Does eating family meals and having the television on during dinner correlate with overweight? A sub-study of the PRO GREENS project, looking at children from nine European countries

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Abstract

Objective: Family meals have been negatively associated with overweight in children, while television (TV) viewing during meals has been associated with a poorer diet. The aim of the present study was to assess the association of eating family breakfast and dinner, and having a TV on during dinner, with overweight in nine European countries and whether these associations differed between Northern and Southern & Eastern Europe.

Design: Cross-sectional data. Schoolchildren reported family meals and TV viewing. BMI was based on parental reports on height and weight of their children. Cut-off points for overweight by the International Obesity Task Force were used. Logistic regressions were performed adjusted by age, gender and parental education.

Setting: Schools in Northern European (Sweden, the Netherlands, Iceland, Germany and Finland) and Southern & Eastern European (Portugal, Greece, Bulgaria and Slovenia) countries, participating in the PRO GREENS project.

Subjects: Children aged 10–12 years in (n 6316).

Results: In the sample, 21% of the children were overweight, from 35% in Greece to 10% in the Netherlands. Only a few associations were found between family meals and TV viewing during dinner with overweight in the nine countries. Northern European children, compared with other regions, were significantly more likely to be overweight if they had fewer family breakfasts and more often viewed TV during dinner.

Conclusions: The associations between family meals and TV viewing during dinner with overweight were few and showed significance only in Northern Europe. Differences in foods consumed during family meals and in health-related lifestyles between Northern and Southern & Eastern Europe may explain these discrepancies.

Keywords

Family meals
Television
Overweight
Children
Europe

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The prevalence of overweight and obesity has increased among schoolchildren in Europe and has been higher among those living in Southern & Eastern Europe compared with Northern Europe\(^{(1–3)}\). The possible determinants of overweight and obesity are several, including dietary factors such as nutrient intake, food intake and eating and meal patterns, as well as physical activity and time spent in sedentary activities, such as television (TV) viewing and computer use\(^{(5–4)}\).

Two recent reviews\(^{(5,6)}\) found that children and adolescents who had shared more frequent family meals were more likely to have a normal weight than those who had less often shared family meals. However, in one of the reviews\(^{(5)}\) the conclusion was that the inverse association between family meal frequency and overweight is inconsistent. A possible association may be explained by a healthier overall food intake\(^{(7,8)}\) induced by planned and daily meals. Foods typically consumed during main meals are therefore considered healthier than foods eaten as snacks. Another explanation is that a certain meal pattern is an indicator of a health-promoting lifestyle of the family. Skipping breakfast has in other studies been associated with a less healthy lifestyle, with lower levels of physical activity and higher levels of sedentary behaviour\(^{9,10}\).

Most of the studies included in the reviews of frequency of family meals and childhood overweight\(^{(5,6)}\) were conducted in North America and none in Europe. One study of Finnish schoolchildren showed that more frequent family meals predicted a lower BMI two years later\(^{(11)}\). The daily routines developed in this age group are an interesting study population as these children are in the transition from childhood to adolescence. This age group is an interesting study population as these children are able to answer questionnaires by themselves. The present study was to examine the associations of family meals and a habit of having the TV on during dinner with 11-year-old children’s overweight in nine European countries. Based on the differences in overweight levels between Northern and Southern & Eastern European countries, we also examined whether the associations vary between these two regions. The general hypothesis was that having family meals and not having a TV on during meals are associated with a lower risk of overweight among children.

### Materials and methods

The present study is a part of the PRO GREENS project, which was designed primarily to assess 11-year-olds’ consumption of fruit and vegetables in ten European countries (Bulgaria, Finland, Germany, Greece, Iceland, Norway, Portugal, Slovenia, Sweden and the Netherlands) before and after an intervention to promote fruit and vegetable consumption in schools. In the current analysis we used cross-sectional data collected at baseline in nine of the ten European countries; Norway was excluded since no data on weight were collected there. The baseline survey was conducted from April to October 2009. Sampling of schools was performed regionally in all countries, except Slovenia and the Netherlands, where the sample was nationally representative. In Bulgaria, Finland, Iceland and Sweden, schools were selected in the capital regions or in other areas, mainly in urban areas. In Finland, only Swedish-speaking schools along the Finnish coast were included (both urban and rural areas). In Germany, Greece and Portugal, the selected schools were close to the research centres (Porto, Heraklion and Giessen; C Lynch, AG Kristjansdottir, SJ te Velde et al., unpublished results). All participating schools received a letter or a telephone call introducing the project and enquiring about participation. The procedure for collecting data had been performed before and entailed providing information to teachers on how to collect the data\(^{(19)}\). The children were asked to complete a questionnaire in the classroom, supported by teachers or research staff. The children then took another questionnaire home to be completed by one of their parents. The teachers returned all the questionnaires in closed envelopes to the national research groups, who in turn entered the data according to an agreed data protocol. All relevant medical ethics committees in the participating countries approved the PRO GREENS project’s study protocol in autumn 2008. All participating parents and their children signed a consent form, whereas no incentives were given for those participating in the study.

