

# Eating habits and eating behaviors by family dinner frequency in the lower-grade elementary school students

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**BACKGROUND/OBJECTIVES:** Recently, there has been an increased interest in the importance of family meals on children's health and nutrition. This study aims to examine if the eating habits and eating behaviors of children are different according to the frequency of family dinners.

**SUBJECTS/METHODS:** The subjects were third-grade students from 70 elementary schools in 17 cities nationwide. A two-stage stratified cluster sampling was employed. The survey questionnaire was composed of items that examined the general characteristics, family meals, eating habits, eating behaviors, and environmental influence on children's eating. The subjects responded to a self-reported questionnaire. Excluding the incomplete responses, the data (n = 3,435) were analyzed using  $\chi^2$ -test or t-test.

**RESULTS:** The group that had more frequent family dinners ( $\geq 5$  days/week, 63.4%), compared to those that had less ( $\leq 4$  days/week, 36.6%), showed better eating habits, such as eating meals regularly, performing desirable behaviors during meals, having breakfast frequently, having breakfast with family members ( $P < 0.001$ ), and not eating only what he or she likes ( $P < 0.05$ ). Those who had more frequent family dinners also consumed healthy foods with more frequency, including protein foods, dairy products, grains, vegetables, seaweeds ( $P < 0.001$ ), and fruits ( $P < 0.01$ ). However, unhealthy eating behaviors (e.g., eating fatty foods, salty foods, sweets, etc.) were not significantly different by the frequency of family dinners.

**CONCLUSIONS:** Having dinner frequently with family members was associated with more desirable eating habits and with healthy eating behaviors in young children. Thus nutrition education might be planned to promote family dinners, by emphasizing the benefits of having family meals on children's health and nutrition and making more opportunities for family meals.

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## INTRODUCTION

Adequate nutrition during childhood is important to physical growth and optimal health. Many studies, however, have reported inadequate nutrient intakes and poor eating habits of school-aged children [1-3]. According to the results of a recent Korea National Health and Nutrition Examination Survey (KNHANES), the diets of children aged 6-11 were below the recommended level for calcium (consuming 65% of Recommended Nutrient Intakes) and potassium (75% of Adequate Intakes), while the mean intakes of protein and sodium were more than two-folds of recommended level [4]. Only one-third of children aged 6-11 practiced two or more of four healthy dietary behaviors (moderating fat intake, reducing sodium intake, consuming sufficient fruits and vegetables, reading nutrition facts) that are suggested in Health Plan 2020 [4,5]. Poor eating habits of school-aged children include not eating a variety of foods, eating snacks

that are high in fat or sugar, frequent consumption of instant foods and skipping breakfast [1-3].

An increase in working mothers, economic growth and lifestyle changes have altered dietary patterns. Sung *et al.* [6] reported that the percentage of children taking part in family meals had decreased and children who eat alone had increased. Children eating alone, compared with those eating with family members, had meals with fewer side dishes and were less satisfied.

Family meals are defined as meals eaten with all or most family members [7,8]. Family meals serve several purposes: time for communication and interaction with family members, observation and opportunity to learn from parents, and time to eat together, resulting in the possibility to build family bonds and receive emotional and psychological support. The evening meal is important as it provides a significant portion of nutrient intakes compared to other meals and snacks [9]. A study reported that elementary school students more commonly

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shared a family meal at dinner than other meals [10].

Fruh *et al.* [11] reported many benefits of family meals on children and adolescents, including healthy food selection, academic success, having positive values and fewer behavioral issues (e.g., school problems, substance abuse and excessive weight loss). Several studies suggested that family meals help to improve dietary intakes and eating behaviors of children or adolescents [7,12-16]. Family meals are known to have a positive effect on emotional, psychological and physical health. A study with 5<sup>th</sup> and 6<sup>th</sup> graders found that children having more frequent family meals showed more positive self-rated mental health as well as physical health [17]. Children or adolescents having family meals more frequently indicated greater satisfaction with life and positive psychological feelings [10,12]. Kim *et al.* [18] reported that family meals and the environment for meals relieved psychological problems of children, especially aggression and emotional instability, and contribute to the emotional and social development of children. Therefore, nutrition education or nutrition service for children should encourage family meals and a supportive environment for meals in addition to providing nutrition information.

The importance of family meals has recently received attention, and studies on family meals have been done in the past several years [10,12,13,17,19]. Most of these studies, however, have been done regionally and focused on upper-grade elementary school students or adolescents, and mainly examined the status of family meals, perceptions and attitudes toward family meals. This study was conducted with young children (third-graders) from a nationwide sample and investigated if dietary life characteristics such as eating habits and eating behaviors of third graders were different by the frequency of family dinners.

