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Diet Quality, Nutrient Intake, Weight Status, and Feeding Environments of Girls Meeting or Exceeding Recommendations for Total Dietary Fat of the American Academy of Pediatrics

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Abstract

Objectives—To compare the diet quality and weight status of girls consuming diets meeting the recommendation of the American Academy of Pediatrics for dietary fat with those of girls consuming >30% of energy from fat and to examine relationships between girls' dietary fat intake, mothers' nutrient intakes, and mothers' child-feeding practices.

Design—Participants were 192 white girls and their mothers, who were divided into 2 groups: >30% of energy from fat (high fat [HF]) or ≤30% of energy from fat (low fat [LF]), based on girls' 3-day dietary recalls. Girls' food group and nutrient intakes, Healthy Eating Index, body mass index, and mothers' nutrient intakes and child-feeding practices were compared.

Results—Girls with HF diets consumed fewer fruits, more meat, and more fats and sweets and had lower Healthy Eating Index scores than did the girls in the LF group. Mothers of girls in the HF group had higher fat intakes than did those in the LF group. Girls and mothers in the HF group had lower intakes of fiber and vitamins A, C, B6, folate, and riboflavin. Mothers in the HF group reported using more restriction and pressure to eat in feeding their daughters. Girls in the HF group showed greater increase in body mass index and skinfold thickness from age 5 to 7 years.

Conclusion—These findings provide additional support for the recommendation of the American Academy of Pediatrics to limit total dietary fat. Findings reveal that mothers' use of controlling feeding practices are not effective in fostering healthier diets among girls and that mothers' own eating may be more influential than their attempts to control the intake of their daughters.

As a part of a population-wide approach to affecting dietary change and reducing cholesterol levels among children and adolescents, the Committee on Nutrition of the American Academy of Pediatrics (AAP) has recently recommended that by 5 years of age, children consume diets with ≤30% of energy (but not <20% of energy) from fat and <10% total calories from saturated fatty acids.¹ Children and adolescents in the United States today consume diets that are substantially higher in dietary fat than these recommended levels, with current estimates ranging from 34% to 36% of energy from fat.² Not only do the diets of children exceed recommended levels for fat and total energy, but these diets also fail to meet minimum recommendations for all food groups.³ Diets high in fat and energy have been found to contribute to overweight and obesity.^{4–7} Childhood overweight has tripled in the United States in the past 30 years, with 1 in 4 children overweight or at risk for overweight.⁸ This suggests

that compliance with the AAP dietary recommendations to reduce fat intake could also contribute to reducing the prevalence of childhood overweight.

The AAP recommendations to reduce children's dietary fat intake are accompanied by suggestions that fat calories should be replaced by eating more grain products, fruits, vegetables, low-fat (LF) dairy products, beans, lean meat, poultry, fish, and other protein-rich foods. Children should meet the recommendation to lower fat intake by consuming a wide variety of foods from all the food groups and consuming adequate energy to maintain healthy body weight. Lower fat diets may be attained via these substitutions across food groups; however, in some cases, children's diets that are lower in fat are of lower nutrient density and higher in simple sugars rather than in complex carbohydrates,⁹ raising the possibility that lower fat diets may not necessarily be healthier diets.

The purpose of this research was to compare girls' diets that had >30% of energy from fat with those meeting the AAP recommendations to maintain dietary fat intake at ≤30% of energy. Specifically, girls' food group intake, nutrient intakes, diet quality, body mass index (BMI), and skinfold thickness were compared for the 2 groups. Relationships between girls' dietary fat intake, maternal nutrient intakes, and mothers' child-feeding practices were also evaluated. We also investigated whether mothers of girls whose diets met the AAP guidelines were more likely to meet dietary recommendations themselves and whether they were more likely to report using child-feeding strategies to foster healthy diets in their daughters than were mothers of girls whose diets did not meet the guidelines. We focused on mothers' use of 2 feeding strategies: 1) those intended to restrict children's access to energy-dense snack foods, and 2) those intended to pressure children to eat foods that are good for them.

