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Parental feeding practice is associated with child's body mass index in Thai school-aged children

A case study in Don Tum district, Nakhon Pathom, Thailand

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Abstract

Purpose – Parental feeding practice (PFP) plays an important role in child's eating behavior and weight status, but less information is available about its role in the Thai family setting. The purpose of this paper is to examine the influence of PFP on child's gender and body mass index (BMI).

Design/methodology/approach – Participants included 227 parents-child dyads from the suburban area of Nakhon Pathom province, Thailand. Children aged 9-12 years and parents who were either child's mother, father or grandfather/grandmother were enrolled in the study. Body weight, height, waist circumference and body fat were measured in all children. Eating behavior of each child was assessed by using child's eating questionnaire. Parents also provided their feeding practices in child feeding questionnaires. Information on household food security was also obtained from children's parents.

Findings – There was significant difference in eating behaviors and home environment between child's genders. For child's eating behavior, mean total eating scores of girls were significantly greater ($p = 0.002$) than that of boys and that the inappropriate home environment was more found in families of boys than girls. Regarding feeding practice, parents used more food restriction ($p = 0.008$) and monitoring on child's eating ($p = 0.042$) in girls than boys. Parents put more pressure to eat on the normal weight than obese children ($p = 0.001$). Regression analysis revealed that, apart from parental BMI and household income, PFPs have a significant impact (15.6 percent explained variance) on child's BMI.

Originality/value – This study highlights the importance of being aware of child's gender and weight status when feeding practices were provided to them. Nutrition education for parents should take account for parents' perceptions and concerns as well as the modification of feeding practices to improve children's eating behaviors.

Keywords Body mass index, Feeding practice, Pressure to eat, Restriction, Thai children

Paper type Research paper

Introduction

All children should have access to the adequate nutritious food that could promote their optimal physical growth and development. Parents play a key role in their child's eating behavior and food intake. Emerging evidence indicated that parental control in child feeding could impede child's ability to self-regulate his/her food intake, particularly, when the child

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was exposed to the external cues, such as large food portion size[1] or rewards[2] leading to increase food consumption. Additionally, restriction of unhealthy foods or snacks has been shown to increase child's food preference and intake of the restricted food[3, 4]. Pressuring the child to eat more has been observed to reduce food consumption and negative attitude on the food he/she was pressured to eat[5]. One study showed that girls' negative emotion about "eating too much" foods was associated with parental restrictive feeding practices[6], and child's gender moderated the relation between restriction and body esteem in girls but not boys[7]. The association between parental feeding practices (PFPs) and children's weight status has been extensively studied and restriction was associated with either higher[8, 9] or lower child's BMI[10], while "pressure to eat" was associated with lower BMI in both preschool[11] and school-aged children[12, 13].

Household food security (HHFS) is defined as all household members can access to sufficient foods at all times to meet their nutrient requirements to be healthy[14]. The relationship between household food insecurity (HHFIS) and obesity in children and adolescent has been investigated in cross-sectional studies, of which mixed results were found, i.e. positive association[15, 16] and no association[17, 18]. Similarly, the results from longitudinal studies also indicated both positive[19] and no association[20, 21] between HHFIS and childhood obesity. The evidence for positive association was that food-insecure children frequently consume high-caloric food[22, 23]. HHFIS also affected the dimension of PFP. Due to low income and the food-insecure household, the family relied on the use of high-energy supplement to the children[24], and low vegetable and fruit consumption was commonly found in the families[25].

In Thailand, the prevalence of obesity in school children was 16.3 percent in urban and 7.7 percent in rural area, and that obesity rate was higher in the older than younger children[26]. Childhood obesity is caused by many factors. Besides the genetic predisposition, it is assumed that family environment, such as HHFIS and inappropriate parental feeding style, could contribute to obesity in children. However, less information on these factors was available for Thai children. Previous study primarily revealed that parental control over child's food intake was one of the risk factors[27]. However, the term of parental control in that study covered various aspects of feeding strategies to reduce child's food intake. Since different child feeding practices contribute to the difference in child's food responsiveness, hence, the aim of this study was to explore on the relationship of some specific feeding practices and home environment to eating behaviors and nutritional status of school-aged children.

