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foods or drinks that you are currently not allowed to have? (yes/no). Space was provided for students to write in the type of food or drink, and the people who currently restrict the food (eg, mother, father, self, grandmother, grandfather, teacher, sports coach, dance teacher, physician, other person, or other source, such as magazines or advertisements) and to write why the food is forbidden.

The forbidden foods students listed on the questionnaire were categorized as predominantly containing sugar and fat (eg, chocolate), sugar (eg, candy, soft drinks), fat (eg, french fries), alcohol, or as having specific properties such as being allergenic foods (eg, those with food colorings) or being high in salt. Forbidden foods were also identified on a list of 38 foods by asking how frequently students are currently allowed to eat these foods (often, sometimes, never, or almost never). Forbidden foods were those that students were never or almost never allowed.

The questionnaire was pilot-tested in a primary and a secondary school that were not involved in the study. Questions that were not clearly understood by students were revised.

### Focus Groups

Focus groups were conducted among classes from randomly selected schools to elicit clarification, to expand on answers recorded on the written questionnaire, and to establish common themes (16). Students who reported at least one food concern or forbidden food were selected to participate. A focus-group observer recorded a written summary of the discussion.

### Procedure

The author and trained research assistants administered the questionnaire to participants during regular school class times. Focus groups were conducted after students completed the questionnaire in a separate room.

### Data Analysis

Corrected  $\chi^2$  analyses were used to determine group differences in categorical data. Follow-up  $\chi^2$  analyses using 2x2 contingency tables were used to determine which groups differed significantly. Statistical analyses were undertaken using SPSS Base 7.5 for Windows (1997, SPSS, Cary, NC). Statistical significance was set at  $P < .05$ .

### RESULTS

A total of 1,131 students (53% girls) from 12 schools completed the questionnaire and 23 focus groups were con-

## Children and adolescents identify food concerns, forbidden foods, and food-related beliefs

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**S**tudies of children and adolescents have shown that food and nutrition issues are important to young people and that children as young as 7 years old (1,2) are actively manipulating their diets to achieve specific nutrition objectives. In addition, the diets of children and adolescents are sometimes severely restricted with or without dietetic or medical supervision to treat asthma (3), hyperlipidemia (4), and overweight (5) as well as to achieve better athletic performance (6) and general health (eg, vegetarian diets) (7).

A 1997 study (8) found that children held beliefs and perceptions about "good" and "bad" foods and that older children were better able to articulate "junk" foods. Although some studies have identified food-related issues among children and adolescents, such as food preferences, perceived healthfulness, parental usage (9-11), weight concerns, and positive health attitudes (12-14), there is a lack

of information about the foods young people restrict and the predictors of these behaviors.

The aims of this study were to investigate food concerns and forbidden foods among children and adolescents and to identify by whom foods are forbidden and why.

### METHODS

#### Participants

Students from 12 randomly selected schools were invited to participate. Socioeconomic status was determined using parental income (15). Written consent was obtained from parents.

#### Questionnaire

The participants completed a questionnaire relating to demographic details, current forbidden foods, and current concerns about food. Food concerns were identified by the question, "Do you have any concerns or worries about foods or drinks?" (yes/no). Students were asked to write their concerns in the space provided. Forbidden foods were examined by asking the question, "Are there any

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ducted at 6 schools (3 primary, 3 secondary) (n=183 students). Forty-two percent of the students who completed the questionnaire (n=468) were primary-school students and 58% (n=663) were in secondary school. A total of 26% (n=296) of students were of lower socioeconomic status.

### Food Concerns

Of the 1,131 students who completed the questionnaire, 30.2% (n=341) reported being currently concerned or worried about eating certain foods and drinks (17.1% boys, 41.2% girls,  $\chi^2=72.4$ , degrees of freedom [df]=2,  $P<.001$ ).

Food concerns increased with age among girls and decreased with age among boys. The number of boys with food concerns in the 6 to 10 year old, 10 to 14 year old, and 14 to 19 year old age groups was 28.9% (n=20 of 69), 17.5% (n=58 of 330), and 11.2% (n=15 of 133), respectively ( $\chi^2=8.4$ ,  $df=2$ ,  $P<.05$ ) and the number of girls was 29.7% (n=22 of 74), 33.2% (n=106 of 321), and 53.4% (n=109 of 204) ( $\chi^2=25.8$ ,  $df=2$ ,  $P<.001$ ), respectively.

