European Journal of Public Health, Vol. 15, No. 3, 224–232

doi:10.1093/eurpub/cki005 Advance Access published on 19 May 2005

Health Inequalities

The relative influence of individual and contextual socio-economic status on consumption of fruit and soft drinks among adolescents in Europe

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Background: The number of studies among children and adolescents that focus on socio-economic differences in food habits is limited. Moreover, most are done in only one country and often include a non-representative sample. The present study examines whether socio-economic differences in the consumption of fruit and soft drinks can be found among young adolescents in a wide range of European countries. **Methods:** Multilevel statistical analysis of 114 558 school-pupils aged 11, 13 and 15 from 28 countries participating in the WHO collaborative cross-national study of Health Behaviours among School-aged Children 2001–2002. The individual outcomes were daily fruit and soft drink consumption and the socio-economic predictors at the individual level were occupation of the head of household and family material wealth. Family material wealth was aggregated at the country level to operationalize country-level socio-economic status. **Results:** In general, girls and younger pupils consumed fruit more often and soft drinks less often. Significant between-school, between-country and between-region differences were found. Fruit consumption increased with family material wealth and higher parental occupational status. Soft drink consumption was lower among pupils of higher parental occupational status in Northern, Southern and Western European countries, but not in Central and Eastern European countries. Only in Central and Eastern European countries was a significant increase in soft drink consumption with increasing family affluence found. The country level of family affluence did not seem to have an effect on either outcome variable. **Conclusion**: The findings underscore the importance of socio-economic factors in relation to the food habits of young adolescents.

Keywords: adolescents, socio-economic status, food habits, multilevel

An optimal diet during childhood and adolescence must be adequate to support normal, and sometimes very rapid, growth and development and at the same time it must aim to reduce the risk of diet-related chronic disease during adulthood.[1] The need to promote healthy eating habits among young people has intensified in recent years due to the growing epidemic of obesity in many countries. Although the causes of obesity are complex, it has been suggested that sugar-sweetened drinks are an important contributory factor in the observed rise in the prevalence of obesity.[2,3] Improving the healthiness of the diet, however, would not only require a major reduction in the consumption of food items like soft drinks, but also a sharp increase in the consumption of vegetables and fruit as many young people do not meet the dietary recommendations for fruit and vegetables.[4–7]

Understanding the factors that influence these food habits and defining population groups with the least healthy food habits (at greatest risk) is of great importance for the development of relevant interventions, programmes and policies.

Several studies have focused on socio-economic differences in food habits,[8] although the number of studies among children and adolescents is limited and most are done in only a few countries and often include only a non-representative sample. Moreover, comparison between these studies is difficult due to heterogeneity in the socio-demographics of the study samples and differences in the measurement of food habits and in the measurement of socio-economic background.[9]

In the present study the influence of socio-economic factors on the consumption of fruit and soft drinks among adolescents in a wide range of European countries will be investigated. The effect of individual-level, school-level, country-level and regional-level socio-economic indicators will be examined. Specifically, we will examine the following research questions:

- Are there significant between-school, between-country and between-region differences in the consumption of fruit and soft drinks, after controlling for individual level socio-economic factors?
- What is the contribution of age, gender, parental occupation and family material wealth to differences in the consumption of fruit and soft drinks?
- Does the country level family material wealth affect the consumption of fruit and soft drinks among adolescents?
- Does the school level of family affluence and/or parental occupation (contextual measures of material wealth and social class reflecting the school socio-economic status profile) have an effect on the consumption of fruit and soft drinks?
- Are there differential effects of parental occupation and family material wealth in different geographical regions of Europe?

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Methods

Subjects

Data were obtained from the Health Behaviour in School-aged Children (HBSC) study 2001/2002, a cross-national survey supported by the World Health Organisation (Europe). The overall goal of the study is to gain new insights into, and to increase understanding of, health behaviour, lifestyles and their context in young people.

