

# Relationships of psychosocial factors to dietary intakes of preadolescent girls from diverse backgrounds

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### Abstract

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Family and personal factors that might be related to the development of food selection and eating patterns have not been well studied in children. The aim of this study was to examine whether such psychosocial factors differ in girls from four culturally diverse Girl Scout troops and how these factors are associated with dietary intakes. The social measures and dietary assessments were all obtained at baseline on subjects who were participating in a small nutrition education programme. The programme enrolled girls and one parent for each girl from four Girl Scout troops in Detroit, Michigan. The social factors assessed included girls' emotionality and use of food to regulate emotions, their general attitudes about health, eating and body image, and self-perceptions of their competence. Dietary intakes also were assessed in both the girls and their parents. There were large differences between troops in ethnicity and parent education level, and there were differences in dietary intakes as well. The psychosocial factors assessed in this study, however, did not differ significantly by troop. When the psychosocial factors were examined for their relationships to dietary factors, there was an indication that families which reported higher self-competence and academic competence in their daughters also had healthier eating patterns in their daughters. This was a small study, but the data suggest that simple comparisons between ethnic groups may not adequately capture the complexity of family and psychosocial factors contributing to good dietary practices.

*Keywords:* girls, diet, social factors, self-competence, family influence.

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### Introduction

This study was undertaken to examine differences in psychosocial factors among four Girl Scout troops from diverse areas of Detroit, Michigan and to exam-

ine whether these factors are associated with dietary intakes. The pathologic processes leading to cardiovascular disease and diabetes have been shown to begin in childhood (Steinberger & Daniels 2003). With regard to breast cancer, diet 20 years previous to the diagnosis of breast cancer is thought to be influential, and the impact of diet on risk may be most important during breast development (Dunn 1994; Colditz & Frazier 1995; Stoll 1998; Russo *et al.* 2001). Many cultural and social influences have been studied with respect to their impact on dietary intakes, but less well studied are the influences of family and personal factors that are possibly related to the development of food selection and eating patterns. These factors include the degree of involvement between girls and their mothers or other parents (Foreyt & Goodrick 1993), the girls' emotionality and use of food to regulate emotions (Israel *et al.* 1994), their general attitudes about health, eating and body image (Thelen *et al.* 1992), and self-perceptions of their competence.

Girls in the United States still have lower than recommended intakes of fruits and vegetables, higher than recommended intakes of fat and a very low intake of whole grains (Cook & Friday 2004). Concerns regarding poor dietary quality are especially evident in African American children. Overall fat intake in US school-aged children decreased from 1989–1991 to 1994–1996 in the CSFII (Continuing Survey of Food Intakes by Individuals); however, the percentage of white children consuming less than 30% of energy from fat increased from 13% to 29%, and the percentage of African American children consuming less than 30% of energy from fat decreased from 10% to 7% during this time. Similar trends are evident in fruit and vegetable (FV) intakes, although they are not quite as disparate, with FV intake in white children increasing from 3.6 to 4.1 servings per day and FV intake decreasing in African American children from 4.0 to 3.9 servings per day from 1989–1991 to 1994–1996 (Gleason & Suitor 2001).

Girls in later middle childhood and early adolescence, along with their mothers, were the targets for this study. Parental dietary intakes as well as attitudes and feeding behaviours are important determinants of children's diets (Birch & Fisher 1998; Gibson *et al.* 1998; Tibbs *et al.* 2001; Fisher *et al.* 2002). A child's

mother appears to have a particularly strong influence on the development of food preferences and eating habits (Pike & Rodin 1991; Fisher & Birch 2002; Birch *et al.* 2003; Maharaj *et al.* 2003). Furthermore, the emotional relationship between mother and daughter itself may be linked to girls' tendency towards more or less healthy patterns of food intake (Humphrey 1989). These family relationships can be expected to impact on the girls' self-competence, which in turn should impact on acquisition of self-efficacy during dietary intervention. Self-efficacy is often targeted in dietary intervention strategies, and it has been shown to be related to dietary quality in children (Ievers-Landis *et al.* 2003; Rimal 2003). Personal factors related to self-competence were examined in a study of obesity rates, and African American girls aged 9–14 had higher and stabler self-worth as well as greater satisfaction with their physical appearance than white girls (Brown *et al.* 1998).