Food concerns were more frequently reported among students of middle/high socioeconomic status compared with low socioeconomic status (32.3% vs 24.1%,  $\chi^2=6.1$ ,  $df=2$ ,  $P<.01$ ). Table 1 summarizes the types of food concerns that did not vary among age or socioeconomic group.

### Forbidden Foods

Forbidden foods were reported by 31% of students (n=350) (29% female, 33.5% male,  $\chi^2=1.1$ ,  $df=2$ ,  $P>.05$ ). The forbidden foods identified by students were categorized as follows: sugary and fatty foods (eg, chocolate, cakes), 43.0%; sugary foods (eg, candy, soft drinks), 20.0%; fatty foods (eg, chips and french fries), 16.3%; alcohol, 12.1%; other foods (eg, chewing gum), 6.9%; allergenic foods (eg, food coloring), 1.5%; and salty foods, <1.0%. Foods and drinks that were reported to be currently forbidden (never or almost never allowed) from the list of 38 foods are listed in Table 2. No significant age or socioeconomic status differences were found. The people primarily responsible for restricting forbidden foods were, in order, mother, father, self, grandmother, and physician. There were no age, gender, or socioeconomic differences in this category.

### Reason for Forbidding Foods

The reasons for forbidding foods given most often on the questionnaire and in focus groups, ranked in descending order, included the following: the food is

**Table 1**

Food concerns of male and female schoolchildren aged 6 to 19 years as reported on questionnaires<sup>a</sup>

Concern	Girls (n=278)		Boys (n=63)		$\chi^2$ <sup>b</sup>
	%	n	%	n	
Becoming fat/overweight	49	136	43	27	0.5
Wanting to be healthier	9	25	10	6	0.1
Feeling guilty after eating	8	21	2	1	...
Food poisoning, food might be "off"	8	21	17	11	6.0*
Fat and sugar content of food high	5	14	6	4	0.1
Future health concerns (eg, heart disease)	5	13	6	4	0.1
Acne	4	11	5	3	...
Tooth decay	4	10	3	2	...
Eating too much in front of others	3	8	0	0	...
High blood cholesterol	2	6	2	1	...
Obtaining enough nutrients	1	4	0	0	...
Fear of addiction (eg, chocolate, cola drinks)	1	3	0	0	...
Fear of underweight	<1	2	3	2	...
Drink too much alcohol	<1	2	3	2	...
Cultural differences in food supply	<1	2	0	0	...

<sup>a</sup>Food concerns were reported by 30.2% (n=341) of 1,131 students surveyed.

<sup>b</sup> $\chi^2$  Compares gender differences. Some  $\chi^2$  analyses could not be performed because of low numbers.

\* $P<.05$ .

unhealthy/"bad for you" (fatty foods, sugary/fatty foods, sugary foods, salty foods); it will cause weight gain (fatty and sugary/fatty foods, peanut butter), tooth decay (sugary foods), hyperactivity (sugary foods, allergenic foods such as colorings, chocolate), and acne (fatty foods, sugary/fatty foods); it can cause damage to dental braces (chewing gum), "a stitch" (carbonated beverages), diabetes (sugary foods), and "the stomach to rot" (cola drinks). Other foods were believed to result in addiction (chocolate, caffeine, "junk food") or cause choking (fish bones), allergy (peanut butter), or menstrual pain (chocolate). Beer and wine were forbidden because of age or religious reasons (eg, among Muslims). Other foods were restricted because of their perceived high sugar content (sweetened breakfast cereal, ice cream flavorings, dried fruits, flavored milk, candy, cookies, chocolate, hot chocolate, soft drinks, sweetened powdered drink mix, ice cream) and/or high fat content (fast food, cakes, pastries/pies/sausage rolls).

None of the students had received advice about restricting foods from a dietitian. Advice from physicians included comments that foods containing sugar cause tooth decay as well as hyperactivity; food colorings (eg, in red and green powdered drink mixes) cause hyperactivity; and some foods cause allergenic reactions (chocolate, food colorings, milk), menstrual pain (chocolate), migraine headaches (chocolate), and asthma (chocolate).