## SUBJECTS AND METHODS

### *Study Design*

This study was a part of large-scale survey to examine dietary life, physical activity and related factors among school-aged children and adolescents. This study employed a cross-sectional survey design. A two-stage stratified cluster sampling design was used, and 70 elementary schools were chosen from a list of schools in 17 cities nationwide, taking into account the number of elementary schools in 17 cities and provinces. Another list of 70 schools from 17 cities was compiled, and these schools were asked to participate in case selected schools from sampling were unwilling to participate. This study was approved by the Institutional Review Board of Seoul Women's University (IRB-2013A-1).

### *Subjects*

Subjects were third-graders from 70 elementary schools sampled from a list of schools in 17 cities. After explaining the study to teachers (principals, class teachers or nutrition teachers), third graders of 3 to 4 classes from each school were asked to participate in the study. Parents or guardians were provided with information and gave written informed consent for their child's study participation. Students were informed that they can withdraw from the study if unwilling to respond to the survey questionnaire. Self-reporting data were collected from

4,549 third-graders in 2013. Excluding the data of incomplete responses on family meals or other study variables, data from 3,435 third-graders out of 4,549 data were used for statistical analysis. The completion rate was 75.5%.

### *Measurements*

A draft of the survey questionnaire was developed using literature reviews on dietary life, eating habits and eating behaviors of school-aged children; and then reviewed by 3 nutrition professors. After revision of the draft of the questionnaire, it was pilot-tested with 20 elementary school students to check understanding and the wording or sentences. The final questionnaire was developed and revised based on comments from nutrition experts and results of the pilot testing.

The survey questionnaire was composed of items examining general characteristics, family meals, eating habits, eating behaviors and environmental influence on children's eating. General characteristics included age, gender, weight, height, residential area (province), perceived stress in daily life, and the person who prepares the meal. Body mass index was calculated based on self-reported weight and height. Eating habits included the variety of foods, regular meals, size of meals, frequency of having breakfast, eating out, snacks (frequency, snack foods), behavior during meals, unbalanced diet and types of disliked foods [20-23]. Eating behaviors covered 12 items, with six items related to consumption of food groups, including grains, protein foods, vegetables, fruits, dairy products and seaweeds; six items on unhealthy eating behaviors such as eating fatty foods, sweets, soft drinks, salty foods, processed or instant foods, and eating snacks at night [22-24]. Each eating behavior item was assessed by frequency on 7-point scale from 'never' to '3 or more times a day', and then converted to number of consumption frequency of each food group per day for statistical analysis. Items on environmental influences included dietary life education, person who influences eating habits of subjects, and influence of TV advertisement on food selection [20]. On family meals, frequency of having breakfast and dinner with family members in the past week was asked [25]. The frequency of having dinner with family members was used as the variable to categorize subjects by family meals, as family meals were more often at dinner [10]. Family dinner was considered an important activity, as it is a time for interaction and communication among family members [16].

### *Data analysis*

Data of 3,435 third-graders were analyzed using SPSS (PASW Statistics 18.0; SPSS Inc., Chicago, IL, USA). Descriptive statistics, such as frequency, mean and standard deviation, were calculated. Based on items used in the Korea National Health and Nutrition Examination Survey (KNHANES) and the distribution of subjects on frequency of family dinners in this study, subjects were categorized into two groups; more frequent family dinners (dinner with family members 5 or more times per week) and less frequent family dinner (dinner with family members 4 or fewer times per week). Chi-square test or t-test was used to determine significant differences between groups in study variables of eating habits, eating behaviors and environmental influence. Statistical significance was set at  $\alpha = 0.05$ .

## RESULTS

### General characteristics of subjects by family dinner frequency

General characteristics of 3,435 subjects are shown in Table 1. The mean age was 8.8 years and 48.4% were boys. The mean height and weight was 133.6 cm and 31.3 kg, respectively, and mean BMI was 17.4. Subjects who had dinner with family members 5 or more days per week (group having more frequent family dinner) was 63.4%, and those who had dinner with family members 4 or fewer days per week (group having less frequent family dinner) was 36.6%. There was no statistically significant difference in gender, mean height, weight and BMI between the two groups.

