



## Cross-Sectional Exploration on Feeding Practices of Feeders towards Preschoolers' Picky Eating Behaviors

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### Abstract

**Background:** Picky eating is quite common among preschoolers, which may lead to imbalanced diet. Picky eating behavior among preschoolers was found associated with feeding style. With the complex family structure of 2-career parents in Hong Kong and unique authoritarian Chinese feeding style, this study aimed to explore the differences in feeding practices among different preschoolers' feeding persons and to investigate if preschoolers' picky eating showed differences if they are fed by different feeding persons.

**Methods:** A cross-sectional survey was conducted in five Hong Kong kindergartens. Feeding persons of the preschoolers were asked to complete questionnaires with responses in different feeding styles and 2-day dietary records of the preschoolers. The dietary review was conducted to evaluate if the preschoolers were picky eaters if they missed any one of the five food groups or they did not consume sufficient amount of any food groups at their age. Descriptive statistics and chi-squared tests were analyzed to explore the chance of picky eating occurrence regarding the types of feeding persons and the feeding practices.

**Results:** 240 preschoolers aged 2 to 7 were recruited. 57.5% preschoolers were found picky eating. There was no significant difference in preschoolers' picky eating behaviors among different types of feeding person. Significantly more picky eaters were found fed by carers with lower education levels.

**Conclusion:** Preschoolers fed by feeders with lower education may have limited skill and knowledge in food choices that preschoolers may have higher chance in developing picky eating problems.

**Keywords:** Picky eating, Feeding practice, Preschoolers, Feeding persons, Cross-sectional study

to try unfamiliar food [2]. When the children are found to refuse the intake of some food groups [3], especially vegetables, picky eating, selective eating or choosy eating were frequently described in these eating problems. Picky eating sometimes is used when the children are described as having strong food preferences [4-5]. Literature found that the prevalence of picky eating among preschoolers varied from 8% to 54% in different population [1,2,6,7]. According to a local survey conducted in Hong Kong with 7,057 kindergartners aged 2 to 7, more than 40% of parents indicated that their children had picky eating [8]. About 56% of preschoolers consumed less than one serving of fruits each day and approximately 66% of them had less than a bowl of cooked vegetables each day [8]. It was found that only 12% of preschoolers consumed enough daily amounts of vegetables and fruits [8].

There are many factors causing picky eating among preschoolers and parents' influential role is a crucial point. Some studies revealed that parental perception of children's weight status, attitude on how to feed their children, family dietary style and caring pressure would affect preschoolers' picky eating behavior [9,10]. Preschoolers' food preference was found associated with their parents' food choices and feeding practices that could lead to less variety of food intake [11,12]. It was found that mother's eating habits and whether the mother viewed her children as a 'picky eater' had a great influence on the children's actual consumption of vegetables and fruits [13]. It was evident that preschoolers' picky eating behavior was aggravated when their parents used unhealthy snacks, like sweets, chocolates and chips, as rewards to encourage parents' desired good behavior [14,15]. In addition, high controlling practices, such as pressure to eat and food restriction, could have adverse effect on the preschoolers' picky eating behavior [16]. Preschoolers were less likely to consume unfamiliar food when their parents forced them to try under pressure [17]. Theory of classical conditioning determines children have bad experience in feeding unfamiliar food; they are prone to refuse that food. In some cases, children were found less likely to be picky-eating and consumed more vegetables and fruits if their mothers consumed more vegetables and fruits [18]. Therefore, parental feeding styles were heavily studied to play a crucial role in children's eating behavior [19].

Chinese parenting style has been described as authoritarian that

### Introduction

Picky eating is a common feeding problem among preschoolers which may lead to poor diet and result on poor growth and development. Picky eating has a wide definition in literature. Some studies found that parents described their children 'picky' when the children consuming a limited quantity of food [1]. Picky in some extent could be referred to food neophobia when the children were unwilling

**Citation:** Chung LMY, Fong SSM (2015) Cross-Sectional Exploration on Feeding Practices of Feeders towards Preschoolers' Picky Eating Behaviors. J Nutri Med Diet Care 1:009