Material and method

The study was carried out in Don Tum, one of the districts in Nakhon Pathom province, Thailand, which is about 51 km far from Bangkok. Don Tum district comprised of eight sub-districts which covered 69 villages and had a populations of 47,553 people. The majority of populations were agricultural workers.

Participants

The participants consisted of 227 parent-child dyads living in the same household. Children were studying in Grade 4-6 in government primary schools. Four sub-districts of Don Tum, namely, Baan-Luang, Lum-Hoei, Sam-Ngam and Huai-Duan, were randomly selected for the study. For each sub-district, one primary school was selected as target school. The sample of participants selected is shown in Figure 1.

Sample size was calculated as:

$$N = \left(\frac{Z\alpha}{2}\right)^2 \frac{P(1-P)^2}{d}$$

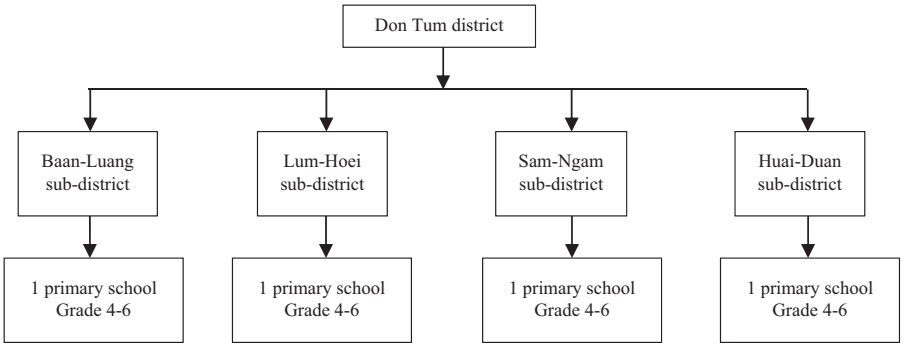

Figure 1.
Study design for sample selection

where P represents prevalence of obese children in Nakhon Pathom as 14.9 percent[28] and the allowance error (d) as 5 percent to get the total 195 parent-child dyads. To cover the drop-out rate of participants, the additional 10 percent of number of total participants was added to the calculated sample size and the final target of participants became 215 parent-child dyads.

The parent was either child's mother, father or other relatives, i.e. who was the most responsible person for taking care of the child's diet. The study protocol was reviewed and approved by the Mahidol University Central Institutional Review Board (MU-CIRB 2015/166.0311). Written-informed consents were obtained from the parents and children for their participation in the study.

Assessment of PFP

The assessment of PFP was done using the questionnaires modified from child feeding questionnaires which were developed by Birch *et al.*[29]. The question items included three domains: restriction, pressure to eat and monitoring on the child's eating during the past 12 months. "Restriction" was the strategy that parents used to restrict the child's access to foods (eight items), "pressure to eat" was the strategy that involved the tendency of parents to pressurize the child to eat more, particularly at mealtime (four items) and "monitoring child's eating," was the extent feeding strategy in which the parent kept track on the child's eating. The possible responses to each item were as follows: never done (assigned 1 point), one to three days/month (2 points), one to two days/week (3 points), three to four days/week (4 points), five to six days/week (5 points) and every day (6 points). The higher score indicated higher control over the child's eating. Reliability test was performed in a sample of 56 mother-child dyads living in the Phuttamonthon district, Nakhon Pathom province. The reliability tested by Cronbach's α was 0.86.

Assessment of HHFS

Assessment of HHFS during past 12 months was done using the guide of Bickel *et al.*[30] with some modified questionnaires. The questionnaire consisted of ten items which covered the aspects of the capability of household members to buy or access to various kinds of foods, and the strategies on food management and food allocation within the household when there was food shortage or insufficient foods. The possible responses to each item were as follows: never (assigned 1 point), one to three days/month (2 points), one to three days/week (3 points), three to four days/week (4 points), five to six days/week (5 points) and every day (6 points). The higher total score indicated higher HHFIS. Reliability test was performed in a sample of 56 mother-child dyads living in the Phuttamonthon district, Nakhon Pathom province. The reliability tested by Cronbach's α was 0.87.