The majority of subjects resided in Gyeonggi-Incheon (32.2%), Gyeongsang-do (31.6%) and Seoul (17.6%). Family dinner frequency was significantly different by residential area ( $P <$

0.001). In the group with less frequent family dinners, 56.4% resided in Seoul or Gyeonggi-Incheon, and subjects from Seoul or Gyeonggi-Incheon were 46.3% in the group with more frequent family dinners. Approximately half (51.6%) of subjects perceived stress in daily life as 'average.' Those who perceived less stress in life as 'a few' or 'none' was 30.3% in the group with less frequent family dinners, compared to 36.5% in the group with more frequent family dinners ( $P < 0.001$ ). Most subjects (87.5%) reported that the mother was the person who most often prepares the meal, and this was not significantly different by family dinner frequency.

### Eating habits of subjects by family dinner frequency

The results of subjects' eating habits are shown in Table 2. Two-thirds (66.7%) had meals 'regularly/very regularly' and 68.9% ate an adequate size meal. Compared to these, 45.5%

**Table 1.** General characteristics of subjects by family dinner frequency

Variables	Total (n = 3,435)	Family dinner frequency		t or $\chi^2$ <sup>4)</sup>
		≤ 4 days/week (n = 1,256)	≥ 5 days/week (n = 2,179)	
Age (yrs)	8.8 ± 0.6 <sup>1)</sup>	8.8 ± 0.6	8.8 ± 0.6	0.2
Height (cm)	133.6 ± 6.2	133.6 ± 6.3	133.6 ± 6.2	-0.1
Weight (kg)	31.3 ± 6.7	31.4 ± 6.7	31.3 ± 6.7	0.1
BMI (kg/m <sup>2</sup> )	17.4 ± 2.8	17.5 ± 2.8	17.4 ± 2.8	0.2
Gender				
Boys	1,664 (48.4) <sup>2)</sup>	614 (48.9)	1,050 (48.2)	0.2
Girls	1,771 (51.6)	642 (51.1)	1,129 (51.8)	
Total	3,435 (100.0)	1,256 (100.0)	2,179 (100.0)	
Residential area				
Seoul	606 (17.6)	260 (20.7)	346 (15.9)	36.8***
Gyeonggi-Incheon	1,111 (32.2)	449 (35.7)	662 (30.4)	
Chungcheong-do	257 (7.5)	82 (6.5)	175 (8.0)	
Jeolla-do	273 (7.9)	78 (6.2)	195 (8.9)	
Gyeongsang-do	1,087 (31.6)	359 (28.6)	728 (33.4)	
Others (Gangwon-do, Jeju-do)	101 (2.9)	28 (2.2)	73 (3.4)	
Total	3,425 (100.0) <sup>3)</sup>	1,256 (100.0)	2,179 (100.0)	
Perceived stress from daily life				
Very severe	125 (3.7)	52 (4.2)	73 (3.4)	21.4***
Severe	353 (10.5)	145 (11.8)	208 (9.7)	
Average	1,740 (51.6)	658 (53.6)	1,082 (50.5)	
A few	835 (24.8)	289 (23.5)	546 (25.5)	
None	319 (9.5)	84 (6.8)	235 (11.0)	
Total	3,372 (100.0) <sup>3)</sup>	1,228 (100.0)	2,144 (100.0)	
The person who most often prepares the meal				
Mother	2,897 (87.5)	1,044 (85.7)	1,853 (88.5)	10.7
Father	83 (2.5)	27 (2.2)	56 (2.7)	
Grandmother	273 (8.2)	118 (9.7)	155 (7.4)	
Housemaid	19 (0.6)	10 (0.8)	9 (0.4)	
Myself	20 (0.6)	10 (0.8)	10 (0.5)	
Others (aunt, etc.)	19 (0.6)	9 (0.7)	10 (0.5)	
Total	3,311 (100.0) <sup>3)</sup>	1,218 (100.0)	2,093 (100.0)	

\*\*\*  $P < 0.001$

<sup>1)</sup> Mean ± SD

<sup>2)</sup> n (%)

<sup>3)</sup> Numbers less than 3,435 in total of each variable are unanswered responses.

