ABSTRACT

Objective: To test the hypotheses that adolescents have different perceptions of family-environmental factors than do their parents, and that dietary intake of adolescents is more highly associated with the adolescent’s own perceptions than those of their parents.

Design: Data from self-administered questionnaires were used.

Participants: Five-hundred two students aged 12 to 14 years, and one of each student’s parents.

Main Outcome Measures: Two types of family-environmental factors (ie, family food rules and home availability and accessibility of food) for 3 self-reported dietary behaviors (ie, fruit, snack, and breakfast intake).

Analysis: Unpaired t tests, chi-square tests, percentage (gross) disagreement, standardized regression coefficients, and linear regression analyses.

Results: For most rules and most perceptions of availability and accessibility, considerable disagreement was found between parents and students. Self-reported intake of fruit and snacks was more highly associated with student measures, but breakfast intake was more highly associated with parent measures of rules and availability.

Implications for Research and Practice: The findings might explain mixed results on the associations between family-environmental factors and children’s dietary intake that were found in earlier studies. Researchers need to be aware that in studies into family-environmental determinants of dietary habits using self-reports, the results are possibly influenced by whether the data were reported by parents or by children.

Key Words: diet, food rules, food availability, adolescents

INTRODUCTION

The promotion of healthful diets among children and adolescents has become a priority for public health. An appropriate diet during childhood and adolescence can reduce the risk of immediate problems, such as anemia, overweight, and decreased learning abilities. Also, because healthful eating habits early in life are likely to be main-
cused on different dietary behaviors of youngsters of different age groups and studied different (combinations of) family-environmental factors. The studies found mixed results on the associations between family-environmental factors and children’s dietary intake, although in the majority of the studies, associations were found for at least some of the family-environmental factors.\textsuperscript{9,25} This is also a conclusion in a recent review of environmental correlates of obesity-related dietary behaviors in youth. The factors associated with children’s intake that were most consistent were parental intake and parental education. The samples that found a positive association for the relationship between availability and accessibility with children’s fruit and vegetable intake slightly outnumbered the samples that found no association. All other associations between children’s intake and potential environmental factors at the household level were inconsistent, appeared nonexistent, or were examined in only 1 or 2 studies.\textsuperscript{26}

A possible explanation of the differences in associations found may be the way potential family-environmental factors were measured: some studies use parental measures, whereas others ask the children themselves about the potential behavioral determinants. Children might have different perceptions of family-environmental factors than their parents (hypothesis 1), and dietary intake of the children might be more highly associated with the children’s own perceptions than those of their parents (hypothesis 2). Indeed, in earlier diet-related studies, differences between adolescents and their parents have been found in their perceptions of family determinants, such as decision-making power about food, obligation rules, and family meal specifics.\textsuperscript{8,27-28} In the present study, a convenience sample allowed testing both hypotheses for 2 types of family-environmental factors (family food rules and home availability and accessibility of food) for 3 dietary behaviors (fruit intake, snack intake, and breakfast intake).

**STUDY DESIGN AND PROCEDURES**

The present study used data from a larger study among 12- to 14-year-old students and 1 parent. Students were recruited from lower vocational schools (preparatory secondary vocational education) located in urban as well as rural settings in the southern part of the Netherlands. Children from families of lower socioeconomic background are over-represented in Dutch preparatory secondary vocational schools. The students participated in an evaluation study of a Dutch nutrition education program. Data were used from a baseline questionnaire that was completed by the students in the classroom under supervision of the teacher, and from a parent questionnaire that was mailed to the home address.\textsuperscript{29} The questionnaires completed by the students were matched with those of the parents using school number, date of birth, and gender of the students. The children’s mothers were asked to fill in the questionnaire, or if that was not possible, the father or other caregiver completed the survey.

The study was exempt from ethical review according to prevailing Dutch standards because the study was considered to be low risk, participation was voluntary, and completion of the surveys was considered to be equivalent to assent by students and consent by parents.

**Measures**

Two questionnaires were used, 1 for adolescents and 1 for parents. The same items were used on both surveys for the measures of family food rules, availability, and accessibility, and there were some variations in demographic items. The adolescent questionnaire also included assessments of fruit, snack food, and breakfast consumption.

In both the parent and student questionnaires, family rules relating to fruit and breakfast were assessed by 2 yes-no items for each behavior (ie, are there rules at home about: how many fruit servings the child should eat; when the child should eat fruit; how often the child should eat breakfast; what the child should eat at breakfast), and rules relating to snacks were measured by 3 items (ie, are there rules at home about: how many snacks the child is allowed to eat; when the child is allowed to eat; which snacks the child is allowed to eat).