The Michigan Metro Girl Scout Council provided access to enrol study participants as well as the structure for conducting the activities of the study. Previous studies have shown that both Girl Scouts and Boy Scouts can be useful avenues for nutrition education of children (Cullen *et al.* 1997; Baranowski *et al.* 2002). Participants in this present study gave information concerning their family expressiveness, the girls' self-perceived competence and their attitudes towards their bodies and towards health in general. We hypothesized that dietary quality might be lower in the African American troops, in accord with national data (Gleason & Suitor 2001), but that mother–daughter relationships and girls' self-competence would be stronger (Brown *et al.* 1998). The latter would in turn facilitate acceptance of dietary education programmes aimed primarily at the girls through the Girl Scout programme. We also examined the potential influence of psychosocial factors directly on the dietary habits of the girls, their mothers and their families, as some of the psychosocial factors might be more closely associated with dietary patterns than with ethnicity. The psychosocial factors selected for study were those aspects of family relationships that contribute to the girls' self-competence, family eating behaviours and degree of positive and negative expressiveness.

## Methods

### Participants

The Michigan Metro Girl Scout Council facilitated enrolment of troops into the Girl Scout Nutrition Program, a troop-based programme of education activities designed to improve girls' nutrient intakes. Efforts were made to select troops that represented various areas of metropolitan Detroit, where ethnicity and socio-economic status were quite different, because both of these factors are important components of dietary habits and mother-daughter relationships (Taylor 1996; Halpern *et al.* 1999; Mulholland & Mintz 2001; Neumark-Sztainer *et al.* 2002). The study participants were drawn from four troops: two that met in the city of Detroit and two that met in the suburb of Farmington Hills. The only inclusion criterion was troop participation and there were no exclusion criteria. One troop in each location met at a public school (designated as troops City P and Suburban P), and the others met at private parochial schools (designated as troops City R, which was a Lutheran school, and Suburban R, which was a Jewish school). Of all the members in the troops, 76% chose to participate in this study, with 43 parents (41 mothers, one grandmother and one father) and 44 girls enrolled (19 in the city, 25 in the suburbs, with two suburban girls being twins). Families in the city troops were predominately African American, and those in the suburbs were predominately Caucasian. Most of the girls enrolled attended the school where the troop met, except for four who attended other schools (two in the public school troops and two in the private school troops). Except for one sixth grader, the girls were all in the fourth or fifth grade. Table 1 presents numerical and demographic data concerning the families represented in each troop.

### Instruments

#### *Family demographic and dietary information*

The parents completed a study questionnaire that assessed demographic factors, household health sta-

tus, select dietary practices and general interests in nutrition education (Table 1). There were large differences among troops as there were two different kinds of schools that girls were drawn from in both the city and suburban areas.

#### *Dietary assessment*

For dietary assessment, the parents were asked to complete the Block '98 Food Frequency Questionnaire (Patterson *et al.* 1990). Girls were taught how to keep 3-day food records (assigned for a Sunday, Monday and Tuesday). Three-day food records have been shown to have better agreement with observed intakes than recalls and food frequency questionnaires in 9- and 10-year-old girls (Crawford *et al.* 1994). The food records were analysed with the Nutrition Data System 2.92 Software (University of Minnesota, Minneapolis, MN; Food Database 9A, Nutrient Database version 24).

#### *Psychosocial characteristics*

The parents and their girls completed questionnaires tapping multiple aspects of family and child social and emotional characteristics. Parents completed the 40-item Family Expressiveness Questionnaire (Halberstadt 1986; Halberstadt *et al.* 1999), which asked them to rate the degree of expressiveness that characterized their family during ordinary family activities. The emotional atmosphere in the family, particularly between mother and child, has been found to be an important factor in adjustment of girls with serious diet-related disorders (Humphrey 1989; Pike & Rodin 1991; Maharaj *et al.* 2001). This questionnaire produced two scores: one reflecting positive expressiveness and the other reflecting negative expressiveness. Each item was rated across a 9-point scale, from 'not at all frequently in my family' to 'very frequently in my family'. Examples of items that capture positive and negative expressiveness, respectively, are: 'Praises someone for good work' and 'Blame one another for family troubles'. This questionnaire has been tested in children with good results (Halberstadt 1986; Halberstadt *et al.* 1999). There are 40 items on the questionnaire: 20 for positive expres-

