sup>16</sup> and to distinguish the more frequent TV viewers (4 h or more each day).

Test-retest reliability and relative validity of TV viewing time (average hours of TV viewing time per day) was assessed as part of a study on food-related lifestyle behaviours. One hundred and twelve students (mean age 11.8 (standard deviation (SD) 0.6) years; 52% boys) of four primary schools in Flanders, Belgium completed the lifestyle questionnaire twice with a test-retest interval of 7 days. Students completed a food diary and a TV viewing diary between the two data collection exercises. The TV viewing diary consisted of seven time bars (one for each day) on which respondents had to indicate TV viewing in 15-min time intervals. Each school day the diaries were checked for completeness by two researchers. One pupil did not return his completed diary. Intraclass correlations between test and retest (boys: 0.76 (95% confidence interval (CI) 0.63–0.85); girls: 0.81 (95% CI 0.69–0.88)) and between test and the 7-day TV viewing diary were calculated (boys: 0.36 (95% CI 0.11–0.57); girls: 0.54 (95% CI 0.32–0.71)). No systematic difference was found between test and retest. However, in comparison with the TV viewing diary, a higher TV viewing time was reported by both boys (TV questions: 2.96 (SD 1.84) h per day; TV diary: 1.91 (SD 1.14) h per day ( $t = 4.51$ ;  $df = 56$ ;  $P < 0.001$ )) and girls (TV questions: 2.03 (SD 1.25) h per day; TV diary: 1.43 (SD 0.89) h per day ( $t = 4.21$ ;  $df = 53$ ;  $P < 0.001$ )).

Socio-economic status (SES) was based on questions asking pupils about their parents' jobs. Countries were required to condense the answers into six categories labelled from 1 (high SES) to 5 (low SES) and 6 (economically inactive). For the current analyses responses were classified on the basis of the occupation of the 'head of the household' and the original six categories were recoded into three categories (high, middle and low). The head of the household was defined in terms of who had the highest ranking occupational position.

Eating habits were assessed using a short food-frequency questionnaire. Pupils were asked how many times a week they usually consumed fruits, vegetables, sweets (candy, chocolate) and non-diet (sugared) soft drinks. Response categories were 'never', 'less than once a week', 'once a week', '2–4 days a week', '5–6 days a week', 'once a day, every day' and 'more than once a day, every day'. Test-retest reliability and relative validity of

the items have been investigated in Flanders, Belgium and were found to be acceptable for the current analyses<sup>17</sup>.

**Statistical analyses**

Age- and gender-standardised prevalence of TV viewing was computed for each country and ranked according to average TV viewing time per day. Analyses of variance were used to examine sociodemographic differences in TV viewing time. *Post hoc* tests (Scheffé) were used for multiple comparisons. Logistic regression analyses were used to investigate associations between TV viewing time and eating habits, having first dichotomised the food items into daily consumption versus consumption on a less than daily basis. All analyses controlled for gender, age and SES. Analyses were conducted for each country separately. As interactions with gender were not significant (except for fruit in Wales and vegetables in The Netherlands), analyses were conducted for boys and girls together.

The software package used was SPSS 12 (SPSS Inc., Chicago, IL, USA). Due to the large sample sizes only *P*-values <0.01 are considered significant in the analyses presented below.