METHODS

Participants

The study participants were 197 five-year-old girls and their mothers who were participating in a longitudinal project investigating development of controls of food intake and dieting of girls. Families were recruited for participation using flyers and newspaper advertisements. Families with age-eligible female children within a 5-county radius also received mailings and follow-up phone calls. The eligibility criteria for girls' participation included living with both biological parents, the absence of severe food allergies or chronic medical problems affecting food intake, and the absence of dietary restrictions involving animal products. Of the original sample, 192 girls and their mothers also participated when the girls were 7 years old. Five girls who had <20% of energy from fat were excluded in the analysis. The sample was 99% white. On average, mothers were in their mid-30s (35.4 ± 0.3 years). Almost two thirds of mothers (63%) were currently employed, reporting an average of 20 hours per week. Twenty-eight percent of reported family incomes were below \$35 000, 35% between \$35 000 and \$50 000, and 36% above \$50 000. Mothers were well educated; mothers' mean education was 15 ± 2 years (range: 12–20). All procedures were approved by the Pennsylvania State University Institutional Review Board, and mothers provided written consent for their own and for their daughter's participation before data collection.

Girls' Measures

Weight Status and Skinfold Measurements—Girls' height and weight measurements were obtained to determine BMI (weight [in kg]/height² [in m]). Three height and weight measurements were collected for each girl by trained research assistants, and average weight and height were used to calculate the BMI score. Girls' subcutaneous body fat was assessed using the sum of triceps and subscapular skinfold measures. All skinfold measurements were taken by a trained staff member according to those procedures described by Harrison et al.¹⁰

Skin-fold measurements were taken on the right side of the body in duplicate to the nearest 10th of a millimeter using Harpenden skinfold calipers (Crymch, United Kingdom).

Girls' Dietary Intake—Girls' food group, energy, and nutrient intake were measured using three 24-hour recalls. Recalls were conducted with mothers in the presence of their daughters by trained staff at the Pennsylvania State University Diet Assessment Center using the computer-assisted *Nutrition Data System, Version 2.6* (Nutrient Database, Version 12, Food Database 27, Nutrition Coordinating Center, University of Minnesota, Minneapolis, MN), using the same method applied in the parent-child autotutorial dietary education program study.¹¹ A previous study validated mothers' reports of dietary intake of 5-year-old children comparing mothers' report with home observation.¹² Two weekdays and 1 weekend day were randomly selected over a 2-week period during the summer. Food portion posters (2D Food Portion Visual, Nutrition Consulting Enterprises, Framingham, MA) were used as a visual aid for estimating amounts of foods eaten. Nutrient data were averaged across 3 days to obtain an estimate of average energy and nutrient intake. A food group analysis was conducted on Nutrition Data System summary file data to determine the average number of US Department of Agriculture Food Guide Pyramid-recommended servings from grains, vegetables, fruits, dairy, meat, fats, and sweets food groups.¹³ The assignment of food to food group and assessing number of servings were based on the guidelines of the US Department of Agriculture.¹⁴ Mixed dishes were disaggregated into the corresponding components, and the sum of the gram weights of each components was used to calculate the number of servings for each food group.

The Healthy Eating Index (HEI)¹⁵ was computed to measure girls' diet quality. The index consisted of 10 components based on the analysis of the three 24-hour dietary recalls. Components 1 to 5 measured the degree to which a girl's diet conformed to the Food Guide Pyramid serving recommendations of the US Department of Agriculture for the 5 major food groups¹³ and are based on the average number of servings from the 3 days of intake data. Similarly, components 6 to 9, which measured total fat, saturated fat, and cholesterol and sodium intakes, were based on 3-day averages; component 10 measured variety in girls' diets by examining number of different foods consumed over the 3 days of dietary intake. A maximum score of 10 was obtained if 16 or more different food items were consumed over the 3 days. The other components of the index were scored similarly with maximum scores of 10 and minimum scores of 0, where high scores were closer to recommended ranges or amounts. Therefore, a combined maximum score was 100.

