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Television viewing and food consumption in Flemish adolescents in Belgium

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Summary

Objectives: To examine associations of television viewing with overall food consumption

Methods: A computerised 24-hour dietary recall and a questionnaire were completed by 1031 adolescents (±12–14 years of age).

Results: Those who generally watched more television were more likely to consume frequently advertised items such as soft drinks and snacks. Not all frequently advertised food items (e.g. cereals) were associated with television viewing. An inverse association was found with fruit, water and milk. A negative association was found with brown bread; a positive association was found with white bread. The results indicate that high television viewing and a less nutrient dense food pattern are part of a lifestyle influenced by common underlying factors.

Conclusions: Nutrition interventions aimed at improving adolescents' food habits should target high television-viewers. Our findings underline the importance of tackling socio-demographic differences.

Keywords: Adolescents – Television – Food intake – Social status – Belgium .

A number of studies have documented a link between TV viewing and food consumption: frequent TV users consume significantly more soft drinks, fried foods, snacks (Utter et al. 2003; Van den Bulck 2000; Vereecken et al. 2006) and have a higher energy intake (Stroebele & de Castro 2004). This may be due to eating while watching TV (Matheson et al. 2004) or at other times a consequence of food advertisement (Halford et al. 2004; Jeffrey et al. 1982).

In addition, several studies have shown that low TV users consume fruit and vegetables more often (Boynton-Jarrett et al. 2003; Utter et al. 2003; Woodward et al. 1997).

It has been suggested that the selective promotion of certain types of foods may, in the long run, crowd out less popular foods, such as fruit and vegetables of a typical diet (Boynton-Jarrett et al. 2003; Coon et al. 2001). Most advertisements are for foods high in sugar, salt or fat. In addition, many food advertisements have misleading messages, suggesting that the advertised foods are healthy or nutritious (Boynton-Jarrett et al. 2003) or build positive associations with developmental needs such as positive affect, popularity, individuality and sexuality rather than nutrition and hunger (Chen & Kennedy 2001).

However, it is also possible that it is not television as such which discourages consumption of fruit and vegetables and encourages consumption of less nutrient dense items, but that TV viewing and eating habits are both part of a lifestyle influenced by the same, individual, social and/or environmental factors (Coon et al. 2001). Both TV viewing and eating habits of children and adolescents may be substantially influenced by their parents. Parents influence their children's food preferences and intake patterns through the foods they make available and accessible to the child, their own eating behaviour (food modelling), and the types of table food management practices they use (Nicklas et al. 2001). Since parents serve also as both models (Songul Yalcin et al. 2002) and gatekeepers for their children's TV viewing behaviour (Davison et al. 2005) by making television available and accessible and may play control over their children's viewing behaviour, it is not unlikely that family dynamics for both behaviours are linked. According to Woodward et al. (1997) and Coon et al. (2001), this would be reflected in associations of TV viewing with infrequently advertised food items or the general food consumption pattern.

The study of Woodward et al. (1997) suggests that both these pathways may function in the linking of television to chil-

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dren's food consumption patterns, although the nature of the linkage may vary from food group to food group. In their study, the link with 22 mostly not heavily advertised food items from all major food groups was investigated. A positive association was found with 18 items; however for eight items the effect of TV viewing did not survive after adjustment for socio-demographics and/or micro-dietary environments (perceived friends' and parents' consumption). The ten items for which the TV effect proved to be robust were mainly snack items, often eaten away from meals.

In the present study associations between general TV viewing time and the overall food consumption pattern (divided into 24 food groups) will be investigated in a large sample of Belgian-Flemish adolescents. In a first step, socio-demographic differences in TV viewing and food consumption are described. Following Woodward et al.(1997) and Coon et al. (2001), we hypothesized that the existence of common underlying factors of TV viewing and food habits would be reflected in associations of TV viewing time with the overall eating pattern and not only with frequently advertised food items.

Methods

Data were collected between January and February 2004. Students of grade 1 and 2 (±12–14 years of age) of six secondary schools participated in the study. Students were asked to complete an anonymous questionnaire and the computerised self-administered single 24-hour dietary recall program "Young Adolescents Nutrition Assessment on Computer" (YANA-C), during one school hour, under the supervision of two researchers.

The study was approved by the ethical board of the University Hospital of Ghent.