<sup>4)</sup> by t-test or  $\chi^2$ -test

**Table 2.** Subjects' eating habits by family dinner frequency

Variables	Total (n = 3,435)	Family dinner frequency		$\chi^2$ or $t^4$
		$\leq 4$ days/week (n = 1,256)	$\geq 5$ days/week (n = 2,179)	
<b>Variety of foods</b>				
Do not eat a variety of foods at all	69 (2.0) <sup>1)</sup>	23 (1.8)	46 (2.1)	2.9
Do not eat a variety of foods	450 (13.1)	166 (13.2)	284 (13.1)	
Average	1,349 (39.4)	509 (40.6)	840 (38.7)	
Eat a variety of foods	1,110 (32.4)	406 (32.4)	704 (32.4)	
Eat a variety of foods very much	450 (13.1)	151 (12.0)	299 (13.8)	
Total	3,428 (100.0) <sup>2)</sup>	1,255 (100.0)	2,173 (100.0)	
<b>Regularity of meals</b>				
Very irregular	44 (1.3)	16 (1.3)	28 (1.3)	23.2***
Irregular	119 (3.5)	51 (4.1)	68 (3.1)	
Neither irregular nor regular	977 (28.6)	408 (32.6)	569 (26.2)	
Regular	1,498 (43.8)	529 (42.3)	969 (44.7)	
Very regular	782 (22.9)	246 (19.7)	536 (24.7)	
Total	3,420 (100.0) <sup>2)</sup>	1,250 (100.0)	2,170 (100.0)	
<b>Size of meals</b>				
Very little	66 (1.9)	26 (2.1)	40 (1.8)	8.2
Little	490 (14.4)	204 (16.4)	286 (13.2)	
Adequate	2,350 (68.9)	843 (67.8)	1,507 (69.5)	
Much	450 (13.2)	150 (12.1)	300 (13.8)	
Very much	55 (1.6)	20 (1.6)	35 (1.6)	
Total	3,411 (100.0) <sup>2)</sup>	1,243 (100.0)	2,168 (100.0)	
<b>Behavior during meals</b>				
Just eating	669 (19.5)	287 (22.9)	382 (17.5)	45.4***
Conversation with family members	2,090 (60.8)	675 (53.7)	1,415 (64.9)	
Playing games or Watching TV	506 (14.7)	211 (16.8)	295 (13.5)	
Reading a book	141 (4.1)	67 (5.3)	64 (3.4)	
Others (Getting around, etc.)	29 (0.8)	16 (1.3)	13 (0.6)	
Total	3,435 (100.0)	1,256 (100.0)	2,179 (100.0)	
<b>Breakfast frequency (times/week)</b>				
Breakfast frequency (times/week)	6.2 $\pm$ 1.7 <sup>3)</sup>	5.9 $\pm$ 1.8	6.3 $\pm$ 1.6	-6.1***
<b>Breakfast frequency with family members (times/week)</b>				
0	416 (12.4)	214 (17.8)	202 (9.3)	620.7***
1-2	978 (29.1)	565 (47.1)	413 (19.1)	
3-4	509 (15.1)	232 (19.3)	277 (12.8)	
5-6	388 (11.5)	83 (6.9)	305 (14.1)	
7	1,069 (31.8)	105 (8.8)	964 (44.6)	
Total	3,360 (100.0) <sup>2)</sup>	1,199 (100.0)	2,161 (100.0)	

\*\*\*  $P < 0.001$ <sup>1)</sup> n (%)<sup>2)</sup> Numbers less than 3,435 in total of each variable are unanswered responses.<sup>3)</sup> Mean  $\pm$  SD<sup>4)</sup> by  $\chi^2$ -test or by t-test

of subjects responded that they 'eat a variety of foods/eat a variety of foods very much' (Table 2). Eating a variety of foods and size of meals were not statistically different by family dinner frequency. However, the group with more frequent family dinners showed a higher percentage of subjects having 'regular/very regular meals' compared to the group having less frequent family dinners (69.4% vs. 62.0%, respectively;  $P < 0.001$ ).

On behavior during meals, 'conversation with family members' was the most common behavior (60.8%), followed by 'just eating' (19.5%), 'playing a game or watching TV' (14.7%) and reading a book (4.1%). Those who had conversation with family

members during meals were higher in the group with more frequent family dinners (64.9%) than the group with less frequent family dinners (53.7%;  $P < 0.001$ ). Subjects reported that they had breakfast 6.2 times per week on average. The group with more frequent family dinners had breakfast 6.3 times per week on average, and the other group had breakfast 5.9 times per week ( $P < 0.001$ ). On breakfast frequency with family members, 41.5% reported having breakfast with family members 2 or fewer days per week. The group with more frequent family dinners had breakfast more than 5 times per week with family members at a higher rate than the group with