### DISCUSSION

Nearly one third of the children and adolescents in this study identified concerns about food, and the type of concern did not vary among age or socioeconomic groups. The majority of students with concerns were older girls who were concerned about weight control, a finding similar to those of previous studies (12-14). There were some gender differences in the students' food concerns: female students reported more guilt about eating and male students were more concerned about food poisoning. The divergent concerns of male and female students should be investigated further.

The low level of concern about acne contrasts with findings of previous reports (17,18) and suggests that food-related beliefs of children and adolescents may have changed. Perhaps nutrition education may have somewhat dispelled the myth that certain foods cause acne.

The finding that food concerns are more common among schoolchildren from middle/high socioeconomic backgrounds suggests a greater awareness of and interest in health and nutrition-related issues among these socioeconomic groups and that this trend should be further examined. The need for nutrition education to target different food- and nutrition-related concerns in lower socioeconomic groups may be warranted.

Foods forbidden by parents were more likely to be foods containing sugar (eg, sugar added to food/drinks, sweetened breakfast cereals, ice cream flavorings/syrups, flavored milk, and dried fruits)

**Table 2**

Food and drinks reported on questionnaires as forbidden among male and female schoolchildren aged 6 to 19 years

Food	Girls		Boys		$\chi^2$ <sup>a</sup>
	%	n	%	n	
Beer, wine	74.7	426	54.7	266	49.7***
Sugar added to food/drinks	35.5	204	21.3	103	58.2***
Salt on food	28.3	161	19.2	93	28.9***
Breakfast cereal, sweetened	29.6	173	14.8	73	49.2***
Peanut butter, chocolate hazelnut spread	20.4	118	14.7	71	26.7***
Ice cream flavorings, syrups	21.5	125	10.8	53	57.2***
Dried fruits	11.3	66	16.3	80	6.2*
Fish	13.3	77	12.3	61	3.6
Fast foods	16.1	93	9.1	44	47.0***
Flavored milk	15.6	91	9.6	47	19.3***
Candy	15.1	87	9.1	45	46.7***
Cookies	13.9	79	9.4	46	35.2***
Chocolate	15.2	88	7.9	39	34.9***
Hot chocolate	14.5	80	8.3	41	27.0***
Cakes	15.2	88	6.5	32	61.4*
Pastries/pies	13.8	79	8.3	40	45.3***
Potato chips	13.1	76	6.5	32	25.6***
Soft drinks	12.2	70	7.2	35	28.5***
Muffins, crumpets	12.1	71	6.6	33	31.6***
Sweetened powdered drink mix	10.6	60	7.1	34	13.2**
French fries	10.6	61	5.7	28	43.2***
Red meat	8.4	49	7.1	35	5.5
Cheese	6.8	40	7.5	35	1.8
Graham crackers	5.9	34	7.5	37	8.3*
Popsicles	7.9	46	5.3	26	32.7***
Milk (plain)	5.8	34	7.5	37	5.8
Yogurt	6.2	36	6.9	34	0.2
Ice cream	7.5	44	5.3	26	28.4***
Rice	5.8	34	6.8	34	2.1
Breakfast cereal (plain)	6.7	39	5.1	25	5.1
Pasta	3.9	23	6.3	31	4.5
Chicken	5.0	29	4.4	22	0.3
Fruit juice	3.6	21	3.5	17	0.2
Bread/toast	3.9	23	2.2	11	2.9
Vegetables	1.9	11	2.6	13	1.6
Fruit	1.2	7	1.6	8	2.8

<sup>a</sup> $\chi^2$  Compares gender differences.\* $P < .05$ .\*\* $P < .01$ .\*\*\* $P < .001$ .

than food containing substantial amounts of dietary fat (eg, cakes, french fries, pastries/pies). The discrepancy between the restriction of some of these food items for what appears to be simply the difference in the level of sugar in each food was remarkable. For example, 7% of students report plain milk to be forbidden vs 13% for flavored milk; 7% for plain cookies vs 12% for sweet cookies, and 6% for plain breakfast cereal vs 23% for sweetened breakfast cereal. The gender differences detected in these results also suggest that parents, in particular mothers, are more likely to restrict the diets of their daughters than their sons.