**Results**

**TV viewing behaviour**

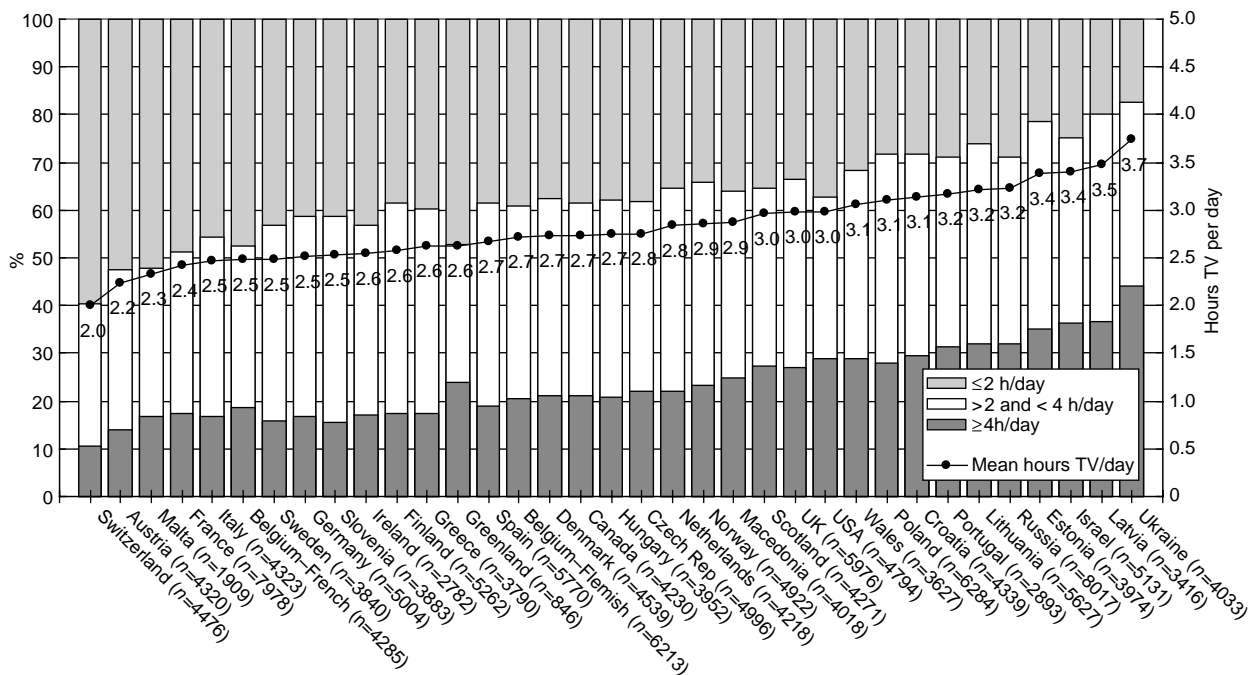
A total of 162 305 pupils completed the questionnaire. Figure 1 illustrates how much time children in the different participating countries spent watching TV, presenting data on mean hours per day and the proportions watching 2 h or less per day, > 2–4 h per day and 4 h or more per day

and more than 4 h per day (i.e. heavy viewers). Large differences exist between the countries, with Switzerland having the lowest mean viewing time (2 h per day) and the lowest proportion of heavy viewers (10%), while Ukraine had the highest mean viewing time (3.7 h per day) and the highest proportion of heavy viewers (44%). In general, Central and Eastern European countries had the highest TV viewing rates.

Table 1 presents TV viewing time by gender, age and SES. It can be seen that in 26 countries, boys were more likely to watch TV regularly than girls. The 13-year-old students were more likely to watch TV than 11-year-olds in 27 countries, as were 15-year-olds in 14 countries. In four countries, 15-year-olds were less likely to watch TV than 11-year-olds. With the exception of Israel, Greenland, Macedonia, Italy and Portugal, students of higher SES were significantly less likely to watch TV compared with their lower SES counterparts.

**Associations of TV viewing with eating habits**

Table 2 shows that in all but one country (Greenland) increased TV viewing time was statistically significantly associated with higher rates of daily consumption of sugared drinks and sweets. Conversely, increased viewing time was statistically significantly associated with lower rates of consumption of vegetables (in 20 countries) and fruit (in 19 countries). Most of the countries where no statistically significant association was found between TV viewing time and fruit/vegetable consumption were in Central and Eastern Europe.



