



## **A Retrospective Study on the Relationship of Changes in Likes/Dislikes with Food Habits in 4- and 6-Year-Old Children**

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. Authors TO, ST and NK developed the standardized protocol and the structured questionnaire. Author MK conducted the focus group research in the preschool education setting. Author TO drafted the manuscript. All authors revised the article critically for important intellectual content and approved the final manuscript. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Objective:** This is a retrospective cohort study to investigate children's food habits, affecting changing their likes/dislikes, on the basis of questionnaires answered by the mothers of 222 children.

**Methods:** The questionnaire data was analyzed on 4 years old children at the beginning of the first year of kindergarten and on the same children at the end of the second year, when they were 6 years old. The questionnaire included 18 questions regarding their children's lifestyle, likes/dislikes, attitude toward foods and guardian's food habits. The Kruskal Wallis test was performed to compare the ordered categorical outcomes among four groups of changes in likes/dislikes: "(+) to (-)" means that the children disliked some foods as 4 year olds, and that as 6 year olds they disliked no foods, "(+) to (+)", "(-) to (+)", and "(-) to (-)".

**Results:** In total, 71.0% results reported (+) to (+), 10.0% reported (+) to (-), 6.5%

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reported (-) to (+) and 12.5% reported (-) to (-). Among the four groups, "Respect for food" ( $p < 0.001$ ), "Enjoying school lunches" ( $p < 0.01$ ), and "Family's deviated food habits" ( $p < 0.01$ ) significantly varied. Children in the "(+) to (-)" group showed significantly more favorite behaviors than in the "(+) to (+)".

**Conclusion:** Changes in children's likes/dislikes during kindergarten 2 years' course may be related to "Respect for food", "Enjoying school lunch" and "Family's deviated food habits". Therefore, managing these habits may be important when trying to change children's likes/dislikes.

*Keywords: Likes/dislikes; food habits; food attitudes; enjoying school lunches.*

## 1. INTRODUCTION

Childhood is a sensitive period for development of food acceptance patterns [1,2,3]. At that time, likes/dislikes play an important role in significant determinants of food acceptance [4]. Recent studies reported that exposure to fruits and vegetables during infancy may promote their higher consumption in later childhood [5]. In contrast, neophobia leads to lower consumption of fruit and vegetables, protein foods and total calorie intake [6]. Therefore, likes/dislikes should be improved during early childhood.

Thus far, studies have focused on the food preferences within a family corresponding to that within a culture [7]. According to our recent study, likes/dislikes of mothers during childhood and their current food habits affected preferences of children [8]. Moreover, some studies reported that the young children's easily accept unfamiliar food that are familiar either to parents and siblings at home [9] or to their peers [10]. Thus, children's likes/dislikes are affected by family food behavior.

Studies have showed that parents develop eating behaviors of children not only through the foods that are made accessible to them but also by the parents' eating habits [11] behavior at mealtimes and their practices when feeding the child [12]. A meal pattern with a lack of breakfast or 'breakfast and lunch together' has been related to a clustering of less healthy lifestyle factors and food choices, leading to a poorer nutrition intake [13]. Thus, food attitude and food habits may affect their food preference. Food attitude include 'Respect for food' and 'Concern about food' as well as "Enjoying school lunch" in the study. School lunch can promote healthy eating by making healthy choices easy during the school day in adolescents [14,15].

In this study, we detected specific food habits and food attitudes of children and their mothers, which affected the likes/dislikes of children using a retrospective cohort study on the data of three classes with different birth year of kindergartens at the beginning and end of the 2-year kindergarten course. Since the retrospective study indicates that one of the children's food attitude, "Enjoying school lunch" as well as other food habits may affect children's likes/dislikes, we also asked parents the reason why children "Enjoy school lunch".

## 2. METHODS

A questionnaire was given to mothers of the children who attended a private kindergarten in Hyogo Prefecture, Japan, at the beginning and end of the 2-year kindergarten course, when children were 4 and 6 years old, respectively; the questionnaire was provided in April for the

first year and in March two years later. Questionnaires were returned in 2009 and 2011 by the mothers of 75 children; in 2010 and 2012 by the mothers of 74 children; and in 2011 and 2013 by the mothers of 86 children. In total, 222 questionnaires of 235 (94.5%) children were returned. Among them, questionnaires returned with blank answers were not analyzed. Finally, 200 (85.1%) questionnaires were analyzed.