The current study identified the types and sources of nutrition misinformation

among schoolchildren, for example, the notion that dietary sugar causes hyperactivity, acne, and diabetes and that chocolate causes acne and menstrual pain. Despite extensive and conclusive international research findings to the contrary (19-23), these nutrition myths appear to be well entrenched in the community. Such nutrition misinformation appears to be promulgated by physicians and members of the broader community. This finding highlights the need for improved nutrition education among physicians and medical students.

Dietary advice should aim to remove the focus on individual food items as "good" or "bad" (8), "high sugar," or "high fat" and rather focus on providing

an understanding of the nutrient density of foods. Parents, children, teachers, and physicians need to understand how to evaluate the overall nutritional value of a food item rather than simply evaluating whether it contains sugar or fat. Dietary advice should clarify that nutrient-dense foods such as flavored milk, yogurt, and breakfast cereal are suitable foods for children and adolescents.

## APPLICATIONS

The findings of this study indicate that more research into the types of foods young people are restricting, the reasons for their specific dietary behavior, and whether nutrition and health education messages are most effective when they target specific groups is needed. When working with children and adolescents, dietitians, educators, and other health professionals should initially investigate current food beliefs, concerns, and restrictive food practices to make dietary counseling and nutrition education as relevant and effective as possible. ■

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and whether marketing in schools exploits a captive audience of children for private gain (7).

Because the school environment influences eating behavior (12), and school-age children are consuming diets that can lead to chronic disease (13), nutrition professionals should understand the sorts of food messages that reach children in schools. The purpose of this study was to assess nutrition professionals' knowledge of and attitudes toward the food industry's educational and marketing programs in elementary schools.

## METHODS

A 61-item questionnaire was developed using a variety of formats. Thirteen questions were designed to collect demographic data. The 23 knowledge questions used Likert scale, "check if applicable," and open-ended formats. The 25 attitude questions used Likert scale, yes/no, agree/disagree, "select A or B", and open-ended formats. Food industry programs described in the questionnaire were representative of the types found in the aforementioned elementary school study (5) (eg, Campbell Soup Company's [Camden, NJ] Labels for Education, which exemplifies label collection programs).

Respondents were asked about their level of involvement with specific programs, where they learned about such programs, whether they agreed that environmental factors in schools influence eating behaviors, and whether they thought food industry programs were among these factors. Respondents were given brief descriptions of 12 programs and asked to indicate whether each seemed likely to influence student consumption of the sponsor's products. Other questions were designed to elicit more general attitudes regarding food industry programs in schools.

Content validity was assessed by 3 faculty members and approximately 50 nutrition education graduate students. The questionnaire was pilot tested with 50 randomly selected members of the survey population, after which changes were made to enhance clarity.

Questionnaires were mailed to a systematic random sample of 350 members of The American Dietetic Association's (ADA) School Nutrition Services dietetic practice group and to the 339 members of the Society for Nutrition Education's (SNE) Division of Nutrition Education for Children not included in the pilot study. The response rate was 61% (n=417). Response rates by groups were 56% from ADA and 65% from SNE. Because the survey was confined to nutrition professionals likely to work with

# Nutrition professionals' knowledge of and attitudes toward the food industry's education and marketing programs in elementary schools

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Food industry marketers frequently use schools to get products and messages to children (1,2). According to James McNeal (3), an expert on marketing to children, children have money to spend, influence their families' food choices, and are the consumers of the future. He says, "Cradle-to-grave marketing . . . can be learned from observing the masters, like McDonald's and the Coca-Cola Company" (4, p 40).

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A 1998 study of elementary schools (5) found that brand-name foods are served, advertised, and promoted in school cafeterias. Food products and coupons are distributed to students in classrooms and during field trips. Students collect food product labels and register receipts redeemable for school equipment and sell food products in school fund-raisers. Food advertisements reach students via textbook covers, magazines, newspapers, posters, radio, videos, the Internet, and teaching materials. Teaching materials and contests developed by the food industry often incorporate sponsors' products or promote sponsors' brands.

Although industry-sponsored school materials offer the possibility of wide distribution of nutrition information (6), questions have been raised about their objectivity and educational value (7-11)