Dietary Habits in Adolescence: Contribution of Snacking

Claude Cavadini

Nutrition plays a key role during adolescence, which is a period of tremendous changes. From a somatic point of view, it is a period of fast growth, often with high physical activity, with sexual maturation, including menstrual losses and sometimes pregnancy for girls, requiring an important amount of energy and nutrients. New food habits may appear, which have psychological, social, and socioeconomic causes including peer influence, rejection of familial constraints, search for autonomy and identity, increase of purchasing power, regular preparation of own food, urbanization, and the habit of eating outside the home (1,2). The newly emerging food patterns and habits may have far-reaching implications on the health status of the mature and older adult (3) and on their food choices. Adolescents have often been identified as a group at nutritional risk because of their food habits. Both in Europe and in the United States, the habit of skipping breakfast and the possible consequences on daily nutrient intakes have been discussed (2,4–6). The habit of missing meals and their replacement by frequent snacking is another concern, as is the influence of take-out food and fast food (1,7–9). The role of sugar and confectionery has been investigated in relation to dental caries (7,10–12), as has the role of soft drinks on micronutrient intake (1). The increasing prevalence of overweight and obesity observed in U.S. adolescents (13,14) is also a subject of concern, as is the frequent habit of dieting, especially among girls, leading to intakes below recommendations (7).

In this chapter, we shall present results of recent surveys of adolescent food habits in Europe. We shall put particular emphasis on snack food, fast food, and so called “junk food” to see if this type of food becomes an important part of daily adolescent food intakes and to evaluate possible consequences of such habits.

ADOLESCENT FOOD HABITS IN SWITZERLAND

In 1993, the Institute for Social and Preventive Medicine of the University of Lausanne, supported by the Federal Office of Public Health, implemented a survey of health and lifestyles of adolescents in the German-speaking part of Switzerland
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TABLE 1. Adolescent food habits in Switzerland: description of sample

<table>
<thead>
<tr>
<th>Participants:</th>
<th>Occupation: Apprentices/students</th>
<th>67/33%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex: Girls/boys</td>
<td>Residence: Town/country</td>
<td>38/62%</td>
</tr>
<tr>
<td>Age: 15–16 y</td>
<td>Nationality: Swiss/foreigner</td>
<td>82/18%</td>
</tr>
<tr>
<td>17 y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19–20 y</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(15). For this survey, 5461 questionnaires were distributed at schools to randomly chosen groups of adolescents (by class) representative of this population in Switzerland. Schools were either high schools (students) or professional schools (apprentices). The study focused on self-perceived health, family life, occupation, relations with friends, leisure time, sex life, and risk behavior including consumption of alcohol, drugs, and smoking. An additional questionnaire on food habits was also distributed to approximately one fourth of the sample, randomly chosen. This questionnaire was developed and validated at the Nestlé Research Centre and included questions related to meal and snacking pattern, dieting habits, use of supplements, and self-assessment of food habits. The questionnaire also evaluated the frequency of consumption of different types of food eaten either as meals or as snacks: dairy products, bread and cereals, meat, fruits, vegetables, confectionery, savory snacks, fast food, and drinks. The adolescent sample which participated in the survey on food habits is described in Table 1.

RESULTS

Main Meals

Breakfast was skipped by 27% of the girls and by 24% of the boys on the day of the study; the three main reasons cited were as follows: no time: girls 31%, boys 41%; not hungry: girls 30%, boys 21%; and not used to it: girls 30%, boys 34%. Two thirds of the adolescents eating breakfast did so in less than 15 minutes. The habit of skipping breakfast was independent of age in girls, whereas in boys it increased from 18% at 15–16 years of age to 28% at 19–20. For both girls and boys, skipping breakfast was more common in apprentices than in students, and more common in adolescents living in towns than in those living in the country.