**Fig. 1** Television (TV) viewing habits: percentage who watch 4 h or more, 2–4 h and 2 h or less per day and average TV viewing time per day by country (number of respondents)

**Table 1** Comparison (mean (SE) and significant differences) of reported TV viewing time per day by gender, age and SES

	Gender		Age (years)			SES (occupation head household)				Sig.*	n	
	Boy	Girl	11	13	15	Low	Middle	High				
									Sig.*			Sig.*
<b>North America</b>												
Canada	2.87 (0.04)	2.55 (0.04)	2.84 (0.04)	2.76 (0.04)	2.53 (0.05)	2.97 (0.05)	2.73 (0.04)	2.43 (0.05)	1 > m > h	15 < 11, 13	3619	
USA	3.10 (0.04)	2.83 (0.04)	2.99 (0.05)	3.02 (0.05)	2.88 (0.05)	3.23 (0.05)	2.95 (0.04)	2.71 (0.05)	1 > m > h	15 < 11, 13	4084	
Israel	3.39 (0.04)	3.43 (0.03)	3.57 (0.04)	3.62 (0.04)	3.03 (0.05)	3.42 (0.05)	3.57 (0.04)	3.24 (0.04)	m > h		4721	
<b>North Europe</b>												
Denmark	2.84 (0.03)	2.63 (0.03)	2.47 (0.04)	2.91 (0.04)	2.82 (0.04)	3.03 (0.05)	2.78 (0.03)	2.38 (0.05)	1 > m > h	11 < 13, 15	3986	
Finland	2.60 (0.03)	2.56 (0.03)	2.57 (0.03)	2.61 (0.04)	2.55 (0.04)	2.80 (0.04)	2.64 (0.03)	2.29 (0.03)	1 > m > h		4734	
Greenland	2.85 (0.10)	2.47 (0.09)	2.34 (0.12)	2.89 (0.10)	2.75 (0.12)	2.70 (0.11)	2.57 (0.10)	2.71 (0.14)		11 < 13	759	
Norway	2.90 (0.03)	2.74 (0.03)	2.58 (0.04)	3.00 (0.04)	2.88 (0.04)	2.96 (0.04)	2.83 (0.03)	2.67 (0.05)	1 > h	11 < 13, 15	4370	
Sweden	2.58 (0.04)	2.40 (0.04)	2.24 (0.04)	2.59 (0.04)	2.64 (0.04)	2.66 (0.04)	2.49 (0.06)	2.32 (0.03)	1 > h	11 < 13, 15	3375	
<b>Central and Eastern Europe</b>												
Croatia	3.26 (0.04)	2.98 (0.04)	2.88 (0.05)	3.42 (0.04)	3.06 (0.05)	3.26 (0.05)	3.16 (0.03)	2.93 (0.06)	1, m > h	11, 15 < 13	4176	
Czech Republic	2.94 (0.03)	2.63 (0.03)	2.63 (0.04)	2.90 (0.04)	2.82 (0.04)	2.89 (0.05)	2.85 (0.04)	2.61 (0.03)	1, m > h	11 < 13, 15	4861	
Estonia	3.56 (0.04)	3.21 (0.04)	3.30 (0.04)	3.59 (0.04)	3.25 (0.04)	3.49 (0.04)	3.44 (0.05)	3.22 (0.05)	1, m > h	11, 15 < 13	3911	
Hungary	2.88 (0.04)	2.64 (0.04)	2.59 (0.05)	2.97 (0.04)	2.72 (0.05)	2.97 (0.06)	2.87 (0.04)	2.45 (0.04)	1, m > h	11, 15 < 13	3756	
Latvia	3.69 (0.04)	3.27 (0.04)	3.42 (0.05)	3.60 (0.05)	3.42 (0.05)	3.62 (0.05)	3.50 (0.06)	3.32 (0.05)	1 > h	15 < 13	3004	
Lithuania	3.34 (0.03)	3.01 (0.03)	3.05 (0.04)	3.34 (0.04)	3.14 (0.04)	3.34 (0.04)	3.24 (0.04)	2.96 (0.04)	1, m > h	11, 15 < 13	4568	
Macedonia	3.07 (0.04)	2.82 (0.04)	2.63 (0.05)	3.18 (0.05)	3.03 (0.05)	2.83 (0.04)	3.05 (0.06)	2.95 (0.05)	m > l	11 < 13, 15	3294	
Poland	3.22 (0.03)	2.85 (0.03)	2.98 (0.04)	3.16 (0.04)	2.96 (0.04)	3.30 (0.03)	3.00 (0.04)	2.80 (0.05)	1 > m > h	11, 15 < 13	5872	
