



Original Article

Development of an intervention programme for selective eating in children with autism spectrum disorder



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KEYWORDS

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Summary *Objective/Background:* Most parents of children with autism spectrum disorder (ASD) have difficulties with the selective eating behaviour of their children. This study aimed to develop a newly designed intervention programme on improving selective eating behaviour for parents of children with ASD and evaluate its effectiveness.

Methods: The participants were 23 parents of children (aged 3–6 years) with ASD. The education programme included a session that addressed approaches to improve selective eating and attitudes at meal times, with a discussion. The intervention aimed to identify the underlying factors and approaches to improve selective eating in children and the self-efficacy of parents.

Results: Significant differences were observed before and after the intervention in the degree of difficulty perceived by parents, their degree of self-efficacy, the number of recommendations conducted by them, their subjective view of the degree of dietary imbalance, and the number of food items consumed by their children.

Conclusion: We developed an interventional programme for parents of children with ASD and this programme was found to be useful. It is important for occupational therapists to consider

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the factors and approaches for selective eating in children with ASD in order to provide early intervention for their parents.

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Introduction

The Centers for Disease Control and Prevention (CDC) estimated that one in 68 children among multiple communities in the United States has autism spectrum disorder (ASD). This new estimate is approximately 30% higher than previous estimates of 2012 (Wingate et al., 2014). In Japan, it is estimated that prevalence rate of autism in children up to 5 years of age was 3.5% (Kamio, Kawamata, Nakai, & Mishima, 2015). According to DSM-5, ASD is a lifelong neurodevelopmental disorder characterised by impaired social communication combined with restrictive and repetitive patterns of behaviour and interest. Impairments in sensory processing are also very common (American Psychiatric Association, 2013).

Parents of children with ASD report that they have difficulties with the daily activities, behaviours, and communication abilities of their children. The other concerns that parents often express involve the eating habits of their children during meals (Bicer & Alsaffar, 2013; Williams, Dalrymple, & Neal, 2000), and this can create stress in the household (Anderson, Must, Curtin, & Bandini, 2012; Rogers, Magill-Evans, & Rempel, 2012). Moreover, children with ASD are often highly selective eaters with very limited food acceptance (Cermak, Curtin, & Bandini, 2010).

In fact, an estimated 58%–67% of parents of children with ASD experience the selective eating behaviours of their children in countries such as Japan (Bicer & Alsaffar, 2013; Kerwin, Eicher, & Gelsinger, 2005; Tateyama, Miyajima, & Shimizu, 2013; Williams et al., 2000). Several studies have compared dietary variety among children with ASD, those with normal cognitive development, and those with other developmental disabilities, and these studies concluded that the dietary variety is lower in children with ASD and that these children are more likely to refuse food (Bandini et al., 2010; Marshall, Hill, Ziviani, & Dodrill, 2013; Williams, Hendy, & Knecht, 2008; Zimmer et al., 2012). Early childhood is the period when children experience new foods, tastes, and textures. Young children who consistently refuse to eat or to try a variety of foods are frequently described as ‘picky eaters’ by their parents (Legge, 2002; Tomchek & Dunn, 2007; Twachtman-Reilly, Amaral, & Zebrowski, 2008). Although selective eating is not uncommon in young children with normal development, selective eating in children with ASD may extend beyond the early childhood period. Selective eating patterns are five times more likely in children with ASD than in children with typical neurological development (Sharp et al., 2013). Selective eating tends to be more pronounced, start earlier, and extend over a longer period in children with ASD than in other children. In our pre-study investigation, more than 80% of the parents of young children with ASD reported that

selective eating resulted in parental difficulties (Miyajima, Tateyama, Hirao, Nakaoka, & Higaki, 2014).

Food selectivity can become a significant problem because it can be associated with inadequate nutrition owing to the limited nutritional intake of a restricted diet (Cornish, 1998; Dovey, Staples, Gibson, & Halford, 2008; Herndon, DiGuseppi, Johnson, Leiferman, & Reynolds, 2009; Lockner, Crowe, & Skipper, 2008; Raiten & Massaro, 1986; Schmitt, Heiss, & Campbell, 2008; Williams et al., 2000). Several studies have reported that children with ASD may be at greater risk for nutritional deficits as a result of limited dietary variety; however, these findings are not conclusive (Emond, Emmett, Steer, & Golding, 2010; Hyman et al., 2012; Zimmer et al., 2012). Food selectivity is a frequent problem in children with ASD, and the child’s unusual eating patterns can significantly stress the family (Grodén et al., 2001; Legee, 2002). If children have selective eating patterns, their parents often do not know how to deal with the situation, and this easily results in stress. Most parents of children who have poor eating habits tend to have lower self-efficacy because of stress and the daily loss of confidence. Therefore, it is important to understand the self-efficacy of parents, as this might help improve a child’s food acceptance (Miyajima, Tateyama, Hirao, Nakaoka, & Higaki, 2016).

