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The Effect of Mothers' and Fathers' Food Preferences on Children's Preferences with Their Attitude

Tomoko Osera[1,2], Setsuko Tsutie[3], Misako Kobayashi[2], Yukiko Segawa[1], Chie Kajiwara[4], Hiroko Hashimoto[1,4] and Nobutaka Kurihara[1*#]

[1]Preventive Medicine, Graduate School of Life Science, Kobe Women's University, 2-1 Higashisuma-Aoyama, Suma, Kobe, 654-8585, Japan.
[2]Takakuradai Kindergarten Attached to Kobe Women's University, 4-2 Takakuradai, Suma, Kobe, 654-0081, Japan.
[3]Nutrition Management, Graduate School of Life Science, Kobe Women's University, 2-1 Higashisuma-Aoyama, Suma, Kobe, 654-8585, Japan.
[4]Integrated Life Nutrition Course, Osaka Seikei College, 3-10-62 Aikawa, Higashiyodogawa-ku, Osaka, 533-0007, Japan.

Authors' contributions

This work was carried out in collaboration between all authors. Authors TO, ST and NK designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors MK and HH made the arrangement for the survey at individual facilities. Authors CK and YS managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aims: Early childhood is most crucial for establishing eating habits; therefore, controlling the preferences of young children is critical. This study investigated the relationship between mothers' and fathers' food preferences in their childhood and their children's present food preferences.
Study Design: This was a cross-sectional study.
Methods: Questionnaires were provided to the parents of children in the age group of 3-5. The association between children's preferences, their food concerns and mothers' and fathers' preferences during their childhood and the present was examined using a multiple logistic regression analysis. A questionnaire was given to the parents of 1,010 children aged between 3 and -5 years and who attended 5 private kindergartens and nursery facilities in Japan. The children's preferences were significantly related to their mothers' and fathers' preferences during childhood, (but not current parental food preferences), as well as children's enjoyment of school lunches and their consumption of traditional Japanese food.

**Corresponding author: Email: kurihara@suma.kobe-wu.ac.jp; #Tel.: +8178-737-2417, Fax: +8178-737-2417;*
Co author: Email: tomokocup12@yahoo.co.jp;

Results: Primarily, the mother's preferences during childhood were most intensively related to children's preferences (4.21 [2.47-7.19], P<0.001: Odds Ratio [95% confidence intervals], probability). The children's preferences were affected not only by mothers' and fathers' preferences during their childhood, which cannot be changed, but also by children's enjoyment of their school lunches and their consumption of traditional Japanese food.
Conclusion: These acts can be modified and may have a key role of improving children's food preferences.

Keywords: Preferences; disliked food; children; father; school lunch; traditional food.

ABBREVIATIONS

CC : Children at present
CI : Confidence interval
FC : Father during childhood
FP : Father at present
MC : Mother during childhood
MP : Mother at present
OR : Odds ratio

1. INTRODUCTION

Although the quantity of children's food consumption varies from meal to meal, their daily energy intake is relatively constant because they adjust their energy intake by consuming more or less as per the requirement in their successive meals [1]. However, the food consumed by adults is very different from that of children because the type of food consumed is critical for their health. For example, eating vegetables improves the longevity of an individual by preventing several diseases such as cardiovascular disease, hypertension, diabetes, obesity and some types of cancer [2,3]. Perez-Rodrigo et al. [4] demonstrated a significant relationship between the like and dislike for fruits and vegetables and the regular consumption of these foods among children and young adults. Uglem et al. [5] reported that vegetable intake during childhood was a good predictor of its consumption in later life. Nevertheless, vegetables are the most disliked food type in this age group [6].

Humans might have innate likes and dislikes before birth [7,8]. Individuals generally like sweet and dislike bitter tastes [9]. Parents' preferences during childhood might have a genetic effect on their children [10]. Cook et al. [11] reported that preferences and neophobia are highly heritable. On the other hand, some studies showed a relationship between parents' current food preferences and the likes and dislikes of their children [12,13]. The frequencies of imitation and food intake show a similar pattern of food preference in an entire family [14]. The acceptance of unfamiliar foods by young children is reportedly influenced by their parents and siblings [15]. The serving of vegetables by parents to children also affects the vegetable consumption of the family members [16]. We previously demonstrated that the mothers' preferences during their childhood affect the children's preferences more than the mothers' current preferences [6]. In this study, we investigated the relationship of the fathers' preferences as well as the mothers' with the children's. Thus, we examined which affected children's preferences more intensively; the fathers' or the mothers' preferences during childhood or their preferences at present.