In total (nine countries), 10 373 children were invited to participate in the study. Of these, 7680 children completed the questionnaire. The children invited to participate were born mainly in 1997 and 1998, and their mean age at baseline was 11·3 years (see Table 1). The participation rate was 74·0% and varied between countries, from 55·2%...
(the Netherlands) to 91.8% (Greece). The present paper reports findings on 6316 children whose parents reported data on the weight and height of their child. The proportion of observations with data on weight and height varied between countries, from 54% in Iceland to 92% in Bulgaria and Slovenia.

**Overweight**
The children's BMI was based on their weight and height reported in the parents' questionnaire. BMI based on parental reporting of height and weight has previously been found reliable and to have strong correlations with actual values\(^{(20,21)}\). Overweight, including obesity, was defined using age- (year and month) and sex-specific cut-off points available from the International Obesity Task Force\(^{(22)}\).

**Meal-related determinants**
The children's questionnaire included questions on family meal patterns and having a TV on during dinner, as follows. The children were asked how often they ate breakfast together with their mother and/or father. Corresponding questions and response categories were also asked about dinner (evening meal). The response categories were ‘every day’, ‘4–6 days per week’, ‘1–3 days per week’, ‘less than one day per week’ and ‘never’. The last two categories were combined into one for family breakfast and one for family dinner because of the few observations in these categories. The children also answered how often a TV was on during dinner. The response categories were the same as for family meals.

**Confounders**
Children's gender, age and parental educational level were included in the analyses as possible confounders. The parents' questionnaire enquired about the child's mother's highest level of education; this level of education was then transformed into a dichotomous variable, distinguishing children with mothers who reported a university degree (a Bachelor's or Master's) from those with mothers of lower levels of education.

**Statistical methods**
The nine countries were further divided into two groups based on geographical location. The first (Northern Europe) included Finland, Germany, Iceland, the Netherlands and Sweden. The second (Southern & Eastern Europe) included Bulgaria, Greece (i.e. Crete), Portugal and Slovenia. The reason for dividing the countries is that overweight and obesity and health behaviours among schoolchildren vary between Southern & Eastern Europe, compared with Northern Europe\(^{(1–3)}\). Another reason for doing this was to increase the power, since the number of participants in single countries was not too high.

Data were described by mean values for continuous variables and by proportions for dichotomized variables. The \(\chi^2\) test was conducted to test whether there were

| Table 1 Mean sociodemographic characteristics of 11-year-old children in Europe with data on weight status, by country and in Northern and Southern & Eastern Europe, PRO GREENS project, 2009 |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Variable        | All             | Southern & Eastern Europe | Northern Europe | Sweden | The Netherlands | Iceland | Finland | Germany | Portugal | Slovenia | Greece | Bulgaria |
| n               | 6316            | 3359                      | 2957            | 652    | 503             | 378     | 857     | 567     | 703     | 1121    | 652    | 883      |
| Age (years), mean | 11.1            | 11.0                      | 11.0            | 11.0   | 11.0            | 11.0    | 11.0    | 11.0    | 11.0    | 11.0    | 11.0    | 11.0     |
| Overweight (%)  | 21.5            | 26.0                      | 15.0            | 11.0   | 10.0            | 19.0    | 17.0    | 19.0    | 30.0    | 22.0    | 30.0    | 20.0     |

*As defined using age- (year and month) and sex-specific cut-off points available from the International Obesity Task Force\(^{(22)}\).
differences in meal-related and overweight status variables between countries or country groups.

Logistic regression analysis was used to test the association between the meal-related variables and children’s overweight separately in all nine countries. All analyses were adjusted for the gender and age of the child, as well as parental educational level. Logistic regression was used to test whether these associations differed between Northern and Southern & Eastern Europe by including an interaction term for country group and meal-related variables in the models. If the interaction terms approached significance \((P < 0.1)\), stratified analyses by country groups were conducted and adjusted for age, gender, parental educational level and country. The results from the logistic regression analyses were reported as odds ratios and 95% confidence intervals.