Russia	3.35 (0.03)	3.04 (0.03)	3.11 (0.04)	3.42 (0.04)	3.05 (0.04)	3.42 (0.04)	3.22 (0.03)	2.95 (0.04)	1 > m > h	11, 15 < 13	7012	
Slovenia	2.60 (0.03)	2.36 (0.03)	2.49 (0.04)	2.67 (0.04)	2.29 (0.04)	2.64 (0.03)	2.55 (0.04)	2.26 (0.05)	1, m > h	15 < 11 < 13	3622	
Ukraine	3.83 (0.05)	3.62 (0.04)	3.74 (0.06)	3.90 (0.05)	3.52 (0.05)	3.84 (0.04)	3.73 (0.09)	3.59 (0.05)	1 > h	15 < 11, 13	3730	
<b>South Europe</b>												
Greece	2.78 (0.03)	2.41 (0.03)	2.37 (0.04)	2.82 (0.04)	2.60 (0.04)	2.83 (0.04)	2.65 (0.04)	2.32 (0.04)	1, m > h	11 < 15 < 13	3729	
Italy	2.42 (0.03)	2.50 (0.03)	2.21 (0.04)	2.65 (0.04)	2.53 (0.04)	2.57 (0.05)	2.47 (0.03)	2.34 (0.05)		11 < 13, 15	4214	
Malta	2.41 (0.06)	2.15 (0.05)	2.18 (0.07)	2.55 (0.06)	2.10 (0.06)	2.47 (0.06)	2.34 (0.07)	2.02 (0.07)	1, m > h	11, 15 < 13	1788	
Portugal	3.16 (0.05)	3.11 (0.05)	2.90 (0.06)	3.47 (0.06)	3.02 (0.06)	3.21 (0.09)	3.23 (0.04)	2.95 (0.06)	m > h	11, 15 < 13	2758	
Spain	2.70 (0.03)	2.62 (0.03)	2.37 (0.03)	2.73 (0.03)	2.88 (0.04)	2.83 (0.04)	2.71 (0.03)	2.44 (0.04)	1, m > h	11 < 13, 15	5636	
<b>West Europe</b>												
Austria	2.24 (0.05)	2.11 (0.05)	1.80 (0.06)	2.35 (0.06)	2.37 (0.06)	2.52 (0.06)	2.02 (0.05)	1.97 (0.09)	1 > m, h	11 < 13, 15	1911	
Belgium – Flemish	2.94 (0.03)	2.50 (0.03)	2.64 (0.03)	2.81 (0.03)	2.72 (0.03)	3.19 (0.04)	2.72 (0.03)	2.25 (0.03)	1 > m > h	11 < 13	5965	
Belgium – French	2.59 (0.04)	2.38 (0.04)	2.30 (0.05)	2.52 (0.05)	2.64 (0.05)	2.86 (0.05)	2.49 (0.06)	2.11 (0.04)	1 > m > h	11 < 13, 15	3386	
England	3.08 (0.05)	2.99 (0.05)	3.00 (0.06)	3.10 (0.06)	3.00 (0.06)	3.16 (0.05)	3.08 (0.09)	2.87 (0.06)	1 > h		2516	
France	2.44 (0.03)	2.25 (0.03)	2.03 (0.03)	2.48 (0.03)	2.51 (0.03)	2.66 (0.03)	2.18 (0.04)	2.18 (0.04)	1 > m, h	11 < 13, 15	7575	
Germany	2.60 (0.03)	2.32 (0.03)	2.04 (0.03)	2.65 (0.04)	2.69 (0.04)	2.77 (0.03)	2.47 (0.03)	2.14 (0.04)	1 > m > h	11 < 13, 15	4652	
Ireland	2.64 (0.04)	2.43 (0.04)	2.38 (0.05)	2.61 (0.05)	2.62 (0.05)	2.74 (0.05)	2.46 (0.06)	2.40 (0.04)	1 > m, h	11 < 13	2622	
Netherlands	2.91 (0.04)	2.61 (0.04)	2.52 (0.05)	2.92 (0.05)	2.86 (0.05)	3.03 (0.04)	2.91 (0.04)	2.36 (0.07)	1, m > h	11 < 13, 15	3102	
Scotland	3.02 (0.04)	2.88 (0.04)	2.90 (0.05)	3.03 (0.05)	2.91 (0.06)	3.13 (0.05)	2.98 (0.06)	2.73 (0.04)	1, m > h		3570	
Switzerland	2.02 (0.03)	1.86 (0.03)	1.55 (0.04)	2.02 (0.04)	2.26 (0.04)	2.30 (0.04)	1.79 (0.03)	1.74 (0.05)	1 > m, h	11 < 13 < 15	4030	
Wales	3.04 (0.04)	3.10 (0.04)	2.96 (0.05)	3.16 (0.05)	3.09 (0.05)	3.36 (0.05)	3.12 (0.07)	2.73 (0.04)	1, m > h		3170	

