ORIGINAL ARTICLE

Annals of Agricultural and Environmental Medicine
www.aaem.pl

Does parents' nutrition knowledge determine healthy eating habits and relationships with food in children aged 3–6 years in the Lublin region of Poland, according to the study 'Know and like what you eat'?

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Kawecka P, Kostecka M, Kostecka J, Tobiasz A, Górecka M. Does parents' nutrition knowledge determine healthy eating habits and relationships with food in children aged 3–6 years in the Lublin region, according to the study 'Know and like what you eat'? Ann Agric Environ Med. doi: 10.26444/aaem/217572

Abstract

Introduction and Objective. Early childhood is a critical time for establishing food preferences and dietary habits. Parents should therefore have a good knowledge of their children's dietary and nutritional requirements. The aim of this study is to determine whether parents' knowledge about nutrition has an impact on healthy eating habits and identify patterns of relationship with food in preschool children.

Materials and Method. Parents completed a three-part questionnaire assessing the frequency of their children's consumption of various types of food, their knowledge of proper nutrition of preschoolers, and and a subjective assessment of their children's relationship with food.

Results. The level of parental nutrition knowledge were linked to the consumption frequency of various food groups. The greatest differences in consumption frequency were observed for: milk and dairy products ($p<0.05$), yellow and orange vegetables ($p<0.01$) and green vegetables ($p<0.05$). The children of parents with a high level of nutrition knowledge were more likely to accept novel products after repeated exposure ($p<0.05$). The healthy eating behaviours, identified as pattern I, were linked to the regular consumption of breakfast and 4–5 meals per day ($p<0.01$).

Conclusions. In summary, Parents' knowledge about nutrition had a significant impact on the diversity of their children's diets. Parents with a high level of knowledge were more likely to follow recommendations regarding dietary diversity and meal frequency. The use of food as a reward was associated with the development of abnormal relationships with food in the study population.

Key words

parental nutrition knowledge, relationship with food, preschoolers, mealtime distractions, perception of hunger and satiety

INTRODUCTION

Early childhood is a critical time for establishing food preferences and dietary habits [1]. Several studies have shown that eating behaviour is affected by the family environment, and by parental eating habits and modes of feeding [2]. Infants and young children learn what, when, and how much to eat through their experiences with food, as well as observations of the family's eating habits [3]. Parents and caregivers shape children's eating behaviours, both directly and indirectly, through overt and covert control by deciding what foods serve, coping with eating problems, modelling good dietary habits and a healthy relationship with food [4]. Berge et al. analyzed the feeding relationships between parents and children and found that high levels of parental nutrition knowledge were associated with the lowest risk of eating disorders [5]. Family meals were also a significant factor in early childhood. The authors of the *Growing Up Today* study concluded that frequent family meals could have protective effects [6]. Research has shown that children's eating habits can also be influenced by the family's socio-economic status (SES) and parents' food choices [7, 8].

Parents should have a good knowledge of their children's dietary and nutritional requirements. Parents' and caregivers' eating behaviours can be affected by numerous factors, including SES, education, age, professional status, and level of nutrition knowledge. Research has shown that parents' nutrition knowledge can influence children's eating behaviours, in particular food choices and taste preferences [9, 10]. However, the relationship between parents' nutrition knowledge and children's relationships with food has not been investigated extensively to date, and there is a lack of such studies in relation to the population of Polish preschoolers.

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Received: 24.10.2025; accepted: 30.01.2026; first published: 12.02.2026

OBJECTIVE

The aim of this study is to determine whether parents' knowledge about nutrition has an impact on healthy eating habits and relationships with food in children aged 3–6, and to identify patterns of relationship with food in preschool children from the Lublin region in eastern Poland.. Research hypotheses were formulated, the first of which stated that a high level of nutritional knowledge among parents promotes a varied diet and a number of meals in line with recommendations among children. The second hypothesis assumed that parents' high knowledge of proper nutrition promotes the development of proper relationships with food, and the communication of hunger and satiety by the child. The third hypothesis assumes that children who accept new flavours and signal feelings of hunger and satiety are more likely to eat breakfast and the recommended number of meals during the day. The final hypothesis assumed that using food as a reward influences the development of unhealthy relationships with food. To the best of the authors' knowledge, this is the first study to seek correlations between parents' knowledge and the relationships with food of preschool children in eastern Poland.