Mothers' Measures

Mothers' Dietary Intake—Mothers' food intake was measured using a quantitative Food Frequency Questionnaire (FFQ).¹⁶ Each mother completed a FFQ regarding their dietary intake during the previous 3 months. FFQs were completed by mothers several months before the point at which 24-hour recalls were conducted with their daughters. FFQs were completed by 191 mothers. A previous report showed that test-retest reliability (intraclass correlation coefficient) of fat intake measured by FFQ was 0.74. The reported validity of FFQ compared with 4-day food record and four 24-hour recalls was 0.62 for fat.¹⁷

Child Feeding Questionnaire—The child feeding questionnaire^{18,19} contains 31 items that assess dimensions of maternal control in child feeding and factors that may elicit maternal control. Among those, 3 hypothesized factors that assess maternal attitudes and practices about controlling child-feeding strategies were used in this study: 1) monitoring (3 items), assessing the extent to which mothers oversee their child's eating (eg, "How much do you keep track of the high-fat foods that your child eats?"); 2) restriction (8 items), assessing the extent to which mothers restrict their child's access to foods (eg, "I intentionally keep some foods out of my child's reach"); and 3) pressure to eat (4 items), assessing mothers' tendency to pressure their

children to eat more food (eg, “My child should always eat everything on her plate”). All items were measured using a 5-point Likert-type scale, with each point on the scale represented by a word anchor. The internal consistency (Cronbach’s α) was 0.92 for monitoring, 0.73 for restriction, and 0.70 for pressure to eat.¹⁹

Statistical Analysis

Girls were divided into 2 groups, based on their fat intake, using data from 3-day diet recalls. The LF intake group included girls who consumed 20% to 30% of energy from fat (84 girls), and high-fat (HF) intake group was defined as girls who consumed >30% of energy from fat (108 girls). All analyses were performed using *SAS Software, Version 6.12* (SAS, Cary, NC). Using the general linear model, analysis of variance was conducted to compare food group intakes, weight status, and maternal feeding practices of girls consuming HF and LF diets. Analysis of covariance was used to compare LF and HF groups in girls’ and mothers’ nutrient intakes controlling for the energy intake. The least-square means were provided. Pearson correlation analyses were also performed to assess relations of girls’ fat intake (percent of energy intake) to girls’ weight status, mothers’ fat intake, and mothers’ feeding practices.

RESULTS

Girls’ Energy and Fat Intake

Girls’ mean energy intake was 1526 kcal, which is 84.8% of recommended dietary allowances²⁰ and was slightly lower than the mean energy intake of US 5-year-old children, which is 1577 kcal.² The frequency distribution of girls’ percentage of energy from dietary fat is shown in Fig 1. Approximately 45% of girls consumed diets with $\leq 30\%$ of energy from fat. Only ~2% of girls had diets with $\leq 20\%$ of energy from fat, and these 5 girls were excluded from the analyses. The mean percentages of saturated fat, monounsaturated fat, and polyunsaturated fat intake were 11.4%, 11.6%, and 5.4% of total energy intake, respectively.

Background Information by Fat Intake Level

The average years of education for mothers was 15 years for both groups. Household income did not differ between LF and HF groups: 73.5% of the family in LF group and 70.4% in HF group had household income >\$35 000. The percentage of working mothers in LF and HF groups was 62% and 64%, respectively, and did not differ between the 2 groups.

Girls’ Food Group Intake by Fat Intake Level

Differences in the food group intake patterns of girls consuming HF and LF diets were assessed by comparing the number of servings consumed from each food group by girls in the HF and LF groups (Table 1). Girls on HF diets consumed significantly more fats and sweets than did girls on LF diets. The girls on HF diets also consumed significantly more meat than did the LF group, although the number of servings from the meat group consumed by girls in both groups was below the recommended 2 servings per day. HF and LF groups did not differ in the number of servings of grains. The number of servings of fruits differed across HF and LF groups; the mean number of servings of fruit consumed by the LF group was close to the recommended 2 servings a day, whereas the HF group consumed only 1.26 servings. There were no significant differences in vegetable intake, and both groups had only approximately half the number of recommended servings of vegetables; only ~8% of girls consumed the recommended number of servings of vegetables. Girls consuming HF and LF diets did not differ in dairy intake, and, on the average, they consumed more servings of dairy foods than the recommended 2 servings a day. In summary, girls on HF diets consumed more sweets and fats, more meat, and fewer fruits than did girls on LF diets.