Lunch was taken very regularly by 92% of the girls and 95% of the boys. It was a traditional cooked meal for 51% of the girls and for 75% of the boys ($p < 0.001$). Lunch was taken at home by approximately 50% of the sample and in canteens by 30%. It was taken in a fast food restaurant by <1% of the girls and <2% of the boys. Apprentices ate in restaurants much more than students: 7% vs. 2%.

Dinner was also taken regularly, less often by girls (79%) than by boys (87%) ($p < 0.001$). There was no difference in age and place of residence; however, students took dinner slightly more often than apprentices: 88% vs. 81% ($p < 0.05$).
TABLE 2. Adolescent food habits in Switzerland: frequency of snacking

<table>
<thead>
<tr>
<th>Snacks (No.)</th>
<th>Girls</th>
<th>Boys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morning (%)</td>
<td>31</td>
<td>64</td>
</tr>
<tr>
<td>Afternoon (%)</td>
<td>21</td>
<td>64</td>
</tr>
<tr>
<td>Evening (%)</td>
<td>45</td>
<td>43</td>
</tr>
</tbody>
</table>

Snacking

Snacking was very common in this group of adolescents, as shown in Table 2. There was no significant difference in snacking frequency with age for girls or boys. Apprentices ate fewer snacks than students during the afternoon ($p < 0.001$); however, they snacked more during the evening ($p < 0.001$). Evening snacks were more often consumed in towns than in the country ($p < 0.05$). The different snack items and their frequency of consumption are shown in Fig. 1. The intakes of bread, cakes and pastries, chocolate, and dairy products were similar in girls and in boys. Consumption of these products was quite large, especially bread and dairy products,
which were regularly taken as snacks by about 80% of the subjects. Girls ate more fruits, fruit juices, raw vegetables, and diet soft drinks than boys; on the other hand, boys ate more sandwiches, chips, peanuts, and soft drinks.

**Total Daily Intake**

The total daily food intake of this group was evaluated through a food frequency questionnaire, the results of which are shown in Table 3. Dairy products with the exception of cheese were taken regularly. Bread was consumed by most subjects but not breakfast cereals. Consumption of meat was greater in boys than in girls, and fish consumption was very low. As already noted for snacks, total daily consumption of fruits, fruit juice, and vegetables was higher in girls than in boys. Consumption of hamburgers and pizzas was very low, as was that of alcohol in girls. Alcohol consumption was more common in boys.

**ADOLESCENT FOOD HABITS IN EUROPE**

In 1994, a marketing study focusing on children’s eating habits was implemented in five European countries: the United Kingdom (UK), France, Germany, Spain, and Italy (16). The method used was a combination of face-to-face interviews and a
DIETARY HABITS IN ADOLESCENCE

Afternoon

Evening

FIG. 2. Adolescent snacking habits in Europe. Percentage of adolescents eating none, one, two, or more snacks per morning, afternoon, and evening in five countries: UK, United Kingdom; F, France; G, Germany; E, Spain; I, Italy (2).

2-day dietary record. The topics addressed were awareness and interest in health issues, use of supplements, relative importance of information sources and their influence, eating habits with particular emphasis on snacking, preparation of own food, and frequency of eating out of the home. Approximately 300 children and adolescents from 7 to 15 years of age were studied in each country, with the same number of girls and boys. In each country, 100 girls and boys aged 7–9, 10–12, and 13–15 years were studied. The results described hereafter are those of the oldest group.

RESULTS

Snacking

In the group of adolescents aged 13–15 years, the comparison of snacking habits gave interesting results as shown in Fig. 2. There were large differences in snacking patterns throughout Europe. The highest frequency of snacking was observed in France, where more than 90% of adolescents ate one and more snacks during morning, afternoon, and evening. In the UK and Germany, 80% of the adolescents ate snacks regularly. In Italy, 85% of the adolescents ate snacks during the morning and afternoon, and 35% during the evening. In Spain, 20% of the adolescents ate snacks during the morning and in the evening, and 60% during the afternoon. In the five countries, the highest mean frequency of snacking was observed during the afternoon.
The most popular items for snacking were chips and savory snacks, sweets and chocolate, yogurt and pot desserts, biscuits, soft drinks, fruits and fruit juices. Pizza was the most popular snacking item for Italian adolescents. Adolescents from the UK and Spain preferred chips and savory snacks, whereas French adolescents preferred confectionery, fruit juices, and soft drinks. German adolescents seemed to have the healthiest snacking habits, as they more often consumed fruits and yogurt or pot desserts.