MATERIALS AND METHOD

Ethical Approval. The study was approved by the Human Research Ethics Committee of the University of Life Sciences in Lublin, in the compliance of a scientific research project with ethical principles (Approval No. UKE/21/2024, dated 17 April 2024). All participants, in the case of preschool children, their parents or legal guardians, provided informed consent to participate in the study. Data obtained during the interviews were confidential and restricted only to the researchers.

Study design and participants. The study was conducted between October 2024 – March 2025 in the city and district of Lublin, south-eastern Poland as part of a project *Know and like what you eat* funded by the Ministry of Science and Higher Education in Warsaw (SKN/SP/601647/202). A total of 510 parents of preschoolers (aged 3–6 years) attending public kindergartens in the municipalities of Lublin region were invited to participate in the study.

The inclusion criteria were the child's age, absence of metabolic diseases or other disorders requiring a specialized elimination diet, and full-term birth. The exclusion criteria were chronic diseases requiring a specialized diet, neurological disorders, including ASD, and preterm birth.

The sample size required for the analyses was calculated based on data on the population of 3–6-year-old children attending kindergartens in municipalities in the Lublin region. A 95% confidence level and a 5% margin of error were applied, resulting in an estimated sample size of 137 individuals. For this reason, the group of 358 parents who met the inclusion criteria for the study was considered sufficient. Before participating in the study, parents were informed about its purpose and procedure. The questionnaires collected ensured the anonymity of respondents. Parents received the questionnaires at kindergartens and completed them independently, either at home or during meetings with a teacher and university students.

The questionnaire consisted of three parts. The first part was a qualitative survey – SF-FFQ4PolishChildren questionnaire – which is a self-administered tool and was developed by Kowalkowska, Wadolowska, and Hamulka in 2015, and previously published by Hamulka et al [11, 12], which allows for the assessment of the frequency of consumption of selected food groups. The respondents could choose one of the following consumption frequencies (converted into daily frequency, times/day): never/almost never, less than once a week, once a week, 2–4 times/week, 5–6 times/week, every day, a few times a day. In order to ensure consistent interpretation of the obtained data, daily consumption frequency indicators (number of times per day) were used in accordance with the methodology [11, 12].

The second part of the questionnaire contained 18 questions concerning parents' knowledge about proper nutrition for preschool children [13], and respondents could choose from three categories of answers: 'true', 'false', or 'I do not know'. The questions concerned parents' knowledge about planning balanced meals, recommended intake of dairy products, recommended sources of dietary fiber, recommended number of vegetable and fruit servings, recommended number of meals, importance of eating breakfast, recommended portion sizes in the daily food ration, children's energy requirements, and fluid intake. The respondents received 1 point for a correct answer and 0 points for an incorrect answer or 'I do not know' answer. Each respondent's points were counted (possible score: 0 – 18 points). The results obtained allowed for classification into three knowledge categories in a tertile distribution: bottom (0–8 points), middle (9–13 points), and upper tertile (14–18 points).

The last section of the questionnaire contained questions about the child's eating behaviours as assessed by the parents: relationship with food, hunger and satiety cues, mealtime distractions, acceptance of novel tastes, consistencies, and food products, or reluctance to try new foods, degree of independence during meals and duration of meals. The part of the questionnaire concerning children's relationship with food was based on the *'From Seed to Core'* questionnaire proposed by nutrition therapists. This part of the questionnaire is used by authors at the Dietetic Clinic when working with children with eating disorders. The respondents were also asked to provide information about the child's age and gender and the parent's age, education, SES, and place of residence.

Each part of the questionnaire had previously been used separately by researchers in surveys or in their work at the Dietetic Clinic. However, it was decided that a pilot study would be conducted prior to the main study in order to assess the validity of the research tool. The pilot study was conducted in June 2024 on a group of 50 parents of children attending Kindergarten No. 12 with integrated classes in Lublin. Based on the completed questionnaires, the correctness of the prepared tool was assessed, and the layout and selection of questions were understandable to the respondents.

Analysis of patterns of relationship with food. To identify patterns of relationship with food among preschool-aged children, a cluster analysis was conducted using the group average method and Pearson correlation as the distance measure. The analyzed dietary patterns and food attitudes were divided into three separate clusters (marked as I, II, and III). Patterns of relationship with food were identified based on the following behaviours: signalling hunger and

satiety, eating meals independently, eating meals without distractions, accepting new textures and flavours, trying new, unfamiliar foods and products.