HEI scores were computed to measure the dietary quality of girls (Table 2). In both groups, the total HEI scores corresponded to “a diet that needs improvement,” but scores for both groups were slightly higher than those reported for US girls of this age, 67.8.¹⁵ The LF group had significantly higher total HEI scores than the HF group. Because the groups were defined based on the fat intake, we also compared girls’ score on the HEI excluding the 3 fat-related subscales. Even when excluding 3 fat sub-scales, girls on LF diets had significantly higher HEI scores than did girls on HF diets.

Girls’ Energy and Nutrient Intake by Fat Intake Level

Energy and nutrient intakes for girls on HF and LF diets are shown in Table 3. Total energy intake for girls consuming HF and LF diets did not differ significantly, although there was a trend for higher energy intakes in the HF group. Given this marginal difference in energy intake, nutrient intakes of the 2 groups were compared, controlling for total energy intake. Carbohydrate intake was higher for girls on LF diets than for girls on HF diets. There were no significant differences in protein intakes. Girls on LF diets consumed more fiber than did girls on HF diets. With respect to micronutrients, the LF group had higher intakes of several vitamins: A, C, thiamin, B6, folate, and niacin, and the LF group had higher iron and magnesium intakes. Girls on HF diets consumed more sodium than did girls on LF diets. Calcium and zinc intakes did not differ between groups. On average, most nutrient intakes met or exceeded the recommended level, with the exception of zinc, which was low for both groups relative to recommendations, perhaps reflecting relatively low meat intake of both groups.

Girls’ Weight Status by Fat Intake Level

Girls on HF and LF diets did not differ in BMI at either 5 or 7 years old, but change in BMI from 5 to 7 years of age was significantly greater for girls on HF diets, and the same result was obtained when controlling for BMI at age 5 years. Change in the sum of skinfold thickness (sum of triceps and subscapular) was also significantly higher in the HF group than in the LF group; girls who consumed relatively more energy from fat at age 5 years gained more subcutaneous fat from ages 5 to 7 years (Table 4). In the correlation analysis, fat intake (percent of energy intake) was positively correlated with change in BMI from ages 5 to 7 years ($r = 0.14$; $P < .05$), whereas carbohydrate intake was negatively related to change in BMI from ages 5 to 7 years ($r = -0.19$; $P < .01$). These findings indicate that total dietary fat intake may be an important factor in the development of overweight during childhood.

Mothers’ Feeding Practices by Girls’ Fat Intake Level

Table 4 also displays mothers’ child feeding practices measured by the child feeding questionnaire.^{18,19} Both maternal restriction and pressure to eat scores were higher for mothers of girls in the HF group than in the LF group. The relationship between mothers’ feeding practices and girls’ macronutrient intake was measured by correlation analysis, controlling for girls’ BMI, because girls’ BMI was negatively correlated with maternal pressure to eat ($r = -0.20$; $P < .005$) and positively correlated with maternal restriction ($r = 0.20$; $P < .005$). When controlling for girls’ BMI, maternal restriction and pressure to eat were positively related to girls’ percentage of total energy from fat ($r = 0.17$; $P = .01$; $r = 0.16$; $P = .02$, respectively), whereas carbohydrate and protein intake were not correlated with maternal feeding practices. No significant relationship was found between mothers’ feeding practices and girls’ total energy intake.