Data collection

Anthropometry. After obtaining the written consent forms from parents and children, the research team made the appointment with the participants. The anthropometry measurement was performed in each child at school in the morning. Standing height was measured using stadiometer (Stanley-Mabo, France). The children were asked to remove the shoes and stand erect such that buttocks and shoulders were in contact with the wall. The height was measured to the nearest 0.1 cm. Body weight and total body fat were measured using tetra-polar bioelectrical impedance analyzer (Tanita^{R}, InnerScan Model BC-545, Tokyo, Japan). The information of gender, child age and height was entered into the software program of the instrument. After stepping on the platform, the subject was instructed to hold the electrode with both handgrips for one minute until the total body fat value was determined. The obese child was categorized by BMI-for-age *Z*-score of > 2 SD of median (2007 WHO Growth Reference). For waist circumference (WC) measurement, the non-stretch tape was positioned horizontally at the umbilicus level. Hip circumference (HC) was measured at the level so that maximum circumference could be placed over the buttocks. Both WC and HC measurement were performed twice and the average value was used as data.

PFP and child's eating behavior

Questionnaires were sent to the children's parents at home to obtain the demographic information of the HHFS, parents' perception on children's nutritional status and feeding strategies that parents provided to the children. Eating behaviors of children were assessed by using self-administered questionnaires. The question items included type of foods and consumption frequency that they performed (14 items) as well as family food environments (six items) that influenced children's eating. Higher eating score indicated proper eating habits in children. Pre-test of child's eating questionnaire was done in 50 mother-child dyads and the reliability of questionnaires was tested by Cronbach's α, which was 0.52.

Data analysis

Data analysis was done by using Statistical Package for Social Science (IBM SPSS Statistics for Windows, Ver.19, IBM Corp., Armonk, NY, USA).

The results of demographic information were presented as mean $\pm$ SD and as proportion. Differences in proportion of participants regarding children's eating and PFP between gender, and between the obese and normal weight children were analyzed by using χ^2 test. Feeding practice scores were also calculated and interpreted. Multiple linear regression using stepwise method was applied to determine the factors that were associated with children's BMI. Significant level was set at $p < 0.05$.

Results

Table I shows the demographic characteristics of children's household. Of the total 227 parent-child dyads, 57.3 percent of parents were children's mothers, 16.7 percent were children's fathers, 19.8 percent were grandmothers/grandfathers and 6.2 percent were other relatives. The majority of parents completed education at primary and secondary school levels. In total, 26 percent of parents were farmers and labor workers, while 24.7 percent were administrative officers, 24.2 percent were housewives and 6.2 percent were the executive staff. Most households, i.e. 48.9 percent had five to seven household members and 71.8 percent of parents had one to two children. Regarding to the household income, it was revealed that 46.2 percent of households had income equal or less than 10,000 baht per month and 37.3 percent had income between 10,001 and 20,000 baht per month. Most households, i.e. 97.3 percent indicated that money expense for household's food and beverages was equal or less than 5,000 baht per month.