In response to this problem, researchers have recognised the need for assessment and treatment of selective eating (Johnson et al., 2014; Kral, Erikson, Souders, & Pinto-Martin, 2013; Sharp et al., 2013). Cermak et al. (2010) discussed the need for parents to understand food selectivity and the importance to address the needs of children with ASD who demonstrate substantial food selectivity, because feeding problems are complex and often multifaceted. To solve the problem of selective eating in children with ASD, it is important to gain a deeper understanding of the various factors that contribute to food selectivity and address them in order to develop holistic interventions for this problem (Tanner et al., 2015).

A number of explanations for food selectivity have been proposed (Whiteley, Rodgers, & Shattock, 2000). Among these, Williams et al. (2000) stated that the most likely factors to influence food selectivity reported by parents were food texture (69%), appearance (58%), taste (45%), smell (36%), and temperature (22%). In the literature, feeding problems have been associated with various factors, including repetitive behaviour, anxiety, and sensory reactivity (Johnson et al., 2014).

Therefore, in our pilot study involving an interview and questionnaire survey, we investigated not only the factors of food preferences but also the approaches for selective eating in children with ASD. We focused more on why these children preferred rather than on why they disliked certain food. We wanted to use the term “food preferences” rather

than “food selectivity” because when we evaluated selective eating, we used the factors of preferences (i.e. temperature or size). In addition, we clarified the association between the factors and approaches; approaches corresponding to the factors (Miyajima et al., 2014). The factors of food preferences reported by parents included 57 items, which were divided into the following three categories: sensory functions (taste, texture, appearance, sound, smell, and temperature; 80%), oral functions (chewing and swallowing; 11%), and cognitive functions (habituation, forecast, and obsession; 9%). The approaches for selective eating reported by parents included 50 items, which are divided into the following four categories: oral, sensory, cognitive, and environmental functions. These represented ‘make chewing and swallowing easier’, ‘change the sensory stimulation they hate’, ‘try new kinds of foods’, and ‘support them in a consistent way’ (Tateyama et al., 2013).

The complicated presentation of children can lead to difficulties in determining the most effective interventions to tackle the problem of selective eating (Tanner et al., 2015). To the best of our knowledge, no study in the literature has investigated interventions focused on an education programme for the parents of children with ASD, which involve the abovementioned factors and approaches. If an occupational therapist can provide ideas about approaches corresponding to the factors of food preferences to the parents of children with ASD through a course, the parents might be able to obtain information for implementing techniques that prevent selective eating and improve the dietary habits of their children.

The present study aimed to evaluate the effectiveness of the programme that was designed to provide information to the parents of children with ASD about the factors of food preferences and approaches for coping with the problems of selective eating.

Methods

Participants

The study participants were Japanese-speaking parents of young children with ASD aged between 3-6 years old; they were recruited from two outpatient developmental support centres in Osaka prefecture. Developmental support centres are available to preschool children with special needs for providing therapy and teaching parents about the impairments of their children in Japan (Ministry of Health, Labour and Welfare, 2011).

In Japan, children who have some developmental problems are assessed with medical examinations; however, ASD is diagnosed later in Japan than in other countries, because of social and cultural differences. For example, children often undergo a medical examination prior to entering school in the US, but many Japanese children are examined after entering school.

The eligibility criteria were as follows: the parent (1) has attended all the programmes in the study including two sessions and two discussions; (2) has a child diagnosed with ASD or a child who scored of more than 15 points in the Social Communication Questionnaire (SCQ) (Kuroda, Inada, & Uchiyama, 2013, p. 7; Rutter, Bailey, & Lord, 2003); and

(3) has experienced difficulties with their children’s selective eating behaviours.

The parents of their children who were admitted to a hospital, changed to a new nursery school or kindergarten, or changed corresponding address recently, and parents who had any personal reason to withdraw from the study, were excluded from this study.

The study protocol was approved by the Research Ethics Committee of the Graduate School of Comprehensive Rehabilitation, Osaka Prefecture University prior to data collection (no.: 2013-210). Informed consent was obtained from each parent and the director of each participating centre. All procedures performed in this study involving human participants were in accordance with the ethical standards of the Institutional and/or National Research Committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Examination and measurement methods

This study was a single-group, self-controlled trial that compared variables at baseline, and before and after the intervention (Katz, Kihara, & Kihara, 2013, pp. 1–13). The baseline and intervention periods were 2 months respectively (Fig. 1). Baseline measurements were used to evaluate the effectiveness of the programme and gather baseline information regarding the participants before the session and discussion.