Measures

General TV viewing was assessed with a 14-item TV viewing measure consisting of two sets of seven questions. In the first set, respondents were asked whether they usually watch TV on Mondays, with response options "usually not, "about one Monday a month", "about 2 Mondays a month", "about 3 Mondays a month", "every Monday". The same question was repeated for all other days of the week. In the second set of questions, respondents were asked for the number of hours they usually spend watching TV on Monday when they watch TV on Monday, with nine response options ranging from "not at all", "about half an hour", "about one hour", "about 2 hours"… to "7 hours or more". Also this question was repeated for all other days of the week.

Detailed information regarding the respondents' food consumption on the previous day was assessed using YANA-C. YANA-C is a single day 24-hour dietary recall, structured according to six meal occasions (breakfast, mid-morning snack, midday meal, afternoon snack, evening meal and evening snack) embedded within questions that take the respondents through a range of sequential activities (i.e. when the respondents woke up, what the respondents did during the morning …). Kappa values of YANA-C for categorising subjects in consumers and non-consumers against a one-day dietary record and against a 24-hour dietary recall interview were good, varying between 0.38 (for butter & sauces, against the interview) and 0.92 (for cereals, against the dietary record). Comparing the amounts consumed of the different food groups for those who consumed the food items according to YANA-C and the validation standards, showed a significantly higher estimate in YANA-C against the food record for four of the 18 investigated food groups and for one food group against the interview. Breakfast cereals were significantly underestimated against both formats. A detailed description of the validation study has been described elsewhere (Vereecken et al. 2005).

Socio-economic status (SES) was based on the occupation of the 'head of the household' encoded from two series of five questions asking respondents about their fathers' and mothers' jobs. Responses were classified into three categories representing the required level of skills: 1) a high or scientific level of skills (e.g. doctors, teachers), 2) a medium level of skills (e.g. secretaries) and 3) a low or elementary level of skills (e.g. professional cleaners, truck drivers). If neither of the parents was economically active, the head of household was placed in the lowest category. A detailed description of the questions and the categorizations of parental occupational status can be found elsewhere (Vereecken & Vandegehuchte 2003).

Analysis

Food items from YANA-C were grouped based on nutritional attributes (nutrient content and food use). Food groups are presented in Table 1. Composite dishes were decomposed into their main ingredients. Mann-Whitney and Kruskal-Wallis tests were used to investigate gender and SES differences in food consumption.

Based on the 14-item TV viewing measure, a general hours per week TV viewing variable was created. Variations in TV viewing behaviour were examined by analysis of variance.

The general TV viewing variable was divided into tertiles based on percentiles 33 and 66 (low users, average users and high users) and food items were recoded into consumers and non-consumers. Percentage of consumers on the previous day by gender, SES and TV viewing are presented.

Dichotomising the food variables was necessary for multivariate analysis because of skewness. Binary logistic regres-

sion analyses with the dichotomised consumption variables as dependent variables, general TV viewing time as independent variable, and controlling for gender, SES, and type of day of the week were used to investigate associations with general TV viewing. Correction for type of day was necessary, as the type of day influences both TV viewing behaviour and food habits (Baranowski et al. 1997; Matheson et al. 2004).

Results

Of the 1 090 potential participants, 5.4 % were absent on the day of testing; 1 031 students were present and participated in the study. Mean age of the participants was 13.3 (SD = 0.7); 37 % were 12 years or younger, 46 % were 13 years and 17 % were 14 years or older; 52 % were boys; 22 % were classified into low SES, 46 % into medium SES, 29 % into high SES, and for 3 % the description of parental occupations was missing or inaccurate. Dietary data of YANA-C for 10 respondents was missing due to a disk error.

Univariate associations showed that boys watch more TV than girls (average hours per day: boys = 2.56 (SD = 1.47)), girls = 2.26 (SD = 1.32); F = 10.84, df (1,921), p = 0.001), older adolescents more than younger (12 year or younger = 2.22 (SD = 1.31); 13 year olds = 2.44 (SD = 1.4); 14 year or older = , 2.79 (SD = 1.56); F = 16.75, df (2,915), p < 0.001), adolescents from lower SES more than adolescents from middle and high SES and adolescents from middle SES more than adolescents from high SES (low SES = 2.87 (SD = 1.51), middle SES = 2.44 (SD = 1.39), high SES = 2.07 (SD = 1.2); F = 19.55, df (2,894), p < 0.001).

Table 1 shows the overall picture of adolescents' consumption pattern by gender and SES. Boys consume more potatoes, breakfast cereals, white bread, milk, coffee & tea, soft drinks, savoury snacks, sweets and chocolates and meat than girls, whereas for fruit, fruit juice and water the reverse is true. A positive association with SES was found for vegetables, brown bread, milk, cheese and water; a negative association with SES was found for coffee & tea and sweet soft drinks.