SE – standard error; TV – television; SES – socio-economic status.

\*Significant differences of the analyses of variance are indicated; Scheffé post hoc tests are used for multiple group comparisons. b – boy; g – girl; 11 – 11-year-olds; 13 – 13-year-olds; 15 – 15-year-olds; l – low SES; m – middle SES; h – high SES; n – number of respondents included in the analyses; missing data on parental occupation reduced the sample size of some countries substantially.

**Table 2** OR (99% CI) for TV viewing time of the logistic regression models predicting daily consumption of soft drinks, sweets, vegetables and fruit

	OR (99% CI)			
	Soft drinks	Sweets	Vegetables	Fruit
North America				
Canada	1.328 (1.240–1.421)***	1.253 (1.174–1.338)***	0.862 (0.813–0.914)***	0.881 (0.830–0.934)***
USA	1.257 (1.199–1.317)***	1.249 (1.191–1.310)***	0.929 (0.884–0.976)***	0.934 (0.887–0.982)***
Israel	1.150 (1.098–1.204)***	1.117 (1.067–1.169)***	0.999 (0.955–1.044)	0.988 (0.945–1.034)
North Europe				
Denmark	1.327 (1.212–1.453)***	1.257 (1.155–1.368)***	0.922 (0.864–0.983)**	0.905 (0.850–0.964)***
Finland	1.398 (1.270–1.539)***	1.348 (1.231–1.476)***	0.878 (0.820–0.940)***	0.928 (0.868–0.993)**
Greenland	1.096 (0.976–1.231)	1.060 (0.948–1.186)	0.967 (0.859–1.089)	0.971 (0.851–1.107)
Norway	1.470 (1.375–1.571)***	1.387 (1.292–1.489)***	0.905 (0.847–0.967)***	0.924 (0.870–0.982)***
Sweden	1.457 (1.328–1.599)***	1.350 (1.232–1.478)***	0.933 (0.868–1.004)	1.015 (0.943–1.094)
Central and Eastern Europe				
Croatia	1.174 (1.113–1.237)***	1.172 (1.112–1.234)***	0.963 (0.910–1.019)	1.003 (0.952–1.056)
Czech Republic	1.235 (1.171–1.301)***	1.266 (1.199–1.336)***	0.944 (0.894–0.997)**	0.951 (0.905–1.000)**
Estonia	1.335 (1.223–1.457)***	1.214 (1.144–1.288)***	0.979 (0.910–1.054)	1.015 (0.950–1.085)
Hungary	1.279 (1.208–1.355)***	1.226 (1.158–1.297)***	0.926 (0.857–1.000)	1.006 (0.949–1.066)
Latvia	1.251 (1.152–1.359)***	1.231 (1.152–1.316)***	1.015 (0.951–1.082)	0.980 (0.914–1.050)
Lithuania	1.165 (1.079–1.257)***	1.161 (1.094–1.231)***	0.937 (0.890–0.987)**	0.961 (0.908–1.018)
Macedonia	1.105 (1.041–1.173)***	1.132 (1.069–1.199)***	1.007 (0.947–1.069)	0.985 (0.930–1.043)