The data were collected by means of standardised questionnaires administered in school classrooms to a representative sample of 11-, 13- and 15-year-old schoolchildren, with a recommended sample size of 1536 students per age group.[10] ‘Cluster sampling’ was used, where the cluster was the class. The questionnaires were completed in the school classroom and confidentiality was ensured. In every school one teacher was appointed as co-ordinator. He or she organised the data collection and administered the survey according to standard instructions.

The questionnaire consisted of a number of core questions, which were similar in all participating countries, and focus questions, which allowed participating countries to include additional questions of national interest. More detailed information about the study is provided elsewhere.[10]

In the present analyses, samples of 28 European countries or regions were included.

Variables

Dependent variables

Pupils were asked to indicate the frequency of eating fruit and drinking coke or other soft drinks that contain sugar by ticking one of the following seven responses: ‘never’, ‘rarely/less than once a week’, ‘once a week’, ‘2–4 times a week’, ‘5–6 times a week’, ‘once a day, every day’ and ‘more than once a day, every day’. Response options were recoded into dichotomous outcome variables (1 = daily, 0 = less than daily).

Independent variables

Four individual-level variables (age, gender, parental occupation and material wealth), two aggregated school-level variables (average family material wealth and average parental occupation), one aggregated country-level variable (average family material wealth) and geographical area were used for our analyses.

Parental occupations (OCC) were encoded from questions asking students 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 our analyses, responses were classified on the basis of the occupation of the ‘head of household’ and the original six categories were recoded into three categories (high, middle and low). The head of household was defined in terms of who had the dominant occupational position. The school OCC level was computed by aggregating the individual pupils’ OCC for each school.

Material wealth was measured with a four-item family affluence scale (FAS). The four indicators were car ownership (0, 1 or 2 or more), computer ownership (0, 1, 2, 3 or more) number of family holidays last year (0, 1, 2, 3 or more) and own bedroom (no = 0, yes = 1). A FAS score was calculated by summing the responses to these four items (0–9). The school and country averages of these FAS scores were calculated as second and third level variables and within each country the individual level FAS scores were recoded into tertiles (high, middle, low).

Countries were classified into four groups reflecting different socio-cultural and socio-economical environments in Europe: Western European countries (WEC); Central and Eastern European countries (CEEC), Northern European countries (NEC) and Southern European countries (SEC).

Data analyses

Frequencies of daily consumption of fruit and soft drinks were produced for all participating countries.

Multilevel logistic regression analyses were conducted for each country separately and pooled for the total sample. We anticipate that our individual responses, consumption of fruits and soft drinks, are clustered by schools and countries. Importantly, the clustering at the school- and the country-level is not considered as a nuisance that needs to be adjusted. Rather we hypothesise that the differential clustering of health behaviours among adolescents can be partially accounted for by substantive processes that operate at the level of schools and countries. This requires that we consider an explicit multilevel model whereby the variation in fruit and soft drink consumption can be partitioned and explained simultaneously at the individual, school and country level. The principles underlying multilevel modelling procedures are well-known.[11] In the context of the analysis presented here, multilevel techniques allow estimation of: (i) the average effect of family socio-economic status (SES) on adolescents eating behaviour across all schools and countries, conditional on other individual factors (fixed parameters); (ii) the between-school and between-country variation that cannot be accounted for by individual family-level SES (‘random parameters’); and (iii) the extent to which school-level and country-level SES relate to adolescent eating behaviour (fixed parameters) and account for the between-school and between-country variation (random parameters). Additionally, we also considered regional dummies which were specified in the fixed part of the multilevel model to account for the country-level groupings.

Our multilevel models included adolescent children at level-1 nested within schools at level-2 nested within countries at level-3. The binary outcome, soft drink consumption and fruit consumption, was modelled using the multilevel binomial non-linear logit link with second order Predictive/Penalized Quasi-likelihood (PQL) approximation procedures.[12] Models were calibrated using the Maximum Likelihood procedure as implemented within *MLwiN* software version 1.1[13], which utilises the (Restricted) Iterative Generalized Least Squares algorithm.[14] Individual-level variables are presented as dummy indicator variables, contrasted against a base category.