A questionnaire was distributed before and after each session to find out the parental attitudes regarding the selective eating and dietary habits of their children with ASD. At the same time, the developmental age and developmental quotient (DQ) of the children with ASD were determined by using the *Kyodaishiki* developmental schedule (Koyama, Osada, Tsujii, & Kurita, 2009). The *Kyodaishiki* developmental schedule is a standardised test used quite often in Japan. DQ has the highest correlation with IQ, and the assessment has been validated (Koyama, Osada, Tobari, & Takeda, 2003; Koyama et al., 2009). The information about parents’ knowledge on approaches and the factors of food preference was collected at the baseline measurement. The outcome measures were measured at three timepoints: (1) baseline (2 months prior to the intervention), (2) before the intervention, and (3) after the intervention. The outcome measures in this study are described below.

The changes to parental attitudes were assessed using: (1) The degree of difficulty experienced by the parents was assessed using a visual analogue scale (VAS; 0–100 points) (Bijure, Silver, & Gallagher, 2001), (2) The degree of self-efficacy of the parents was evaluated using the Self-efficacy Assessment for Parents of Children with Selective Eating (SAPS) scale, with a scoring system of 12–60 points (12 items), and (3) The number of recommendations implemented by parents (50 items; Table 1).

The SAPS scale consists of 12 items and is divided into three areas: (1) basic attitudes to eating, (2) factors underlying likes and dislikes, and (3) compliance to recommendations for selective eating (Miyajima et al., 2016; Tateyama & Miyajima, 2015). Each item was measured according to how confident the parents are to pursue the necessary actions for improving the child’s food

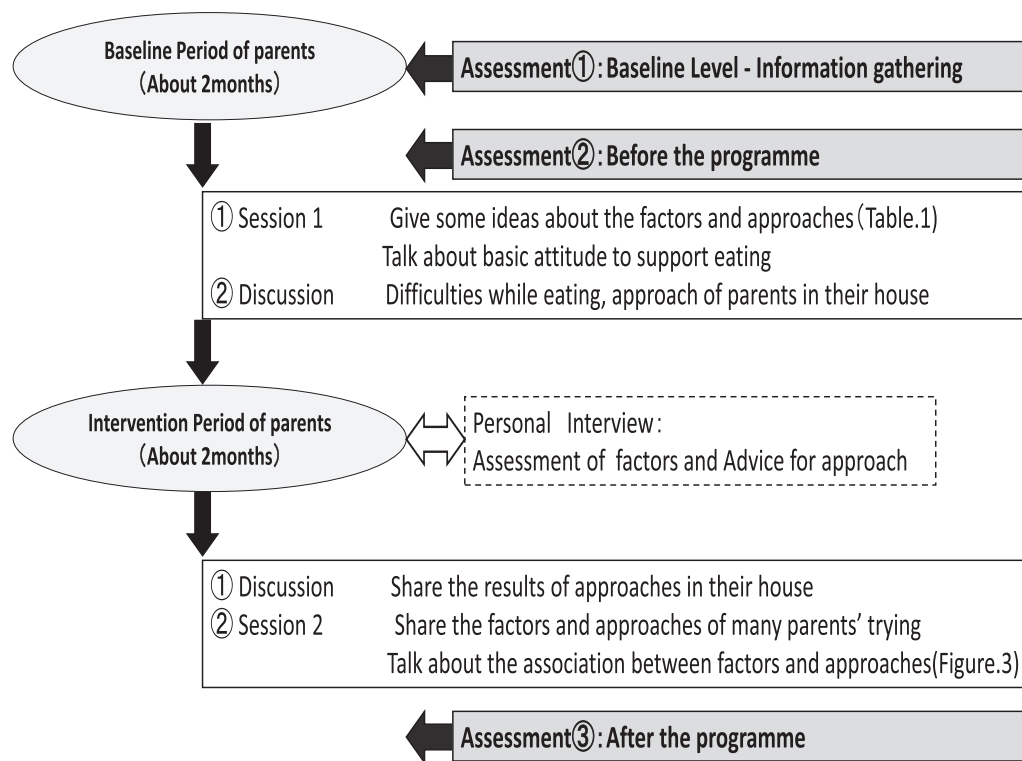


Figure 1 Research design and the interventional program content.

acceptance. A Likert scale (Likert, 1932) was used for the responses to questions, with higher scores representing higher self-efficacy.