Results of the logistic regression analyses with the dichotomised food consumption variables as dependent variables and general TV viewing time as independent variable showed that increased TV viewing was positively associated with consumption of white bread, sweet soft drinks, savoury snacks and sweets & chocolates. A negative relationship was found between TV viewing time and the consumption of fruit, brown bread, milk, water, and sweet sandwich filling & sugar. Vegetables were only borderline significantly associated with TV viewing. No significant association was found for the remaining food items (Tab. 2).

Discussion

Socio-demographic variations in TV viewing and dietary behaviour confirm what previously has been found. Boys watch more TV than girls and adolescents of lower SES more than adolescents of higher SES (Utter et al. 2003; Vereecken et al. in press).

In adolescence, boys generally require a higher nutrient and energy intake than do girls due to their greater gain in bone and lean tissue, greater growth rate (Spear 2002), greater average body weight and higher resting metabolic rate (Rolls et al. 1991). Matthys et al. (2003) reported that 13–15 year old Flemish boys consumed on average 10625 KJ/day, whereas their female counterparts consumed only 8030 KJ/day. Our results indicate that girls' lower caloric intake results from a lower intake of several food groups: potatoes, white bread, milk, soft drinks, savoury and sweet snacks and meat.

In previous research, SES differences in the consumption of fruit, vegetables and soft drinks (Vereecken et al. 2004) among Belgian Flemish adolescents have been reported. However, to our knowledge, this is the first international publication on influences of parental occupation on the consumption of a wide range of food groups in Flemish adolescents. Our results showed a higher intake of vegetables, brown bread, milk, cheese and water and a lower intake of soft drinks and coffee & tea for those of higher SES, indicating a more nutrient-dense diet for the higher social class.

Furthermore, associations were found between TV viewing and several foods of different major food groups.

Our findings confirm that those who watch more TV have a higher consumption of sweet and savoury snacks and soft drinks. Concluding from the latter that TV-advertisement influences food habits, however, is premature: while it is true that food items high in fat and sugar are often advertised on TV, it is highly unlikely that adjustment for parental occupation removed all confounding due to social circumstances. Moreover, also cereals and dairy products such as yoghurt and ice cream appear frequently on the screen, while no association was found for these items. The fact that our findings demonstrate no association between TV viewing and the consumption of cereals or other dairy does however not indicate that food advertisement does not influence consumption. It might be that the influence is situated on brand switching rather than category changing (= more of the same or changing from product e.g. soft drinks instead of milk).

More interesting, however, are the associations found with items less often advertised on TV, such as fruit, milk and the two **interchangeable** variations of bread; nonetheless there have been some campaigns for the promotion of milk, fruit and vegetables and for the craftsmanship of traditional bakers (but not for white or brown bread in itself) during the last years. It

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Table 1 Consumers (%[a]) by gender, average consumption, standard error (SE) (in gram) and significance of the gender comparisons, consumers by SES, average consumption and SE and significance of the SES comparisons