Pattern I explained 17.74% of variance and was characterized by high factor loadings for healthy food attitudes and eating behaviours, in particular communication of hunger and satiety and meal duration, independent eating, absence of mealtime distractions, acceptance of new tastes and consistencies, and willingness to try novel foods and products.

Pattern II explained 15.86% of variance and was characterized by varied appetite, but also acceptance of novel tastes after repeated exposure.

Pattern III explained 15.13% of variance and grouped unhealthy eating behaviours and food attitudes relating to the inability to communicate hunger and satiety, and prolonged mealtime resulting from refusal to eat without distractions, refusal to eat novel foods and products, refusal to accept novel tastes and consistencies after repeated exposure.

Good fit of the models was confirmed by the Hosmer and Lemeshow Goodness-of-Fit Test ($p > 0.05$). Receiver Operating Characteristic (ROC) analysis was used to assess the quality of the classifications; the area under the ROC curve was calculated (AUC). AUC for all models ranged from 0.617 – 0.769.

Data analysis. Categorical variables were presented as sample percentages (%), and continuous variables were expressed by median values and the interquartile range (IQR). The differences between groups were analyzed in the chi-squared test (categorical variables) or the Mann-Whitney test (continuous variables). The Kruskal-Wallis test was used to analyse the relationship between variables in more than two mutually independent groups. Prior to statistical analysis, the data were checked for normal distribution using the Kolmogorov-Smirnov test. Categorical variables were analyzed using logistic regression models. The odds ratios (OR) and 95% CI were calculated. The significance of OR was verified in the Wald test. The reference categories (OR = 1.00) included selected demographic factors (child's age) and parental factors (age, education, nutrition knowledge). In each analysis, a set of confounders was selected based on the modelled research question.

The results of all tests were regarded as statistically significant at $p < 0.05$. Data were processed in the Statistica programme (version 13.1 PL; StatSoft Inc., Tulsa, OK, USA; StatSoft, Kraków, Poland, and STATA 16.0, Stata Corp.).

RESULTS

The study population consisted mainly of boys and children aged 5–6 years, and their parents returned 358 correctly completed questionnaires. The study population is characterized in Table 1.

Responses to the questions concerning the recommended intake of dairy products and vegetables were significantly differentiated by the parents' age. Parents with vocational education had lower levels of nutrition knowledge (Tab. 2), especially regarding the importance of breakfast, and the recommended daily fluid intake. High SES was significantly associated with knowledge of the recommended age-appropriate intake of dairy products, vegetables and fibre, while low SES was significantly associated with lower knowledge of recommendations for fluid intake. Eating without distractions was associated in the study population with parents' knowledge of the recommended amount of vegetables in the diet, sources of dietary fibre, and the overall number of meals.

Table 1. Characteristics of the study population

	Total sample, Number, n=358	p
Child's age, n(%)		
3–4 years	158 (44.2)	<0.05
5–6 years	200 (55.8)	
Child's gender, n(%)		
Female	169 (47.1)	Ns
Male	189 (52.9)	
Parent's gender, n (%)		
Female	290 (81.0)	<0.05
Male	68 (19.0)	
Parent's age, n (%)		
<25 years	48 (13.3)	<0.05
26–35 years	181 (50.6)	
35–40 years	129 (36.1)	
Place of residence, n (%)		
City with a population above 100,000	215 (60.1)	<0.05
City with a population below 100,000	90 (25.3)	
Rural area	53 (14.6)	
Parent's education		
Secondary	101 (28.2)	<0.05
Vocational	40 (11.3)	
University	217 (60.5)	
Socioeconomic status		
Low	79 (22.1)	<0.05
Medium	143 (39.9)	
High	(38.0)	

Differences are significant at $p<0.05$.

The level of parental nutrition knowledge was linked to the consumption frequency of various food groups as part of the recommended daily food ration for preschoolers (Tab. 3). The greatest differences in consumption frequency (3–6 times per day) were observed for: milk and dairy products (high vs low nutrition knowledge: 1.2±1.1 vs 0.4 ± 0.5; $p<0.05$), yellow and orange vegetables (high vs average: 1.5±1.0 vs 0.2 ± 0.3; $p<0.01$), and green vegetables – high vs low nutrition knowledge: 1.3±1.1 vs 0.3 ± 0.2; $p<0.05$). It was also noted that in the studied population, high nutritional knowledge among parents was associated with regular consumption of breakfast. Parents with high nutritional knowledge were significantly more likely to report that their children had a healthy relationship with food, expressed as Pattern I. On the other hand, low nutritional knowledge among parents was associated with snacking between meals and using food as a reward (Tab. 4).

