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ASSOCIATION BETWEEN PARENTAL PSYCHOLOGICAL FACTORS AND VEGETABLE INTAKE IN CHILDREN WITH INTELLECTUAL DISABILITIES IN JAPAN: A CROSS-SECTIONAL STUDY

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Abstract: An adequate vegetable intake provides essential nutrients, and the importance of vegetable intake has been emphasized. Picky eating behaviour, which is a problem in children with intellectual disability (ID), may result in a lack of vegetable intake. The aim of this research was to investigate how parental psychological factors, e.g. self-efficacy, outcome expectancy, is associated with vegetable intake in children with ID. This cross-sectional study was conducted on school children from sixteen special needs schools in the Ibaraki prefecture and the two in other areas. A questionnaire on parental outcome expectancy, self-efficacy and a brief self-administered diet history questionnaire (BDHQ) was distributed to parents of all school children in the first to sixth grade of elementary school on 2nd September 2022. Parental outcome expectancy and self-efficacy were assessed using a five-ordinal scale. A lack of vegetable intake is defined as less than 130g of vegetable intake, which for children, is considered to be two portions. Logistic regression analysis was used to estimate the odds ratio (O.R.) with a 95% confidence interval for analysis of the effects of parental factors on the children's vegetable intake. The data is based on a total of 447 participants (27.6% participation rate). It was observed that the parents of children who consume less than 130g of vegetables a day have a lower outcome expectancy of adequate vegetable consumption (adjusted O.R.=0.877,p=0.017); a higher tendency to stop too much snacking (adjusted O.R.=1.562,p=0.065); a lower self-efficacy regarding adequate vegetable intake (adjusted O.R.=0.508, p<0.01) and a higher tendency to stop too much snacking (adjusted O.R.=1.261, p=0.057) than the parents of children who consume more than 130g of vegetables a day. The parents of children who consume fewer vegetables tend to have lower self-efficacy regarding adequate vegetable intake, which may lead to a lower outcome expectancy. It is necessary to encourage these parents to become aware of the benefits of vegetable intake and it is important that they believe in their children's ability to eat a wide variety of food, including vegetables

Keywords: vegetable intake, children with intellectual disabilities, cross-sectional study, parental outcome expectancy, parental self-efficacy

Introduction

The importance of adequate vegetable intake has been well documented as an essential part of a healthy lifestyle (World Health Organization,2004). The health benefits of vegetable intake in providing essential nutrients such as vitamins, dietary fibre has been emphasized (World Health Organization,2004). Some countries dietary recommendations include vegetable intake, not only for

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adults, but also for children (Ocké, 2008; Kastorini,2019). The childhood stage is a critical period during which eating behaviours and food preferences develop. In addition, the gut microbiota, which is regulated by an interaction which carries on into adulthood between the host and environmental factors, including diet, also develop (Derrien,2019). The fermentation of dietary fibre by colonic bacteria may have important health benefits. (Holmes et al,2020). This fermentation may be vital for the balance of microflora in the long term, as the flora is created in the early stages of life. Therefore, early vegetable intake is important on human health during our entire life.

Environment factors, such as parental factors, might affect the children's vegetable intake. Many previous studies focused on the critical role parents play in children's health related behaviour (Mechanic, 1980), including vegetable intake. Previous studies have shown a positive association between parental modelling of eating vegetables and the child's preference for vegetables (Bere, 2004; Cullen, 2001; De Bourdeaudhuij, 2008; Granner, 2004; Reinaerts, 2007). Other studies found that parental role modelling significantly affects only girls' intake of fruits and vegetables (Kristjansdottir, 2006), or boys of a normal weight, but not the intake of obese boys (De Bourdeaudhuij, 2006). Thus, it may be difficult to encourage healthy eating in children who have already adopted unhealthy eating habits, particularly boys.