Likes and dislikes are some of the primary determinants of food intake [17,18]. They are easily acquired in the early years of life, and then modified by early socialization and experiences [19-21]. Food choices by younger children are affected more by older children as peer modelling [22]. Children's likes and dislikes are related to their attitude towards food [23]. In addition, the knowledge and attitudes of parents affects their children's dietary intake [24]. Therefore, we hypothesized that a parents attitude toward food influences their children's preferences. To test this hypothesis, we investigated the relationship of children's food preferences with their attitude towards food, in addition to their parents' preferences.

2. METHODS

In May 2014, a questionnaire was given to the parents of 1,010 children aged 3–5 years and attending two private kindergartens and nursery facilities each and a daycare centre in Hyogo and Osaka Prefectures, Japan. There was a questionnaire sheet for each child; therefore, parents with two children received two copies and answered one for each child. Parents were informed about the objectives and methods of this study, and they answered the questionnaire

voluntarily, with the right to withdraw at any time during the study. Individual privacy was protected all through the investigation. The study was approved by Kobe Women's University People's Ethics Committee. Under these conditions, mothers agreed to cooperate with the scientific investigations while their children were attending the classes in the kindergarten or nursery in this study.

In total, 856 (84.8%) questionnaires were returned. The questionnaire with the answer as 'not applicable' for each question was treated as a blank. The questionnaire was filled out by the mothers of 826 children (96.5%), fathers of 18 (2.1%) and grandmothers of five (0.6%). Of the children that were the subjects of the responses, 412 were the first child (48.1%), 301 were the second child (35.2%), 110 were third (12.9%) and 20 were fourth or more (2.3%). The responders included the parents of 259 3-year-olds, 288 4-year-olds, and 309 5-year-olds; there were 428 boys and 422 girls.

The questionnaire included 30 questions in three sections: (1) the child's food preferences (CC), (2) the mother's and father's current and childhood preferences (MP/FP and MC/FC, respectively), and (3) the family lifestyle, food habits, enjoyment of school lunches, and intake of traditional Japanese food etc. Parents answered whether the mother, the father and their children had disliked food at present and whether they consumed the food during their childhood. If they answered 'yes' to each question above, they also answered which foods the mother, father and their children disliked with free description. If the answers were not the father's or mothers, they asked both parents about their likes and dislikes and asked the mothers about their habits/their children's habits and answered the questions in the questionnaire. Additional questions analysed the parents' cooking habits and attitudes towards food as well as the children's lifestyle, bed time, wake-up time, whether or not the child assisted in shopping tasks, food habits, frequency in which the children ate breakfast, frequency the mothers ate breakfast, whether or not the children helped to prepare the dishes, enjoyment of school lunches, and the amount of traditional Japanese food which the children consumed and so on.

SPSS version 19.0 J (IBM Japan, Ltd, Tokyo, Japan) was used for all statistical analyses. Pearson's $\chi 2$ and Fisher's exact tests were used to assess the pairwise relationships among MP, FP, MC, FC and CC.

Multiple logistic regression analysis by forced entry method was performed for the association between MP, FP, MC, FC and CC. All survey answers were documented in a way that the numbers of responses between any two groups was similar; e.g. the five choices, 'before 6 a.m.,' '6–7 a.m.,' '7–8 a.m.,' '8–9 a.m.,' and '9–10 a.m.,' were combined into two, 'before 8 a.m.' and '8–10 a.m.,' based on the median and mean ± SD. As well, multiple logistic regression analysis by stepwise method was performed for the association between MP, FP, MC, FC and CC as well as that between the children's and mother's lifestyle, food habits, school lunches and the amount of traditional Japanese food consumed.