Characteristics	*n* (%)
Child's parent	
Father	38 (16.7)
Mother	130 (57.3)
Grandmother/grandfather	45 (19.8)
Other relatives	14 (6.2)
Parent's BMI (kg/m^2)	24.67 ± 4.47[a]
Parental education	
Uneducated	11 (4.9)
Primary level	102 (44.9)
Secondary level	96 (42.3)
Diploma	10 (4.4)
Bachelor and higher	8 (3.5)
Parental occupation	
Housewife	55 (24.2)
Administrative officer	56 (24.7)
Small trade	30 (13.2)
Agriculture/labor worker	59 (26.0)
Executive staff	14 (6.2)
Others	13 (5.7)
Household members (persons)	
1-2	4 (1.8)
3-4	89 (39.2)
5-7	111 (48.9)
> 8	23 (10.1)
No. of household member	5.22 ± 2.10[a]
Total children of parents (children)	
1-2	163 (71.8)
> 2	64 (28.2)
No. of children	2.17 ± 0.91[a]
Child order (child)	
1st	107 (47.1)
2nd	89 (39.2)
3rd	28 (12.3)
4th	1 (0.4)
5th	2 (0.9)
Household's income (baht/month)	
< 10,000[b]	104 (46.2)
10,001-20,000[b]	84 (37.3)
20,001-30,000[b]	20 (8.9)
> 30,000[b]	17 (7.6)
Money expense for family foods and beverages (baht/month)	
< 5,000[b]	215 (97.3)
5,001-10,000[b]	6 (2.7)

Notes: $n = 227$. [a]Mean ± SD; [b]1 USD = 33.92 baht

Table I. Demographic characteristics of households and children

The nutritional status and eating behaviors of children is presented in Table II. Mean BMI-for-age *Z*-score of boys was significantly higher than that of girls and BMI values of both genders were within the normal range. The height and total body fat of girls were significantly higher than that of boys ($p = 0.027$ for height and $p = 0.028$ for body fat), whereas mean WC value of girls was smaller than that of boys ($p = 0.023$). Regarding to

	Boys ($n = 109$)	Girls ($n = 118$)	p-value
Child's age (years)	10.74 ± 0.99	10.57 ± 0.93	0.180*
Body weight (kg)	42.10 ± 15.63	41.20 ± 14.14	0.818**
Height (cm)	141.32 ± 8.01	143.81 ± 8.74	0.027*
BMI-for-age Z-score	0.99 ± 1.87	0.49 ± 1.74	0.041*
Waist circumference (cm)	71.25 ± 15.72	66.61 ± 13.18	0.023**
Hip circumference (cm)	79.96 ± 11.86	80.52 ± 11.81	0.725*
Total body fat (%)	19.53 ± 11.75	21.83 ± 10.83	0.028**
Child's eating behavior			
Total eating score	57.57 ± 8.18	60.87 ± 8.05	0.002*
The child ate too fast and had a large meal (days/week)			
> 5	17 (15.6)	6 (5.1)	0.009[a]
< 5	92 (84.4)	112 (94.9)	
The child consumed various colored vegetables (days/week)			
> 5	16 (14.7)	28 (23.7)	0.085[a]
< 5	93 (85.3)	90 (76.3)	
Whenever the siblings could not eat all food on the plate, the child would finish it (days/week)			
> 5	6 (5.5)	3 (2.5)	0.250[a]
< 5	103 (94.5)	115 (97.5)	

Notes: Percent values are shown in parentheses. p-values are measured by *unpaired Student's t-test, **Mann-Whitney test and [a]χ^2 test

Table II.
Nutritional status and eating behaviors of children by gender

eating behavior, significantly higher proportion of boys who ate fast with a large meal portion was found when compared to girls ($p = 0.009$).

Table III presents the characteristics of home environment and PFPs provided to children. There was no difference in HHFS between genders. For home environment, the results showed significantly higher proportion of boys who reported that their parents kept more crispy snacks ($p = 0.025$) and dessert/candy at home ($p = 0.004$) when compared to proportion of girls. Similarly, boys more often insisted their parents to buy the advertised foods/snacks for eating than girls did ($p = 0.044$). Regarding feeding practice, the parents reported that they used greater restriction ($p = 0.008$) and greater monitoring ($p = 0.042$) in girls than boys.

The data were also analyzed to see whether there was any difference in PFP between the obese and normal weight children (Table IV). Although the obese children had significantly greater BMI Z-score, WC and HC and total body fat ($p = 0.001$) than normal weight children, there was no difference in eating pattern and total eating score between two groups. Table V showed no significant difference in HHFS and home food environment between the normal weight and obese children. However, significantly higher pressure to eat by parent was more observed in the normal weight than in obese children ($p = 0.001$). The results from multiple linear regression (Table VI) indicated that the change in child's BMI Z-score was significantly associated with PFP, i.e., restriction and pressure to eat, child's gender, parent's BMI and household income.