**Table 1.** Demographic and household characteristics of study participants. Data given as per cent or mean (SD)\*

Characteristic	City troops		Suburban troops		P-value†
	City R n = 10	City P n = 9	Suburban R n = 11	Suburban P n = 14	
School troop meets at	Private Lutheran	Public	Private Jewish	Public	
Ethnicity of parent (% of Caucasian)	10	0	100	93	<0.0001‡
Age of parent (years)	40 (7)	34 (7)	44 (4)	40 (7)	0.013
Ethnicity of girl (% of Caucasian)	0	0	100	92	<0.0001‡
Age of girl (years)‡	9.8 (0.6)	9.2 (0.4)	10.0 (0.0)	9.6 (0.5)	0.001‡
Education of parent (% of college graduate)	40	22	64	36	0.561
Current smoking by parent (%)	10	22	0	54	0.005‡
TV watching (hours per day)	3.3 (1.6)	4.3 (1.6)	2.4 (0.7)	3.0 (1.4)	0.023
Families with two adults (%)	50§	89	100	93	0.001‡
Health of the household members (%)¶					
High blood pressure	70	44	27	36	0.253
Diabetes	30	22	0	0	0.027
Cancer	30	11	0	7	0.194
Currently following a special diet (%)	0	22	55	21	0.037
Have been trying to improve the diet for more than 6 months (%)	40	44	73	57	0.459
Want to change the diet (%)**	90	89	100	93	0.779
Want to learn about nutrition (%)	90	33	67	57	0.020

\*The data were obtained from the study questionnaire filled out by parents (42 mothers, one grandmother and one father). The only exceptions were smoking status and TV viewing which were from the Block '98 Food Frequency Questionnaire given to the parents. The troops meeting at parochial schools are designated 'R' and the troops meeting at public schools are designated 'P'; †P-values were determined by Fisher's exact test or the Kruskal-Wallis test, and significant differences among troops after adjustment for multiple comparisons by the Holm method are marked with the superscript; ‡The girls were in the 4th–5th grades with the exception of one girl in troop 33 who was in the sixth grade; §The other families in this troop had one adult (30%) or more than two adults (20%); ¶The percentages refer to families who had any household member with the listed health problems; \*\*The things parents wanted to change about their diets fell into the following categories: eat less or cut back on snacks (23% of respondents), less fat (31%), less meat (5%), less sugar and junk food (23%), eat more fruit and vegetable (18%) and eat healthier in general (15%).

siveness and 20 for negative expressiveness. A score that is 20 points higher in positive expressiveness, for example, would reflect answers that are quite a bit more positive (four points higher) on five (or 25%) of the positive expressiveness items.

The girls were asked to complete a 16-item Family and Feelings Questionnaire, which was designed for this study to capture how feelings can influence dietary intakes in a more direct way. The questionnaire was developed based on prior interviews with the 4th–5th grade girls about food and feelings, and this identified four areas where feelings were associated with food intake. The Family and Feelings Questionnaire therefore was designed to produce four scores: (1) food is positive in family life ( $\alpha$  of 0.63); (2) the girl eats to improve her mood ( $\alpha$  of 0.63); (3) mother tries to

control the girl's eating ( $\alpha$  of 0.65); and (4) girl avoids or regrets eating ( $\alpha$  of 0.71) (Casey & Norvilitis, unpublished research). As the scores were based on different numbers of items, they were z-transformed prior to analysis to place them on an equivalent scale. Responses were elicited for the way the respondent feels about the item across a 4-point scale: never, rarely, often and most of the time. Examples of items are: 'My mother and I have fun cooking together', 'I eat when I feel sad', 'My mother tries to get me to eat less' and 'I feel really bad after I eat a lot of food'.