**Received:** August 04, 2015; **Accepted:** November 12, 2015; **Published:** November 14, 2015

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the parents used to exert controlling power over their children. This type of parenting style involved varieties of daily concern, caring and feeding would be one of them [20]. In Hong Kong, 45.3% of families were the type of 2-career family. Most of preschoolers' feeding person was their grandparents or domestic helpers, instead of their parent who needed to work for a long period of time every day. Survey resulted that 10.6% of preschoolers are fed by domestic helpers and 5.9% of them were fed by grandparents [15]. Since many studies focus on the relationship between maternal feeding and children's picky eating, there are a limited number of studies investigating the roles of feeders and their feeding practice in preschoolers' picky eating problems. However, the complex family structure in preschoolers' caring responsibility and the unique parenting style in Hong Kong may affect the eating behavior, particularly picky eating among preschoolers. Therefore, this study aimed to explore the feeding practices among different feeders and to investigate if any significant differences in the occurrence of picky eating among preschoolers' with different feeders.

## Methodology

### Design

This was a cross-sectional study using a self-administered questionnaire and a 2-days food diary completed by the feeding persons of the preschoolers.

### Settings

The dietary records and feeding practice questionnaires were distributed and collected in five governments-subsidized kindergartens in Hong Kong.

### Samples and Samplings

Preschoolers and their parents were recruited by convenience in five kindergartens in Hong Kong. Inclusion criteria were: the preschoolers aged 3 to 6 years and studying in kindergarten 1 to 3 were invited. In recent years, it has been common for children living in Mainland China to come study in Hong Kong. Taking consideration of the varied eating cultures and food choices, the preschoolers recruited must be a permanent resident living in Hong Kong. Exclusion criteria: the preschoolers of cross-boundary students were excluded to avoid different feeding practice affected by other cultures. Teachers in the kindergartens helped to distribute information sheets to the parents of the preschoolers.

### Instrument

A questionnaire consisted of 3 parts and it was designed to collect demographic data and feeding practices of the feeders. First part included 12 questions about the demographic data of preschoolers and their feeders. Second part included 3 questions about feeding practices of feeding person. And the last part was a set of 2-day dietary record to assess the eating habits of preschoolers. Feeders were asked to record all the details of food items, corresponding portion size and condiments added to the food. The feeders were asked to record each food consumed by, not cooked for the preschoolers in 2 consecutive full days.

### Procedure

This study was approved by the ethics review committee of the Hong Kong Institute of Education. After getting the ethical approval, information letters were distributed to eligible preschoolers and their parents, explaining the objective, procedures, method of the study. After returning the consent forms, each participant received the questionnaire with demographic data and a set of 2-day dietary record form from the kindergartens in January 2014. The demographic data could be completed by the parents or feeding person. The 2-day dietary record should be completed by the feeding person on the coming Saturday and Sunday because the children normally had most of their meals at schools during weekdays. The feeding person needed to list out the food prepared for their preschooler in meals and record

the amount that the preschooler had. If participants had any queries, the kindergartners could answer their questions. After finishing the questionnaires, preschoolers should return it to the kindergartners. Teachers of the kindergartens also helped to measure the body height and body weight of the preschoolers. Body height was measured in a standing scale and the unit was in centimeters (cm). Body weight was measured in a standing balance and the unit was in kilograms (kg).

## Data analysis

For the dietary records, two independent researchers evaluated the records according to the Dietary Guidelines [21]. According to the Dietary Guidelines, children should consume all the food groups of carbohydrates, fruits, vegetables, protein and dairy products. Therefore, these five food groups were used as criteria to assess the 2 days dietary records. If there was any missing food group or the amount of consumption was found not sufficient for the age of preschoolers in the 2 days dietary records, the preschoolers would be classified as picky eaters. If all the five food groups were found and the corresponding amounts of consumption were sufficient for the age of preschoolers in the 2 days dietary records, the preschoolers would be classified as non-picky eaters. The results of the dietary review from the two independent researchers were compared to ensure results were in consistent.

All data collected were coded and analyzed using IBM SPSS version 21. Descriptive statistics were used to analyze the demographic data, such as age, height, and weight. Chi-square tests used to explore if the types of feeders (parents, grandparents and maids), their education level and their feeding practices showed significant differences in the occurrence of picky eating preschoolers.