Results

Of the 130 164 students who completed a questionnaire, 12% were excluded from analyses due to missing values on one or more variables (OCC, 9.5%; FAS, 2.0%; age, 0.7%; soft drink consumption, 0.5%; fruit consumption, 0.4%).

Tables 1 and 2 present the percentage of daily consumers of fruit and soft drinks by age, gender, OCC and FAS for each country. On average, across countries, 33% of students reported daily consumption of fruit and in all countries less than half the pupils consume fruit daily. On average, across countries, 26% of students reported daily consumption of soft drinks. Comparison between countries shows a wide variation, with national figures of daily fruit consumption of 17–43% among boys and 23–53% among girls, and for soft drinks of 10–50% among boys and 5–42% among girls.

The empty multilevel model, a model without predictors, allows us to decompose the variance of the outcome variable between the individual, school and country level. The crude country-level variance was 0.143 (SE = 0.039) for fruit and 0.460 (SE = 0.124) for soft drinks, and the crude school level variance was 0.107 (SE = 0.007) and 0.179 (SE = 0.009) respectively, indicating differences in the consumption of both food items between countries as well as schools. Including the regional dummies into the model (table 3, Model 1) decreased the country-level variance for fruit to 0.105 (SE = 0.029) and for soft drinks to 0.210 (SE = 0.057). Comparing the different regions (data not shown) revealed that pupils living in SEC were significantly more likely to eat fruit daily than pupils in any other area. Pupils in NEC were significantly less likely to drink soft drinks daily than pupils in all other areas. Pupils in CEEC were significantly less likely to drink soft drinks daily than pupils in WEC.

Significances of the individual-level characteristics in the separate country analyses are presented in tables 1 and 2.

In all but five countries, boys drink soft drinks significantly more often than girls, while in all but four countries, girls eat fruit significantly more often than boys. In 17 countries, daily consumption of soft drinks increases with age, no significant age difference was found in 10 countries and, only in Portugal, 15-year old pupils consumed soft drinks significantly less often than their 11-year old counterparts. In 24 countries a significantly lower consumption of fruit was found among the 15-year olds in comparison with the 11-year olds, in the remaining countries no significant age difference was found.

There was a positive relationship between fruit consumption and OCC in 15 countries and no significant relationship in 13 countries (including eight CEEC countries). For soft drinks there was a negative relationship in 23 countries and no significant relationship in five countries (all CEEC countries).

Table 1 Percentage of daily fruit consumers by gender, age category, family affluence, parental occupation and significance in two-level logistic regression analyses ($n = 114\,558$)

		Gender[a]		Age[b]			FAS[a]			OCC[a]			
		Boy	Girl	11	13	15	Low		High	Low		High	n
WEC	Belgium Flemish	22	31***	30	27*	22***	22	27**	31***	23	25	32***	5838
	Belgium French	37	41**	42	40	34***	37	37	41	39	35	41	3330
	France	34	35	40	34***	29***	31	34*	38***	33	36	35	7592
	Ireland	29	36***	37	31*	30**	30	34	35*	30	29	37**	2558
	Netherlands	27	29**	32	28	23***	26	27	30	26	27	32*	3058
	Scotland	32	37***	40	33***	28***	29	37**	38***	30	30	40***	3530
	Switzerland	31	41***	40	35**	33***	34	36	38	33	37	40*	4043
	Wales	21	26***	28	21***	22**	19	24*	27**	19	22	28***	3119
CEEC	Croatia	33	38***	42	35***	28***	29	33*	42***	32	36	38	4161
	Czech Republic	35	49***	48	42***	37***	38	41	47***	39	41	45**	4789
	Estonia	18	23***	24	21*	16***	16	20**	25***	21	18	21	3870
	Hungary	29	33***	38	31***	26***	26	30*	40***	31	30	34	3779
	Latvia	22	26**	25	24	23	17	22*	33***	22	22	28	2935
	Lithuania	20	24***	24	23	19**	12	20***	31***	18	20	30**	4404
	Macedonia	41	48***	48	43	42	39	44	49***	42	43	49**	3232
	Poland	41	52***	50	48	42***	36	50***	55***	43	49	51	5842
	Russia	24	28***	30	28	21***	17	26***	39***	25	25	30	6999
	Slovenia	33	45***	46	37***	33***	34	40*	43***	37	42*	42	3611
	Ukraine	23	25**	29	26	18***	17	24**	30***	22	23	27	3650
NEC	Denmark	26	39***	39	31***	27***	33	31	34	30	32	36*	3944
	Finland	17	27***	23	21	21	19	22	25**	19	21	26**	4705
	Norway	23	35***	34	29***	25***	26	29	35***	28	29	31	4324
	Sweden	25	28	35	22***	21***	25	28	27	25	25	29*	3342
SEC	Greece	35	41***	45	41	29***	33	37	42***	36	38	41	3676
	Italy	38	38	39	35*	41	37	38	39	36	38	41*	4153
	Malta	43	52*	55	48*	41***	46	47	50	46	47	51*	1785
	Portugal	43	53***	54	47**	41***	44	46	53***	48	48	48	2689
	Spain	36	38	42	35***	33***	32	36	42***	35	36	41*	5600