	Gender							SES based on parental occupation									
	boy	girl	boy		girl			low	medium	high	low		medium		high		
	%	%	Mean	(SE)	Mean	(SE)	p	%	%	%	Mean	(SE)	Mean	(SE)	Mean	(SE)	p
Fruit, vegetables, potatoes																	
Fruit	62	73	144	(7)	171	(7)	**0,003**	64	66	72	149	(11)	156	(8)	165	(9)	0,171
Vegetables	74	79	104	(5)	101	(5)	0,728	74	76	81	100	(8)	97	(5)	115	(6)	**0,012**
Potatoes	72	69	156	(6)	126	(6)	**0,001**	75	69	68	154	(10)	138	(6)	134	(8)	0,321
Cereals																	
Breakfast cereals	35	27	13	(1)	9	(1)	**0,001**	33	29	34	11	(1)	10	(1)	12	(1)	0,366
Brown bread	41	46	53	(3)	50	(3)	0,448	32	46	49	38	(4)	54	(3)	60	(5)	**<0,001**
White bread	59	56	78	(4)	55	(3)	**0,001**	61	59	51	74	(5)	68	(4)	60	(5)	0,073
Other cereal products (pasta, rice, pizza bottom, cereal binding)	24	27	39	(4)	31	(3)	0,590	27	22	31	44	(6)	29	(3)	41	(5)	**0,017**
Dairy																	
Milk	56	45	163	(10)	114	(8)	**<0,001**	44	50	55	110	(12)	143	(10)	156	(12)	**0,013**
Cheese	37	35	26	(2)	20	(2)	0,226	35	34	41	21	(2)	20	(2)	31	(3)	**0,022**
Other milk products (sweet milkdrinks, yoghurt, milkdesserts)	39	45	110	(8)	120	(8)	0,053	41	40	48	109	(12)	114	(9)	128	(10)	0,181
Beverages																	
Water	63	78	372	(21)	438	(21)	**<0,001**	63	70	77	312	(29)	430	(24)	446	(25)	**<0,001**
Fruit juice	34	44	131	(10)	147	(11)	**0,025**	36	37	43	124	(15)	134	(11)	160	(15)	0,161
Coffee/tea	20	15	55	(6)	35	(5)	**0,021**	25	15	14	72	(11)	37	(5)	35	(6)	**0,002**
Soft drinks	76	60	509	(20)	285	(17)	**<0,001**	78	68	62	470	(29)	404	(21)	332	(23)	**<0,001**
Diet soft drinks	18	19	91	(11)	81	(10)	0,817	18	19	18	82	(18)	89	(11)	91	(14)	0,786
Sweets and snacks																	
Sweet breakfast rolls, pastry, biscuits	61	71	62	(4)	63	(5)	0,072	58	68	68	57	(6)	62	(5)	68	(6)	0,253
Savoury snacks (crisps, nuts)	27	21	21	(2)	11	(1)	**0,006**	29	22	22	17	(2)	15	(2)	16	(2)	0,108
Sweets, chocolates, candy bars	46	42	29	(2)	22	(2)	**0,047**	43	44	47	25	(3)	25	(2)	27	(3)	0,743
Sugar and sweet sandwich filling	39	40	26	(2)	22	(2)	0,867	37	40	43	21	(3)	24	(2)	29	(3)	0,317
Meat, eggs and fish																	
Meat	83	85	157	(5)	123	(4)	**<0,001**	81	86	86	141	(8)	142	(5)	143	(7)	0,901
Fish	9	9	12	(2)	9	(2)	0,932	7	9	11	9	(3)	10	(2)	10	(2)	0,285
Eggs	10	9	8	(1)	6	(1)	0,505	12	7	10	8	(2)	5	(1)	9	(2)	0,086
Sauces and fat (butter…)	51	52	20	(2)	19	(1)	0,930	51	51	51	18	(2)	20	(2)	19	(2)	0,961

[a] % who consumed food items from the food groups on the previous day

Table 2 Consumers (%) by low, average and high TV use and OR of TV viewing in the logistic regression analyses with the dichotomised consumption variables as dependent variables, controlling for socio-demographics and type of day

	low TV use	average TV use	high TV use	OR[a]	95 % CI		
Fruit, vegetables, potatoes							
Fruit	74	70	58	**0.83**	**0.74**	**0.92**	***
Vegetables	82	78	72	0.90	0.80	1.00	
Potatoes	70	71	69	1.02	0.89	1.17	
Cereals							
Breakfast cereals	33	32	28	0.92	0.83	1.03	
Brown bread	49	50	32	**0.79**	**0.71**	**0.88**	***
White bread	53	53	65	**1.17**	**1.05**	**1.29**	**
Other cereal products	26	24	25	0.95	0.86	1.09	
Dairy							
Milk	61	47	45	**0.82**	**0.74**	**0.91**	***
Cheese	37	37	34	0.94	0.84	1.04	
Other milk products	44	47	38	0.94	0.85	1.04	
Beverages							
Water	79	72	60	**0.81**	**0.72**	**0.90**	***
Fruit juice	41	41	34	0.94	0.85	1.05	
Coffee/te	19	15	18	0.96	0.84	1.10	
Sweet soft drinks	62	67	78	**1.24**	**1.10**	**1.40**	***
Diet soft drinks	15	20	18	1.04	0.91	1.17	
Sweets and snacks							
Biscuits and pastry	67	69	62	1.01	0.91	1.12	
Savoury snacks	18	23	32	**1.29**	**1.15**	**1.44**	***
Sweets and chocolates	39	43	50	**1.19**	**1.08**	**1.32**	***
Sweet sandwich filling & sugar	41	46	35	**0.88**	**0.80**	**0.98**	*
Meat, eggs, fish							
Meat	85	86	82	0.89	0.78	1.01	
Fish	11	8	11	1.01	0.85	1.19	
Eggs	9	9	9	1.05	0.89	1.25	
Sauces and fat	56	49	49	0.93	0.84	1.02	

[a] OR = odds ratio of TV viewing, with TV viewing as continuous variable; *** = $p < 0.001$; ** = $p < 0.01$; * = $p < 0.05$

is possible that he lower consumption of fruit, milk and water, found among those who watch more TV, could be explained by the higher intake of sweets, savoury snacks and soft drinks. However the higher consumption of white bread and the lower consumption of the more nutrient-dense brown bread among those who watch more TV rather seems to be an indication that both TV viewing and food habits are part of a less healthy lifestyle influenced by common underlying factors.