**Weekly Frequency of Food Consumption**

The weekly frequency of consumption of different food items, including main meals and snacks, is shown in Table 4. Adolescents from the UK had the highest consumption of several items like breakfast cereals, confectionery, biscuits, chips, and savory snacks, and French fries, but also a high consumption of fruits, fruit juice, and soft drinks. French adolescents had the highest consumption of yogurt and pot desserts and the lowest of chips and savory snacks. German respondents had the highest consumption of soft drinks and frequent consumption of fruits, fruit juice, and confectionery. Spanish adolescents had a high consumption of French fries and the highest consumption of meat products like charcuterie/pâté and burgers. Italian teenagers reported the highest levels of fruits and pizza consumption. Adolescents ate each of the following items three to four times per week: fruits, fruit juices, soft drinks, yogurt/pot desserts, confectionery, and biscuits. Breakfast cereals, savory snacks, chips, and French fries were eaten on average two to three times per week but with greater intercountry differences. Pizza, burgers, and charcuterie consumption was around once per week. Spanish and French adolescents most often ate away

<table>
<thead>
<tr>
<th>Food Item</th>
<th>UK</th>
<th>F</th>
<th>G</th>
<th>E</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits</td>
<td>4.6</td>
<td>3.7</td>
<td>4.6</td>
<td>4.3</td>
<td>4.8</td>
</tr>
<tr>
<td>Soft drinks</td>
<td>4.8</td>
<td>3.4</td>
<td>5.4</td>
<td>3.4</td>
<td>3.9</td>
</tr>
<tr>
<td>Breakfast cereals</td>
<td>4.8</td>
<td>2.9</td>
<td>2.0</td>
<td>2.1</td>
<td>1.5</td>
</tr>
<tr>
<td>Fruit juices</td>
<td>4.7</td>
<td>3.7</td>
<td>4.3</td>
<td>2.9</td>
<td>3.4</td>
</tr>
<tr>
<td>Sweets/chocolate</td>
<td>4.7</td>
<td>3.6</td>
<td>4.4</td>
<td>3.0</td>
<td>3.3</td>
</tr>
<tr>
<td>Yogurt/pot dessert</td>
<td>3.4</td>
<td>4.6</td>
<td>3.6</td>
<td>3.8</td>
<td>2.9</td>
</tr>
<tr>
<td>Biscuits</td>
<td>4.3</td>
<td>3.6</td>
<td>1.8</td>
<td>3.0</td>
<td>3.3</td>
</tr>
<tr>
<td>Chips/snacks</td>
<td>5.0</td>
<td>1.7</td>
<td>2.7</td>
<td>2.3</td>
<td>2.5</td>
</tr>
<tr>
<td>French fries</td>
<td>3.1</td>
<td>1.5</td>
<td>1.3</td>
<td>3.0</td>
<td>1.7</td>
</tr>
<tr>
<td>Pizzas</td>
<td>1.3</td>
<td>1.3</td>
<td>1.0</td>
<td>1.1</td>
<td>2.2</td>
</tr>
<tr>
<td>Burgers</td>
<td>1.3</td>
<td>0.9</td>
<td>0.6</td>
<td>1.3</td>
<td>1.0</td>
</tr>
<tr>
<td>Charcuterie/pâté</td>
<td>0.8</td>
<td>1.9</td>
<td>0.2</td>
<td>3.2</td>
<td>0.2</td>
</tr>
</tbody>
</table>

From Cathro J and Hilliam M (16).
UK, United Kingdom; F, France; G, Germany; E, Spain; I, Italy.
TABLE 5. Adolescent food habits in Europe: frequency of eating out of home