## Results

In total, 240 questionnaires were collected from the parents of the recruited preschoolers. Among the preschoolers, 55.4% were male (n = 133) and 44.6% were female (n = 107) (Table 1). Only 1.3% preschoolers (n = 3) had food avoidance due to religion. Only 0.8% preschoolers (n = 2) were vegetarians. The participants who had food avoidance due to religion and vegetarian diet were excluded in data analysis because their eating habits were affected by factors other than feeding practices. The mean age of male and female was 4.1 and 4.0 respectively (p > 0.05). The mean height of male was 104.3 cm with standard deviation of 10.25cm and the mean height of female was 101.3 cm and the standard deviation of 11.38 cm. The mean weight of male was 18.1 kg with standard deviation of 4.20 kg while the mean weight of female was 17.2 kg and the standard deviation was 4.45 kg.

### Characteristics of feeding persons

In the questionnaire, there were 3 types of feeding person found: Parents, Grandparents, Maid/Others. Responses reported 146 parents (60.8%), 52 grandparents (21.7%) and 42 maids/others (17.5%) were the key responsible feeding persons of the preschoolers (Table 2). Among the feeding persons, most of them obtained secondary education (63.3%) and around one-fifth (22.1%) obtained tertiary education. Fewer than half of the feeding persons were born in Hong Kong and 14.2% of the responded feeding persons perceived themselves picky eaters (Table 2).

Responses found that around one third (36.7%) of the feeding persons do nothing in regards to children's picky eating problems. There were one-fourth (25.4%) of them try to replace another foods

**Table 1:** Demographic characteristics of preschoolers.

	Male	Female
	n (%)	n (%)
<b>Sex</b>	133 (55.4)	107 (44.6)
	<b>Mean (S.D.)</b>	<b>Mean (S.D.)</b>
<b>Age (year)</b>	4.1 (1.11)	4.0 (1.10)
<b>Height (cm)</b>	104.3 (10.25)	101.3 (11.38)
<b>Weight (kg)</b>	18.07 (4.20)	17.22 (4.45)

**Table 2:** Characteristics of the feeding persons of preschoolers.

Types of feeding persons	n (%)	
Parents	146 (60.8)	
Grandparents	52 (21.7)	
Maids/others	42 (17.5)	
Highest education obtained	n (%)	
Primary education	35 (14.6)	
Secondary education	152 (63.3)	
Tertiary education	53 (22.1)	
	Yes n (%)	No n (%)
Self-perceived picky eaters	34 (14.2)	206 (85.8)
Food avoidance due to religions	15 (6.3)	225 (93.8)
Born in Hong Kong	106 (44.2)	134 (55.8)

**Table 3:** Feeding practices on preschoolers' picky eating problems.

	n (%)
Do nothing	88 (36.7)
Replace another foods to the preschoolers	61 (25.4)
Give preschooler's favorite food as incentives	41 (17.1)
Allow preschooler watching TV during meals	17 (7.1)
Punishment	19 (7.9)
Force ssspreschoolers to eat	14 (5.8)

**Table 4:** Results of Chi-squared tests.

	Picky eaters (assessed by dietary records)		p-values
	Yes n (%)	No n (%)	
Preschoolers' sex			
Male	71 (29.6)	62 (25.8)	> 0.05
Female	67 (27.9)	40 (16.7)	
Feeding persons			
Parents	79 (32.9)	67 (27.9)	> 0.05
Grandparents	32 (13.3)	20 (8.3)	
Maids/Others	27 (11.3)	15 (6.3)	
Feeding person's education level			
Primary education	22 (9.2)	13 (5.4)	< 0.05
Secondary education	94 (39.2)	58 (24.2)	
Tertiary education	22 (9.2)	31 (12.9)	
Feeding practices to picky eating			
Positive	68 (28.3)	51 (21.3)	> 0.05
Neutral	40 (16.7)	35 (14.6)	
Negative	30 (12.5)	16 (6.7)	
Allow preschoolers watching TV during meals			
Yes	77 (51.7)	47 (19.6)	> 0.05
No	61 (48.3)	55 (22.9)	

as alternatives for the preschoolers. There was 17.1% feeders offer preschooler's favorite food as rewards for them to finish the food in meal time. 7.1% feeding persons reported they allowed preschoolers watching television during meal time and 7.9% feeding persons adopted punishment when the children refused to eat. 5.8% of the feeding persons had experience in forcing the preschoolers to eat (Table 3).