A previous study showed parental self-efficacy was significantly related to vegetable intake in children (Koh, 2014). Parental psychological factors, such as parental self-efficacy and outcome expectancy, seem to be important factors of adequate vegetable intake in children. However, the effects of parental psychological factors on vegetable intake in children with ID is unknown, although it would appear it is more important for children with ID in developing healthy eating habits because of the closer communication they have with their parents. Children with ID often have limitations in behaviours related to health. One such limitation is food selectivity (Bandini, 2019). Picky eating behaviour, a problem in children with ID, may result in insufficient vegetable intake (Bandini, 2019). Although it has been well documented that children with ID are likely to have problem with their diet because of their food refusal, only few studies examined diet in children with ID. One study, the first to evaluate the correlation between nutrient intake and the anthropometric status of children with ID, found no significant correlation between nutrient intake and anthropometric parameters (Calis, 2010). The reason for the absence of a correlation was considered to be the result of measurement error in nutrient intake, which is difficult to obtain accurately. Another study found that children with ID consumed significantly fewer vegetables than children without ID (Slevin, 2012). This study revealed that obesity is more prevalent in children with ID who were found to eat fewer vegetables. Health problems related to eating behaviours, such as obesity, occur more frequently in children with ID, although it was found in this previous study that there are no differences in the nutrition intake

between the obese children with ID and non-obese children with ID. Health promotion strategies targeted at improving an unhealthy diet, such as a deficient intake of vegetables among children with ID, is recommended.

To develop healthy diet promotion strategies, knowledge regarding the effect of environmental factors, such as parental psychological factors regarding food selectivity in children with ID is vital. The aim of this study is to examine how parental psychological factors, such as self-efficacy and outcome expectancy, affect vegetable intake in children with ID. This could facilitate the promotion of healthy eating and ensure a higher quality of life for children with ID.

Materials and Methods

Study designed and Participants

A cross sectional study involving 1622 children from sixteen special needs schools in the Ibaraki prefecture and two schools in another area was conducted. Between 2nd and 9th September 2022, all participants answered two questionnaires. Prior to this, written informed consent was obtained from parents who provided contact details and information regarding their children's disabilities. This study was approved by the research ethics committee of Ibaraki Christian University (Approval No.2022-008).

Questionnaire

Two questionnaires were used in this study. They were distributed at the school and completed at home by the parents. Regardless of the parents' decision to participation in this study, these questionnaires were returned to school in September 2022.

The general questionnaire posed personal questions including details of the children's disabilities and parental psychological status, such as outcome expectancy and self-efficacy. The parental outcome expectancy answers to the questions: "Is this important for your child's health" and self-efficacy "You can do this?" were assessed using a five-ordinal scale (1 = strongly disagree ; 2 = disagree; 3 = Neither disagree nor agree; 4 = agree; 5 = strongly agree) for the questions; Having a healthy diet (Healthy diet), Eating enough vegetables (Vegetable), Having Breakfast every morning (Breakfast), To stop too much snacking (Snacking).

A brief self-administered diet history questionnaire (BDHQ15y) was developed. The questionnaire consisted of four-page fixed-section questionnaires to collect data on the consumption frequency of selected foods commonly eaten in Japan, general dietary behaviour, estimates of the dietary intake of foods and beverage items during the preceding month and information regarding usual cooking

methods. Estimates of daily intake for foods and nutrients were calculated using an ad hoc computer algorithm for the BDHQ15y based on the Standard Tables of Food Composition in Japan (Kobayashi,2011). A lack of vegetable intake is defined as being less than 130g of vegetable, namely two portions for children. In this study, information about body height, weight, and date of birth were also collected using the BDHQ15y.

Statistical analyses

Binomial logistic regression analysis was used in this research to estimate the odds ratio with a 95% confidence interval for the analysis of the effects of parental factors on the children's vegetable intake: less than 130g or not. The predictors' variables are the parental outcome expectancy, self-efficacy on diet adjusted for gender, school year and school area. ANCOVA was used to compare vegetable intake between each school years. All statistical analyses were performed using SPSS statistical software (version 23, IBM Japan). Two-sided values < 0.05 were considered statistically significant.