The changes in the eating patterns of children with ASD were assessed using: (1) The number of foods that the child chose to eat (47 items), and (2) The parents' subjective view of the degree of dietary imbalance (VAS; 0–100 points).

The 47 items of food included carbohydrate-rich foods, liquids, fish, meat, vegetables, beans, eggs, seaweed, mushrooms, and potatoes, etc. We also assessed the factors for the favourite foods through a 57-item questionnaire (Miyajima et al., 2014), and the approaches for selective eating were assessed through a 50-item questionnaire (Miyajima et al., 2014; Tateyama & Miyajima, 2015) which had been used in a pilot study before (Table 1).

Content of intervention

The developmental support centres in Japan conduct seminars regularly to parents of children with ASD, and the intervention was part of this regular service (Fig. 2).

This programme intended to help parents to take care of their children and provide opportunities for them to learn how to cope with selective eating. This programme also intended to change the environment between parents and children by making an intervention for the parents based on the Person Environment Occupation model. In occupational therapy for children with developmental disorders, child care support for parents is very important (Karashima, 2008, pp. 39–43).

The programme consisted of two 40-min sessions and two discussions for the parents of children with ASD. The

session was about the factors underlying selective eating and approaches to improve selective eating and attitudes at meal times. The aims of the programme were: (1) to learn the basic attitudes towards eating; (2) to elucidate factors influencing food preferences; and (3) to implement new approaches to tackle selective eating. Personal interviews were conducted upon request. The sessions included presentations on the results of previous investigations (Miyajima et al., 2014).

In session 1, parents were introduced to 57-factor items and 50 -approach items identified by analysing qualitatively the interviews after checking the assessment results (Table 1). This helped in providing a different point of view to parents and enhanced their awareness of the issues associated with ASD. For example, if the oral factor for disliking sliced meat was because it was hard to chew, we suggested to make the food bite size, such as a meat ball, as the approach. If the sensory factor for disliking a sandwich was because of having mixed flavours in the mouth, we suggested to avoid mixing the flavours, such as giving egg omelette and toast separately, as the approach. If the cognition factor for disliking the food for the first time was unpredictable, we suggested to cook the food together and show the process as the approach.

Next, basic attitudes towards eating were discussed and a report from a person with ASD was presented. The parents were then divided into small groups to discuss personal experiences and identify factors underlying the culinary likes and dislikes of their children. Later, various approaches to address the identified factors were discussed and the participants were encouraged to implement these new approaches at home.

Before session 2, we conducted another discussion with the same small group to allow parents to share the results

Table 1 Assessment of Content: Introduction of a Parental Course—Factor and Approach.

Factors of Food Preferences (57 items)			
Oral	Chew	1) small size	5) hard
	Swallow	3) easy to swallow	6) difficult to swallow
Sensory	Taste, Flavour	8) sweet	14) flavours mixed in the mouth
	Smell	15) strong smell	16) scentless
	Texture	20) flaky	31) gummy
	Temperature	32) hot	34) lukewarm
	Sound	36) crunchy	39) fibrous
	Appearance	42) colourful	46) monotoned
Cognition	Prediction	52) predictable, unsurprising	56) unpredictable
	Familiar	53) everyday food	55) same bland
	Obsessed	54) obsessed, particular	57) hate everything except favourite food
Approach for Selective Eating (50 items)			
Oral	Make it easier to chew and swallow	3) make food bite size, consistent firmness	
Sensory	Change the dislike sensory elements	5) grind and mix, add soup, or eliminate fibre	
	Not to mix sensory elements	9) stop each bite and avoid mixing the flavour and texture	
Cognition	Use the flavoured sensory elements	11) change to favoured flavours and tastes	
	Introduce new ingredient	20) serve anyway even they cannot eat	
	Decide the size and amount as might be expected	22) show small amount on a spoon	
	Experience together as might be expected	26) cook the food together and show the process	
Environment	Decide the roles as might be expected	28) clarify each step and process	
	Let not notice ingredients of the meal	34) mix with favourite food without noticing	
	Help eating in the consistent way	38) always helped by the same person	
	Do not force to eat and recognize their efforts	39) praise and recognize their efforts	
	Create a pleasant atmosphere	41) show and share a pleasant atmosphere for themselves	
	Take advantage of the obsession and make the same environment	44) prepare the same bland (B flavour of A company)	
	Experience different places and environments	49) eat at different places for many times	

of incorporating the approaches identified in the session 1. Small, detailed steps were recommended to maintain implementation of the approaches that were successful. The parents also examined about why some of their approaches were unsuccessful, and they were encouraged to try different methods or to implement the changes in smaller steps.