3. RESULTS

3.1 Children's Preferences and Their Relationship to Various Factors

Among the children, 77.3% had some foods that they disliked, which included 77.2%, 74.1%, and 80.3% of children aged 3-, 4- and 5-years, respectively. There were no significant differences in likes and dislikes based on age. Fisher's exact tests revealed that the relationships between MP and CC and between FP and CC were statistically significant (Table 1A, 2A), as were those between MC and CC and between FC and CC (Table 1B, 2B). CC showed a significant relationship with a combination of the answers for MP and MC. In other words, the relationship between CC and MC/MP was not affected when the mother's preference changed or did not change at present (Table 1C). CC showed a significant relationship with the combination of answers for FP and FC. In the detail, there was also a significant relationship between CC and FC/FP. Tables 2C-3 and 4 showed whether or not the father had a disliked food during childhood.

3.2 Relationships between the Present (MP and FP) and Childhood (MC and FC) Likes and Dislikes of Mothers and Fathers and Their Children (CC)

Multiple logistic regression analysis by forced entry method showed that CC was significantly related to MC and FC but not to MP and FP (Table 3A, B). It also showed that CC was significantly related to MC rather than to MP and CC was significantly related to FC than to FP (Table 3C). Multiple logistic regression analysis by stepwise method was used to assess the relative importance of MC, MP, FC, FP and the

children's and the mother's lifestyle and food attitudes on CC. The result showed that CC was also significantly related to MC, FC, 'children enjoyment of school lunches', and 'children's consumption of traditional Japanese food' (Table 4). The result showed that MC related to CC strongly than FC.

3.3 Relationships between the Food Group Preferences of the Children and Parents

The number of foods and food groups were selected by parents as being disliked by their children as well as the mother and father during their childhood and at present. Vegetables were the most disliked food group in all categories. The relationships between the dislikes of each food group and specific foods among the CC, MC, and FC groups are shown in Tables 5 and 6.

4. DISCUSSION

The present study demonstrated that MC had a significant relationship with CC (Tables 1, by Fisher's exact tests and 3 A & C, by multiple logistic regression analysis). It is consistent with the result of our previous study which investigated the relationship in preferences between children and mothers only [6].

Table 1. Relationships between the present (MP) or childhood (MC) preferences of mothers and their children (CC)

	Mother		Children (CC)				Fisher's exact probability test
	During childhood (MC)	At present (MP)	Yes		No		
A	-	Yes	325	(41.7)	65	(8.3)	p<0.001
	-	No	275	(35.3)	114	(14.6)	
B	Yes	-	314	(55.1)	60	(10.5)	p<0.001
	No	-	60	(8.0)	60	(8.0)	
C1	Yes	Yes	300	(40.9)	52	(7.1)	C1,2 p<0.05; C1,3 p=N.S; C3,4 p<0.001; C2,4 p=N.S; C1,2,3,4 p<0.001
2	No	Yes	8	(1.1)	5	(0.7)	
3	Yes	No	210	(28.6)	53	(7.2)	
4	No	No	51	(6.9)	55	(7.4)	

Numbers are the actual numbers of the answers. Numbers in parenthesis () mean % in each table 2 x 2 or 4 x 2. N.S, not significant. 'Yes' means having disliked foods; 'No' means not having disliked foods. MC, Mother during childhood; MP, Mother at present; CC, Children during childhood. A means 2 x 2, including MP x CC, B means 2 x 2, including MC x CC, C means 4 x 2, including MP, MC x CC, the number showed on each line combined Fisher's exact probability test

Table 2. Relationships between the present (FP) or childhood (FC) preferences of fathers and their children (CC)

	Father		Children (CC)				Fisher's exact probability test
	During childhood (FC)	At present (FP)	Yes		No		
A	-	Yes	317	(46.1)	65	(9.2)	p<0.001
	-	No	220	(32.0)	114	(12.7)	
B	Yes	-	314	(55.1)	60	(10.5)	p<0.001
	No	-	132	(23.2)	60	(11.2)	
C1	Yes	Yes	248	(44.0)	52	(7.8)	C1,2 p<0.05; C1,3 p=N.S.; C3,4 p<0.001; C2,4 p=N.S.; C1,2,3,4 p<0.001
2	No	Yes	9	(1.6)	5	(0.7)	
3	Yes	No	61	(10.8)	53	(2.7)	
4	No	No	123	(21.8)	55	(10.6)	