**Table 3.** Subjects' eating habits regarding food preference, snacks, eating out by family dinner frequency

Variables	Total (n = 3,435)	Family dinner frequency		$\chi^2$ or $t^4$
		$\leq 4$ days/week (n = 1,256)	$\geq 5$ days/week (n = 2,179)	
Unbalanced diet				
Yes	1,595 (46.4) <sup>2)</sup>	602 (48.7)	983 (45.1)	4.2*
No	1,840 (53.6)	644 (51.3)	1,196 (54.9)	
Total	3,435 (100.0)	1,256 (100.0)	2,179 (100.0)	
Foods disliked by subjects <sup>1)</sup>				
Grains and starches	111 (2.9)	41 (2.8)	70 (2.9)	12.7
Meat	153 (4.0)	62 (4.2)	91 (3.8)	
Fish	354 (9.2)	154 (10.5)	200 (8.4)	
Eggs	156 (4.0)	64 (4.4)	92 (3.8)	
Beans	935 (24.2)	369 (25.1)	566 (23.7)	
Vegetables	1,052 (27.2)	395 (26.9)	657 (27.5)	
Fruits	114 (3.0)	38 (2.6)	76 (3.2)	
Dairy products	380 (9.8)	136 (9.3)	244 (10.2)	
Seaweeds	431 (11.2)	143 (9.7)	288 (12.0)	
Others (Kimchi, etc.)	175 (4.5)	68 (4.6)	107 (4.5)	
Total	3,861 (100.0)	1,470 (100.0)	2,391 (100.0)	
Frequency of eating out (times/week)	1.3 $\pm$ 1.0 <sup>3)</sup>	1.3 $\pm$ 1.0	1.3 $\pm$ 1.1	-0.8
Frequency of eating snacks (times/day)	1.5 $\pm$ 0.9	1.5 $\pm$ 0.9	1.5 $\pm$ 0.9	0.4
Foods for snacks <sup>1)</sup>				
Cookie, Confectionery, Candy, Chocolate, Jelly	1,612 (17.0)	593 (17.4)	1,019 (16.8)	11.5
Ramen, Instant cup ramen	365 (3.9)	139 (4.1)	226 (3.7)	
Milk, Yogurt	1,674 (17.7)	573 (16.8)	1,101 (18.2)	
Fruit, Fruit juice	1,728 (18.3)	607 (17.8)	1,121 (18.5)	
Bread, Cake, Donut, Sandwich	1,139 (12.0)	406 (11.9)	733 (12.1)	
Fatty foods (Fried, Burger, Pizza)	173 (1.8)	59 (1.7)	114 (1.9)	
Flour based food (Gimbap, Tteokbokki, etc.)	638 (6.7)	225 (6.6)	413 (6.8)	
Carbonated drink, Sports drink	186 (2.0)	82 (2.4)	104 (1.7)	
Ice cream, Frozen desserts	1,340 (14.2)	505 (14.8)	835 (13.8)	
Others (Rice cake, Sweet potato, etc.)	600 (6.3)	212 (6.2)	388 (6.4)	
Total	9,455 (100.0)	3,401 (100.0)	6,054 (100.0)	

\*  $P < 0.05$ <sup>1)</sup> Multiple response<sup>2)</sup> n (%)<sup>3)</sup> Mean  $\pm$  SD<sup>4)</sup> by  $\chi^2$ -test or t-test

less frequent family dinners (58.7% vs. 15.7%;  $P < 0.001$ ).

#### Subjects' eating habits regarding food preference, snacks and eating out by family dinner frequency

Less than half of subjects (46.4%) had an unbalanced diet, eating only what they liked (Table 3). The percentage of subjects with unbalanced diets was higher in the group with less frequent family dinners (48.7% vs. 45.1%;  $P < 0.05$ ). Foods disliked by subjects were primarily vegetables (27.2%), beans (24.2%) and seaweeds (11.2%). Most frequently disliked foods were vegetables (26.9%), beans (25.1%) and fish (10.5%) in the group with less frequent family dinners; and vegetables (27.5%), beans (23.7%) and seaweeds (12.0%) in the group with more frequent family dinners. Foods that subjects disliked were not significantly different by family dinner frequency.

The mean frequency of snacking and eating out was 1.5 times per day and 1.3 times per week, respectively. The frequency

of snacking and eating out was not statistically different by family dinner frequency. Most commonly mentioned snacks were 'fruits/fruit juices' (18.3%), 'milk/yogurt' (17.7%), 'cookies/confectionery/candy/chocolate/jelly' (17.0%) and 'ice cream/frozen desserts' (14.2%). The percentage of subjects mentioning healthy snacks (e.g., fruits/fruit juices, milk/yogurt) was slightly higher in the group with more frequent family dinners (36.7% vs. 34.6%). However, this difference did not reach statistical significance.