a: OR > 1.
b: OR < 1.
***$P < 0.001$.
**$P < 0.01$.
*$P < 0.05$.

Table 2 Percentage of daily soft drink consumers by gender, age category, family affluence, parental occupation and significance in two-level logistic regression analyses ($n = 114\,558$)

		Gender		Age			FAS			OCC			
		Boy	Girl	11	13	15	Low		High	Low		High	N
WEC	Belgium Flemish	48	31***	32	40+++	46+++	43	38	35	49	40***	30***	5838
	Belgium French	41	33***	34	37	39++	40	38	34	43	37*	33***	3330
	France	32	25***	27	29	29	34	27***	24***	33	24***	24***	7592
	Ireland	40	35**	30	37++	44+++	40	39	33	43	40	31***	2558
	Netherlands	50	38***	37	46+++	49+++	40	42	48+++	43	46	38*	3058
	Scotland	49	42***	43	46	49+	50	44	43	53	50	38***	3530
	Switzerland	37	27***	28	32++	36+++	32	32	33	38	29***	30***	4043
	Wales	37	35	32	37+	38++	37	36	35	39	39	32**	3119
CEEC	Croatia	34	31	32	32	33	31	32	34+++	36	32	28**	4161
	Czech Republic	31	27***	25	30++	31+++	29	28	29	32	29	27**	4789
	Estonia	13	7***	11	11	8	7	9	14+++	10	10	9	3870
	Hungary	33	32	30	33	34	30	31+	36+++	35	35	28**	3779
	Latvia	18	13**	11	17+++	17+++	12	15	19+++	14	14	18	2935
	Lithuania	12	8***	10	11	10	6	9++	13+++	9	9	13	4404
	Macedonia	37	30**	33	32	36+	27	31	41+++	36	32*	33**	3232
	Poland	31	20***	25	28	24	19	25+++	33+++	24	27	26*	5842
	Russia	23	19**	20	23	19	15	19+++	30+++	22	19*	23	6999
	Slovenia	43	37***	36	39	45+++	39	37	41+	42	39*	37**	3611
	Ukraine	19	15	17	18	15	10	15++	24+++	16	15	18	3650
NEC	Denmark	13	6***	7	10+++	11+++	11	9	9	12	9	7**	3944
	Finland	10	5***	6	9++	8+	8	7	9	9	8	6**	4705
	Norway	24	16***	13	20+++	26+++	20	19	21	23	19***	18***	4324
	Sweden	16	8***	8	15+++	13+++	12	10	13	14	13	10***	3342
SEC	Greece	23	14***	15	21+++	19++	20	18	18	21	19	14***	3676
	Italy	28	20***	23	25	24	25	24	24	26	24	22*	4153
	Malta	41	37	37	41	38	38	43+	37	46	38**	30***	1785
	Portugal	37	29***	35	35	28*	30	32	36++	31	35	28*	2689
	Spain	34	26***	27	32++	32++	32	29	28	35	30**	25***	5600

OR > 1 (+++$P < 0.001$; ++$P < 0.01$; +$P < 0.05$); OR < 1 (***$P < 0.001$; **$P < 0.01$; *$P < 0.05$).