Discussion

The results from our study demonstrated that PFP, but not HHFIS, was associated with child's body mass index (BMI). Although mean body weight and BMI of boys and girls were not primarily different, it was observed that girls had better eating behaviors as indicated by higher eating score than boys. Higher proportion of boys who had improper eating behaviors like eating fast with having a large meal portion was found when compared to

Characteristics	Boys ($n = 109$)	Girls ($n = 118$)	p-value
Household food security (tertile score)			0.360*
1st	36 (33.0)	46 (39.0)	
2nd	39 (35.8)	32 (27.1)	
3rd	34 (31.2)	40 (33.9)	
Home environment to promote child's unhealthy eating			
Parent kept more deep-fried food at home (days/week)			0.256*
> 5	24 (22.0)	19 (16.1)	
< 5	85 (78.0)	99 (83.9)	
Parent kept more crispy snack at home (days/week)			0.025*
> 5	12 (11.0)	4 (3.4)	
< 5	97 (89.0)	114 (96.6)	
Parent kept more dessert/candy at home (days/week)			0.004*
> 5	10 (9.2)	1 (0.8)	
< 5	99 (90.8)	117 (99.2)	
Parent kept more carbonated beverage at home (days/week)			0.673*
> 5	13 (11.9)	12 (10.2)	
< 5	96 (88.1)	106 (89.8)	
Parent kept fruit juice at home (days/week)			0.883*
> 5	27 (24.8)	28 (23.9)	
< 5	82 (75.2)	89 (76.1)	
Child insisted parent for buying TV-advertised snack (days/week)			0.044*
> 5	10 (9.2)	3 (2.5)	
< 5	99 (90.8)	115 (97.5)	
Parental feeding practice score	Mean ± SD	Mean ± SD	
Restriction	2.42 ± 1.07	2.82 ± 1.15	0.008**
Pressure to eat	3.17 ± 1.57	3.52 ± 1.57	0.081**
Monitoring on child's eating	3.10 ± 1.62	3.56 ± 1.75	0.042**

Notes: Percent values are shown in parentheses. p-value by *χ^2 test and **Mann-Whitney test, Significant level was set at $p < 0.05$

Table III.
Home environment and parental feeding practice provided to children by gender

girls. This might be explained by the fact that the age between eight and ten would be the time in body esteem during physiological development[31], with one previous study found no significant difference in body dissatisfaction between boys and girls[32], while another indicated lower satisfaction with physical appearance was associated with being female and parent perception of child overweight[33]. We did not find any difference in HHFS between genders. The discrepancy of PFP providing to gender was of interest that parents use higher restriction and higher monitoring in girls than in boys. The study by Birch and Fisher[34] in families with young daughters revealed that mothers' dietary restrictions and perceptions of their daughters' risk of overweight predicted feeding practices and daughters' eating behaviour. Feeding practice was also influenced by the parental concern about child's weight. Former studies indicated that mothers reported more concern for their daughters' weight[35, 36], thereby, contributed to more restriction on children's food intakes[36].

Home environment was considered as one of the important factors that affected unhealthy eating in children. Our results showed that in families whose children were boys, parents kept more unhealthy foods; like crispy snacks and dessert/candy at home. Longitudinal study in school children demonstrated that home availability of snacks was associated with higher snack consumption in children[37]. Boys in families from our study tended to insist more their parents to buy the TV-advertised snacks for their eating than girls did. Prolonged television viewing could contribute to the development of overweight through food advertisement/commercials on TV that urged children[38] and adolescents[39] to consume more snacks which have a high content of sugar, fat and salt. Our results