#### Eating behaviors of subjects by family dinner frequency

Results on consumption frequency of food groups and unhealthy eating behaviors (e.g., eating fatty foods, sweets, salty foods) are presented in Table 4. Subjects consumed 'grains and starch foods' and 'vegetable side dishes at meals' 1.6 times per day on average. Mean consumption frequency was 1.3 times per day for 'eating fruits', 1.2 times per day for 'eating one or

**Table 4.** Eating behaviors of subjects by family dinner frequency

Variables	Total (n = 3,435)	Family dinner frequency		t <sup>3)</sup>
		≤ 4 days/week (n = 1,256)	≥ 5 days/week (n = 2,179)	
1. Eat grains and starches <sup>1)</sup>	1.6 ± 1.2 <sup>2)</sup>	1.5 ± 1.2	1.7 ± 1.2	-5.3***
2. Eat one or more foods in meat, fish, eggs, beans at meals	1.2 ± 1.0	1.0 ± 0.9	1.2 ± 1.0	-6.9***
3. Eat vegetable side dishes at meals	1.6 ± 1.1	1.4 ± 1.1	1.6 ± 1.1	-4.6***
4. Eat fruits	1.3 ± 1.0	1.2 ± 1.0	1.3 ± 1.0	-2.7**
5. Eat dairy products (e.g., milk, yogurt, cheese)	1.2 ± 0.9	1.1 ± 0.9	1.2 ± 0.9	-5.8***
6. Eat seaweeds	0.6 ± 0.7	0.6 ± 0.7	0.7 ± 0.8	-3.6***
7. Eat fatty foods	0.2 ± 0.3	0.2 ± 0.3	0.2 ± 0.3	-1.6
8. Eat sweets	0.5 ± 0.6	0.5 ± 0.5	0.5 ± 0.6	-0.3
9. Have soft drinks	0.2 ± 0.4	0.2 ± 0.4	0.2 ± 0.4	0.3
10. Eat spicy and salty foods	0.3 ± 0.4	0.3 ± 0.4	0.3 ± 0.4	-0.1
11. Eat processed foods or instant foods	0.3 ± 0.4	0.3 ± 0.4	0.3 ± 0.4	-0.7
12. Eat snacks late at night	0.2 ± 0.4	0.2 ± 0.4	0.2 ± 0.4	-0.4

\*\* P &lt; 0,01, \*\*\* P &lt; 0,001

<sup>1)</sup> Each item was measured by 7-point scales from 1 (almost not eating) - 7 (more than 3 times/day) and was analyzed by converting as the number of consumption (times a day).<sup>2)</sup> Mean ± SD, times/day<sup>3)</sup> by t-test**Table 5.** Environmental influence on eating by family dinner frequency

Variables	Total (n = 3,435)	Family dinner frequency		χ <sup>2</sup> or t <sup>3)</sup>
		≤ 4 days/week (n = 1,256)	≥ 5 days/week (n = 2,179)	
Dietary education experience during the last year				
No	1,437 (42.4) <sup>1)</sup>	535 (43.1)	902 (42.0)	0.4
Yes	1,952 (57.6)	706 (56.9)	1,246 (58.0)	
Total	3,389 (100.0) <sup>2)</sup>	1,241 (100.0)	2,148 (100.0)	
Most influential person on eating habits				
Parents	3,120 (92.0)	1,119 (90.3)	2,001 (93.0)	9.0*
Teacher	172 (5.1)	73 (5.9)	99 (4.6)	
Friend	12 (0.4)	7 (0.6)	5 (0.2)	
Others (Grandmother, etc.)	87 (2.6)	40 (3.2)	47 (2.2)	
Total	3,391 (100.0) <sup>2)</sup>	1,239 (100.0)	2,152 (100.0)	
Ways of obtaining nutrition information				
TV-Radio	512 (15.7)	192 (15.9)	320 (15.6)	4.0
Newspaper-Magazine	41 (1.3)	15 (1.2)	26 (1.3)	
Internet	235 (7.2)	95 (7.9)	140 (6.8)	
Book-Cookbook	370 (11.4)	141 (11.7)	229 (11.2)	
Teacher-Nutrition teacher	304 (9.3)	106 (8.8)	198 (9.7)	
Parents	1,685 (51.7)	611 (50.6)	1,074 (52.4)	
Friend	28 (0.9)	13 (1.1)	15 (0.7)	
Social network service	29 (0.9)	12 (1.0)	17 (0.8)	
Others (school newsletter, etc.)	54 (1.7)	22 (1.8)	32 (1.6)	
Total	3,258 (100.0) <sup>2)</sup>	1,207 (100.0)	2,051 (100.0)	
Influence of TV advertisement on food selection				
Not Influenced at all	539 (15.7)	185 (14.7)	354 (16.3)	2.5
Not influenced	570 (16.6)	218 (17.4)	352 (16.2)	
Average	1,748 (51.0)	650 (51.8)	1,098 (50.6)	
Influenced	464 (13.5)	164 (13.1)	300 (13.8)	
Influenced very much	106 (3.1)	38 (3.0)	68 (3.1)	
Total	3,427 (100.0) <sup>2)</sup>	1,255 (100.0)	2,172 (100.0)	