<table>
<thead>
<tr>
<th>UK (%</th>
<th>F (%)</th>
<th>G (%)</th>
<th>E (%)</th>
<th>I (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>At least once a week</td>
<td>36</td>
<td>42</td>
<td>37</td>
<td>47</td>
</tr>
<tr>
<td>Once a fortnight</td>
<td>20</td>
<td>15</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Once a month or less</td>
<td>42</td>
<td>33</td>
<td>43</td>
<td>31</td>
</tr>
<tr>
<td>Never</td>
<td>2</td>
<td>10</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

From Cathro J and Hilliam M (16).
UK, United Kingdom; F, France; G, Germany; E, Spain; I, Italy.

From home (Table 5), at least once a week apart from school meals. The favorite places for eating away from home were restaurants or fast food establishments that sold burgers and pizzas. When eating out, in all five countries except Italy, burgers were the first preference and pizza the second. In Italy, the order was reversed.

DISCUSSION

As shown from the two studies presented in this chapter, there is a great variability in food habits of adolescents in Europe. This great diversity exists among countries as well as among individuals (17). One striking finding of the Swiss study is the difference between the attitudes of girls and boys toward food. Boys reported more pleasure in eating and a better assessment of their own food habits, which seems to reflect a more positive attitude about food.

Skipping breakfast, especially among girls, is possibly a result of their motivation to lose weight; it would be interesting to know whether girls claiming not to be hungry are really so or if this is just a dieting strategy. In the Swiss study, skipping breakfast is frequent and comparable to observations in other European countries or in the USA (5,18). The tendency to skip breakfast increases with age in Swiss male adolescents; the same observation was made in the USA for children of both genders from 8 to 11 years old (19). This last study showed that children of single parents skipped breakfast more frequently than children with two parents. Skipping breakfast does not seem to have an influence on cognitive performance (20); it might, however, lower daily micronutrient intakes by replacing breakfast cereals—often fortified and usually consumed with milk—by consumption of snacks with lower nutrient density later during the day (5,6). A study in U.S. children and adolescents (4) showed that consumption of ready-to-eat cereals at breakfast increases the consumption of vitamin A, calcium, iron, copper, zinc, and carbohydrates.

Missing meals does not seem to be a problem in Switzerland. The frequent consumption of lunch and dinner is satisfactory and reflects habits that are still traditional for a majority of adolescents. Home and canteens are the two main places where lunch is eaten; this emphasizes the potential educative role played by the family in
teaching healthy food habits and also the importance of providing balanced meals in school restaurants.

Snacking is important in Switzerland, since more than 60% of girls and boys ate one snack at least three times a day. The Swiss study showed that the most popular snacks are dairy products, fruits and fruit juices, diet soft drinks, bread, soft drinks, and confectionery. A French study has shown that snacking covered 20–25% of the daily energy intake (17) and a recent study in the UK (12) showed that adolescent boys ate 29% of their total daily energy intake as snacks and girls 24%. The study from the Leatherhead Food Research Association (16) shows a great variety in snacking patterns throughout Europe and illustrates differences in snacking contribution to energy intakes. A study in the USA (21) showed more frequent snacking than in Europe, since only 12% of the adolescents never ate snacks, whereas 42% ate one or two snacks per day, 31% ate three to four snacks per day, and 15% ate five or more snacks per day. Thirty-nine percent of snacks were nutritious (fruits, vegetables, nuts, cheese, milk, and yogurt). This is lower than in Europe, and 61% were food such as chips, soda, candy, ice cream, and cakes (all items also called “junk food”—an expression related to behavior without relation to food composition). Another U.S. study (8) confirmed these results and showed that snacks contribute more than 30% of the daily energy intake (more than in Europe), mainly through carbohydrates. These snacks had low nutrient densities for iron, calcium, and vitamin A (2,22,23).

Some takeaway snacks like pizzas or sandwiches made with cheese, ham, fish, or eggs can provide up to 25% of the energy and nutrients of recommended daily allowances (RDA) (24,25). They can be part of a balanced diet and should not be considered as junk food.