	Normal weight ($n = 112$)	Obese ($n = 60$)	p-value
Child's age (years)	10.70 ± 0.97	10.64 ± 0.94	0.680*
Body weight (kg)	32.79 ± 6.14	60.50 ± 12.41	0.001**
Height (cm)	140.88 ± 8.38	146.9 ± 7.03	0.001*
BMI-for-age Z-score	−0.43 ± 0.79	3.06 ± 0.86	0.001**
Waist circumference (cm)	59.24 ± 5.25	88.18 ± 10.78	0.001**
Hip circumference (cm)	73.41 ± 6.11	94.97 ± 8.14	0.001**
Total body fat (%)	13.62 ± 4.38	36.89 ± 6.77	0.001**
Child's eating behavior	Mean ± SD	Mean ± SD	
Total eating score	59.47 ± 8.39	60.18 ± 7.84	0.596**
The child ate too fast and had a large meal (days/week)			0.255[a]
> 5	106 (94.6)	54 (90.0)	
< 5	6 (5.4)	6 (10.0)	
The child consumed various kind of vegetables (days/week)			0.735[a]
> 5	91 (81.3)	50 (83.3)	
< 5	21 (18.8)	10 (16.7)	
Whenever the siblings could not eat all food on the plate, the child would finish it (days/week)			0.696[a]
> 5	108 (96.4)	57 (95.0)	
< 5	4 (3.6)	3 (5.0)	

Notes: Obese child: BMI-for-age Z-score > ±2 SD (2007 WHO Growth Reference). Per cent values are shown in parentheses. p-values are measured by *unpaired Student's t-test, **Mann-Whitney test and [a]χ^2 test

Table IV. Anthropometry and eating behaviors of children by nutritional status

support the perception that a positive family food environment is needed for improving the child's physical activity and diet quality.

After comparing the normal weight and obese children, we did not find any difference in HHFS and home environment affecting child's eating between two groups. For HHFS, the responses from the majority of children's parents of two groups indicated that they could easily get access to most foods. Previous longitudinal studies in children have shown no[20, 21] or positive association[19] between food insecurity and childhood obesity, and that positive association might be attributable to low-quality diet and poor eating habits in children[22, 23]. Although the eating pattern and eating score of the obese children were not different from that of the normal weight children, it was observed that parents put more pressure to eat on their normal weight than the obese children. This could be explained by the fact that there might be some parents, i.e. 16.5 percent (data not shown), who perceived their normal weight children as underweight, thereby they tended to pressurize the children to eat more. This was consistent with the results of former studies that the use of pressure to eat increased as mothers perceived their child to be thinner[36, 40].

Our analyses by multiple linear regression indicated that child's BMI was associated with child's gender and parent's BMI. Previous evidence demonstrated that the risk of becoming obese children increased with parental obesity[41, 42] which was partly characterized by genetic heritability component. The positive association between household income and child BMI was found in our study. Current literature shows that obesity is related to socio-economic status (SES) and the association varies by gender, age and country. SES may affect the access to food and change in lifestyle patterns of people, resulting in imbalance in their energies. Studies show that low SES groups in industrialized countries and high SES groups in developing countries are at increased risk of being obese[43, 44].

Our results indicated that PFP by using more food restriction was positively associated with child's BMI. This was consistent with the evidence from the systematic review of the literature in school-aged children which showed that higher food restriction has been associated with higher child's BMI in most cross-sectional[45] and one longitudinal studies[46].