The results were analyzed to identify the relationship between parents' nutrition knowledge and children's eating behaviors and relationship with food (Tab. 5). The children of parents with high level of nutrition knowledge were more likely to accept novel products after repeated exposure (OR 1.27; 95%CI 1.09–1.39; $p<0.05$), but were also more likely to

Table 2. Odds ratios (95% confidence interval) in an analysis of the relationships between parents' familiarity with dietary recommendations and child's age, parents' age, parents' education, level of nutrition knowledge, SES or eating with distraction

Variable	Child's age (ref. 5–6 years) 3–4 years	Parent's age (ref. 26–35 years)		Parent's education (ref. university)		Nutrition knowledge (ref. average)		Socioeconomic status (ref. middle)		Eating without distractions (ref. eating with distractions)
		<25 years	>35 years	Secondary	Vocational	Low	High	Low	High	
Recommended intake of dairy products	1.76** (1.23–1.9)	1.02 (0.9–1.09)	1.37* (1.2–1.56)	0.92 (0.8–0.94)	0.92 (0.74–0.98)	1.03 (0.94–1.22)	1.78** (1.61–1.94)	1.12 (0.89–1.26)	1.33* (1.06–1.59)	1.17 (0.94–1.34)
Recommended sources of dietary fiber	0.89 (0.77–0.94)	1.04 (0.89–1.09)	0.94 (0.78–1.08)	0.64* (0.41–0.89)	0.71* (0.63–0.82)	0.88 (0.71–1.07)	1.43* (1.22–1.7)	0.74* (0.59–0.89)	1.44* (1.07–1.63)	1.39* (1.04–1.56)
Recommended number of vegetable servings	0.81* (0.74–0.93)	0.94 (0.91–0.98)	1.33* (1.13–1.49)	0.93 (0.88–0.97)	0.98 (0.91–1.03)	0.91 (0.83–0.96)	1.09 (1.02–1.14)	0.80* (0.71–0.93)	1.39* (1.03–1.55)	1.55* (1.17–1.78)
Recommended number of fruit servings	1.09 (1.02–1.17)	0.97 (0.88–1.08)	1.02 (0.96–1.09)	0.99 (0.92–1.04)	1.02 (0.91–1.12)	1.02 (0.94–1.05)	1.07 (0.98–1.12)	1.03 (0.89–1.11)	1.09 (0.94–1.23)	1.05 (0.91–1.24)
Recommended number of meals	0.77* (0.62–0.91)	0.91 (0.84–0.98)	0.94 (0.56–1.09)	1.01 (1.0–1.04)	1.37* (1.24–1.49)	1.01 (0.96–1.09)	1.44* (0.88–1.89)	1.06 (0.91–1.17)	1.12 (0.94–1.23)	1.44* (1.09–1.61)
Importance of eating breakfast	1.02 (0.93–1.18)	1.04 (0.93–1.06)	0.91 (0.83–0.96)	1.07 (1.01–1.12)	0.44** (0,36–0.62)	0.54** (0.47–0.69)	0.98 (0.91–1.06)	1.11 (0.93–1.26)	1.49* (1.19–1.63)	.2 (0.96–1.37)
Snacking between meals	1.56* (1.11–1.93)	0.89 (0.85–0.92)	1.13 (1.03–1.17)	0.97 (0.91–1.02)	1.07 (1.01 –1.11)	0.71* (0.64–0.89)	1.08 (1.01–1.14)	1.04 (0.97–1.14)	1.09 (0.97–1.17)	0.72* (0.59–0.94)
Recommended fluid intake	1.51* (1.21–1.77)	1.09 (1.02–1.17)	1.02 (0.9–1.11)	0.63* (0.51–0.99)	0.57** (0.19– 0.76)	0.86* (0.79–0.93)	1.52* (1.14–1.84)	0.71* (0.56–0.97)	1.11 (0.97–1.21)	1.09 (0.91–1.3)

The results are significant at * p<0.05; ** p<0.01

Table 3. An analysis of the relationship between consumption frequency of selected food groups and the level of parental nutrition knowledge