Later, the factors and recommendations from a previous study (Miyajima et al., 2014) were introduced to the parents in the session 2 so that they could obtain maximum benefit from the interventional programme. In addition, a lecture on the association between factors and approaches was given (Fig. 3).

An additional session or a personal interview, as requested by parents, was conducted between the session 1 and session 2 within 2 months. Each interview lasted for about 40 minutes, and an occupational therapist answered questions about dietary status. The parents reassessed the information regarding food preference factors of their children after the interview.

Analysis

All data analyses were performed using SPSS statistical software (version 22; IBM Corp., Armonk, NY, USA). Baseline

factors were recorded 2 months before the intervention and re-evaluated 2 months after the intervention. Data were collected for parents of children with ASD who had difficulties with selective eating and parents who participated in all the sessions.

Normality was assessed using the Shapiro–Wilk test. The differences between the periods were analysed by either: (a) a one-way analysis of variance or (b) the Friedman test, depending on the nature of the data (Table 3). The Bonferroni test was used where multiple comparisons were indicated. A p-value of <0.05 was considered statistically significant.

Results

Participant and diet condition characteristics

Forty-nine participants attended the session 1. Fourteen (28.6%) out of the 49 participants were unable to attend the session 2 due to working, personal business or illness of their children. A total of 35 participants attended all the programmes. Of these 35 participants, 20 of them had children diagnosed with ASD. In addition, on assessment using the SCQ, we identified four children with cut-off scores of more

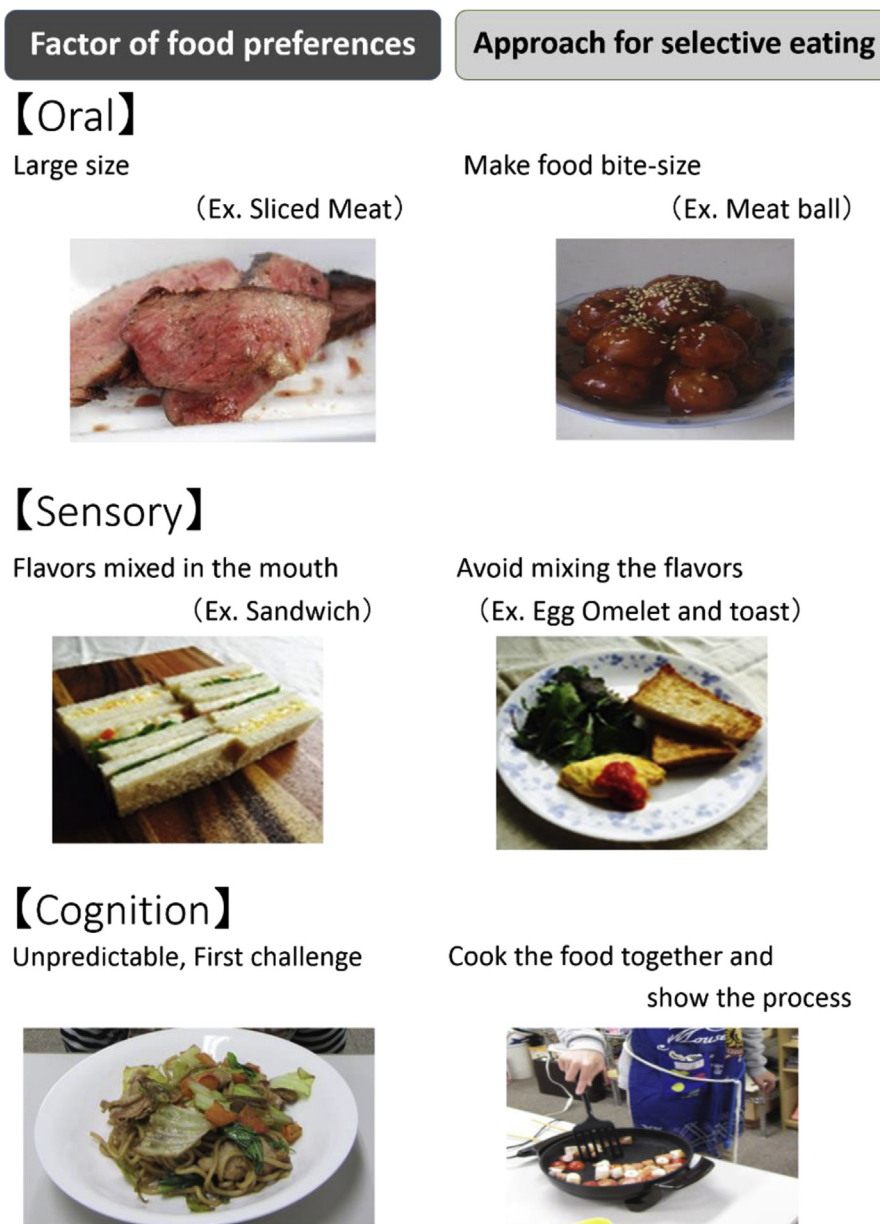


Figure 2 Introduction of a parental program – factor and approach (part of the presentation).

than 15 points, and they were included in the analysis. Of those 24 selected parents, 23 reported difficulties owing to selective eating in their children. Hence, a total of 23 participants (46.9%) were finally included in this study. [Table 2](#) summarises the characteristics of the participating children and parents, and the parents' perception of the dietary balance of their children.