In both the parent and student questionnaires, availability and accessibility of fruit were assessed by 4 items (ie, if the child indicates that he or she likes a certain type of fruit, would the parent buy it; is there fruit at home that the child likes; is fruit available in a place where it catches the eye; how many days per week [0-5 days] does the child get fruit to take to school). Snack availability was assessed by 3 items (ie, if the child indicates that he or she likes a particular snack, would the parent buy it; are snacks usually available at home; how many days per week does the child get snacks to take to school). Breakfast availability and accessibility were assessed with 2 items (ie, if the child indicates that he or she likes a certain breakfast product, would the parent buy it; is the table set for breakfast). Some items were measured on never to always, or certainly not to certainly yes 5-point scales, and some could be answered with yes or no or by indicating number of days (Table).

In the adolescent questionnaire, both fruit and snack food consumption were assessed using 2 questions from validated food frequency questionnaires.\textsuperscript{30,31} Students indicated how many days per week they consumed fruit or sweets and savory snacks and the number of servings of fruit or sweets and savory snacks they consumed on those days. Frequency and quantity were multiplied to obtain estimates of mean consumption in servings per day. One item asked students how many days per week they normally ate breakfast.

Finally, the student questionnaire asked about the student’s age and sex and about whether one or both parents had been born abroad (ie, migrant origin). The parent questionnaire included questions on marital status, age, and educational level of both parents.
<table>
<thead>
<tr>
<th>Food rules (% yes)</th>
<th>Parents</th>
<th>Students</th>
<th>P value for difference in group frequency or means</th>
<th>Average percentage (gross) disagreement across pairs of parents and students</th>
<th>( \beta ) dietary intake and parent measures †</th>
<th>( \beta ) dietary intake and student measures †</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fruit</strong> How many fruit servings the child should eat</td>
<td>27.7</td>
<td>14.6</td>
<td>.000</td>
<td>26.9</td>
<td>−.03</td>
<td>−.07</td>
</tr>
<tr>
<td>When to eat fruit</td>
<td>10.0</td>
<td>9.7</td>
<td>.036</td>
<td>15.5</td>
<td>.01</td>
<td>−.12**§</td>
</tr>
<tr>
<td><strong>Snacks</strong> How many snacks the child is allowed to eat</td>
<td>78.6</td>
<td>43.2</td>
<td>.000</td>
<td>47.2</td>
<td>.02</td>
<td>.12**</td>
</tr>
<tr>
<td>When to eat snacks</td>
<td>75.4</td>
<td>31.8</td>
<td>.054</td>
<td>55.5</td>
<td>.06</td>
<td>.10*</td>
</tr>
<tr>
<td>Which snacks to eat</td>
<td>43.3</td>
<td>14.1</td>
<td>.045</td>
<td>41.9</td>
<td>.04</td>
<td>.05</td>
</tr>
<tr>
<td><strong>Breakfast</strong> How often the child should eat breakfast</td>
<td>76.6</td>
<td>39.7</td>
<td>.000</td>
<td>46.2</td>
<td>−.29***</td>
<td>−.24***</td>
</tr>
<tr>
<td>What to eat for breakfast</td>
<td>34.7</td>
<td>13.6</td>
<td>.000</td>
<td>32.9</td>
<td>−.17***</td>
<td>−.09</td>
</tr>
<tr>
<td><strong>Availability and accessibility ‡</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fruit</strong> Buy on request (scale 1-5)</td>
<td>4.44 (0.71)</td>
<td>4.09 (0.81)</td>
<td>.000</td>
<td>13.9</td>
<td>−.01</td>
<td>.07</td>
</tr>
<tr>
<td>Liked fruit in the house (scale 1 to 5)</td>
<td>4.51 (0.61)</td>
<td>4.29 (0.88)</td>
<td>.000</td>
<td>9.3</td>
<td>.21***</td>
<td>.30***</td>
</tr>
<tr>
<td>In a place that catches the eye (% yes)</td>
<td>88.2</td>
<td>74.8</td>
<td>.000</td>
<td>20.8</td>
<td>−.01</td>
<td>−.00</td>
</tr>
<tr>
<td>Fruit to take to school (0 to 5 days)</td>
<td>1.07 (1.84)</td>
<td>0.86 (1.67)</td>
<td>.058</td>
<td>29.5</td>
<td>.23***</td>
<td>.32***</td>
</tr>
<tr>
<td><strong>Snacks</strong> Buy on request (% yes)</td>
<td>49.2</td>
<td>80.6</td>
<td>.007</td>
<td>45.4</td>
<td>.01</td>
<td>.09*</td>
</tr>
<tr>
<td>Snacks in the house (scale 1-5)</td>
<td>4.38 (0.76)</td>
<td>4.19 (0.87)</td>
<td>.000</td>
<td>9.1</td>
<td>.15**</td>
<td>.22***</td>
</tr>
<tr>
<td>Snacks to take to school (0 to 5 days)</td>
<td>1.68 (2.12)</td>
<td>2.25 (2.20)</td>
<td>.000</td>
<td>46.1</td>
<td>.17***</td>
<td>.20***</td>
</tr>
<tr>
<td><strong>Breakfast</strong> Buy on request (% yes)</td>
<td>75.6</td>
<td>89.3</td>
<td>.008</td>
<td>26.5</td>
<td>−.10</td>
<td>−.05</td>
</tr>
<tr>
<td>Table set (scale 1-5)</td>
<td>3.32 (1.50)</td>
<td>3.14 (1.52)</td>
<td>.052</td>
<td>27.0</td>
<td>.18***</td>
<td>.13**</td>
</tr>
</tbody>
</table>