Mothers’ Energy and Nutrient Intakes by Girls’ Fat Intake Level

To investigate whether relationships existed between mothers’ and daughters’ intake and diet quality, nutrient intakes of mothers of girls in the HF and LF groups were compared (Table 5). Mothers of girls in the HF group consumed more fat and less carbohydrates than did mothers

of girls in the LF group. Mothers' energy and protein intakes did not show significant differences between the LF and HF groups, but LF mothers had greater fiber intakes. Correlation analyses revealed that mothers' and daughters' fat intake (percent of total energy intake) were significantly correlated ($r = 0.31$; $P = .0001$), and that fat intakes were more highly correlated than mothers' and daughters' energy intake ($r = 0.15$; $P = .03$) or carbohydrate intake ($r = 0.21$; $P = .003$). Table 5 indicates that mothers of girls in the LF group had higher intakes of vitamins A, C, riboflavin, folate, and magnesium. Calcium intakes were also higher in mothers of girls consuming LF diets. The pattern of differences in nutrient intakes for mothers of girls in HF and LF groups were quite similar to those noted for their daughters.

DISCUSSION

When diets of girls meeting the AAP recommendations for dietary fat intake were compared with diets of girls exceeding 30% of energy from fat, several differences were apparent. Girls meeting the recommendation (consuming 20%–30% of total energy from fat) had diets that were higher in fruit and fiber intake and had higher quality diets, as indicated by HEI scores. Girls on LF diets had higher intakes of vitamins A, C, B6, folate, thiamin, and niacin and higher iron intakes than did girls on HF diets. These findings fail to provide support for concerns that children's diets with $\leq 30\%$ of energy from fat may compromise nutrient intake and dietary quality.^{21–23} Fat intake influenced girls' change in weight status. Although girls on HF and LF diets did not differ in weight status at either 5 or 7 years of age, girls on HF diets showed significantly greater increases in both BMI and skinfold thickness from 5 to 7 years of age, a finding in agreement with Klesges et al.²⁴

Girls with LF diets had slightly but not significantly lower energy intakes than girls on HF diets; in contrast, Nicklas et al.⁹ reported that children consuming diets lower in total fat were eating 25% fewer calories than children on the HF diets. In the present sample, the LF group consumed significantly more carbohydrates, but not more sucrose than did the HF group. These findings also differed from those reported by Nicklas et al.,⁹ where children on the lowest fat diets consumed 20% more sucrose. Although girls on LF diets did not consume significantly more grains than did girls on HF diets, the LF group had higher fiber intakes, perhaps because of their higher intake of fruits. Girls on LF diets also had higher iron intakes, despite the fact that their meat intakes were lower than were those of girls in the HF group, probably because of the slightly but not significantly greater intake of fortified grains and fruits by the LF group.

Our findings are consistent with those reported from intervention studies showing that the nutrient intake/density of most vitamins and minerals increases when mean fat intake decreases.^{25–27} These studies revealed that we can reduce fat intake of children safely through intervention and that fat reduction may also increase nutrient adequacy. However, a number of studies have reported that a decrease in total dairy food or calcium intake may occur with reduction of fat intake.^{26,28} Dixon et al.²⁸ reported that young children who reduced their fat intake accomplished this by replacing HF foods with lower fat foods, particularly within the dairy group, and Peterson and Sigman-Grant²⁹ showed this to be a highly effective strategy for reducing fat intake. In the present research, we did not see differences in dairy food or calcium intake between girls consuming LF and HF diets. Although some studies report the potential negative effects of unsupervised LF intakes in children, such as increased sugar intake and reduced micronutrient intake,⁹ our findings and other previous intervention studies highlight benefits of diets meeting the AAP recommendation for fat intake on overall nutrient adequacy of children.

Findings revealed similar nutrient intake patterns for mothers and daughters. These similarities in patterns of intake were evident despite the use of different measurement methods for mothers and daughters and the fact that reported intakes were completed over different periods of time;

both factors would reduce the likelihood of seeing similarities between mothers' and daughters' diets. Several other studies^{30–32} also reported mother–child relationships in macronutrient intake. Mothers may be serving as models for their daughters, or they may select diets from the same array of food available in the home and the broader food environment. Finally, mothers reported their own intakes and they also participated, along with their daughters, in dieting recalls for the girls, and having mothers reporting in both cases may have contributed to the mother–daughter similarities that we noted.