For snacking habits, easy access appears to be the prime consideration in food choice; when adolescents were provided a wide variety of nutritious snacks, they tended to select them rather than the less nutritious snacks (26,27). Since there is no evidence that frequent snacking, as opposed to eating structured meals, is detrimental to health, and since snacking is becoming part of adolescent food habits, it is important to provide a variety of nutritious snacks especially in vending machines located in schools.

The pattern of eating in fast food restaurants, where food is ordered and picked up from a counter, is different in Europe than in the USA. The main reasons for eating in fast food restaurants are quick service, convenience, price, taste, and surroundings. The very low frequency of eating out in fast food restaurants in Switzerland probably has two major causes: the focus of the study on weekdays and the low density of fast food restaurants in this country compared to the USA. The frequency of eating out in fast food restaurants is also low in the European study; this is in contrast with the USA where it is estimated that 20% of the population eat daily in a fast food restaurant (28).

For people who eat regularly in fast food restaurants, there might be both an excess energy and low micronutrient intakes. The energy of a typical fast food meal like a large hamburger, French fries, apple pie, and cola is approximately 1300 kcal (5440 kJ) (29); fat yields about 44% of the energy, carbohydrates 46%, and proteins 10%.
Such a meal contributes approximately half the daily energy requirement of an adolescent and 40% of RDA for calcium and thiamine, 30% for iron, 20% for vitamin C, and 5% for vitamin A (29). However, the high fat content of such meals should be evaluated in the context of the overall diet: with a frequency of about one fast food meal per week in Europe, this does not have much dietary significance. In the USA, however, it is a matter of concern because fast food meals are also served in school canteens (30). In the two studies presented here, the frequency of consumption of hamburgers and pizzas is lower than, for example, that of meat or yogurt; fast food items do not therefore represent a major proportion of adolescent intakes. This proportion will probably increase in the future since the major U.S. fast food companies have plans for a considerable increase in their presence in Europe (30). In the future, adolescents will have more opportunities to eat in fast food restaurants and should be educated to balance their meals with adequate food choice, including salads and low-fat dressings that are available in fast food restaurants. Several large fast food companies have already introduced healthier products and more choice.

Soft drink consumption is high both in Switzerland and in the rest of Europe. Consumption of soft drinks and diet soft drinks is dependent on gender, both in the Swiss study and in the USA (21). In this last study, 27% of soft drinks taken by girls were diet soda; in boys, this proportion was 14%. We shall not discuss soft drink consumption further as this is covered in another chapter of this book.

Several studies in the USA, Europe, and Australia have shown that adolescent food habits are reasonably well balanced (1,7,11). However, in France, 29% of adolescent girls had calcium intakes below 40% of the RDA for the French population (ANC, Apports Nutritionnels Conseillés) (11). A comparison of food intakes of 11- to 12-year-old children in the UK between 1980 and 1990 (10) showed little change in total energy intakes, but there were changes in the proportions of different food groups. In 1980, as in 1990, meat was the main contributor to daily energy, fat, and protein intakes. In 1990, confectionery consumption increased by more than 30% compared with 10 years earlier and had become the second contributor to energy intake, followed by French fries and bread. During this decade, consumption of milk, bread, biscuits, cakes, butter, margarine, and chips decreased, whereas consumption of breakfast cereals and soft drinks increased. In the USA during the last two decades, childhood obesity increased (14) and in 1991, the prevalence of overweight in adolescents was 21% (13). Since mean daily energy intake did not increase during this period, the cause is probably a decrease in physical activity. Promoting physical activity must therefore be part of nutritional education. Nevertheless, even if the levels of energy intake have not increased recently in the USA, they are above the current RDA (31): 104% for girls and 116% for boys aged 15–18 years. Their protein intake is about two times the RDA, vitamin intakes are above RDA values, and mineral intakes (calcium, iron, magnesium, and zinc) are above the RDA in boys and below the RDA in girls. This latter point—an insufficient mineral intakes in girls—might be a problem in Europe too because in the Swiss study, one fifth of the girls were dieting to lose weight, a higher proportion of spontaneous dieting than reported 10 years ago in France (18).
CONCLUSION