In 21 countries, there was a higher relative odds of daily fruit consumption among the higher FAS pupils, and in 12 countries (including 10 CEEC countries) this was also true for daily soft drink consumption. In France the consumption of soft drinks was lower among the more affluent and in the remaining countries no significant relationship between daily soft drink consumption and FAS was found.

The three level random intercept models of pupils within schools within countries with the regional dummies in the fixed part, and in addition age, gender, OCC and FAS in the fixed part for the pooled sample are presented as Model 2 in table 3. In comparison with Model 1, this model resulted in only minor changes in the country-level variance, as could be expected because of the similar composition of the samples in the different countries. Looking at the fixed part, which represents the pooled individual-level relationships across the different European countries, there is a strong linear relationship between fruit consumption and FAS in that, with increasing FAS, the odds of daily fruit consumption increased. Also, pupils of parents with higher OCC were significantly more likely to be a daily fruit consumer than pupils of lower and middle OCC; between middle and low OCC, on the other hand, no significant difference was found. For soft drinks, lower consumption was found with increasing OCC and higher consumption among pupils with high FAS, although no difference was found between pupils of low and middle FAS.

In the next step, aggregated country- and school-level variables were added to the model. The country FAS variable proved not to be significant (data not shown) for both outcome variables.

The aggregated school FAS variable was a significant predictor for soft drinks (lower consumption of soft drinks in schools with more affluent pupils) but not for fruit consumption, while the aggregated school OCC variable was a significant

Table 3 Results of multilevel logistic regression analyses (pooled sample: $n = 114\,558$)

	Fruit									**Soft drinks**								
	Model 1			**Model 2**			**Model 3**			**Model 1**			**Model 2**			**Model 3**		
Fixed elements	OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI		OR	95%CI	
Area																		
WEC	1.000			1.000			1.000			1.000			1.000			1.000		
CEEC	1.003	0.745	1.351	1.020	0.754	1.380	1.036	0.764	1.403	0.484	0.318	0.738	0.474	0.310	0.725	0.430	0.277	0.669
NEC	0.831	0.560	1.232	0.832	0.559	1.238	0.826	0.554	1.232	0.208	0.119	0.363	0.211	0.120	0.371	0.223	0.125	0.398
SEC	1.565	1.085	2.258	1.575	1.087	2.281	1.582	1.093	2.292	0.680	0.406	1.142	0.675	0.401	1.137	0.646	0.378	1.105
Individual factors																		
Gender																		
Boy				1.000			1.000						1.000			1.000		
Girl				1.398	1.363	1.434	1.398	1.363	1.434				0.678	0.659	0.699	0.680	0.661	0.701
Age																		
11				1.000			1.000						1.000			1.000		
13				0.795	0.768	0.821	0.792	0.766	0.819				1.228	1.183	1.274	1.240	1.195	1.287
15				0.652	0.630	0.676	0.652	0.629	0.675				1.270	1.221	1.321	1.275	1.226	1.326
FAS																		
Low				1.000			1.000						1.000			1.000		
Mid				1.225	1.185	1.267	1.221	1.181	1.263				1.028	0.993	1.065	1.043	1.007	1.080
High				1.530	1.479	1.581	1.520	1.471	1.572				1.223	1.180	1.267	1.257	1.211	1.305
OCC																		
Low				1.000			1.000						1.000			1.000		
Mid				1.038	1.004	1.073	1.028	0.995	1.063				0.849	0.819	0.879	0.877	0.847	0.909
High				1.186	1.148	1.227	1.166	1.126	1.208				0.720	0.694	0.748	0.769	0.739	0.799
Contextual factors																		
Mean FAS school							1.010	0.979	1.042							0.934	0.902	0.968
Mean OCC school							1.078	1.012	1.148							0.733	0.680	0.789