Of the 23 parents included in the analysis, two were aged 20–29 years, nine were aged 30–39 years, and 12 were aged 40–49 years. These 23 parents had 23 preschool-aged children (mean age, 52.83 ± 12.10 months), including nine children aged 3 years, eight aged 4 years, four aged 5 years, and two aged 6 years. The ratio of boys to girls was 18:5, which was similar to the sex ratio of ASD reported by [Wingate et al. \(2014\)](#). Of the 23 children, 19 were diagnosed with ASD (including pervasive developmental disorder or autism) and four were undiagnosed but had SCQ

scores of >15 points (the ASD cut-off score). All 23 parents reported difficulties at mealtime and suspected that the diets of their children were imbalanced. [Table 3](#) shows these results.

An occupational therapist interviewed 12 of the 23 (52.2%) parents, who requested advice. Of the 12 parents, five had children who consumed less than 10 different food items. The occupational therapist advised the parents on how to best approach their concerns.

Degree of difficulty perceived by parents

The degree of difficulty perceived by parents was measured using a VAS (0–100 points). Statistical analysis revealed that the VAS score significantly decreased by 17.87 points from 54.65 to 37.22 after the intervention ($p < .001$).

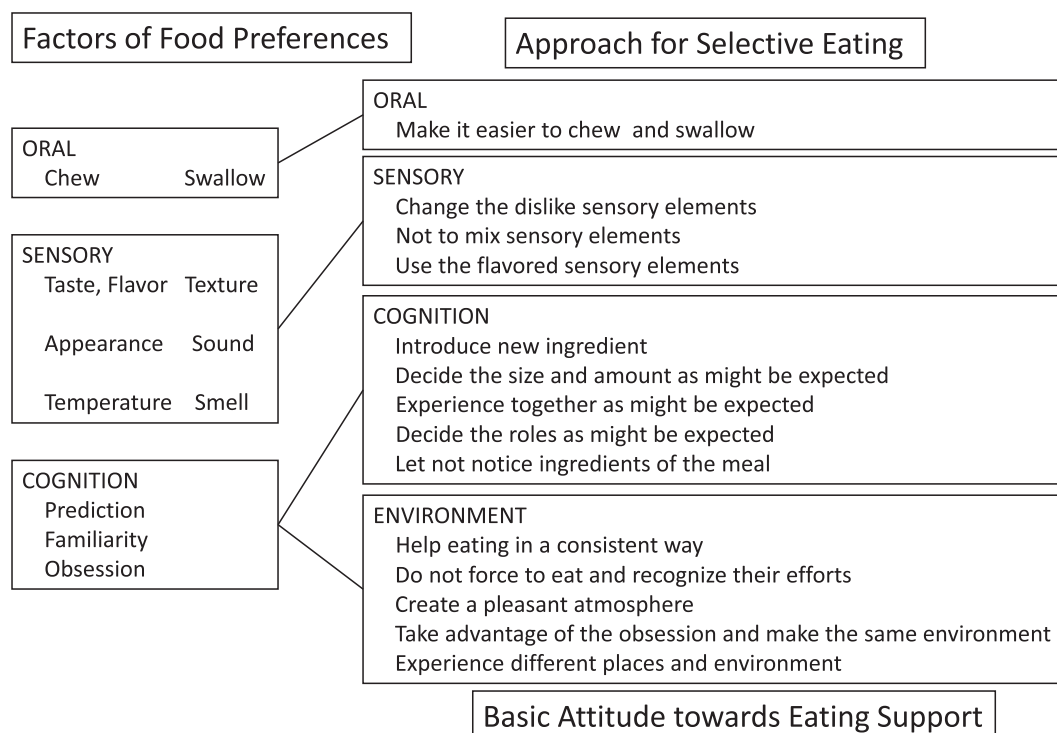


Figure 3 Association of food preferences and the food selectivity approach used in the program.

Degree of self-efficacy of the parents

The degree of self-efficacy of the parents was measured using the SAPS (12–60 points), which showed that the total score significantly increased by 5.35 points from 39.3 to 44.65 after the intervention ($p = .018$).