Poland	1.313 (1.250–1.379)***	1.223 (1.169–1.279)***	1.027 (0.982–1.074)	1.022 (0.979–1.066)
Russia	1.157 (1.108–1.207)***	1.133 (1.089–1.180)***	0.973 (0.938–1.010)	0.988 (0.949–1.028)
Slovenia	1.254 (1.174–1.339)***	1.281 (1.194–1.375)***	0.913 (0.848–0.984)**	0.963 (0.902–1.029)
Ukraine	1.173 (1.098–1.254)***	1.193 (1.131–1.257)***	1.041 (0.991–1.094)	1.059 (0.999–1.122)
South Europe				
Greece	1.263 (1.177–1.356)***	1.200 (1.113–1.295)***	0.941 (0.875–1.012)	0.893 (0.840–0.950)***
Italy	1.146 (1.078–1.219)***	1.201 (1.137–1.270)***	0.893 (0.834–0.956)***	0.945 (0.894–0.999)**
Malta	1.216 (1.122–1.318)***	1.173 (1.082–1.271)***	0.908 (0.809–1.019)	0.959 (0.886–1.037)
Portugal	1.218 (1.142–1.300)***	1.192 (1.109–1.281)***	0.921 (0.859–0.987)**	0.939 (0.883–0.998)**
Spain	1.230 (1.170–1.294)***	1.250 (1.185–1.318)***	0.931 (0.862–1.004)	0.915 (0.871–0.960)***
West Europe				
Austria	1.495 (1.355–1.648)***	1.291 (1.174–1.419)***	0.899 (0.796–1.014)	0.917 (0.840–1.001)
Belgium–Flemish	1.347 (1.283–1.414)***	1.214 (1.156–1.274)***	0.878 (0.839–0.919)***	0.882 (0.835–0.930)***
Belgium–French	1.213 (1.142–1.288)***	1.137 (1.073–1.206)***	0.856 (0.806–0.910)***	0.895 (0.842–0.951)***
England	1.251 (1.174–1.334)***	1.200 (1.123–1.282)***	0.885 (0.823–0.951)***	0.894 (0.831–0.962)***
France	1.313 (1.259–1.369)***	1.218 (1.169–1.269)***	0.887 (0.853–0.923)***	0.939 (0.901–0.978)***
Germany	1.322 (1.243–1.406)***	1.188 (1.117–1.263)***	0.893 (0.840–0.950)***	0.869 (0.820–0.920)***
Ireland	1.277 (1.186–1.374)***	1.196 (1.114–1.283)***	0.886 (0.824–0.952)***	0.905 (0.839–0.977)***
Netherlands	1.182 (1.111–1.256)***	1.072 (1.01–1.1390)**	0.924 (0.868–0.983)***	0.977 (0.913–1.044)
Scotland	1.312 (1.242–1.385)***	1.261 (1.196–1.330)***	0.884 (0.836–0.935)***	0.851 (0.804–0.901)***
Switzerland	1.324 (1.242–1.411)***	1.163 (1.091–1.241)***	0.809 (0.756–0.866)***	0.850 (0.796–0.908)***
Wales	1.227 (1.157–1.301)***	1.200 (1.128–1.278)***	0.854 (0.794–0.918)***	0.893 (0.834–0.957)***

OR – odds ratio; CI – confidence interval; TV – television.

TV viewing time was included in the logistic regression models as a continuous variable. ORs were adjusted for age, gender and socio-economic status.

\*\* $P < 0.01$ ; \*\*\* $P < 0.001$ .