Table 3 (*continued*)

Random elements	Fruit									Soft drinks								
	Model 1			Model 2			Model 3			Model 1			Model 2			Model 3		
	Estimate	95% CI		Estimate	95% CI		Estimate	95% CI		Estimate	95% CI		Estimate	95%CI		Estimate	95%CI	
Level 3 between countries	0.105	0.048	0.162	0.108	0.049	0.167	0.108	0.049	0.167	0.210	0.098	0.322	0.215	0.101	0.329	0.228	0.106	0.350
Level 2 between schools	0.107	0.093	0.121	0.083	0.071	0.095	0.082	0.070	0.094	0.178	0.160	0.196	0.158	0.140	0.176	0.139	0.123	0.155
Level 1	1.000			1.000			1.000			1.000			1.000			1.000		
− 2 log likelihood	146043			143201			143187			119255			116777			116865		

OR = odds ratio; CI = confidence interval; mean FAS school, mean OCC school = continuous, all other variables = categorical.

predictor for both outcome variables (higher consumption of fruits and lower consumption of soft drinks in schools with pupils of parents with higher OCC) (Model 3).

To investigate if geographical region matters in the differential effects of parental occupation and/or material wealth, cross-level interactions between regional dummies and OCC and between regional dummies and FAS were added to model 3. Daily fruit consumption increased with increasing FAS and was higher among pupils of parents of higher OCC. The influence of OCC on daily fruit consumption was comparable for all areas, while the influence of FAS on daily fruit consumption was more pronounced in CEEC countries (ORs are shown in figure 1).

Daily consumption of soft drinks was significantly lower among pupils of parents of higher OCC for all areas except CEEC. The influence of FAS, on the other hand, was especially important in CEEC, in that in these countries there was a significant increase in daily soft drink consumption with increasing FAS. For the other areas the influence was minimal or insignificant.

Discussion

Across all countries, the low proportion of pupils eating fruit daily and the relatively high proportion of pupils drinking soft drinks daily are of concern. These patterns of consumption are likely to be influenced by the billions of dollars spent on advertising and television commercials, the availability of vending machines in many schools and the relatively low budgets for the promotion of healthy food items.

Important socio-demographic and socio-economic differences were found in the consumption of both food items.

Gender

The results of the individual country analyses showed that, in general, patterns of consumption are consistent for gender (higher consumption of fruits and lower consumption of soft drinks among girls). In infancy and childhood, boys and girls show similar eating patterns. In adolescence, however, boys generally require a higher energy intake than girls, due to greater average body weight and higher resting metabolic rate.[15] A lower caloric intake for females may result from eating smaller amounts of the same variety of foods as males and/or by altering their selection to emphasise foods lower in caloric density.[16] The latter is supported by our findings, namely a higher proportion of daily fruit consumers and a lower proportion of daily soft drink consumers among females in comparison with males. Other suggested reasons include greater health consciousness, more concern with their appearance and the socialisation and adult role patterns that our society attributes as appropriate for each gender.[17–19]

Age

The next finding was the lower consumption of fruits and higher consumption of soft drinks among older pupils. The change from childhood to adolescence signifies increasing autonomy over food choices, with increasing opportunities for teenagers to select and purchase their own food and drink outside the home.[6] Developmentally ready to accept information from outside their families, with larger amounts of money to spend, teenagers tend to buy trend-setting rather than traditional food.[20] Therefore, health professionals should focus on the image of the more traditional food items and communicate with schools and food producers about the need for attractive healthy foods.