A questionnaire sheet was given for each child; that is, a mother of two children at the kindergarten received two sheets and answered for each child. Mothers were well-informed as to the objects and methods of this investigation and answered the questionnaire only if they desired, without any compelling force and with the right of free withdrawal. Individual privacy was strictly protected through the investigation. This study was approved by the president of the kindergarten.

The questionnaire for the mothers included 18 question items about their children's lifestyle, likes/dislikes, and food attitudes, as well as their own lifestyle. The question about children's lifestyle includes 4 items: "Wake-up time," "Bedtime," "Having a habit of tooth brushing," and "Frequency children eat breakfast." The question about children's food attitudes includes 9 items: "Talking about food," "Saying greeting before eating," "Watching TV while eating," "Helping go shopping," "Helping make dishes," "Growing food at home," "Enjoying school lunch," "Concern about food," and "Respect for food." The question about guardian's lifestyle includes 4 items; "Frequency mothers eat breakfast," "Family's deviated food habits," "Frequency mothers' cook," and "Mothers want to learn about food." The answers were binarized by make the numbers of the replies of both groups as similar as possible. For example, we combined the four choices: "every day.", "4.5 times a week.", "2.3 times a week." and "Never." into 2 groups: "every day." and "Under 5 times a week.", on the basis of the median. The answers for this questionnaire are ordering scale, assigning high points for good behavior of children. The item "Children eat breakfast" was measured on a 4-point scale, with answers of "everyday" receiving 4 points, "4.5 times a week" receiving 3 points, "2.3 times a week" receiving 2 points, and "Never" receiving 1 point. If children selected "everyday," they received the highest points in the group. The program Statistical Package for the Social Science (SPSS) version 19.0J was used for statical analyzes. McNemer test was used to assess the pairwise relationship lifestyle change over two years. The Kruskal-Wallis test was used to compare ordered categorical data among the four groups divided by changing likes/dislikes: '(+) to (-)', which represents the children have foods at 4 years old and did not like it then, and that they like it at 6 years old, '(+) to (+)', which represents the children have foods at 4 years old and did not like it then, and that as a consequence they did not like it at 6 year olds, '(-) to (+)', which represents the children have foods at 4 years old and like it then, but that they did not like it at 6 years old and '(-) to (-)', which represents the children have foods at 4 years old and like it then, and that they like it at 6 years old.

In addition, in March 2011, a questionnaire was given to mothers of 245 children aged 3-6 years who attended a private kindergarten in Hyogo Prefecture, Japan. In total, 198 (82.5%) questionnaires were returned and analyzed. The questionnaire enquired about school lunches of the children. This included three questions regarding whether their children enjoyed school lunches and the reasons for liking or disliking the lunches. Mothers chose 3 out of 15 items as the reasons with the principal reason defined.

### 3. RESULTS

#### 3.1 Changes in Children's Lifestyle Through 2 Years Kindergarten Course

As shown in Table 1, all question items about children's and mothers' lifestyle did not change significantly through 2 years kindergarten course except "Guardian wants to learn about food" ( $p < 0.001$ ).

**Table 1. The pairwise 4 to 6 years old children relationship lifestyle change in two years**

Question item about lifestyle	Answer	6 years old		P value*	
		4 years old	A		B
Having a habit of tooth brushing	Sometimes + Rarely	A	64	28	N.S
	Often	B	11	34	
Frequency children eat breakfast	Under 5 times	A	0	2	N.S
	Every day	B	2	196	
Frequency mothers eat breakfast	Under 5 times	A	5	0	N.S
	Every day	B	6	185	
Family's deviated food habits	+	A	33	17	N.S
	-	B	21	127	
Likes and dislikes	+	A	142	20	N.S
	-	B	13	25	
Talking about food	Sometimes + Rarely	A	120	15	N.S
	Often	B	30	34	
Saying Greeting before eating	Sometimes + Rarely	A	20	13	N.S
	Often	B	13	152	
Watching TV while eating	None	A	26	45	N.S
	Sometimes + Rarely	B	116	9	
Helping go shopping	Sometimes + Rarely	A	55	19	N.S
	Often	B	32	30	
Growing food at home	Sometimes + Rarely	A	58	23	N.S
	Often	B	13	43	
Frequency mothers' cook	Sometimes + Rarely	A	1	5	N.S
	Often	B	4	128	
Concern about food	Sometimes + Rarely	A	78	18	N.S
	Often	B	15	26	
Respect for food	Sometimes + Rarely	A	81	13	N.S
	Often	B	16	27	
Mothers want to learn about food	Sometimes + Rarely	A	77	7	0.001
	Often	B	27	28	

\* McNemar test and Bonferroni correction.