The following is a breakdown in each domain: 1) Basic attitudes to eating: three items increased from 9.52 to 10.35 points ($p = .018$); 2) Factors of likes and dislikes: four items increased from 14.48 to 16.39 points ($p = .002$); and 3) Correspondence to selective eating: five items increased from 15.31 to 17.95 points ($p < .001$). The average gain scores in these three areas were 0.28, 0.48, and 0.53 points, respectively, with the most significant increase in 'correspondence to selective eating' ($p = .018$).

Number of recommendations carried out by parents

There was a significant increase in the number of recommendations carried out by parents (increase of 7.00 items from 18.39 to 25.39) and the number of approaches attempted by parents (increase of 7.39 items from 26.17 to 33.13) (both, $p < .01$). The most common approaches among parents of children with ASD were 'change the hated texture' (10 parents), 'change to favoured texture' (10 parents), 'gradually mix favoured texture' (10 parents), and 'change to favoured flavours and tastes' (nine parents). Of these classifications, the greatest change in compliance with regard to sensory function was 'change the hated sensory elements' and 'use of favoured sensory elements'.

In the open questions of the questionnaire, parents described their approaches as 'I made the food bite-size to be

eaten easily' as an oral function; 'I changed to softened food' as a sensory function; 'I served the same menu for the family,' 'I increased the volume of disliked food without letting the child know', and 'I cooked together and showed the child the cooking process' as cognitive functions; and 'I tried to eat at different places many times' as an environment function.

Some successful examples were 'I fried the fish', 'I cut the vegetables to a small size', 'I changed the vegetables used in the soup', and 'I mixed small carrots in gravy and hamburger patty'.

Number of foods that children found acceptable

Among the 47 listed food items, the number of food items that children consumed significantly increased by 4.35 from 20.52 to 25.17 items ($p = .004$) after the intervention. On the other hand, the number of unaccepted food items significantly decreased by 2.73 from 14.52 to 11.79 items after the intervention ($p < .001$).

Parents' subjective view of the degree of dietary imbalance

The parents' subjective view of the degree of dietary imbalance was measured using a VAS, which showed a significant decrease of 13.65 points from 58.09 to 44.43 points after the intervention ($p < .001$).

Discussion

There were significant differences in all outcome measures before and after the intervention. Therefore, it is

Table 2 Characteristics of the Participants and Dietary Status (n = 23).

Characteristics of participants (n = 23)			
Parents			
Age	20–29	2	9%
	30–39	9	39%
	40–49	12	52%
Gender	male	0	0%
	female	23	100%
Children			
Age	3 years old	9	39%
	4 years old	8	35%
	5 years old	4	17%
	6 years old	2	9%
	average \pm SD	52.83 \pm 12.1 months	
Gender	boy	18	78%
	girl	5	22%
Diagnosis	ASD	19	83%
	SCQ (more than 15 points)	4	17%
Development age ^a	0 year old	2	9%
	1 year old	6	26%
	2 years old	5	22%
	3 years old	2	9%
	4 years old	1	4%
	unclear/unadministered	7	30%
Development Quotient (DQ) ^a	0–19 the most severe	0	0%
	20–34 severe	1	4%
	35–49 moderate	8	35%
	50–69 mild	4	17%
	70–border	2	9%
	unclear/unadministered	8	35%
Diet condition of participants (n = 23)			
Degree of difficulty	great	6	26%
	normal	9	39%
	few	8	35%
	none	0	0%
Dietary unbalance (subjective view)	very unbalanced	7	31%
	unbalanced	9	38%
	few unbalanced	7	31%
	none	0	0%
Eatable food items before intervention (in 47 items)	1–10	5	21%
	11–20	7	31%
	21–30	7	31%
	more than 31	4	17%

^a Kyodaishiki developmental schedule.

important that occupational therapists understand the factors and approaches for selective eating in children with ASD in order to provide early intervention for their parents.

The results of this study showed that the number of recommendations carried out by the parents increased after the intervention. This is possibly because the parents of children with ASD understood the factors of food preferences addressed in the programme, and they were influenced to implement these approaches to improve selective eating. Meanwhile, the degree of difficulty perceived by parents decreased, while self-efficacy improved after the intervention.

As expected, the parents' subjective view of the degree of dietary imbalance and the number of food items acceptable to the children improved after the intervention, and these perceptions are expected to maintain across time. In spite of the short period of this intervention (2 months), the intervention not only improved the parents' subjective view of the degree of dietary imbalance but also increased the number of food items that the children found acceptable. We believe that this result is a direct consequence of the improved communication among the parents in small groups, which enabled the parents to become familiar with the various factors underlying food preferences of their children and motivated them to try new

Table 3 Self-reported Compliance with Recommendations Before and After the Intervention.