### Picky eating assessed by 2-days food diary

After assessing the food diary of preschoolers' 2-days food intake, 53.4% (n = 71) male and 62.6% (n = 67) female preschoolers were classified as picky eaters. Girls were in higher percentage in picky eating as compared with boys, although the difference was not significant (p > 0.05) (Table 4). Although there was no statistical association between picky eating in preschoolers and their TV-watching during meal time, the results showed that more preschoolers were picky eaters if they were allowed to watch TV during meals than those preschoolers who were not allowed to watch TV during meal time (p > 0.05).

Chi-squared test found that there was no significant difference

		Feeding persons			
		Parents n (%)	Grandparents n (%)	Maids/others n (%)	
Allow watching TV during meal times	Yes	75 (31.3)	29 (12.1)	20 (8.3)	P > 0.05
	No	71 (29.6)	23 (9.6%)	22 (9.2)	
Positive		72 (30.0)	27 (11.3)	20 (8.3)	P > 0.05
Neutral		45 (18.8)	15 (6.3)	15 (6.3)	
Negative		29 (12.1)	10 (4.2)	7 (2.9)	

**Table 5:** Comparisons of types of feeding persons and the feeding practices.

between preschoolers' picky eating and the types of feeding persons (p > 0.05). However, the picky eating preschoolers were found significantly higher in the group of preschoolers with feeding persons having secondary education (p < 0.05). If the preschoolers refused to eat, feeding persons were asked to respond their feeding practices in one of the seven choices, they were: 1) let their children not eat, 2) punish their children, 3) give their children alternative food choice, 4) force their children to eat, 5) give their children snacks as rewards, 6) take away the provided food, 7) allow their children to watch TV during meal time. We group the responses of feeding practice into 3 categories. For responses that feeding persons show encouragement in getting their preschoolers to eat, they were grouped as positive responses such as give their children alternative food choice, give their children snacks as rewards and allow their children to watch TV during meal time. For responses that feeding persons show no encouragement in getting their preschoolers to eat, they were grouped as neutral responses such as let their children not eat and take away the provided food. For responses that the feeding persons show threat to force their preschoolers to finish their food, they were grouped negative responses, such as let their children not eat or force their children to eat. With chi-squared analysis it was found no difference between the feeding practice types and picky eating problems (p > 0.05) (Table 5).

### Discussion

In this study, the prevalence of picky eater in preschoolers was 57.5%, which was deemed higher than the reported prevalence (up to 50%) in other countries [3,5,6]. This higher prevalence might be caused by the lack of agreement on the definition in studies and different cultural acceptance of picky eating worldwide [22].

In the current study, it was significant that preschoolers' picky eating problems were shown significantly different with feeding persons' educational level. Picky eating was of higher chance to be occurred in the group of preschoolers who were fed by feeding persons with secondary and primary education. This could be because the feeding persons with tertiary education had better concepts in healthy eating and they may pay more attention in food choices to make sure their children obtain sufficient nutrition for growth and development. For those feeding persons having primary education and secondary education, they may not have sufficient knowledge and skills in choosing nourished diet for their children, particularly to those preschoolers who were cared by maids or nannies. Studies indicated lower education level was associated with food quality and this resulted less knowledge in healthy food choices [23]. Misconceptions of preschoolers' nutrition requirements and improper snacks categorization [24-27] were also found possible reasons in poor food choices for the children. A local survey revealed that 73% to 88% students had foods high in sugar, salt and fats, but 71% of parents believed their sons/daughters' eating habits were "healthy" [15]. Also the prevalence of preschoolers' picky eating was found higher if the preschoolers were fed by grandparents or maids/nannies. Grandparents prone to spoil their grandchildren while maids or nannies may not pay too much attention on children's eating behavior because they were not the decision makers in food purchasing and they showed little control in preschoolers' healthy diet.

Nevertheless, results in this study showed higher chance of

picky eating among preschoolers who used to watch TV during meal time. This postulated the prolonged eating time would probably affect the taste of the food which made the preschoolers less interest to eat the provided food. This would be worth to be explored in future studies.

## Limitation

The convenience sampling could lead to sampling bias. The proportions of different types of feeding persons were not evenly distributed. The recruited number of maids was much less than parents and this could be due to the demographic characteristics of the recruited population. Recruited families were mainly from low household-income family, which might not have financial abilities to afford employing maids to take care of the children. However, maids were usually the key caretakers among those families with higher household income.

## Conclusion

Preschoolers fed by feeders with lower education may have limited skill and knowledge in food choices that preschoolers may have higher chance in developing picky eating problems.

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