\*\((P < .05)\); \*\*\((P < .01)\); or \*\*\*\((P < .001)\)

†Significant coefficients are indicated with the above \( P \) values.

‡ A higher scale score indicates higher availability or accessibility.

§ Significant difference between regression coefficient parent and student \( t = -2.158; P = .031 \)
The full questionnaires, including the items that were used for the present study, were pretested for comprehensiveness, correct interpretation, and length among the students of 2 classes (N = 60) by group administration followed by an interview and among several parents (N = 8) by individual administration followed by an interview.

In a control sample of 469 students, percentage test-retest agreement with a time interval of about 3 months varied from 69% to 88% for the items on rules and from 71% to 82% for the dichotomous items on availability. Test-retest correlations were all statistically significant (P < .001) and varied from \( r = 0.30 \) to \( r = 0.60 \) for the availability items with interval scales.

### Data Analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences for Windows (SPSS Inc., version 12.0.2, Chicago, Ill, 2004). Descriptive statistics (percentages and means) were used to describe students’ and parents’ background characteristics and the variable scores of both parents and students. To assess whether the mean group scores of the parents and the students differed significantly, unpaired t tests were conducted for the availability and accessibility variables that were measured with interval scales and chi-square tests for the dichotomous variables. To assess average disagreement across pairs of parents and students, percentage disagreement (for dichotomous variables) or gross disagreement (disagreement beyond an adjacent answering category) was calculated. Standardized regression coefficients were used to assess the association between students’ dietary intake and student and parent measures of rules, availability, and accessibility, respectively. To assess whether the regression coefficients of parents and student differed significantly, linear regression analyses, with dietary intake as the dependent variable, were conducted. Predictors in these analyses were the family-environmental variable, a dummy variable that was coded 1 for students and 0 for parents, and a variable that was the product of these 2 variables.

### Participants

Of the approximately 1100 parents who received the questionnaire, 724 completed and returned it, and 502 (69%) could be matched with the questionnaires of their children and were thus included in the present study. The other parent questionnaires could not be matched with those of their children, either because their children had not completed the baseline questionnaire or because the matching criteria did not correspond. Since some schools mailed the questionnaires themselves, the exact number of questionnaires mailed to the parents is not known. The student respondents had an average age of 12.7 years, and 52% were girls. Ninety-two percent of the parent questionnaires were completed by the mothers, whose average age was 41.9 years. Fifty-seven percent of the mothers and half of the fathers had a low educational level (none, primary school, or lower vocational school). A large majority of the parents were married or living together with a partner (89%). Eleven percent of the families were migrant families with at least 1 parent born abroad. Students reported mean fruit intake of 0.89 (SD 0.80) servings per day, mean snack intake of 1.80 (SD 1.41) servings per day, and consuming breakfast on 6.03 (SD 2.02) days a week.

### STUDY FINDINGS

#### Disagreement Between Students and Parents

The table shows that students and parents both reported having household rules regarding snack intake and breakfast more frequently than they reported having household rules regarding fruit intake.

The most reported rules concern how many snacks the child is allowed to eat and how often the child should eat breakfast. For all 3 dietary habits, parents reported significantly more rules than the students. Percentage disagreement between parents and students was highest for the 3 snack rules and the rule about how often the child should eat breakfast.