#### Self-perceptions

The girls completed a 22-item measure tapping multiple aspects of self-perceived competence devel-

oped by Harter and Pike. This was the 'What Am I Like' Questionnaire, a well-validated and reliable instrument which yields self-perceived competence measures in four dimensions: social, physical/athletic, cognitive/academic and personal competence, as well as an overall index of self-perceived competence (Harter 1982). Items were given dichotomously, respondents were asked to indicate which is more like you, and answers of 'really true for me' or 'sort of true for me' were available for each sub-item. For example, for physical competence, 'Some kids do well at sports' BUT 'Other kids do badly at sports'. For academic competence, an example is 'Some kids can't figure out answers' BUT 'Other kids can figure out answers'. This instrument was tested in children from the third to ninth grade and has internal reliability  $\alpha$  ranging from 0.73 to 0.86 (Harter 1982).

### Procedure

A presentation regarding the programme was made at meetings of each of the four troops, and signed, informed consent was obtained from the parents and the girls who wished to participate. For completing all the questionnaires and agreeing to participate in the programme, each family received \$80 in vouchers that were valid towards Girl Scout Council activities or Girl Scout shop purchases. Each troop also received a \$200 voucher for Girl Scout activities. The study procedures were approved by the Wayne State University Human Investigation Committee.

The Girl Scout Nutrition Program began in January of 2000 with nutritional and psychosocial assessments at troop meetings. If parents did not attend the initial troop meeting, materials were sent home for them to complete. Subsequently, there were presentations at the troop meetings each month through June (five meetings), and a monthly newsletter and calendar were mailed to the girls' homes. The programme ended with a week-long nutrition day camp on the campus of Wayne State University during July of the same year. All measures in this report were taken before the nutrition education programme started.

### Analyses

Descriptive statistics were generated to characterize the study sample. Differences among troops in categorical variables were evaluated by Fisher's exact test. Differences among troops for either the demographic, dietary or social scale variables were evaluated by the non-parametric k-sample Kruskal-Wallis rank sum test.

Correlations between dietary variables and social scales were evaluated using Spearman rank correlations. The Spearman rank correlations were used to select pairs of variables for which there might exist a gradient of dietary intake by social scale score (as described more fully in *Results*). The scores were divided into quartiles, and gradients of intake, which are not necessarily linear, were examined. The presence of such gradients across quartiles of psychosocial scores was evaluated by the non-parametric k-sample Kruskal-Wallis rank sum test. In some instances when the gradient appeared monotonic, it was evaluated by the more powerful Jonckheere-Terpstra test for this specific pattern. All significance tests were two-sided. Corrections for multiple comparisons (type I error control) were performed by the method of Holm (1979).

## Results

### Demographic characteristics of the study population

There were wide demographic differences between troops, as shown in Table 1. The education level of parents was highest in the troop meeting at the suburban religious school, followed in rank order by parents of the city religious school troop, suburban public school troop and the city public school troop. Smoking by the parents and hours per day of girls' television viewing, both habits related to food consumption, were higher in troops with lower education levels. The prevalence of health problems within the household was greater in the two city troops, which were largely African American, than in the two suburban troops, which were largely Caucasian. These findings are in general agreement with studies carried

out on demographic and health factors in larger populations (James *et al.* 1997).

### Dietary factors and intakes

In response to an open-ended question of 'Are there things about your diet that you would like to change? If yes, what?', nearly all of the parents in each troop indicated 'yes' (Table 1) and the desired changes listed were all consistent with United States Department of Agriculture (USDA) Dietary Guidelines for Americans. Most parents also indicated that they had been trying to improve their diets. Most of the parents (60%) wanted to learn more about nutrition, except for troop City P where only a third of parents indicated this interest. This troop also had the youngest mean parent age and the lowest percentage of parents who were college graduates (Table 1). The concerns regarding a change towards a better diet in all troops were ease of preparation (for 75% of all parents), taste (for 84% of all parents) and availability (for 70% of all parents). Divergent replies were obtained with regard to the cost of food, which was classified as 'very important' by 45% of parents and 'not so important' by another 43% of parents.

Table 2 shows that suburban girls had lower intakes of fat and a higher number of family meals per week. In suburban troop R, many of the families followed kosher eating practices, which most likely impacted on weekly meat intakes. Parents in city troop P and suburban troop R had higher FV intakes than in the other two troops. The only other significant difference between troops in dietary intakes was intake of the soy isoflavone, genistein. Intake of soy foods was not reported by parents in the two city troops while 90% of parents in Suburban R and 25% of parents in Suburban P reported consumption of soy products, and this was reflected in the genistein intakes given in Table 2. In all troops, mean dietary fibre intakes were well below current recommendations (20–35 g day<sup>-1</sup> for adults and age +5 g day<sup>-1</sup> for children), and fat intake was above 30% of energy in all but one troop.