Our findings regarding child-feeding practices may be a key to understanding how to achieve the AAP guidelines to reduce dietary fat intake. Mothers of girls whose fat intake exceeded the AAP recommendation reported using greater dietary restriction and greater pressure to eat with their daughters than did mothers of girls on LF diets. Parental use of restriction and pressure to eat are in part a response to the child's weight status, with heavier children eliciting more restriction, and thinner children more pressure to eat. However, mothers who take responsibility for controlling their children's intake may use both practices, independent of the child's weight status; restriction is used to curb the child's intake of snacks or junk foods, whereas pressure to eat tends to be used at mealtime to increase children's intake of healthy foods. These findings suggested that the use of restriction and pressure in child feeding are ineffective and counterproductive in bringing children's diets into line with current recommendations. When taken together with results showing dietary similarity between mothers and daughters, these findings suggest that daughters' intake was more closely related to what mothers were eating than to what mothers were saying to daughters about eating. Casey and Rozin³³ reported that parents believed that pressuring children to eat is an effective way to induce children to accept and like foods and that restriction can be effective in limiting children's liking and intake of preferred foods. However, experimental research reveals that restriction can foster heightened interest in restricted foods and overconsumption of those foods when they are available,³⁴ and pressuring children to eat fosters dislikes for those foods.³⁵

The present research has several limitations, including a sample that is exclusively white, 2-parent families. This restricted sample precludes generalizing the findings to other socioeconomic, ethnic, and racial groups. This is especially problematic because the prevalence of overweight is even higher among Hispanic and black children than among non-Hispanic white children.⁸ In addition, dietary intake patterns and child-feeding practices may differ across racial and ethnic groups. Research on the factors that are related to the dietary fat intake is needed. Other limitations relate to differences in the dietary intake methods used with mothers and daughters.

CONCLUSION

In comparing diets of girls meeting the AAP recommendation for a diet with between 20% and 30% of total energy from fat with girls who consumed diets higher in fat, we noted that girls meeting recommendations had diets that came closer to meeting other dietary recommendations for several foods groups and for several key nutrients. In addition, girls who consumed dietary fat in excess of the AAP recommendation showed greater increases in BMI and skinfolds from 5 to 7 years of age than did girls consuming LF diets. This finding suggests that although the AAP recommendations were designed primarily to influence children's and adolescents' cholesterol levels, their successful implementation could also have an impact on slowing or reducing childhood overweight and have a positive impact on children's diet quality. With respect to anticipatory guidance for parents, the similarities noted between the diets of mothers and daughters suggest an effective way for mothers to influence girls' diets in ways consistent with the AAP dietary recommendations: mothers who consume diets consistent with recommendations will have daughters who are more likely to do so as well. These findings also provide an additional rationale for mothers to consume healthier diets: in addition to having

positive effects on their own health, these patterns may prove beneficial to daughters as well. With respect to the means for achieving the AAP recommendations, the results indicate that although modeling healthy patterns of food intake may be effective, the use of controlling child-feeding practices that restrict children's intake of snack and pressure children to eat healthy foods are not associated with healthier diets in children.

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ABBREVIATIONS

AAP	American Academy of Pediatrics
LF	low fat
BMI	body mass index
HEI	Healthy Eating Index
FFQ	Food Frequency Questionnaire
HF	high fat

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Fig 1.
The distribution of girls' fat intake.

TABLE 1

Number of Servings by Food Groups for Girls Consuming HF (>30%) and LF (≤30%) Diets

Food Groups	LF Intake Group* (n = 84)	HF Intake Group* (n = 108)	Recommended Number of Servings [†]
Grains (number of servings)	5.0 ± 0.2 ^a	4.7 ± 0.1 ^a	6
Vegetables (number of servings)	1.7 ± 0.1 ^a	1.5 ± 0.1 ^a	3
Fruits (number of servings)	1.8 ± 0.1 ^a	1.3 ± 0.1 ^b	2
Dairy (number of servings)	2.7 ± 0.1 ^a	2.9 ± 0.2 ^a	2
Meat (number of servings)	1.1 ± 0.1 ^a	1.3 ± 0.1 ^b	2
Fats and sweets (number of servings)	4.6 ± 0.2 ^a	5.3 ± 0.3 ^b	NA

NA indicates not available.