Country

The multilevel analyses showed that a substantial amount of the unexplained variance was attributable to differences between

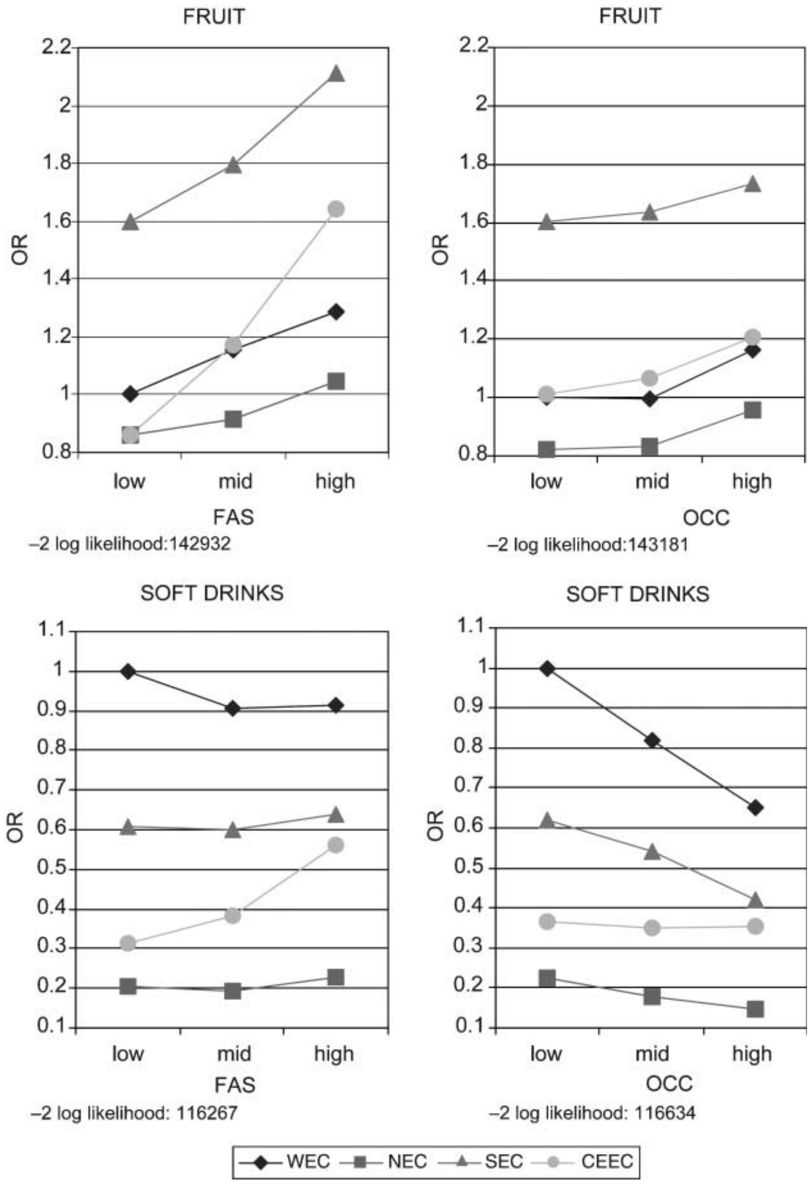

Figure 1 Odds ratios of FAS by area (reference: WEC, low OCC) and OCC by area (reference: WEC, low OCC) for daily fruit and soft drink consumption

countries. Geographical area, reflecting cultural diversity between Mediterranean, Western, Northern and East-Central European diets, reduced a considerable amount of this variation.

Socio-economic status

Further, our findings support the hypothesis that there are socio-economic disparities in the consumption of fruit and soft drinks among adolescents in Europe. However, differences in consumption of fruit and soft drinks are apparent between countries in relation to parental occupation and FAS.

A clear relationship was found between SES and daily fruit consumption: OCC and FAS were both independent predictors of fruit consumption, with higher consumption among the more affluent and among those whose parents have higher OCC.

Concerning soft drink consumption it was slightly surprising that the relationships with FAS and OCC were not consistent within country groups. However, from a methodological point of view it is important to recognise that different SES indicators may give different, and therefore complementary, information and that, generally, no indicator is superior to any other.[21] In our study, FAS represents a measure of material wealth and parental occupation more directly denotes education, social position and culture.[22] Depending on the aim of the analysis, one specific indicator may be preferred. Both indicators are meaningful in the context of the current analyses.