Variable	High nutrition knowledge		Average Nutrition knowledge		Low nutrition knowledge		p-value in the Kruskal-Wallis test
	Mean±SD	Median (p5-p95)	Mean±SD	Median (p5-p95)	Mean±SD	Median (p5-p95)	
	Daily consumption frequency						
Milk and dairy products	1.2±1.1	1.1 (0.0-2.0)	0.7±0.6	0.4 (0.0-2.0)	0.4±0.5	0.2 (0.0-1.0)	0.031
Flavored dairy products	0.4±0.5	0.4 (0.0-2.0)	0.6±0.5	0.4 (0.0-2.0)	0.4±0.6	0.3 (0.0-2.0)	0.421
Green vegetables	1.3±1.1	1.2 (0.06-2.0)	0.7±0.8	0.6 (0.06-2.0)	0.3±0.2	0.2 (0.06-1.0)	0.016
Yellow and orange vegetables	1.5±1.0	1.1 (0.14-2.0)	0.2±0.3	0.2 (0.06-1.0)	0.6±0.7	0.5 (0.14-1.0)	0.003
Red and purple vegetables	0.6±0.8	0.6 (0.06-1.0)	0.4±0.6	0.5 (0.06-1.0)	0.2±0.4	0.2 (0.06-1.0)	0.078
Fresh fruit	1.1±0.7	0.9 (0.14-2.0)	0.9±0.8	0.6 (0.14-2.0)	0.4±0.3	0.2 (0.14-1.0)	0.061
Wholegrain foods	0.5±0.6	0.4 (0.0-1.0)	0.2±0.3	0.3 (0.06-0.5)	0.2±0.2	0.1 (0.0-0.5)	0.056
Refined cereals	0.3±0.5	0.1 (0.0-1.0)	0.7±0.6	0.4 (0.0-2.0)	0.3±0.4	0.1 (0.0-1.0)	0.129
Eggs	0.3±0.6	0.2 (0.0-1.0)	0.3±0.4	0.2 (0.0-1.0)	0.3±0.4	0.1 (0.06-1.0)	0.721
Meat and processed meats	0.7±0.6	0.4 (0.0-2.0)	0.9±0.8	0.8 (0.0-2.0)	0.7±0.6	0.5 (0.0-2.0)	0.512
Legumes	0.2±0.3	0.2 (0.06-1.0)	0.2±0.4	0.1 (0.0-1.0)	0.2±0.3	0.1 (0.0-1.0)	0.098
Fast foods	0.1±0.3	0.1 (0.06-1.0)	0.1±0.5	0.1 (0.06-1.0)	0.5±0.6	0.3 (0.06-2.0)	0.131
Sweetened beverages	0.6±0.7	0.5 (0.06-2.0)	0.6±0.6	0.5 (0.06-2.0)	1.3±1.0	1.1 (0.06-2.0)	0.023
Juice	0.4±0.6	0.3 (0.06-2.0)	1.1±0.9	1.0 (0.06-2.0)	1.3±1.2	0.9 (0.06-2.0)	0.030
Water	1.2±0.8	1.0 (0.06-2.0)	0.5±0.6	0.3 (0.06-2.0)	0.3±0.4	0.1 (0.06-2.0)	0.012
Sweets	0.7±0.6	0.5(0.06-2.0)	0.8±0.7	0.5 (0.06-2.0)	1.1±0.8	1.0 (0.06-2.0)	0.036

refuse novel foods and products (OR 1.37; 95%CI 1.02–1.48; $p<0.05$) and more likely to communicate satiety (OR 1.3; 95%CI 1.07–1.42; $p<0.05$). In turn, the children of parents with low nutrition knowledge more often refused to eat without mealtime distractions (OR 1.59; 95%CI 1.08–1.78; $p<0.01$), were less likely to accept new tastes (OR 1.45; 95%CI 0.99–1.68; $p<0.05$), and less likely to communicate hunger (OR 0.88; 95%CI 0.67–0.94; $p<0.05$). The healthy eating behaviours identified as pattern I were linked to the regular consumption of breakfast and 4–5 meals per day. The unhealthy eating behaviors described in pattern III were associated with eating the recommended number of meals less frequently and significantly more frequent snacking between meals (Tab. 6). It was also demonstrated that the use of food as a reward was characteristic of pattern III and could be associated with a reluctance to try new flavours and difficulties in correctly interpreting hunger and satiety signals by children.