The food habits observed in Europe, although not satisfactory, should not be a source of great concern. Missing breakfast is a common habit in adolescents, so that the important contribution of this meal to the overall daily food intake should be explained to them. Missing meals apart from breakfast is not frequent. Snacking is very common among adolescents; should snacks partly replace main meals, then it would be important to provide adolescents with nutritious snacks. Snack food may contribute significantly to a balanced diet if the right food choices are taken. Fast food consumption, presently lower in Europe than in the USA, might with time increase to U.S. levels. This will need special attention as fast food restaurants have advantages and limitations that must be considered within the context of the overall diet. Overweight and obesity in adolescence are major problems in the USA but not in Europe, where dieting is frequent in girls and might be a cause of nutrient deficiencies.

In the light of these observations, nutritional education, both in the family and at school, should draw the attention of adolescents to how to choose nutritious foods among the wide variety available. Since the influence of the family is very important in adolescent food education, parents should demonstrate good nutritional habits to their children before the latter reach adolescence. Nutritional education, however, is not enough, since it has been shown that nutritional knowledge is not necessarily associated with better food habits. There are hurdles between health/nutritional information and dieting behavior: lack of time, lack of discipline, and lack of perception of any urgency in preventive measures which may bring benefits only decades later. Other factors such as self-esteem, relationship with friends and family, and peer influences play an important role in adolescent behavior, including eating habits. An aim of preventive health care must be to help adolescents understand how to avoid present and future nutrition-related diseases through the development of their own independence and their own capacity to make good choices.

ACKNOWLEDGMENTS

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REFERENCES

DISCUSSION

Dr. Whitehead: You postulated that people who skip breakfast might lose out on micronutrients because so many breakfast cereals are fortified and because breakfast cereals are always consumed with milk. You then went on to say that this deficit may be made up by snacks but since these weren’t so nutritious, you recommended making them more nutritious. Are you implying that some popular snacks might be fortified with micronutrients in the same way as breakfast cereals?

Dr. Cavadini: My idea was not to propose fortified snacks but to invent new snacks that are compatible with adolescent habits but made with products that are well balanced in terms of micronutrients.

Dr. Whitehead: Why do you avoid fortification of snacks when you seem quite happy that breakfast cereals are fortified?

Dr. Cavadini: I think it is preferable to use readily available foodstuffs as snacks.

Dr. Rey: I do not understand what snacking is. Yogurt, fruit juice, breakfast cereals, bread, vegetables are all ordinary foods and it makes no difference to me if they are taken in an organized meal or by themselves.

Dr. Cavadini: I did not intend to give the term “snack” a negative meaning. There is a consensus in the industry that the definition depends on the size of the package of food. Snacking is eating something often between the main meals. Snacks can be any kind of food. It is something you eat quickly, for example, while driving or at the cinema.

Dr. Rey: Caviar is in small boxes. Do you think that is a kind of snack?

Dr. Cavadini: I don’t think adolescents, even with their increasing purchasing power, can offer caviar!

Dr. Guesry: I think part of the confusion is that in the back of our minds “snack” is negative and we imagine chocolate bars, chips, soft drinks, and so on. But snacks include milk, yogurt, fresh cheese, and other natural products, which obviously don’t need to be fortified. I believe this is the reason why Dr. Cavadini does not see the need to fortify unbalanced snack foods with micronutrients.

Dr. Whitehead: Breakfast cereals have been given a very healthy image. But if you were to take out the micronutrient fortification, then it would be less easy to justify such an image. What we need to do is to look objectively at these snack foods, accept reality—the pattern of life has changed, young people are going to continue eating snack foods—and be constructive about making them better rather than just talking about “first rate foods,” “second rate foods.” I think if we start making conservative judgments like that, then we are going to lose the battle to improve the overall diet.