Food choice is known to be influenced by a wide range of social and economic factors. The effect of these factors can be different for different food items. The lower frequency of fruit consumption among pupils from less affluent families may reflect the higher cost of fruit in comparison with sweets and fats in many European countries.[2] Lower SES families usually have less money to spend on food,[23] and take costs[24,25] and the preferences of their family into account more often, while the well educated may be more likely to consider health in their choice of food when cost is not a barrier.[23,26] The greater influence of FAS in CEEC, countries that are in socio-economical transition, might reflect a more substantial weight of economic determinants in purchasing decisions in these countries.

For soft drinks, the positive association with FAS in CEEC was strikingly in contrast to the pattern found elsewhere. This might indicate that, in these countries, soft drinks are still considered luxury items, affordable only by higher SES groups.

Differences in patterns of consumption across social groups may also reflect the use of food as a symbol of status, whereby the purchase of expensive food items is used as an indication of higher SES.

Contextual SES

Finally, the results of this study suggest that the consumption of fruit and soft drinks are not only influenced by the individual SES of the pupils but also by the SES of the school population. It is likely to be more difficult to consume fruit, milk or any other recommended food item in an environment where other pupils are not or less stimulated to do so. Therefore, schools should create a context where healthy food choices and behaviours are promoted.

Country wealth, on the other hand, did not seem to have a significant effect on the consumption of fruits or soft drinks.

Limitations

In all surveys, questions on parental occupation appear to be problematic. In the present survey, a high percentage of responses could not be coded into one of the occupational categories due to missing, inaccurate or insufficient detailed description. Comparing adolescents who could not be coded into one of the SES groups with their counterparts, revealed a significantly ($P < 0.01$) lower percentage of daily fruit consumers in Poland, a higher percentage of daily fruit consumers in Russia and Sweden and a higher percentage of daily soft drink consumers in France, Norway, Russia, Scotland and Sweden.

Nonetheless, several studies have shown that the classifiable answers of children as young as 11–13 years can be good proxy reports of parental occupation.[27–29]

Further, every country used it's own national occupational coding scheme for coding the pupils' answers, and recoded these afterwards into six categories (from 1 = high SES to 5 = low SES or 6 = economic inactive). This meant that the same occupations could be classified into other categories in different countries, but it might also provide a truer reflection 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.

The FAS is a more straightforward instrument: for these items no intermediate coding is necessary. However, some authors argue that the problem of comparing family affluence across cultures may be greater than the problem of comparing results based on the more traditional measures of social class:[27,30] 'having a car', 'going on holidays'.... may have differential weights and could be differential for different countries. To partly overcome this problem the FAS-scale was recoded within each country into tertiles (a group of the most wealthy, a medium wealthy group and the least wealthy group), with cut-off points depending on the FAS distribution within the countries. In addition, the attention during the interpretation was drawn on the directions of the associations in groups of countries rather than on the strength of the associations in individual countries.

Acknowledgements

This study describes the consumption frequency of fruit and soft drinks among schoolchildren in 28 European countries. Both items are considered as indicators of overall eating patterns, but the use of only two items provides only a limited picture. The results, therefore, should be interpreted with some caution. However, using two different indicators of SES, the findings highlight the importance of socio-economic factors in relation to eating behaviour and reinforce the need to address social inequalities in any nutrition programmes.

The *Health Behaviour in School-Aged Children Survey* is a WHO/EURO collaborative study. The international coordinator of the 2001–2002 study was Candace Currie, University of Edinburgh, Scotland; and the data bank manager was Oddrun Samdal, University of Bergen, Norway.

Key points

- To examine socio-economic differences in the consumption of fruit and soft drinks among adolescents in 28 European countries.
- Parental occupation and family material wealth were both positively associated with fruit consumption.
- A positive association was found between soft drink consumption and family material wealth in Central and Eastern European Countries.
- A negative association was found between soft drink consumption and parental occupation in Northern, Southern and Western European countries.
- The findings highlight the need to address social inequalities in nutrition programmes.

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Received 4 September 2003, accepted 1 April 2004