\* P &lt; 0,05

<sup>1)</sup> n (%)<sup>2)</sup> Numbers less than 3,435 in total of each variable are unanswered responses.<sup>3)</sup> by χ<sup>2</sup>-test or t-test

more protein foods at meals' and 'eating dairy products' (Table 4). All six food group items were significantly different by family dinner frequency. The group with more frequent family dinners consumed more often 'one or more protein foods at meals' ( $P < 0.001$ ), 'dairy products' ( $P < 0.001$ ), 'grains and starch foods' ( $P < 0.001$ ), 'vegetable side dishes at meals' ( $P < 0.001$ ), 'seaweeds' ( $P < 0.001$ ) and 'fruits' ( $P < 0.01$ ).

Among six unhealthy eating behavior items, the mean consumption frequency of sweets was relatively high (0.5 times per day). Mean consumption frequency of 'spicy and salty foods' and 'processed or instant foods' was 0.3 times per day. Mean frequency of 'eating fatty foods', 'having soft drinks' and 'eating snacks late at night' was 0.2 times per day. All six unhealthy eating behavior items were not statistically different between the two groups by family dinner frequency (Table 4).

#### *Environmental influence on eating by family dinner frequency*

More than half of subjects (57.6%) had experience of dietary education in the past year, and there was not statistically difference by family dinner frequency (Table 5). Most subjects (92.0%) reported that parents were the most influential persons on eating habits. The percentage of subjects indicating parents as the most influential persons on eating habits was slightly higher in the group with more frequent family dinners (93.0% vs. 90.3%;  $P < 0.05$ ). More than half (51.7%) of subjects mentioned that parents were the major source of nutrition information, followed by 'TV-radio' (15.7%), 'book-cookbook' (11.4%) and 'teacher-nutrition teacher' (9.3%). Only 16.6% of subjects reported that TV advertisements influenced food selection. There were no significant differences in source of nutrition information or influence of TV advertisements on food selection by family dinner frequency.

## DISCUSSION

This study examined the frequency of family meals, eating habits and eating behaviors of third-graders, and investigated if eating habits and eating behaviors varied by family dinner frequency. Children having meals with family members 5 or more days per week comprised 63.4% at dinner and 43.3% at breakfast, indicating that a family dinner was more common than a family breakfast. Children sharing meals with family members 2 or fewer days per week included 18.0% at dinner and 41.5% at breakfast. Consistent with this study, previous studies found that family meals were more frequent at dinner [10,13]. Study results suggested that a significant percentage of children had meals alone, indicating a need for nutrition education to address the importance and promote creating opportunities for and participating in family meals. According to the results of 2012 KNHANES [4], 95.4% of children aged 6-11 years had dinner and 77.8% of children had breakfast with family members on 4 or more days per week. The percentage of children having family meals was lower in the current study compared to the 2012 KNHANES, which may be partly due to slight differences in the definition of family meals. Studies on family meals reported that children or young adolescents were likely to have meals with family members more frequently than high school students, suggesting a relationship between the

family meal and age [10,12,13,16]. Therefore, the practice of having meals with family members needs to be formed early.

Among general characteristics, family dinner frequency was related to residential area ( $P < 0.001$ ) and perceived stress from daily life ( $P < 0.001$ ). This result suggested that children living in metropolitan areas may have less opportunity to share family meals due to parental or personal busy schedules. Subjects with more frequent family dinners showed less perceived stress in daily life. This finding supports previous studies that family meals positively impact the emotional stability, academic success and healthy eating habits of children [11,26]. Family dinner frequency was not related to general characteristics such as gender and BMI in this study. In a study with adolescents in New Zealand, Utter *et al.* [15] found no association between family meal frequency and BMI. However, family meals were more common for boys than girls [15], which was partially consistent with data of the current study.

With respect to eating habits, children with frequent family dinners showed more desirable eating habits such as consuming regular meals, exhibiting good behavior during meals (e.g., conversation with family members), eating breakfast, and having breakfast with family members more frequently ( $P < 0.001$ ). It may be possible to form a habit of eating meals regularly by having dinner with family members on a regular schedule. Our data supported the previous finding that those eating family meals more frequently were less likely to skip breakfast [14,15].