Numbers are the actual numbers of the answers. Numbers in parenthesis () mean % in each table 2 X 2 or 4 X 2. N.S, not significant. 'Yes' means having disliked foods; 'No' means not having disliked foods. FC, Father during childhood; FP, Father at present; CC, Children during childhood. A means 2 x 2, including MP x CC, B means 2 x 2, including MC x CC, C means 4 x 2, including MP, MC x CC, the number showed on each line combined Fisher's exact probability test

Table 3. Relationships between the present (MP, FP) or childhood (MC, FC) preferences of parents and their children (CC)

			Children(CC)			P value
			OR	(95% CI)		
A	Mother at present	(MP)	1.49	(1,	2.21)	N.S.
	Mother during childhood	(MC)	4.16	(2.67,	6.51)	p<0.001
B	Father at present	(FP)	1.32	(0.74,	2.36)	N.S.
	Father during childhood	(FC)	2.09	(1.17,	3.71)	p<0.001
C	Mother at present	(MP)	1.36	(0.84,	2.20)	N.S.
	Mother during childhood	(MC)	4.21	(2.47,	7.19)	p<0.001
	Father at present	(FP)	1.58	(0.85,	2.92)	N.S.
	Father during childhood	(FC)	1.33	(0.71,	2.49)	N.S.

OR, Odds ratio; CI, confidence interval. MC increased if many mothers have disliked food. FC increased if many fathers have disliked food. A: Included Mother's at present and during children as factors by forced entry method. B: Included Father at present and during children as factors by forced entry method. C: Included Mother and Father at present and during children as factors by forced entry method

Table 4. Multiple logistic regression analysis of factors affecting children's preferences

	Children (CC)			P value
	OR	(95%CI)		
Mother during childhood (MC)	1.49	(1,	2.21)	p<0.001
Children enjoying school lunches	4.16	(2.67,	6.51)	p<0.001
Father during childhood (FC)	1.32	(0.74,	2.36)	p<0.01
Children consuming traditional Japanese food	2.09	(1.17,	3.71)	p<0.05

OR, Odds ratio; CI, confidence interval. MC increased if many mothers have disliked food. FC increased if many mothers have disliked food. Multiple regression analysis by setting entry method, one of which is stepwise method

Table 5. Relationship of children's disliked food and those of mothers' during childhood

Mother	Yes				No				P value
Children	Yes		No		Yes		No		
Vegetable	224	(26.7)	169	(20.1)	196	(23.3)	251	(29.9)	p<0.001
Tomato	14	(1.7)	46	(5.5)	55	(6.5)	725	(86.3)	p<0.001
Fragmented soybeans	5	(0.6)	69	(8.2)	13	(1.5)	753	(89.6)	p<0.05
Fishes	11	(1.3)	83	(9.9)	59	(7.0)	686	(81.8)	N.S.
Mushrooms	9	(1.1)	52	(6.2)	45	(5.4)	734	(87.4)	p<0.05
Meat	16	(1.9)	60	(7.2)	56	(6.7)	707	(84.3)	p<0.001
Soybeans	1	(0.1)	20	(2.4)	36	(4.3)	783	(93.2)	N.S.
Dairy product	7	(0.8)	49	(5.8)	16	(1.9)	768	(91.4)	p<0.001
Milk	4	(0.5)	21	(2.5)	12	(1.4)	803	(95.6)	p<0.001

Values are the number of responses. P values are from Fisher's exact probability test; Numbers in parenthesis () mean % of 'dislike' or 'not dislike' in both

In this study, we investigated the fathers' preferences in addition to the mothers' and observed that the mothers' preference strongly related to CC than the fathers' (Tables 2 and 3B and C). The result is supported by the findings that mothers tend to spend more time caring for children than fathers do [25] and learning about the flavours in foods begins in the womb in amniotic fluid and during early infancy through breast milk [26]. Furthermore, the mother's dieting behaviour, eating consciousness, and the number of conversations they had with their daughter regarding diet affects the dietary behaviour of their junior high school-aged daughters [27]. The children's preferences for healthy or unhealthy foods are associated with their body mass index, their parent's monthly income, their father's education, and the type of daycare they attend [28]. The mother's perception and father's attitude is influenced by

Table 6. Relationship of children's disliked food and those of fathers' during childhood