The answers were binarized by make the numbers of the replies of both groups as similar as possible.

The questions at 6 years old were the same as at 4 years old.

The classification of the answer for the question were shown for at 4 years old, which are represented by "A" or "B".

The classification of the answer at 6-year-old was indicated by "A" or "B".

N.S.: not significant

### 3.2 Children's Likes/Dislikes Change through 2 Years Kindergarten Course and Its Relationship with Their Food Habits

The percentage changes in the four patterns of changes in children's likes/dislikes after the two-year kindergarten course were 71.0%, 10.0%, 6.5% and 12.5% for the (+) to (+), (+) to (-), (-) to (+) and (-) to (-) groups, respectively. (+) to (-), representing disliked some food at 4 years old and no disliked food at 6 years old.

Table 2 shows the relationship of likes/dislikes change patterns of children with their food habits. The mean shows that a good habit is a high point, except 'family's deviated food habits' that a good habit was a low point.

**Table 2. Likes/dislikes of 4- to 6-year-old children in relation with their food habits**

Food habit	N	(-) - (+)	(+) - (+)	(-) - (-)	(+) - (-)	P value*
		13	142	25	20	
Wake-up time <sup>1)</sup>	Mean	3.1	3.3	3.6	3.4	N.S
	Mean rank	73.5	98.6	120.3	106.5	
Bed time <sup>1)</sup>	Mean	2.3	2.4	2.5	2.3	N.S
	Mean rank	91.6	97.5	107.9	89.3	
Frequency children eat breakfast <sup>1)</sup>	Mean	3.9	4.0	4.0	4.0	N.S
	Mean rank	93.8	100.8	101.5	101.5	
Frequency mothers eat breakfast <sup>1)</sup>	Mean	4.0	3.9	3.9	4.0	N.S
	Mean rank	98.0	100.4	98.1	106.0	
Family's deviated food habits <sup>3)</sup>	Mean	0.2	0.4	0.0	0.1	0.002
	Mean rank	88.9	108.0	77.5	83.5	
Talking about food <sup>2)</sup>	Mean	4.4	4.1	4.2	4.2	N.S
	Mean rank	120.6	97.1	106.3	104.0	
Saying greeting before eating <sup>2)</sup>	Mean	4.8	4.8	4.8	4.9	N.S
	Mean rank	94.5	98.1	108.5	111.4	
Watching TV while eating <sup>1)</sup>	Mean	3.8	3.7	3.3	3.5	N.S
	Mean rank	106.9	100.5	89.7	99.6	
Enjoying school lunches <sup>2)</sup>	Mean	4.6	4.5	4.9	4.9	0.003
	Mean rank	100.0	93.2	124.8	122.0	
Helping go shopping <sup>2)</sup>	Mean	4.2	4.2	4.2	4.1	N.S
	Mean rank	105.5	99.5	102.7	101.6	
Helping make dishes <sup>1)</sup>	Mean	3.9	3.8	4.0	4.0	N.S
	Mean rank	100.1	98.2	109.5	106.2	
Growing food at home <sup>2)</sup>	Mean	2.2	2.5	2.2	2.5	N.S
	Mean rank	90.9	102.7	89.5	104.6	
Frequency mothers' cook <sup>2)</sup>	Mean	4.9	5.0	4.9	5.0	N.S
	Mean rank	96.9	101.7	96.5	99.5	
Concern about food <sup>2)</sup>	Mean	4.4	4.2	4.5	4.7	N.S
	Mean rank	123.7	95.4	106.6	114.0	
Respect for food <sup>2)</sup>	Mean	4.5	3.9	4.5	4.7	0.000
	Mean rank	124.2	87.5	128.6	142.4	
Mothers want to learn about food <sup>2)</sup>	Mean	4.4	4.2	4.2	4.0	N.S
	Mean rank	118.7	100.2	105.0	85.0	

\*by Kruskal Wallis test and Bonferroni correction.