The relationships between parents' and girls' dietary intakes were also explored, and these Spearman correlation coefficients are shown in Table 3. The dietary intakes chosen for this analysis were those that the subsequent dietary education programme was emphasized: increasing FV intake, decreasing per cent energy from fat and increasing fibre intake. It

**Table 2.** Mean (SD) dietary data for Girl Scout troops\*

Characteristic	City troops		Suburban troops		P-value
	City R n = 10	City P n = 9	Suburban R n = 11	Suburban P n = 14	
Number of family meals cooked per week†	4.1 (1.8)	4.1 (1.6)	5.5 (1.1)	6.4 (1.9)	0.007
Family dinners eaten together per week†	4.5 (1.6)	3.9 (1.9)	5.5 (1.8)	4.8 (2.0)	0.211
School lunches per week†	2.3 (1.9)	3.0 (2.4)	1.2 (0.9)	2.7 (1.7)	0.171
Genistein intake (µg day <sup>-1</sup> ) ‡	0.0 (0.0)	0.0 (0.0)	850.0 (176.0)	378.0 (264.0)	0.0001§
Parents' FV servings per day	3.6 (1.6)	4.6 (3.0)	6.5 (3.4)	2.7 (1.0)	0.011
Girls' FV servings per day	2.0 (0.9)	3.3 (0.8)	2.9 (1.6)	2.5 (1.4)	0.199
Parents' per cent energy from fat	39 (7)	32 (11)	34 (8)	39 (4)	0.148
Girls' per cent energy from fat	35 (8)	38 (4)	25 (7)	32 (7)	0.003§
Parents' fibre intake (g day <sup>-1</sup> )	14 (8)	14 (8)	17 (7)	12 (3)	0.328
Girls' fibre intake (g day <sup>-1</sup> )	8 (3)	10 (2)	10 (43)	10 (4)	0.605

\*The parents' dietary intakes were assessed using the Block'98 Food Frequency Questionnaire and the girls' intakes were assessed with 3-day food records. There was one food record excluded due to an unusually high reported energy intake of 5155 kcal day<sup>-1</sup>; †The family eating patterns were taken from the study questionnaire the parents filled out; ‡Isoflavone intakes are from parent food frequency questionnaires. Mean daidzein intake was also zero in both city troops and significantly higher ( $P < 0.0001$  by the Kruskal–Wallis rank sum test) in the suburban troops, with means (SD) of 389 (538) and 253 (865) in suburban troops R and P, respectively, with all but one parent in troop R and three of 13 parents from troop P reporting any intake of soy foods; §Still statistically significant at the  $P < 0.05$  level after adjustment for 10 multiple comparisons by the Holm method. FV, fruit and vegetable.



**Table 3.** Correlations between girls' and parents' diets for fruit and vegetable (FV), fibre and fat intakes (Spearman correlation coefficient,  $r$ , and  $P$ -value underneath)\*

Girls' diets	Parents' diets			Number of times dieting <sup>†</sup>
	FV	Fibre	% fat	
FV	-0.324 0.041	-0.114 0.482	-0.328 0.039	-0.489 0.002 <sup>‡</sup>
Fibre	-0.180 0.265	0.188 0.244	-0.207 0.200	-0.175 0.286
% fat	-0.006 0.971	-0.258 0.108	0.112 0.490	0.050 0.762

\*The effective sample size was 40 in each case except for the 'number of times dieting' where the effective sample size was 39. The dietary data are from 3-day food records for the girls and the Block '98 Food Frequency Questionnaire for the parents; <sup>†</sup>Parents reporting of number of times dieting to lose weight on the Block '98 Food Frequency Questionnaire; <sup>‡</sup>Still statistically significant at the  $P < 0.05$  level after adjustment for 12 multiple comparisons by the Holm method.

should be noted that the food frequency questionnaire used for the parents captures usual dietary intakes, while the 3-day food records the girls used capture current intakes. We also examined the variable 'number of times dieting to lose weight' from the Block '98 Food Frequency Questionnaire that the parents completed. Interestingly, the girls' FV intake was negatively associated with the number of times the parent went on a diet to lose weight ( $r = -0.489$ ).