Mean ± standard error. Values with the same letter are not significantly different between the groups at $P < .05$.

* LF intake group; >20% but ≤30% of energy from fat. HF intake group; >30% of energy from fat.

[†] Recommended number of servings are from the *Food Guide Pyramid for Young Children* of the US Department of Agriculture.¹³

TABLE 2

HEI Score for Girls Consuming HF (>30%) and LF (≤30%) Diets

	LF Intake Group* (n = 84)	HF Intake Group* (n = 108)	Maximum Value
HEI-grains	7.0 ± 0.2 ^a	6.6 ± 0.2 ^a	10
HEI-vegetables	4.7 ± 0.3 ^a	4.4 ± 0.2 ^a	10
HEI-fruits	6.6 ± 0.3 ^a	5.1 ± 3.0 ^b	10
HEI-dairy	8.9 ± 0.2 ^a	9.2 ± 0.2 ^a	10
HEI-meat	5.1 ± 0.3 ^a	6.0 ± 0.2 ^b	10
HEI-total fat	10.0 ± 0.0 ^a	7.4 ± 0.2 ^b	10
HEI-saturated fat	8.4 ± 0.2 ^a	4.2 ± 0.3 ^b	10
HEI-cholesterol	9.9 ± 0.1 ^a	9.6 ± 0.2 ^b	10
HEI-sodium	9.4 ± 0.2 ^a	9.0 ± 0.2 ^b	10
HEI-variety	8.6 ± 0.2 ^a	8.3 ± 0.2 ^a	10
Total HEI	78.4 ± 0.8 ^a	69.6 ± 0.8 ^b	100
Total HEI excluding fat items	50.1 ± 0.8 ^a	48.4 ± 0.6 ^b	70

Mean ± standard error.

Values with the same letter are not significantly different between the groups at $P < 0.05$.

* LF intake group; >20% but ≤30% of energy from fat. HF intake group; >30% of energy from fat.

TABLE 3

Energy and Nutrient Intake for Girls Consuming HF (>30%) and LF (≤30%) Diets

Nutrients	LF Intake Group* (n = 84)	HF Intake Group* (n = 108)	Recommendation†
Energy (kcal)	1491 ± 32 ^a	1563 ± 33 ^a	1800
Carbohydrate (g)	233 ± 1.6 ^a	205 ± 1.4 ^b	NA
Fat (g)	46 ± 0.5 ^a	58 ± 0.5 ^b	NA
Protein (g)	53 ± 1.0 ^a	53 ± 0.9 ^a	24
Sucrose (mg)	48.7 ± 1.5 ^a	45.6 ± 1.3 ^a	NA
Fiber (g)	11.8 ± 0.3 ^a	10.1 ± 0.3 ^b	NA
Vitamin A (R.E.)	872 ± 50 ^a	751 ± 44 ^b	500
Vitamin C (mg)	96.5 ± 4.9 ^a	71.5 ± 4.3 ^b	45
Thiamin (mg)	1.5 ± 0.03 ^a	1.3 ± 0.03 ^b	0.9
Riboflavin (mg)	1.8 ± 0.04 ^a	1.7 ± 0.04 ^a	1.1
Niacin (mg)	15.9 ± 0.4 ^a	15.0 ± 0.4 ^b	12
Vitamin B6 (mg)	1.3 ± 0.04 ^a	1.2 ± 0.03 ^b	1.1
Folate (μg)	221.6 ± 7.4 ^a	181.5 ± 6.5 ^b	75
Calcium (mg)	853 ± 30 ^a	814 ± 26 ^a	800
Iron (mg)	11.1 ± 0.3 ^a	10.0 ± 0.3 ^b	10
Sodium (mg)	2190 ± 55 ^a	2316 ± 48 ^b	NA
Magnesium (mg)	199.9 ± 3.9 ^a	189.1 ± 3.5 ^b	120
Zinc (mg)	7.3 ± 0.2 ^a	7.2 ± 0.2 ^a	10

NA indicates not available.