Children who had family dinner more frequently were significantly more involved in conversation with family members during meals ( $P < 0.001$ ). A previous study showed that speaking with family members was the most commonly cited reason by adolescents for enjoying family meals [19]. Similar to the current study, previous studies on elementary school students revealed that conversation with family members was the most common behavior during meals [2,10,27,28]. This study found that a significant percentage of children in the group with less frequent family dinners exhibited undesirable behavior during meals, such as 'playing a game or watching TV', 'just eating', 'reading a book' and 'getting around'. Coon *et al.* [29] found that elementary school children watching TV at two or more meals per day had a lower intake of nutrient-rich food and higher intakes of processed foods and soft drinks, compared to children with families that watched TV less often during meals. Feldman *et al.* [7] reported that those who watched TV during family meals had undesirable eating behavior, such as consuming fewer vegetables and drinking more soda.

The percentage of picky eaters was significantly lower among children with more frequent family dinners. This finding is similar to a study that reported middle school students sharing more frequent family meals were less likely to eat only what they like, more likely to eat meals slowly and eat adequately, suggesting a positive impact of family meals on dietary behaviors [12]. Foods that children disliked were primarily vegetables, beans and seaweeds in the current study, which is similar to other studies on elementary school students [1,30]. Nutrition education may incorporate strategies to increase vegetable consumption by changing beliefs regarding vegetables, increasing self-efficacy of eating vegetables, providing opportunities to

taste and have vegetables at meals or as snacks. The frequency of eating out and eating snacks or snack foods was not significantly different by family dinner frequency. Haapalahti *et al.* [31] reported that children with regular family dinners showed a tendency to consume sweets and fast foods less often. Husby *et al.* [32] suggested that a dietary environment at home needs to be modified in a healthy way because children were more likely to eat meals and snacks at home.

Results on eating behaviors showed that consumption of grains, protein foods, dairy products, vegetables, seaweeds ( $P < 0.001$ ) and fruits ( $P < 0.01$ ) was significantly more frequent in children with more frequent family dinners. This suggests that family meals have a positive influence on consumption of each food groups by children. However, it is possible that some statistically positive associations between some eating behaviors and family dinner frequency were partly due to the large sample size. Study results suggest that nutrition education may be naturally taught at family meals by talking with children and being a role model of healthy eating behaviors. Consistent with the current study, Gillman *et al.* [16] reported that increasing the frequency of family dinners with children was related to higher consumption of fruits and vegetables, and higher consumption of nutrients including fiber, folate, calcium and iron. Studies with adolescents revealed that the number of family meals or family dinners was positively related to healthy eating behaviors such as increased intakes of fruits, vegetables, dark-green vegetables, grains and calcium-rich foods, and negatively associated with soft drinks [7,8,12,14].

In contrast to the positive relationship of family dinners and some eating behaviors in the current study, unhealthy eating behaviors such as consuming high-fat foods, sweets, soft drinks, salty foods, processed or instant foods and eating snacks late at night were not significantly different by frequency of family dinner. A previous study indicated that results on less healthy behaviors (e.g., fast-foods, sweets, fried foods, snack foods) were inconsistent [7,15]. This may be attributed snack foods and sweets being accessible in living environments but not typically consumed at family meals.

Physical and social environment may be important factors in influencing eating habits and eating behaviors of children. In this study, subjects indicated that parents were the most important source of nutrition information and persons with influence on the eating habits of children. More parental influence was reported by the group with more frequent family dinners. Oh *et al.* [33] found that children with a working mother felt more stressed in daily life and scored lower in dietary habits. Another study [34] videotaped children and families during a family dinners and reported that a parent's affective expression during family meals was associated with a kindergarten child's social competence. Videon-Manning [14] reported that parental presence at family dinners was positively related to an adolescent's healthy eating behaviors such as consuming fruits, vegetables and dairy products. Findings indicate that parents have significant influence on the eating behaviors of children and adolescents. Therefore, consistent attention and support for parents on children's eating habits are needed.

The strength of the current study was large representative sample of children, covering 17 cities in Korea. However, there

were some limitations. First, a cross-sectional survey was used, preventing investigation of causal associations among variables. Second, family dinner frequency was used as a measure of family meals and more detailed information on family meals (e.g., quality of meals) was not obtained.

With a large and representative sample, this study showed that children with frequent family dinners had desirable eating habits, such as eating regular meals, eating breakfast, exhibiting desirable behavior during meals and less likely to have an unbalanced diet. The frequency of consuming a variety of foods, including grains, protein foods, vegetables, fruits, dairy products and seaweeds was higher in children with frequent family dinners. Based on this study, nutrition education is needed to promote creating opportunities to have meals or dinners with family members, and stressing the importance and benefits of family meals. Nutrition education should also include parents, as they were identified as having significant influence on the eating habits of children, and strategies to change the physical and social environment of eating to increase the frequency of family meals.

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