### Psychosocial scales

Although there were differences in socio-economic and demographic factors between troops, none of the psychosocial scales derived from the three psychosocial questionnaires differed significantly by troop either before or after adjustment for multiple comparisons. Summary scores for each instrument by troop are given in Table 4. The sign of the  $z$ -transformed scores for the Family and Feelings Questionnaire indicates whether a troop is below or above average for each scale. It is interesting to note that troop City R had the highest scores for most of the scales. Troop City P had both the highest positive family expressiveness and the lowest mean for the 'girl eats to improve mood' scale. Positive and nega-

tive family expressiveness were not highly correlated with each other (Spearman  $r = 0.067$ ), a finding that is consistent with previous research (Halberstadt *et al.* 1999). The dietary factors from the Family and Feelings Questionnaire were explored for correlations with the psychosocial scales from the 'What Am I Like' and Family Expressiveness Questionnaires, but none of the correlations were statistically significant after adjustment for multiple comparisons. The strongest associations were between the 'food is positive in family life' score with self-perceived personal ( $r = 0.308$ ,  $P = 0.035$ ), and overall ( $r = 0.317$ ) competence scores. The correlation of negative expressiveness with 'mother tries to control girl's eating' was also positive ( $r = 0.302$ ).

### Relationships of psychosocial scales and dietary intakes

The scales calculated from the three psychosocial questionnaires were examined for possible correlations with the dietary intakes of both the parents and girls (Table 5). The parental dietary intakes were examined for correlation with the psychosocial questionnaire that they filled out, the Family Expressiveness Questionnaire. The girls' dietary intakes in turn were examined for correlation with the scales derived from the Family and Feelings Questionnaire and the perceived self-competence scales that the girls filled out. We also examined correlations with the 'number of family meals cooked per week' variable that was obtained from the demographic questionnaire, as this may be associated with the degree of family closeness. The dietary intakes shown in Table 5 are shown for quartiles of psychosocial scores, with the highest quartile representing the group with the highest score. Statistical analyses were carried out, but as this was a small study, the directions of any trends are also potentially important. For example, the highest quartile in the 'girl avoids or regrets eating' scale was associated with one less family meal each week versus the lowest quartile, and FV intakes were about 0.5 serving per day lower.

For the perceived self-competence scales, correlations with  $r > 0.20$  were selected for analysis of potential gradients of dietary intakes or 'number of family

**Table 4.** Mean (SD) scores from psychosocial questionnaires in troops from different areas of Detroit

Scale	City troops		Suburban troops		P-value
	City R n = 10	City P n = 9	Suburban R n = 11	Suburban P n = 14	
Self-perceived competence*					
Social	24.2 (2.8)	21.9 (4.0)	21.5 (6.5)	22.1 (4.7)	0.527
Athletic/physical	23.8 (3.2)	21.1 (2.0)	20.1 (5.5)	21.2 (4.0)	0.160
Cognitive/academic	23.8 (3.6)	21.8 (3.6)	23.1 (4.2)	22.6 (4.2)	0.709
Personal	23.6 (5.1)	21.7 (3.3)	21.7 (6.1)	22.9 (4.2)	0.572
Overall	95.5 (11.6) <sup>†</sup>	86.6 (7.6)	86.4 (21.0)	88.8 (13.0)	0.332
Family and Feelings <sup>‡</sup>					
Food is positive in family life	0.20 (1.25)	-0.30 (1.14)	0.09 (0.41)	-0.03 (0.97)	0.685
Girl eats to improve mood	0.16 (1.02)	-0.52 (0.57)	-0.07 (0.92)	0.21 (1.15)	0.278
Mother tries to control girl's eating	0.39 (1.05) <sup>‡</sup>	-0.15 (1.05)	-0.10 (1.02)	-0.14 (0.92)	0.319
Girl avoids or regrets eating	0.00 (1.32)	-0.18 (0.79)	0.39 (1.14)	-0.12 (0.74)	0.679
Family Expressiveness <sup>§</sup>					
Positive	132 (32)	156 (13) <sup>¶</sup>	148 (16)	138 (21)	0.083
Negative	98 (28)	95 (32)	106 (23)	102 (25)	0.931