## Discussion

This paper benefits from being able to present comparable data from a large number of countries across Europe and North America. Considerable variation was found between countries in TV viewing time. The variety and quality of TV programmes available for viewing varies greatly between countries and this, combined with cultural and/or parental attitudes to watching<sup>18</sup> as well as the accessibility of other competing/concurrent media like computers, may influence the amount of time young people spend watching TV. The American Academy of Pediatrics recommends limiting children's total media time (including TV viewing) to no more than 2h of quality programming per day<sup>16</sup>. In most of the countries in this study, the majority of 11–15-year-olds report watching

more than 2h each day, with significant minorities reporting to watch in excess of 4h or more each day. It is highly unlikely that this time is spent watching high-quality programmes only, although information on type of programme watched is not available.

Our results also show that boys are more likely to watch TV than girls, as are students of lower SES. In countries where age differences were found, 13-year-olds generally report watching more than 15-year-olds, with the 15-year-olds watching more than 11-year-olds. Throughout childhood, TV dominates media usage and increased access to TV accompanies increased TV watching. It is now common to see more TVs in the home; additionally young people are more likely to eat meals while watching the TV, to have TVs in their bedrooms and to have access to videocassette recorders<sup>19</sup> and DVD players. Nevertheless,

when adolescents are between the ages of 14 and 18 years, music media increases at the cost of TV viewing<sup>2</sup>. The higher TV viewing times among students of lower SES is in accordance with the literature<sup>20,21</sup>.

As expected, students who report watching more TV are more likely to consume sweets and/or soft drinks containing sugar on a daily basis. This may be because they eat sweets or drink soft drinks more often while they are watching TV or as a result of the advertisements they see when watching TV. Studies with young children have shown that higher TV viewing time was associated with a higher request, purchase and consumption of advertised foods<sup>7,22–24</sup>. Others have also suggested that TV viewing and unhealthy food habits should be seen as indicators of a less healthy lifestyle, influenced by a range of personal, social and environmental factors<sup>6,11</sup>.

The association between watching TV and reduced likelihood of regularly consuming fruit and vegetables, found in many countries, could be a part of this less healthy lifestyle or possibly a result of the replacement of fruit and vegetables by other foods advertised more frequently. The lack of evidence for this association in Central and Eastern European countries requires further investigation but one factor could be differences in what and how much is being advertised on TV across these countries. On the other hand, issues such as family food culture (e.g. eating together), parenting practices and the availability of alternatives (such as pre-prepared or takeaway foods) are likely to mediate the role of TV on food consumption or are cultural-specific confounders of TV viewing and food consumption.

### Limitations

The limitations of the study should be acknowledged when interpreting the findings presented here. First, the data are from a self-report questionnaire with some evidence that, when comparing the TV viewing items with a 7-day TV viewing diary, adolescents may overestimate their TV viewing time, although this validation work has been restricted to one country to date. Second, while several studies have shown that the classifiable answers of children as young as 11–13 years can provide good proxy reports of parental occupation<sup>25–27</sup>, some 12.8% of responses could not be coded into one of the occupational categories due to missing, inaccurate or insufficiently detailed descriptions. Additional analysis suggests that in eight countries, those 11–15-year-olds not responding or giving incomplete answers to parental occupation were more likely to watch TV (Belgium–Flemish, Belgium–French, Ireland, Malta, Norway, Scotland, Switzerland and the USA). Conversely, in Greece and Macedonia, non-responders were less likely to watch TV. Each country developed an occupational coding scheme for classifying students' answers and recoded these into six categories (1 = high SES to 5 = low SES and 6 = economic inactive). This is far from perfect but provides a reasonable picture

of relative SES within the countries, given the variation in status and income accorded to professions in different countries. To improve comparability, occupational categories were further recoded into three groups (high, middle, low) of approximately the same size within each country.

### Conclusion

Significant proportions of young people report watching a substantial amount of TV. Given the associations with eating habits presented here, this may well put them at greater risk of overweight and obesity and poorer nutritional status. Efforts to use advertising targeted at children and adolescents to promote healthy foods and to replace young people's TV viewing time with alternative activities would appear to offer a way forward in the short term.

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