(-) means that children disliked no food, (+) means that children dislike more than one foods, (-) to (+), means that the children disliked no foods as 4 year olds and that as 6 year olds they disliked some foods, (+) to (+), means that the children disliked some foods as 4 year olds and that they disliked some foods as 6 year olds, (-) to (-), means that the children disliked no foods as 4 year olds and that they disliked no foods as 6 year olds, (+) to (-), means that the children disliked some foods as 4 year olds, and that as 6 year olds they disliked no foods, 1) The scale is upto 4 points; the highest point indicates a good habit, 2) The scale is upto 5 points; the highest point indicates a good habits, 3) Family's deviated food habits 0 - 1

The changes of likes/dislikes were significantly associated with 3 question items; “Respect for food”, “Enjoying school lunches” and “Deviation of family’s food preference” (p=0.001, p=0.003 and p=0.002, respectively). In “respect for food” there were significant differences among 4 groups. The highest groups are shown; (+) to (-), followed by (-) to (-) and (-) to (+), and then (+) to (+). “Enjoying school lunch”, there were significant differences by 4 groups. The highest group was (+) to (-), followed by (-) to (-), (-) to (+) and (+) to (+). There were significant differences for ‘enjoying school lunches’ in the 4 groups. The highest groups were (+) to (-) and (-) to (-), followed by (-) to (+) and (+) to (+). There were significant differences in ‘family’s deviated food habits’ in the 4 groups. The highest groups were (-), followed by (+) to (-), (-) to (+) and (+) to (+). Considering all results in a comprehensive manner, children in the (-) to (-) and (+) to (-) groups showed a significantly better behavior than those in other groups. The (+) to (-) group showed a tendency to be in the highest position among the 4 groups. The (+) to (+) group showed a tendency to be in the lowest position among the 4 groups.

**Table 3. Reasons for enjoying (A) or not enjoying (B) school lunches**  
**(A) Reasons for enjoying school lunches**

Reasons	Years old (N*)			All (198)
	3 (49)	4 (85)	5 (64)	
It tasted good	32	64	55	151
Eat with friends	33	52	55	140
Eat with teacher	17	31	15	63
Theirs turn for prepare meal	11	16	16	43
Not make at home	5	9	19	33
Another helping, a refill	7	9	7	23
Eat preference meal	6	10	5	21
Can eat dislike food	4	7	8	19
Hungry	6	7	5	18
Eat grown foods	0	7	8	15
Nutritionist comes to class	0	6	3	9
Others	2	0	1	3
Watch make meal	0	2	0	2
Know food names	2	0	0	2

**B) Reasons for not enjoying school lunches**

Reasons	Years old (N*)			All (13)
	3 (4)	4 (6)	5 (3)	
Can't eat dislike food	3	2	1	6
Others	1	3	1	5
Don't want to eat food they	0	2	2	4
No refill	1	0	0	1
Do not watch meals being made	0	0	1	1

*Values are the number of responses for 13 children who do not enjoy school lunch. This answer included the option “Neither”. \*number*

### 3.3 The Reason of Children Enjoying School Lunch

In addition to likes/dislikes of children, we analyzed the reasons why children enjoy school lunches using another questionnaire. The main reason was that school lunches tasted well,

and the second was that children eat with friends. The third most common reason was that they eat with the teacher, implying that mothers at home did not often cook meals that children eat for lunch at school. 'Eat with friends' significantly increased with age of children (Table 3 (A)).

We also analyzed the reason why children did not enjoy school lunches (Table 3 (B)). Only 13 children (6.6%) were in the 'not enjoying school lunches' category. The main reason was that 'They can't eat food they disliked', the second was 'They don't want to eat food they disliked' and the third was 'others', which included children wanted to eat only homemade dishes cooked by their mothers.