DISCUSSION

The results of the study confirm that high parental nutrition knowledge promotes the establishment of healthy relationships with food, and that children who exhibit behavioural patterns associated with perceptions of hunger

Table 4. Odds ratios (95% confidence interval) in an analysis of the relationship between consumption frequency and parental nutrition knowledge

Variable	Parental nutrition knowledge					
	High nutrition knowledge		Average nutrition knowledge		Low nutrition knowledge	
	OR	95% CI	OR	95% CI	OR	95% CI
Breakfast						
yes	1.56	(1.18–1.64)*	1.14	(0.89–1.36)	1.01	(0.88–1.13)
no	ref		ref		ref	
Mid-morning snack						
yes	1.17	(0.95–1.29)	1.14	(0.91–1.26)	1.03	(0.86–1.11)
no	ref		ref		ref	
Snacking between meals						
yes	1.02	(0.89–1.17)	1.21	(1.01–1.32)	1.49	(1.07–1.67)*
no	ref		ref		ref	
using food as a reward						
yes	1.07	(0.89–1.17)	1.04	(0.85–1.19)	1.33	(1.02–1.67)*
no	ref		ref		ref	
Pattern of relationship with food						
I	1.43	(1.07–1.77)*	1.12	(0.91–1.26)	0.89	(0.74–1.21)
III	0.81	(0.66–1.19)*	1.05	(0.91–1.17)	1.42	(1.07–1.69)*
II	ref		ref		ref	

The results are significant at * p<0.05; ** p<0.01

Table 5. Odds ratios (95% confidence interval) in an analysis of the relationship between children's behaviors and parents' nutrition knowledge (in relation to average knowledge)

	Low nutrition knowledge (ref. average)	High nutrition knowledge (ref. average)
Acceptance of novel foods after repeated exposure	0.91 (0.72-1.09)	1.27* (1.09-1.39)
Refusal to eat novel foods and products/dishes	1.11 (0.93-1.26)	1.37* (1.02-1.48)
Reluctance to try novel foods	1.37* (1.09-1.63)	1.11 (0.98-1.26)
Refusal to accept novel tastes after repeated exposure	1.45* (0.99-1.68)	1.04 (0.88-1.19)
Communicating hunger	0.88* (0.67-0.94)	1.17 (0.98-1.29)
Communicating satiety	0.96 (0.74-1.19)	1.3* (1.07-1.42)
Age-appropriate portion sizes	1.06 (0.81-1.26)	1.43** (1.08-1.56)
Refusal to eat without mealtime distractions	1.59** (1.08-1.78)	1.14 (0.91-1.3)
Independent eating	0.91 (0.78-1.17)	1.14 (1.01-1.28)

The results are significant at: * p < 0.05; ** p < 0.01.

Table 6. Odds ratios (95% confidence interval) in an analysis of the relationship between consumption frequency and pattern of relationship with food.

Variable	Pattern of relationship with food					
	Pattern I		Pattern II		Pattern III	
	OR	95% CI	OR	95% CI	OR	95% CI
Breakfast						
yes	1.39	(1.06–1.48)*	1.06	(0.84–1.27)	1.07	(0.8–1.19)
no	ref		ref		ref	
Mid-morning snack						
yes	1.09	(0.89–1.24)	1.11	(0.87–1.25)	1.01	(0.84–1.17)
no	ref		ref		ref	
Eating 4-5 meals per day						
yes	1.55	(1.17–1.9)**	1.14	(0.94–1.26)	0.88	(0.71-1.04)
no	ref		ref		ref	
Snacking between meals						
yes	1.09	(0.84–1.21)	1.19	(0.87–1.37)	1.48	(1.07-1.69)*
no	ref		ref		ref	
using food as a reward						
yes	1.01	(0.84–1.11)	1.09	(0.81–1.23)	1.42	(1.08-1.79)*
no	ref		ref		ref	

The results are significant at * p<0.05; ** p<0.01

and satiety and do not use distractions during meals, consume more vegetables and regular meals.

Role modelling represents one avenue by which parent and child dietary intake behaviours demonstrate similarities. Parents with higher nutritional knowledge tend to make healthier food choices, but they are also more aware of the impact of diet on the long-term health of their children [14]. Flores-Barrantes et al. studied parental behaviour and feeding practices in six European countries in which parental education was associated with children's higher intake of water, fruits and vegetables, and lower intake of sugary foods and salty snacks [15]. Unfortunately, research shows that practical nutritional knowledge is still insufficient [16].