\*From the 'What Am I Like' Questionnaire filled out by the girls; <sup>†</sup>City troop R was not quite statistically different from the other troops combined with  $P = 0.0832$  for the overall self-competence scale and  $P = 0.0630$  for the 'mother tries to control girl's eating' scale; <sup>‡</sup>From the Family and Feelings Questionnaire filled out by the girls. These scores were  $z$ -transformed before being summarized in the table; <sup>§</sup>From the Family Expressiveness Questionnaire filled out by the parents; <sup>¶</sup>City troop P was significantly different from the other troops combined with  $P = 0.0312$ .

meals cooked per week' shown in Table 5. Those correlations included the negative association of social self-competence with girls' per cent energy from fat ( $r = -0.237$ ), suggesting lower fat intakes with higher social self-competence. Athletic/physical self-competence was negatively associated with the girls' FV intake ( $r = -0.229$ ) and the number of family meals cooked per week ( $r = -0.238$ ), which might be indicative of the time involved with participation in sports. The final self-competence scale to have  $r > 0.20$  with dietary variables was the cognitive/academic scale that correlated positively with the girls' fibre intakes ( $r = 0.302$ ).

Two scales from the Family and Feelings Questionnaire had correlations with dietary variables of  $r > 0.20$ , either positively or negatively. The 'girl avoids or regrets eating' scale was negatively correlated with the 'girls' % fat intake' ( $r = -0.251$ ) and with 'number of family meals cooked per week' ( $r = -0.259$ ). The 'girl eats to improve mood' scale was negatively associated with all the dietary variables, and the strongest of those correlations was 'girls' per cent energy from fat' ( $r = -0.398$ ) and 'family meals cooked per

week' ( $r = -0.202$ ). In the analysis by quartile of psychosocial scale, the fat intake gradient was nearly monotonic and was therefore explored further with a more powerful non-parametric test designed for ordered alternatives, the Jonckheere-Terpstra test. This test indicated a two-sided  $P$  of 0.003 that was still significant after adjustment for 16 multiple comparisons. This was a small study, however, and the directions of any trends are also important to consider.

## Discussion

### Comparisons among troops

This study afforded the opportunity to examine dietary practices and psychosocial factors in a diverse population. The hypothesis was that psychosocial variables would differ by Girl Scout troop and influence dietary intakes, but despite racial differences, there were few differences between troops in the psychosocial scales. Differences between troops, rather, were found in some of the health-related, social and dietary factors. The health conditions reported in this



**Table 5.** Mean dietary intakes of girls or parents by quartile of psychosocial scales, with higher quartiles representing higher scores on the scales\*

Dietary variable	Quartile of psychosocial scale score				P-value†
	Q1	Q2	Q3	Q4	
Social self-competence					
Girls' FV intake	3.1	2.1	3.0	2.8	0.367
Girls' per cent energy from fat	34	35	32	27	0.036‡
Athletic/physical self-competence					
Girls' FV intake	3.5	2.5	2.0	2.6	0.167
Family meals per week	5.9	4.8	5.5	4.5	0.160
Cognitive/academic self-competence					
Girls' fibre intake	9.2	8.6	8.8	12.5	0.041
Girl avoids or regrets eating					
Family meals per week	5.2	5.9	4.7	4.1	0.139
Girls' FV intake	3.2	2.4	2.2	2.6	0.285
Girls' per cent energy from fat	30	31	36	29	0.191
Girl eats to improve mood					
Girls' per cent energy from fat	35	36	31	28	0.003‡ §
Family meals per week	5.7	5.3	4.8	4.8	0.500
Positive family expressiveness					
Parents' FV intake	4.4	3.9	3.8	5.0	0.867
Parents' fibre intake	14	13	12	17	0.579
Negative family expressiveness					
Family meals per week	5.2	4.1	5.2	5.4	0.337
Parents' FV intake	3.1	4.2	6.3	3.7	0.153
Parents' fibre intake	11	14	18	14	0.222
Parents' per cent energy from fat	40	34	37	35	0.304