Limitations

A first limitation of the study is that the data are cross-sectional; therefore inferences of causal relationships cannot be made.

A second limitation is that YANA-C was completed only once by each student: one day of dietary recall per adolescent is little, and will reduce the ability to describe significant relationships severely, although it will not be entirely lost (Nelson & Bingham 1998).

A final limitation is that, due to the nature of the study (a school survey completed in the classroom), no data were gathered from Fridays and Saturdays.

Conclusions

In conclusion, our results confirm the association between TV viewing and the general food consumption pattern of adolescents. Nutrition interventions aimed at improving ad-

olescents' food habits should target high TV-viewers. Reducing consumption during TV viewing or replacing the foods consumed during TV viewing with more healthy items (such as fruit or vegetables served with a dip), might help to change adolescents' dietary intake. Nonetheless, our associations with the two types of bread (positive association with white bread, negative association with brown bread) indicate that not only the consumption of frequently advertised snacks establishes the link between dietary intake and TV viewing. Further exploration of potential common underlying predictors (e.g. a more permissive parenting style) of high TV use and less nutrient dense food habits is warranted.

Furthermore the findings underscore the importance of tackling socio-demographic differences.

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Zusammenfassung

Fernsehen und Lebensmittelverzehr flämischer Adoleszenter in Belgien

Untersuchungsziel: Die Beziehungen zwischen dem Fernsehverhalten und dem gesamten Lebensmittelverzehr sollten untersucht werden.

Methoden: 1031 Adoleszenten (±12–14 Jahre alt) beantworteten einen computerbasierten 24-h Erinnerungsabruf und einen Fragebogen.

Ergebnisse: Diejenigen Jugendlichen, die gewöhnlich mehr fern sahen konsumierten mit grösserer Wahrscheinlichkeit oft beworbene Produkte wie Softdrinks und Snacks. Nicht alle oft beworbene Nahrungsmittel (bspw. Cerealien) konnten mit dem Fernsehverhalten in Verbindung gebracht werden. Eine inverse Beziehung konnte für Früchte, Wasser und Milch festgestellt werden. Ein negativer Zusammenhang zeigte sich für dunkles Brot, ein positiver Zusammenhang für helles Brot. Dies weist darauf hin, dass häufiges Fernsehen und wenig nährstoffreiche Ernährungsmuster zu einem Lebensstil gehören, der von gemeinsam zu Grunde liegenden Faktoren beeinflusst ist.

Schlussfolgerungen: Ernährungsinterventionen zur Verbesserung der Essgewohnheiten von Adoleszenten sollten sich an Jugendliche richten, die häufig fernsehen. Unsere Ergebnisse unterstreichen die Bedeutung soziodemografischer Unterschiede und entsprechend gezielten Massnahmen.

Résumé

Télévision et pratiques alimentaires des adolescents belges (flamands)

Objectifs: Analyser les associations entre le fait de regarder la télévision et les pratiques **alimentaires.**

Méthodes: Un relevé alimentaire électronique sur 24 heures ainsi qu'un questionnaire ont été remplis par 1031 adolescents âgés de 12 à 14 ans.

Résultats: Les adolescents qui regardaient en général plus la télévision étaient plus enclins à consommer fréquemment des produits vantés par la publicité (boissons gazeuses, snacks). Les produits faisant fréquemment l'objet de réclames (par ex. les céréales) n'étaient pas tous associés avec le fait de regarder la télévision. Une association inverse a été constatée pour les fruits, l'eau et le lait. Le pain complet était associé négativement avec la télévision, le pain blanc était associé positivement avec la télévision: cela laisse penser que le fait de beaucoup regarder la télévision et d'avoir une consommation alimentaire pauvre en nutriments sont deux éléments d'un certain mode de vie.

Conclusions: Les interventions nutritionnelles visant à améliorer les habitudes alimentaires des adolescents devraient cibler les jeunes qui regardent beaucoup la télévision. Les résultats de notre étude soulignent l'importance de prendre en charge les différences socio-démographiques.

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