Father	Yes				No				P value
Children	Yes		No		Yes		No		
Vegetable	123	(15.2)	86	(10.7)	297	(36.7)	304	(37.5)	p<0.05
Tomato	10	(1.2)	39	(4.8)	59	(7.2)	702	(86.7)	p<0.01
Fragmented soybeans	1	(0.1)	48	(6.3)	16	(2.1)	692	(91.4)	N.S.
Fishes	10	(1.3)	40	(5.3)	52	(6.9)	654	(86.5)	N.S.
Mushrooms	8	(1.1)	32	(4.2)	46	(6.1)	671	(88.6)	p<0.05
Meat	6	(0.8)	23	(3.0)	62	(8.2)	667	(88.0)	p<0.001
Soybeans	3	(0.4)	8	(1.1)	32	(4.2)	714	(94.3)	p<0.05
Dairy product	0	(0.0)	30	(4.0)	23	(3.0)	704	(93.0)	N.S.
Milk	0	(0.0)	14	(1.8)	16	(2.1)	727	(96.0)	N.S.

Values are the number of responses. P values are from Fisher's exact probability test; Numbers in parenthesis () mean % of 'dislike' or 'not dislike' in both.

breastfeeding [29]. The mothers' and fathers' eating patterns and practices are associated with the feeding practices of infants and young children [30]. Therefore, although fathers play an important role in the formation of young children's preference, the mother's preferences may have a strong influence on it.

In the current study, we also did a multiple logistic regression analysis by stepwise method to assess the relative importance of MC, MP, FC, FP and children's and mother's lifestyles and food attitudes on CC (Table 4). CC was significantly related to (1) MC, (2) the children's enjoyment of school lunches, (3) FC and (4) the amount of Japanese traditional food that the children ate. The result that MC related to CC strongly than FC is consistent to the results from Fisher's exact test and multiple logistic analysis by forced entry method show in Table 1 and 3C. It was reported that preferences are shaped by a combination of both genetic and environmental factors [31]. Behavioral energy balance-related behavioural patterns exist when children are 5 years old [32]. In addition, the analysis showed that CC may have a relationship with the children's enjoyment of school lunches. It was reported that school lunches contribute to healthy eating habits in the population and children [33,34 and 35]. The choices made by children for their school lunches reflect the overall eating patterns among school-aged children [36]. Moreover, 'enjoying school lunch' was related to changes in the likes and dislikes of children [23]. These data suggest that 'enjoying school lunch' is related to children's likes and dislikes. In addition, siblings, peers and parents can act as role models to encourage the tasting of novel foods. Children are more likely to eat in emotionally positive atmospheres [37]. School lunch may be very useful for reducing children's disliked food. Finally, the present analysis demonstrated that CC may have a relationship with the amount of Japanese traditional food the children ate. In the United States, latitudinal variations are reported to influence the frequency of traditional food consumption in children [38]. Japan may have various frequency of the consumption in each area. The Japanese government recommends that children consume traditional Japanese food. In summary, the parents' preferences during childhood cannot be changed. So, we think that these two are important, the children's preferences were significantly related to their enjoyment of school lunches, and children consuming traditional Japanese food.

We then investigated whether MC, FC, MP and FP were related to CC for each food. Consequently, vegetables showed significant relationships of CC to MC (Table 5), FC (Table 6), MP and FP (data not shown). The part of the data was consistent with our previous data that vegetables had significant relationships between both CC and MC and CC and MP [6]. In addition, vegetables were also the most commonly disliked food in all the five groups (MP, FP, MC, FC and CC, data not shown). Infants who receive repeated dietary exposure to a food tend to eat more and might learn to like its flavour [39]. So, it is important to try reducing children's dislike food during childhood.

A limitation of the current study is that the father's preferences were mostly reported by the mothers (97.2%) or other caregivers; some of the fathers did not answer directly. In addition, we only asked likes and dislikes, but not regarding the lifestyle that the fathers led. In the next study,

we would examine the father's likes and dislikes and their lifestyle through a direct investigation although fathers were difficult to recruit.

5. CONCLUSION

In conclusion, this study revealed that the children's preferences were significantly related to their mothers' and fathers' preferences during their childhood: their mothers' preferences strongly affected the children's preferences than that of fathers' preferences. Although the parents' preferences during childhood cannot be changed after their children were born, the other factors which the current study revealed as being significantly related to the children's preferences were children's enjoying school lunches and consuming traditional Japanese food.

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COMPETING INTERESTS

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