\*Psychosocial scales shown were selected based on the absolute magnitude of the Spearman rank correlations (see the *Methods* section for details); †From the Kruskal–Wallis k-sample rank sum test, except in two instances (marked with footnote) where the gradient of dietary intakes appeared to be monotonic across quartiles of social scale score; ‡Two-sided *P*-value from the Jonckheere–Terpstra test to detect a decreasing gradient of fat intake; §Still statistically significant at the *P* < 0.05 level after adjustment for 16 multiple comparisons by the Holm method. FV, fruit and vegetable.

small study by troop (Table 1) are consistent with national data indicating presence of health disparities in African Americans (Dreeben 2001). Parents in the two city troops, unlike parents from the two suburban troops, also reported no dietary intake of soy-containing foods (Table 2), and intake of soy foods by Western populations can be regarded as a health-conscious behaviour (Keinan-Boker *et al.* 2002). The suburban troops reported lower girls' fat intakes and a higher number of family meals eaten together, consistent with previous findings of increased parental presence at family meals being linked with better diets in children (Videon & Manning 2003). Parent smoking, however, was associated more closely with the type of school the troop attended than with their ethnicity (Table 1).

There were generally low correlations between dietary intakes of parents and girls (Table 3). The only correlation that was significant was the negative association of girls' FV intake with the number of times the parent went on a diet to lose weight. This is consistent with work of Birch & Fisher (1998), showing that maternal eating problems are linked with maternal restriction of children's diets, and this in turn impacts negatively on children's diets.

Overall, there were few differences in diet by troop. A very encouraging finding of this study, however, was that an overwhelmingly large proportion of parents indicated an interest in improving their diets in all the troops (Table 1). Even in city troop P, where only a third of parents were interested in learning more about nutrition, 89% of parents wanted to

improve their diets in at least one way. This indicates that nutrition education programmes may be more universally welcome, especially if they highlight specific tools that can help parents improve family diets versus more general nutrition education approaches.

### Relationships of social factors and diet

Despite the large ethnic and socio-economic differences among troops, the social scale scores did not differ significantly by troop (Table 4). We therefore examined the association of psychosocial factors with dietary intakes directly. The two psychosocial scales with the strongest correlation to dietary factors were overall and personal self-perceived competence of the girls (see *Results*). These were positively, albeit modestly, related with food being a positive factor in their family lives. From this, it could be suggested that girls' self-competence in general might be related in important ways to food as a positive family characteristic.

This programme was small, conducted within only four Girl Scout troops and the population was very diverse, but we did observe a statistically significant association of the girls' increased tendency to 'eat to improve their mood' with decreased fat intake (Table 5). This may be a positive finding, but it may also suggest that mood alteration goes with selection of particular, low-fat types of food, prominent among which are soft drinks, hard candy and juice. The other interesting finding was that fat intake was somewhat lower and fibre intake was somewhat higher among girls with high self-perceived competence on the social and cognitive scales, respectively. Other studies have shown a role for a related personal factor, self-efficacy, in better quality of children's diets (Ievers-Landis *et al.* 2003; Rimal 2003). Perhaps, families that fostered relatively higher self-competence and academic self-competence in their daughters also paid more attention to good dietary practices.

Our hypothesis that diet and psychosocial factors would vary by troop due to the ethnic and socio-economic differences present was not borne out by the data, but family and personal psychosocial factors were associated with diet. Previous studies have also shown the importance of family function and

parental role modelling on children's diets (Cullen *et al.* 1998; Tibbs *et al.* 2001; Ievers-Landis *et al.* 2003; Mitchell *et al.* 2003; Videon & Manning 2003; Wu *et al.* 2003). The potential for psychosocial factors to be an important influence on the diets of girls is therefore an area that should be explored further. In particular, the results shown here suggest that simple comparisons between ethnic groups may not adequately capture the nature of the complexity of family and psychosocial factors contributing to good dietary practices. Among children and young adolescents, who are just forming and consolidating their dietary habits and attitudes, multiple family and personal characteristics appear to interact with dietary habits. A greater understanding of these relationships may lead to improved implementation of guidelines for reducing health risk factors related to dietary habits.

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