Results and Discussion

Results

The data for this study was based on a total of 447 participants (27.6% participation rate, see Figure 1).

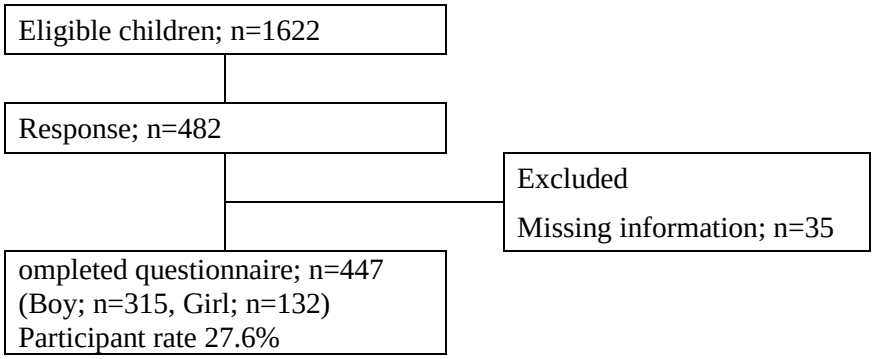

Figure 1. Sample selection procedure

The average vegetable intake was 192.4g (green vegetables; 90.8g). No significant differences were found in vegetable intake (total, green vegetables, other vegetables) between school years (p=0.094, p=0.117, p=0.115, respectively). A third of participants did not meet the 130g a day vegetable intake target (see Table 1). The lower parental self-efficacy score on diet (total) was significantly associated with a vegetable intake less than 130g a day (adjusted O.R.=0.850, p<0.01, Table 2) but not the higher parental outcome expectancy (adjusted O.R.=1.010, p=0.87, see Table 2). It was observed that the parents of children who consume less than 130g of vegetables a day have a lower outcome expectancy

regarding adequate vegetable intake (adjusted O.R.=0.877, p=0.017) ; a higher tendency to prevent the children from snacking (adjusted O.R.=1.562, p=0.065); lower self-efficacy regarding adequate vegetable intake (adjusted O.R.=0.508, p<0.01); and a higher tendency to stop excessive snacking (adjusted O.R.=1.261, p=0.057) than parents of children who consume more than 130g vegetables a day (see Table 3).

Table 1: Participants characteristics

School year		vegetable intake ≧130g	130g＞	total
Year 1	n	59	39	98
	%	60.2%	39.8%	100.0%
Year 2	n	52	23	75
	%	69.3%	30.7%	100.0%
Year 3	n	53	33	86
	%	61.6%	38.4%	100.0%
Year 4	n	48	22	70
	%	68.6%	31.4%	100.0%
Year 5	n	49	16	65
	%	75.4%	24.6%	100.0%
Year 6	n	35	18	53
	%	66.0%	34.0%	100.0%
total	n	296	151	447
	%	66.2%	33.8%	100.0%

Table 2. Odds ratio of Parental outcome expectancy (total) and self-efficacy (total)

	B	Exp(B)	95%CI lower	higher	p
outcome expectancy total	0.010	1.010	0.893	1.143	0.874
self-efficacy total	-0.163	0.850	0.798	0.905	**<0.01**

Table 3. Odds ratio of Parental outcome expectancy (each item) and self-efficacy (each item)

		B	Exp(B)	95%CI lower	higher	p
outcome expectancy	Healthy diet	0.166	1.180	0.700	1.990	0.534