On average, high availability/accessibility was reported. The lowest availability/accessibility was reported by both parents and students with regard to buying snacks on request and setting the table for breakfast. The mean reported number of days that students got snacks to take to school was higher than the mean reported number of days that they got fruit to take to school.

Mean scores of students and parents differed significantly on most availability items. Students reported higher willingness of their parents to buy snacks and breakfast products on their request and more frequent provision of snacks to take to school than the parents. Parents reported higher availability/accessibility than the students of fruit (all items), higher availability of snacks in the house, and that the table is more frequently set for breakfast. The highest disagreement between perceived availability of students and their parents were found for buying snacks on request, and the number of days that snacks are provided to take to school. The lowest disagreement was found for the availability of fruit and snacks that the child liked in the house.

### Associations Between Intake and Food Rules and Availability

The standardized regression coefficients in the table show that the associations between rules about fruit and snacks and students’ dietary intake are small but slightly higher for the student measures than for the parent measures. Associations between breakfast rules and students’ breakfast
intake are stronger, and negative. In particular, the regression coefficient for the rule on what to eat for breakfast is larger for the parent measure. With regard to availability, except for the 3 buy-on-request items and the fruit accessibility item, significant regression coefficients were found for both the student and parent measures. For the fruit and snack items with significant regression coefficients, the associations with the student measures were stronger. For the breakfast item, the association with the parent measure was slightly stronger. A statistically significant difference between the regression coefficient of the parents and the students was found only for the rule on when to eat fruit. For 4 other variables, the regression coefficients were significant for the parent measure and not for the student measure, or vice versa.

DISCUSSION

In this study the investigators tested whether there is a difference between perceptions of family food rules and availability between parents and children, and whether children’s self-reported dietary intake is more highly associated with children’s own perceptions or those of their parents.

For most rules and most perceptions of availability and accessibility, there was considerable disagreement between parents and students. Disagreement between parents and students on perceived availability and accessibility was found for all 3 dietary behaviors included in the present study. Most parent measures were more in the direction of what can be considered to be socially desirable. This finding might indicate that the student measures are more valid, but one cannot be sure about that in the absence of more objective measures.

Intake of fruit and snacks was more highly associated with student measures, but breakfast intake was more highly associated with parent measures of rules and availability. For a number of factors, the regression coefficients were only significant for one of the measures. So, the findings might indeed explain differences between these findings and results of earlier studies, as suggested in the introduction.

The negative associations between rules and intake that were found in the present study appear to support earlier work of, for instance, Fisher et al, in which parental pressure to eat fruit has been found to discourage intake of fruit among young girls.24 In a study by Brown and Ogden, children whose parents reported greater attempts to control their children’s diet reported higher intake of both healthful and unhealthful snacks.25

The use of a small number of items to assess family food environments is considered a limitation of the present study. It is not known whether the small number of items successfully captured all meaningful dimensions of what is going on in the household food environment. Furthermore, the investigators were unable to locate any usable existing validated measures of family food rules and home availability and accessibility of food items. Although these measures have face validity, test-retest reliability was low for some of the items.

Also, the present study included only 2 family environment factors and 3 dietary behaviors. The results cannot be generalized to other factors or behaviors.

The results support the findings in 2 earlier studies among families with adolescents where parents also reported more restrictive rules and rules at mealtimes and had a higher score than their children on whether food is asked for and is actually bought.6,26 However, no differences in perceptions were found in earlier studies for some other measures of family interactions around food, such as the extent to which eating breakfast is a shared family activity and the occurrence of arguments about eating.6,27-28 This finding indicates that disagreement does not necessarily exist for all family environment factors.

IMPLICATIONS FOR RESEARCH AND PRACTICE

In studies into family-environmental determinants of dietary habits using self-reports, researchers need to be aware that the results are possibly influenced by whether the measures were conducted among parents or children. Also, statements about associations between dietary habits and family-environmental factors need to be more precise and indicate whether the statement concerns the parent perception or the student perception of the factor. A specific recommendation is to include (independent) measures of both parents and children in future research.

The extent of disagreement in families is possibly influenced by several factors, such as culture or age of the children, which warrant further study.

More open-ended qualitative research is also needed in this area to better understand what household food rules and availability mean to parents and adolescents and to develop valid and meaningful measures.

An important practice implication is that parents may not perceive a need to change their practices and may be less likely to be open for interventions aimed at promoting healthful diets in their children because they think they provide a supportive environment for healthful eating, although the children do not feel the same way. It will be important for parents to understand children’s views of the family food environment in order for family-oriented interventions to be effective.

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REFERENCES