Characteristics	Normal weight ($n = 112$)	Obese ($n = 60$)	p-value
Household food security (tertile score)			0.322*
1st	43 (38.4)	25 (41.7)	
2nd	29 (25.9)	20 (33.3)	
3rd	40 (35.7)	15 (25.0)	
Home environment to promote child's unhealthy eating			
Parent kept more deep-fried food at home (days/week)			0.622*
> 5	19 (17.0)	82 (20.0)	
< 5	93 (83.0)	48 (80.0)	
Parent kept more crispy snack at home(days/week)			0.588*
> 5	8 (7.1)	4 (6.7)	
< 5	104 (92.9)	56 (93.3)	
Parent kept more dessert/candy at home (days/week)			0.422*
> 5	3 (2.7)	3 (5.0)	
< 5	109 (97.3)	57 (95.0)	
Parent kept more carbonated beverage at home (days/week)			0.583*
> 5	12 (10.7)	4 (6.7)	
< 5	100 (89.3)	56 (93.3)	
Parent kept fruit juice at home (days/week)			0.339*
> 5	26 (23.2)	10 (16.9)	
< 5	86 (76.8)	49 (83.1)	
Child insisted parent for buying TV-advertised snack (days/week)			0.516*
> 5	7 (6.2)	3 (5.0)	
< 5	105 (93.8)	57 (95.0)	
Parental feeding practice score	Mean ± SD	Mean ± SD	
Restriction	2.52 ± 1.09	2.61 ± 1.04	0.480**
Pressure to eat	3.69 ± 1.56	2.68 ± 1.36	0.001**
Monitoring on child's eating	3.29 ± 1.69	3.29 ± 1.73	0.991[a]

Table V.
Household food security and parental feeding practice provided to children

Notes: Obese child: BMI-for-age Z-score > +2 SD (2007 WHO Growth Reference). Percent values are shown in parentheses. p-values are shown by *χ^2 test, **Mann-Whitney test, and [a]unpaired student's t-test

Variables BMI Z-score	Unstandardized coefficient β	SE	Standardized coefficient	p-value	R^2	Adjusted R^2
Constant	−1.100	0.740		0.138	0.177	0.156
Restriction	0.335	0.123	0.204	0.007		
Pressure to eat	−0.368	0.087	−0.311	0.001		
Child's gender (0 = boy, 1 = girl)	−0.639	0.246	−0.172	0.010		
Parent's BMI	0.097	0.027	0.235	0.001		
Household income	0.717	0.356	0.131	0.045		

Table VI.
Factors associated with child's BMI by multiple linear regressions

Notes: Independent variables: feeding practice score (restriction, pressure and monitoring on child's eating score), child's gender, parent's BMI, parent's education, household income and household food security

This feeding practice was also found among Asian parents in one study[8]. Additionally, higher level of restriction has been linked to parents' perception or concerns about child's weight which may mediate the association between child obesity and restriction[47]. Pressure to eat was another feeding practice in which the parents urge the child to eat enough food. Our results found parent's pressure to eat was negatively associated with child's BMI. A study in Malaysia demonstrated that the parents of the overweight children were less likely to pressure

their children to eat than the parents of the normal weight children[48]. Pressure to eat was also influenced by child ethnicity and family income. White non-Hispanic parents reported lower pressure to eat than white Hispanic, black and Asian parents and household income was negatively correlated with parental pressure on their child to eat[11]. Likewise, black Afro-Caribbean parents imposed more restriction on their overweight children, whereas white German parents imposed lower pressure to eat on their children[9]. This suggested that cultural difference could have impact on choice of feeding practice. Since family environment is relatively complex, it is essential to consider other factors, such as child preference, parent's attitude, parental education, family mealtime structure as well as social media that could mediate the child's eating pattern and food intake[49, 50].

The limitation of our study was that the results were derived from a small-scale study in one suburban area; this might not be able to generalize for all Thai children. Although the information of PFPs was from the response to the questionnaires of parents, not direct observation, it is anticipated that our data provided more or less understandings on why Thai parents used such feeding styles to regulate their children's food intakes. Since perception, attitude and the concern about children's weight by the parents are also considered as important factors, future studies are needed to explore more on the effect of these factors on PFP and eating behaviors of children. Such information will be useful for creating the lesson module to improve parental skill for taking care of their children. The expansion of study areas to investigate on HHFS level will help us to more understand the impact of food insecurity on food availability and food access as well as the effect on children's nutritional status.

In sum, there were differences in eating behaviors and home environment between genders among the Thai children. Parents tend to use higher food restriction and monitoring in girls than in boys. Parents also used higher pressure to eat in the normal weight children than the obese children. Feeding practice like restriction and pressure to eat were significantly associated with the child's BMI. To prevent undesirable weight gain in children, PFP should be appropriately modified to improve eating behaviors of Thai children.

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