As the current study shows, parental high nutrition knowledge promotes the development of a healthy approach to food and helps children communicate feelings of hunger and satiety. Pressuring a child to eat (or finish a meal), restricting access to food (or specific food groups), and emotional feeding (offering food as a reward for good behaviour or in response to negative emotions), appear to disrupt the child's innate ability to respond to hunger and satiety cues [17]. Similarly, a

study assessing the eating patterns of children aged 2–5 years found that mothers who responded to satiety cues reported by their two-year-olds, were more likely to report consistent meal times in later preschool years [18].

Food reinforcement can be a sign of positive parenting that appears harmless in the short term, but it can have undesirable consequences by reinforcing the association between food and emotions, and promoting eating behaviours unrelated to hunger and satiety. In the current study, the parents of children adhering to dietary pattern III significantly more often used food as rewards. Farrow et al. (2015) reported that parental use of food as a reward in preschoolers was a predictor of emotional eating in children aged 5–7 years [19]. Jansen (2020) also found that parental use of food as a reward at the age of four years was associated with higher levels of emotional overeating, and picky eating at the age of nine years [20]. Non-nutritive feeding practices where parents used food to manage a child's emotions and/or behaviour were also shown to disrupt appetite self-regulation in children [21].

Mealtime distractions are yet another factor that contributes to unhealthy eating behaviours, particularly in children aged 1–6 years. Attention grabbers, such as toys or a TV, smartphone or computer screen, can prevent the child from focusing on the meal and can potentially lead to picky eating, overeating, and unhealthy food choices. There is considerable evidence to indicate that watching TV during meals is linked to poorer dietary quality due to higher intake of simple sugars and sweetened beverages and lower intake of protein, vegetables, and fruit [22]. These observations are confirmed in the current study. A study by Jensen et al. showed that more than three-quarters of the children surveyed consumed at least one meal or snack per day while watching screens. It was also showed that longer TV viewing was associated with higher consumption of sweets in younger children, and sugar-sweetened beverages in teenagers. [23]. Similar results were reported in the United Kingdom, where more than 70% children watched TV at mealtimes [24]. Portuguese researchers concluded that children who frequently watched TV at mealtime were less likely to accept vegetables, and had a greater preference for sweetened dairy products [25].

Strengths and limitations of the study. A strength of the study was the large and representative sample of parents of preschool children, and that it is one of the first reports to identify three patterns of relationship with food in young children. There is a general scarcity of studies in Polish scientific literature analyzing the influence of parental nutrition knowledge, and on children's relationship with food. The search for associations between parental knowledge and children's dietary behaviours can contribute to the development of a targeted nutritional education programme for parents and the promotion of healthy eating habits and a healthy relationship with food, based on the adequate recognition of hunger and satiety cues.

A limitation of the study was the unequal gender distribution in the population sample. In Poland, men are generally reluctant to participate in surveys, and mothers generally assume full responsibility for the planning and preparation of meals for their children. Another limitation was the use of a qualitative survey as a research tool because correctly filled in food diaries are difficult to acquire, which is why only the frequency of food consumption was analyzed in the study. The use of a questionnaire examining children's attitudes towards new flavours and the recognition of hunger and satiety based on the subjective feelings of parents, was also a limitation of the study. However, the questionnaire is successfully used at the Dietetic Clinic with children with feeding disorders.

CONCLUSIONS

Analysis of the findings of the study revealed diverse patterns of relationships with food among preschool children, and that parents' knowledge about nutrition had a significant impact on the diversity of their children's diets. Parents with a high level of knowledge about nutrition were more likely to follow recommendations regarding dietary diversity, meal frequency, and recommended nutrient intake. Children whose behaviour patterns indicate correct signalling of hunger and satiety, and children who do not require distractions during meals, are more likely to accept new foods, flavours and textures. The use of food as a reward was associated with the development of abnormal relationships with food.

The results obtained prompted the authors to plan further in-depth research to assess the prevalence of feeding disorders, including food neophobia, and investigate the relationship with the feeding model in infancy. In addition, a model of education shaping healthy relationships with food for children was developed, which will be piloted in selected kindergartens in Lublin from January 2026.

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