Adjusted mean ± standard error controlling for the energy intake. Values with the same letter are not significantly different between the groups at $P < .05$.

* LF intake group; >20% but ≤30% of energy from fat. HF intake group; >30% of energy from fat.

† Recommendations are from 1989 *Recommended Dietary Allowances*.²⁰

TABLE 4

Weight Status and Mothers' Child-Feeding Practices of Girls Consuming HF (>30%) and LF (≤30%) Diets

Weight Status	LF Intake Group* (n = 84)	HF Intake Group* (n = 108)
BMI at age 5 y	15.8 ± 0.2 ^a	16.0 ± 0.2 ^a
BMI at age 7 y	16.4 ± 0.2 ^a	16.9 ± 0.3 ^a
Change score of BMI	0.6 ± 0.1 ^a	1.0 ± 0.2 ^b
Change score of skinfold thickness	0.9 ± 0.4 ^a	2.1 ± 0.5 ^b
Mother's restriction	2.8 ± 0.1 ^a	3.1 ± 0.1 ^b
Mother's pressure to eat	2.1 ± 0.1 ^a	2.5 ± 0.1 ^b
Mother's monitoring	3.7 ± 0.1 ^a	3.7 ± 0.1 ^a

Mean ± standard error. Values with the same letter are not significantly different between the groups at $P < .05$.

* LF intake group; >20% but ≤30% of energy from fat. HF intake group; >30% of energy from fat.

TABLE 5

Mothers' Energy and Nutrient Intake Based on Girls' Fat Intake

Nutrients	LF Intake Group* (n = 84)	HF Intake Group* (n = 108)	Recommendation [†]
Energy (kcal)	1838 ± 81 ^a	1797 ± 63 ^a	2200
Carbohydrate (g)	227 ± 4.0 ^a	216 ± 3.5 ^b	NA
Fat (g)	70 ± 1.5 ^a	75 ± 1.3 ^b	NA
Protein (g)	72 ± 1.6 ^a	71 ± 1.3 ^a	50
Sucrose (mg)	42.2 ± 1.7 ^a	40.1 ± 1.4 ^a	NA
Fiber (g)	16.3 ± 0.6 ^a	14.4 ± 0.5 ^b	NA
Vitamin A (RE)	1202 ± 67 ^a	1021 ± 58 ^b	800
Vitamin C (mg)	124.2 ± 6.5 ^a	102.4 ± 5.6 ^b	60
Thiamin (mg)	1.5 ± 0.04 ^a	1.4 ± 0.03 ^a	1.1
Riboflavin (mg)	1.9 ± 0.05 ^a	1.7 ± 0.05 ^b	1.3
Niacin (mg)	18.0 ± 0.5 ^a	18.8 ± 0.5 ^a	15
Vitamin B6 (mg)	1.6 ± 0.05 ^a	1.6 ± 0.04 ^a	1.6
Folate (μg)	278.5 ± 10.4 ^a	247.4 ± 9.0 ^b	180
Calcium (mg)	932 ± 30 ^a	834 ± 26 ^b	800
Iron (mg)	13.8 ± 0.6 ^a	13.0 ± 0.5 ^a	15
Sodium (mg)	3055 ± 56 ^a	2973 ± 48 ^a	NA
Magnesium (mg)	272.9 ± 6.5 ^a	256.5 ± 5.6 ^b	280
Zinc (mg)	11.3 ± 0.4 ^a	10.9 ± 0.3 ^a	12

NA indicates not available.

Adjusted mean ± standard error controlling for mothers' energy intake. Values with the same letter are not significantly different between the groups at $P < 0.05$.

* LF intake group; mothers of girls who consumed >20% but ≤30% of energy from fat. HF intake group; mothers of girls who consumed >30% of energy from fat.

[†] Recommendations are from 1989 *Recommended Dietary Allowances*.²⁰