#### **4. DISCUSSION**

This study showed the food habits of children, which were related to changing likes/dislikes, using a retrospective cohort study over 2 years. There were no significant differences in changes in food habits and food attitudes, except 'guardian wants to learn about food' (Table 1). These results indicated that it did not change their food habits and food attitudes. So we could test "Likes/dislikes of 4- to 6-year-old children in relation with their food habits.

The results showed that at the end of kindergarten course, mothers did not want to learn about food compared with the beginning of the course when their children were 4-year-olds: approximately 5% mothers had changed, suggesting that it is easy for mothers to answer the question in retrospect.

We observed changes in the likes/dislikes of children related to their food habits through the kindergarten course. A change in likes/dislikes was associated with three factors; "Family's deviated food habits", "Respect for food" and "Enjoying school lunch". The association with "Family's deviated food habits" was supported by a previous study, which reported describing that food preferences and eating behaviors of parents provide an opportunity to model good eating habits in their children [16].

As well, "Enjoying school lunch" was related to change in likes/dislikes of children. School lunch provide good balanced diet. Bruening suggested that adolescent friends exhibit similarities in healthy eating patterns [17]. Therefore, it is critical whom the adolescent eats with. School lunch has a good effect on children, i.e., they teach children to have fun while eating. In contrary, fast foods have caused an easy availability of unhealthy foods at home and perceived barriers to healthy eating [18]. Soft drink consumption has been associated with significantly frequent meals in fast food restaurants, watching TV during eating and low restriction rules in adolescence [19]. Accordingly, some researchers have shown that people who often visit fast food restaurants have an unhealthy lifestyle. We discovered that school lunches are beneficial because 'Enjoying school lunches' is a good factor to decrease the number of foods disliked by children (Table 2). It has been suggested that the dieting behaviors of girls in junior high school are affected by mothers who believe that 'cooking is a fun past time.' [20]. This suggestion supported with our result, because 'cooking is a fun past time' may connect with 'enjoying school lunches'. However, it has been unknown association between 'cooking is a fun past time' and 'enjoying school lunches' correctly. This result shows that having fun while eating is important to increase positive eating behavior.

"Respect for food" is also a key factor that may help manage likes/dislikes. Our research showed that the group in which the likes/dislikes of children disappeared through the kindergarten course, namely "(+) to (-)", showed points higher than average in the answer to

“respect for food”. Our other study suggested that similar findings were observed when children in a low “Respect for food” group had significantly more dislikes of food than groups of other “Respect for food” levels (unpublished data). This research showed that “Respect for food” associated with decrease in the dislike of foods by children. We speculate that the foods disliked by children may reduce with a high “Respect for food”.

“Family’s deviated food habits” was related to changes in likes/dislikes of children. It was hypothesized that likes/dislikes of children were affected by family food behavior [9,10]. Our findings support this hypothesis.

We focused on enjoying school lunches. Children enjoyed school lunches because they were ‘tasty’ and because they could ‘eat with friends’ and ‘eat with teacher’ (Table 3, A). Adachi revealed that children who always eat with their family enjoy meals more than children who eat alone [21]. School lunches are also important because they provide a good balanced diet. In addition, it may let children have fun while eating.

This study has some limitations. At first, we only analyzed the lifestyle changes in 4- and 6-year-old children. However, it was difficult to demonstrate the long term behavioral effects of fruit and vegetable intake in this age group by targeting nutrition education programs [22]. This study examines changes in the likes/dislikes of children, but not their food consumption, which will be investigated by us in the subsequent study. In addition, the questionnaire used in this study was modified a little every year. Therefore, we did not get the answers for some questions in the first year, and could not use the answers which we got after the second year. The questions are not listed in Table 1, but listed in Table 2. Although it does not affect our results critically, it is one of the limitations of this retrospective cohort study. We may need investigate it by a prospective cohort study in the near future.

The present data suggest that the factors changing likes/dislikes of children are “Respect for food”, “Enjoying school lunch” and “Family’s deviated food habits”. These factors may be important to reduce likes/dislikes of children.

## **5. CONCLUSION**

Changes in children’s likes/dislikes during kindergarten 2 years’ course may be related to “Respect for food”, “Enjoying school lunch” and “Family’s deviated food habits”, suggesting that managing these habits is important when trying to change children’s likes/dislikes.

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## **COMPETING INTERESTS**

Authors have declared that no competing interests exist.



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