	Measurement items	Means	Range	Unit	Assessment ① baseline level	Assessment ② before	Assessment ③ after	p	
Difficulty	degree of difficulty	VAS	0–100	points	54.13 ± 25.05	54.65 ± 25.01	37.22 ± 24.54	0.000b	***
Self-efficacy	total	SAPS: total	12–60	points	39.3 ± 6.92	39.3 ± 6.92	44.65 ± 6.64	0.018a	*
	1. attitude	NO 1–3	3–15	points	9.52 ± 2.59	9.52 ± 2.59	10.35 ± 2.19	0.018a	*
	2. factor	NO 4–7	4–20		14.48 ± 3.10	14.48 ± 3.10	16.39 ± 2.84	0.002a	**
	3. approach	NO 8–12	5–25		15.31 ± 3.74	15.31 ± 3.74	17.95 ± 3.07	0.000b	***
Approach	practicing now	50 items	0–50	items	18.22 ± 6.91	18.39 ± 6.89	25.39 ± 7.73	0.000a	***
	tried already				26 ± 9.52	26.17 ± 9.56	33.13 ± 7.63	0.003a	**
Diet condition	eatable food	47 items	0–47	items	32.13 ± 11.61	32.48 ± 11.68	35.04 ± 12.00	0.000b	***
	- no need attempts				20.26 ± 10.83	20.52 ± 10.79	25.17 ± 13.04	0.004a	**
	- need attempts				11.87 ± 6.49	11.96 ± 6.43	10.04 ± 6.89	0.164a	ns
	uneatable food				14.87 ± 10.83	14.52 ± 10.79	11.79 ± 13.04	0.000b	***
Subjective view	dietary unbalance	VAS	0–100	points	57.78 ± 23.95	58.09 ± 24.28	44.43 ± 29.46	0.000b	***

VAS = visual analogue scale; SAPS = Self-efficacy Assessment for Parents of Children with Selective Eating.

Average ± standard deviation (SD).

*p < 0.05, **p < 0.01, ***p < 0.001.

Data were analysed by using SPSS22.0, a: One factor repeated measure ANOVA, b: Friedman test, due to the nature of data by the test of normality assessed with the Shapiro–Wilk test.

Differences in mean values were assessed with Bonferroni multiple comparison procedure.

approaches according to the responses of their children. The group dynamics motivated the parents and allowed them to address their challenges without stress. The results of this study show that increasing the number of approaches by parents can increase the number of food items acceptable to children with ASD. Furthermore, although the intervention was short, increasing the number of approaches can improve the degree of difficulty and self-efficacy perceived by parents. Further development of this programme will assist occupational therapists to develop implementation strategies to improving the variety of food preferences acceptable to children with ASD. Parents can also find out the best approach for their children based on various factors and identify the most feasible approach according to their family dynamics.

Limitations

An important limitation of this study was the definition of selective eating, as food selectivity has not been operationally defined in a consistent manner. One reason for the limited studies on the effects of selective eating is the lack of consistent application of an operational definition (Kelly et al., 2015). In this study, parents mentioned that a limited diet (selective eating) was a problem. However, after participating in this study, the parents reported a significant improvement in the perceived degree of difficulty associated with selective eating, self-efficacy, and the number of approaches for selective eating. On the other hand, there was no significant change in the degree of dietary imbalance or the number of food items acceptable to their children. Hence, the results of this study demonstrated that the proposed programme was useful as an introductory programme for parents who experience difficulty with regard to selective eating in their children and that it resulted in short-term improvements in the quality of life of both the parents and children.

Many parents had difficulties following the recommendations to improve selective eating in their children with ASD, which resulted in a decrease in the number of parents who participated in each session, and this might be a challenge in the future. Nonetheless, the findings of this study revealed that parents who participated in the programme benefited from the sessions and discussions. Therefore, we suggest enrolling parents at an earlier stage to familiarise them with the problems associated with implementation of new approaches designed to expand the variety and number of food items consumed by their children. In our next trial, we will continue this study with additional approaches. Furthermore, it is very difficult to address the issue in some children who demonstrate strong selective eating, such as those who choose only one or two food items. For such cases, we suggest longer-term intervention with one-to-one approaches.

Conclusion

In conclusion, we developed an interventional programme for parents of children with ASD and this programme was found to be useful. It is important for occupational therapists to consider the factors and approaches for selective eating in children with ASD in order to provide early intervention for their parents.

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