**Results**

Table 1 presents characteristics described by country and European region. The proportion of overweight children was higher in countries in Southern & Eastern Europe than in Northern Europe (26% vs. 15%). The highest proportion of overweight was found in Greece (i.e. Heraklion; 35%) and the lowest in the Netherlands (10%). All meal-related variables and overweight status differed between countries and between country groups (all \(P\) values <0.001).

Figures 1–3 illustrate the weekly frequency of family meals and having a TV on during dinner. Daily family breakfast was more common in Northern Europe (49%) than in Southern & Eastern Europe (38%) with the exception of Portugal, which showed the highest propor-
tion (60%) of children having family breakfast daily. The lowest proportion of children having daily family breakfast was found in Slovenia (28%) and Greece (30%). Having family dinner daily was also more common in Northern Europe (75%) compared with Southern & Eastern Europe (65%). Daily family dinner was most common in Portugal (85%) and least common in Slovenia (48%). Having a TV on during dinner daily was less common in Northern Europe (19%) than in Southern & Eastern Europe (45%), most common in Portugal (68%) and least common in the Netherlands (10%).

The results from the logistic regression analyses conducted for each country are shown in Table 2. No significant association was found for family breakfast and overweight in the nine European countries. Only in Germany was family dinner associated with overweight. German children who ate dinner with their family on less than one day per week were more likely to be overweight compared with those who had family breakfast daily, and among children who had a TV on during dinner daily (OR=1.94) compared to those who never had a TV on during dinner (Table 3). No significant associations between meal-related determinants and overweight were found in Southern & Eastern Europe.

Discussion

The main finding of the current study was that in the total sample of nine European countries, having family meals was not associated with schoolchildren’s overweight. However, when these associations were stratified by region, results showed that in Northern Europe, children having a family breakfast or dinner less than once weekly were more likely to be overweight, while there was no association between family breakfast or dinner and overweight status in the Southern & Eastern European countries. Having a TV on during dinner was associated with overweight in Northern Europe, but no significant association was found in Southern & Eastern Europe.

The proportion of children classified as overweight was 21% and overweight was found to be more common in Southern & Eastern Europe, particularly Greece (i.e. Crete) and Portugal. The proportion of children classified as overweight in our study in different countries may not, however, be nationally representative of the prevalence of overweight, since we chose to take regional samples in Sweden, Finland, Germany, Iceland, Norway, Portugal, Bulgaria and Greece. Despite most of the samples being regional, the pattern of overweight observed between countries was quite similar to that in other studies conducted.
Family meals, television and children's overweight

Logistic regression analyses for the relationship between overweight and family meals and watching TV during meals in 11-year-old children in nine European countries, PRO

<table>
<thead>
<tr>
<th>Meal-related determinants of overweight</th>
<th>Sweden</th>
<th>The Netherlands</th>
<th>Iceland</th>
<th>Finland</th>
<th>Germany</th>
<th>Portugal</th>
<th>Slovenia</th>
<th>Greece</th>
<th>Bulgaria</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR</td>
<td>0.95 (95% CI: 0.89–1.02)</td>
<td>OR</td>
<td>0.91 (95% CI: 0.85–0.98)</td>
<td>OR</td>
<td>0.97 (95% CI: 0.93–1.02)</td>
<td>OR</td>
<td>0.93 (95% CI: 0.88–0.98)</td>
<td>OR</td>
<td>0.95 (95% CI: 0.89–1.02)</td>
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</table>

How often do you have breakfast with your mother and father?

- Every day: P = 0.92 (n = 838)
- 4–6/week: P = 0.92 (n = 1078)
- 1–3/week: P = 0.95 (n = 844)
- <1/week: P = 0.92 (n = 1039)

How often do you have dinner with your mother and father?

- Every day: P = 0.92 (n = 838)
- 4–6/week: P = 0.92 (n = 1078)
- 1–3/week: P = 0.95 (n = 844)
- <1/week: P = 0.92 (n = 1039)

How often is a TV on during dinner?

- Every day: P = 0.92 (n = 838)
- 4–6/week: P = 0.92 (n = 1078)
- 1–3/week: P = 0.95 (n = 844)
- <1/week: P = 0.92 (n = 1039)

TV, television; ref., referent category.
example, the content of breakfast varies between European countries\(^{23}\). Having frequent family meals may be an indicator of a healthy lifestyle in the family only in some countries. In the Nordic countries, children with frequent meals are generally more physically active and eat healthier food than children with less frequent meals\(^{19,24}\). Children watching more TV eat a greater amount of unhealthy food compared with those watching less, according to previous studies\(^{25,26}\). Having a TV on during meals may influence children’s eating behaviours, such as paying attention to the TV reduces the ability to regulate energy intake\(^{27,28}\). In addition, food commercials on TV may affect eating behaviours. A study conducted in Australia, Asia, Western Europe, and North and South America found that children were exposed to high volumes of TV advertising for unhealthy foods\(^{29}\) and that their consumption of unhealthy foods may increase by watching more TV. Not having a TV on during meals may also be an indicator of a healthy lifestyle in some parts of Europe.