	Vegetable	-0.622	0.537	0.323	0.893	**0.017**
	Breakfast	0.243	1.275	0.744	2.186	0.377
	Snacking	0.446	1.562	0.972	2.510	0.065
self-efficacy	Healthy diet	-0.018	0.983	0.766	1.260	0.890
	Vegetable	-0.677	0.508	0.393	0.657	**<0.001**
	Breakfast	-0.208	0.812	0.617	1.069	0.137
	Snacking	0.232	1.261	0.993	1.601	0.057

Discussion

Despite its cross-sectional nature, this study illustrates the role of parental psychological factors; outcome expectancy and self-efficacy in terms of vegetable intake in children with ID. The parents' lower outcome expectancy and lower self-efficacy regarding adequate vegetable intake may have influenced the vegetable intake in children with ID. It is important for the children's overall health to encourage parents to believe in their children's ability to consume an adequate amount of vegetables. The findings of this study reveal that lower parental self-efficacy on diet was significantly associated with a vegetable intake of less than 130g a day. Parents who are dissatisfied with their children's eating behaviour may tend to deny the benefits of adequate vegetable intake.

This study also showed no significant differences in vegetable intake between the various school year groups, and a third of participants did not meet the 130g daily vegetable intake. The report by the National Health and Nutrition Survey 2019 (Ministry of Health, Labour and Welfare, 2020) showed vegetable intake in Japanese children increased with age: 129g intake in children aged 1-6 years old, 241g in children aged 7-14 years old. The results of this study compare with the national survey's findings, and the reluctance of children in this study in whom no difference in vegetable intake between school year groups was found, although years 7-14 to accept and consume nearly double amount of vegetable intake in children aged 1-6 years is highlighted. A healthy diet including a high consumption of vegetables is especially important for primary school-aged children, because it establishes good nutritional habits leading to better health in adulthood (Te Velde, 2007). Thus, it is suggested that methods for promoting vegetable intake among children with ID is required to ensure their overall health and future quality of life.

The proposed health promotion, involving not only children, but also their parents, is crucial for the successful implementation of methods to increase vegetable intake in children with ID. Again, improving parental psychological factors may be required to encourage adequate vegetable intake in

children with ID. A programme encouraging children to eat a wider variety of food might be the first step to obtain higher parental self-efficacy. In this study, a higher tendency of outcome expectancy and self-efficacy regarding excessive snacking, and lower self-efficacy in total were found. In light of these results, higher parental self-efficacy, rather than knowledge regarding diet, is important to encourage parents to have a higher outcome expectancy on their children's diet. Parental anxiety about feeding children with ID, particularly during their early years, may influence the parents' ability to believe their children are able to consume more vegetables. Thus, interventions, or a nutrition educational programme aimed at supporting parents should be considered.

The participant rate (27.6%) of this population and the data obtained is sufficient for analysis. However, there were several limitations which should be mentioned: firstly, the data was self-reported, although valid and reliable results are evident (Kobayashi, 2011). Therefore, all measures are considered perceived measures, which could lead to instrument bias. A previous study revealed a high degree of under-reporting by parents, due to the stigma attached to those who worked in social care (Zhang, 2020). A similar tendency is possible in this study in parents of children with ID who might also be aware of the stigma. As this was a cross-sectional study, it cannot determine the causality between parental psychological factors and vegetable intake. Further studies should be undertaken to observe longitudinal data and to obtain more accurate food consumption data in this population.

Conclusion

The findings of this study enhance the role of parental psychological factors, such as outcome expectancy and self-efficacy in terms of vegetable intake in children with ID. Improvement in parental psychological factors regarding adequate vegetable intake may be required to encourage adequate vegetable intake in children with ID. The parents' confidence in their children having healthy diet, rather than knowledge regarding diet, is important to encourage healthy eating in children with ID. Interventions protocol should be designed with consideration of supporting parents rather than giving lecture on nutrition. It is an important key of the success intervention to improve parental self-efficacy regarding diet of their children, and parental outcome expectancy regarding this.

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Declaration of Interest Statement

No potential conflict of interest was reported by the author.

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