Dr. Guesry: Dr Cavadini and I are saying that just adding a few vitamins and minerals is not going to improve a bad snack food substantially. But we agree that we should probably try to offer better foods which would be used as snacks by adolescents. This means that we have to work on the balance of the micronutrient content along with the taste, mouth feel, presentation, packaging, and advertising to make good foods fashionable enough to be used by adolescents.

Dr. Giovannini: The fact that the Italian population eats more pizza than hamburger probably depends on education because in Italy, the big pasta and olive oil manufacturing companies have been promoting the importance of correct nutrition in their advertisements for some time now. For this reason, most teenagers seem to prefer pizzas. We have pizza takeaway like hamburger takeaway in the USA. For this reason, I think it is important that the big companies produce good products and invest in nutritional education in the population because in Europe there are good food traditions and these should be maintained with good
modern products. We did a study of nutrition education in five schools in Milan. We reduced cholesterolemia in high-risk families and in their children by education in school, so I think education is very important.

Dr. Cavadini: Thank you for your comment. There is a need for nutritional education as part of general education. It may not be possible to avoid unhealthy eating habits during adolescence but with a background of good education, the young adult may resume the good habits learned earlier.

Dr. Baerlocher: We did a survey in eastern Switzerland of schoolchildren and adolescents aged 15–16 years and we were very surprised to find that the late evening snack was an important meal; it accounted for about 13% of the total energy intake in girls.

Dr. Bonjour: In a survey of children from 9 to 18, we observed quantitative changes in food consumption but we found no evidence that the distribution of macronutrients changed significantly in any way through puberty. So the assumption that adolescence is a period when bad food habits are acquired did not seem to be confirmed by our survey. Do you have any evidence of a change in the macronutrient composition of the diet from before puberty to the adolescent period?

Dr. Cavadini: Unfortunately, the study was qualitative, not quantitative. It was not possible to use food tables to calculate macro- or micronutrient intakes from our data.

Dr. Rey: Do you really think that adolescents are interested in prevention? I am sure they are not, so I don’t see any reason to try to explain to them something they have no interest in. Have we any evidence that snacking is deleterious for adolescents? I read in papers on prevention of coronary heart disease that we should try to give our children good eating habits to avoid atheroma 50 years later and that the initiation of good habits involves a teaching role for the parents. I don’t believe that children can educate their parents. If the role of the family is to teach good habits, who is the teacher? Is there a teacher?

Dr. Cavadini: I don’t think there is one teacher. What I meant is that adults have to give an example. We can’t teach our adolescents how to eat if we are not eating properly ourselves at home. So I think all education is a continuum between school, family, media, friends, etc., including advertisements.

Dr. Gruskin: I think we may be underestimating the power of children to alter family behavior. There are a couple of examples in the USA, e.g., teaching children to take blood pressure and then sending them home to take their parents’ blood pressure, and their parents getting treatment for hypertension; and there are some examples of cessation of smoking. I don’t know about dietary programs. I think the concept of teaching teachers and then teaching children may have a significant role in altering lifestyle, though hard to measure and hard to prove.

Dr. Rey: If you propose to increase the nutritional value of snacks by increasing their variety you will increase the consumption of snacks by adolescents, so this could have negative effects as well as positive. So while it is probably a good thing for the industry it is not necessarily good for nutrition in general to improve the nutrient quality of snacks. By education I don’t have in mind the promotion of snacks, but general eating habits.

Dr. Micskey: Everything is relative. I would be very happy if a Hungarian child had “bad snacks” for breakfast instead of the traditional one, which is a piece of bread with lard or sausage!

Dr. Ballabriga: I think we should not talk about junk food, we need to talk about junk diets, because it is not a question of considering only one food as such but rather the whole of the diet. How many foods without the correct composition are consumed each day? This would give a better indication of what may be considered a junk diet. I do not think there is any need to provide specially supplemented snacks but rather to consider how many snacks the adolescent eats each day.