Socio-economic status, including parental educational level, income level and parental social class, may be a possible confounder, since high socio-economic status has been associated with both frequent family meals and lower risk of overweight\(^{30}\). We adjusted for parental educational level in the analyses, but the associations between meal-related determinants and overweight did not change. The parents’ questionnaire did not include questions on other aspects of socio-economic status, such as income level. Future studies should ideally take this element into account when examining such associations.

Most studies finding associations between family meals and overweight have been conducted in North America and to a lesser extent in Europe\(^{5}\). In Northern Europe, the same pattern was found as in North America, whereas no clear pattern was found in Southern & Eastern European countries. The eating context in Europe probably varies across the North–South axis, which influences the prospect of finding a consistent pattern between family meals and overweight. Despite the quite consistent association between meal patterns and overweight observed in cross-sectional studies, particularly in North America, the causality has not been confirmed in intervention studies\(^{30,31,32}\). The hypothesis that frequent family meals are inversely associated with overweight among adolescents in different parts of Europe could not be confirmed. It might be that in some cultures, meal patterns are indicators of a healthy lifestyle and therefore an association exists between meal patterns and overweight. Further longitudinal and intervention studies should be carried out to confirm this hypothesis.

### Conclusion

In conclusion, the present cross-sectional study did not confirm the hypothesis that eating family meals and not having a TV on during dinner are consistently associated with overweight among schoolchildren in Europe. However, it seems that having a family breakfast on less than one day per week and having a TV on during dinner daily are associated with overweight in Northern Europe.

### Acknowledgements

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**Table 3** Logistic regression analyses for the relationship between overweight and family meals and watching TV during meals in 11-year-old children in Northern Europe and Southern & Eastern Europe, PRO GREENS project, 2009: odds ratios and 95% confidence intervals adjusted for age, gender, parental educational level and country. Separate model for every meal-related variable

<table>
<thead>
<tr>
<th>Meal-related determinants of overweight</th>
<th>Northern Europe</th>
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<th>Southern &amp; Eastern Europe</th>
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<tr>
<td></td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
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<tr>
<td>How often do you have breakfast with your mother and father?</td>
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<tr>
<td>Every day</td>
<td>1.00 Ref.</td>
<td>1.00 Ref.</td>
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<tr>
<td>4–6 d/week</td>
<td>1.10 0.81, 1.48</td>
<td>0.98 0.75, 1.27</td>
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<tr>
<td>1–3 d/week</td>
<td>1.31 1.00, 1.72</td>
<td>1.14 0.93, 1.40</td>
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<tr>
<td>&lt;1 d/week</td>
<td>1.53 1.11, 2.12</td>
<td>0.91 0.73, 1.33</td>
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<tr>
<td>How often do you have dinner with your mother and father?</td>
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<tr>
<td>Every day</td>
<td>1.00 Ref.</td>
<td>1.00 Ref.</td>
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<tr>
<td>4–6 d/week</td>
<td>0.94 0.70, 1.25</td>
<td>1.12 0.88, 1.42</td>
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<tr>
<td>1–3 d/week</td>
<td>1.02 0.66, 1.59</td>
<td>1.01 0.78, 1.30</td>
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<tr>
<td>&lt;1 d/week</td>
<td>2.08 1.21, 3.58</td>
<td>0.95 0.70, 1.28</td>
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<tr>
<td>How often is a TV on during dinner?</td>
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</tr>
<tr>
<td>Every day</td>
<td>1.94 1.45, 2.59</td>
<td>1.26 0.94, 1.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4–6 d/week</td>
<td>1.24 0.88, 1.76</td>
<td>0.96 0.71, 1.29</td>
<td></td>
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<tr>
<td>1–3 d/week</td>
<td>0.96 0.68, 1.35</td>
<td>0.91 0.67, 1.23</td>
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<tr>
<td>&lt;1 d/week</td>
<td>1.07 0.77, 1.49</td>
<td>1.24 0.91, 1.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>1.00 Ref.</td>
<td>1.00 Ref.</td>
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</tbody>
</table>

TV, television; ref., referent category.
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References


