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Association between mothers' feeding practices and food neophobia in primary school-aged children from the Pomeranian Province of northern Poland

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Abstract

Introduction and Objective. Food neophobia—reluctance to try unfamiliar foods—is common in school-aged children and may reduce diet quality. Parental feeding practices strongly influence children's eating behaviours. The aim of the study is to assess food neophobia in children, based on mothers' reports, and to analyze maternal feeding strategies in relation to neophobia levels.

Materials and Method. The study included 1,113 mothers of children aged 7–15. Data were collected using the Child Food Neophobia Scale (CFNS) and a shortened Comprehensive Feeding Practices Questionnaire (CFPQ). Statistical analyses included Kruskal–Wallis and ANOVA tests with *post hoc* analyses, linear regression, and factor analysis ($p < 0.05$).

Results. Low and high food neophobia were observed in 42.86% and 42.58% of children, respectively; 14.56% showed a neutral level. Mothers most frequently used encouragement and modelling. Higher neophobia was associated with more frequent use of monitoring and emotion regulation strategies ($p < 0.05$). Regression analysis ($R^2 = 0.29$) showed positive associations between neophobia and emotion regulation, control, food as a reward, and food environment ($p < 0.05$). Factor analysis identified two feeding styles: control-oriented (monitoring, control, restriction) and supportive (encouragement, modelling, environment). Mothers of highly neophobic children more often used control-oriented practices, while mothers of children with low neophobia preferred supportive strategies.

Conclusions. Food neophobia is highly prevalent among Polish school-aged children. Maternal feeding practices are strongly related to its level. Supportive strategies are associated with lower neophobia, whereas restrictive and emotion-based practices are linked to higher neophobia. Interventions should promote supportive feeding approaches to increase dietary diversity.

Key words

children, food neophobia, Child Food Neophobia Scale (CFNS), feeding practices, nutritional parenting strategies, Comprehensive Feeding Practices Questionnaire (CFPQ)

INTRODUCTION

Since the beginning of the 21st century, the health of school-age children has been seen as one of the fundamental priorities of public health worldwide. Both the physical condition and mental well-being of primary school pupils who are in a phase of intensive development, play a key role not only in their individual maturation, but also in shaping future social potential and human capital [1, 2]. Over the last two decades, an increasing co-occurrence of health problems has been observed among school-age children and adolescents, including impaired visual acuity, excessive body weight, and mental health difficulties. Polish population-based studies indicate that these problems affect children and adolescents across a broad school-age range, constituting a significant challenge for public health [3]. Similar trends have also been reported in international studies and in younger paediatric populations, indicating the global and multifactorial nature of these health issues [4, 5]. The early stages of development are a crucial time for shaping eating habits and other health behaviours, which often become ingrained and remain unchanged in adulthood [6]. A properly balanced diet in early childhood promotes harmonious development and reduces the risk of obesity, and eating habits established during this period largely determine health in adulthood [7].

Positive parental practices, such as setting an example and supporting the child in developing a healthy diet, promote the maintenance of a healthy weight, whereas a lack of involvement and control promotes a higher BMI and unhealthy eating habits [8]. Mothers' daily attitudes and food choices shape the environment in which children develop their eating habits and preferences [9]. Because children have a natural tendency to imitate adult behaviour, parenting strategies can both support the development of healthy eating patterns and reinforce unhealthy patterns. In this context, the phenomenon of food neophobia, understood as a persistent

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aversion or fear of trying new foods, is of particular importance [10]. Neophobia most often appears between the ages of 2–5, a key period for the formation of habits that can last a lifetime [11]. Children affected by this problem usually prefer familiar, mild, and sweet flavours, and strongly resist new or unfamiliar foods [12]. Although neophobia is sometimes treated as a natural stage of development, its persistence over time can lead to a limited diet and, consequently, to nutritional deficiencies [13]. Parents often fail to recognize this phenomenon, interpreting their child's behaviour as mere pickiness, which further hinders early intervention [14]. It is therefore crucial for caregivers to be aware of this and to use appropriate practices, such as patiently and repeatedly introducing new products, eating meals together, and setting a good example, which can alleviate the severity of neophobia and promote the development of healthy habits [15, 16, 17]. Food neophobia is particularly pronounced in early childhood and can significantly influence the development of long-term preferences and eating habits. High levels of neophobia limit dietary diversity, which can lead to nutritional deficiencies, lower acceptance of healthy foods, and poorer quality nutrition. Since parents play a key role in the upbringing and creation of a child's eating environment, their attitudes, practices, and eating strategies can either exacerbate or reduce the manifestations of neophobia. In particular, mothers, who are the primary caregivers in most families, have a significant influence on children's attitudes toward new foods by modelling behaviours, encouraging them to try new foods, and using control and monitoring.

In the light of these considerations, the present study aimed to assess the level of food neophobia in school-aged children, based on maternal reports and to examine the feeding strategies used by mothers in relation to their children's eating behaviours. Additionally, the study sought to analyze the associations between specific parental feeding practices and the severity of food neophobia, with the goal of identifying broader feeding styles that may either exacerbate or mitigate reluctance to try new foods.

MATERIALS AND METHOD

Study design. A cross-sectional study was conducted using an anonymous, self-administered online questionnaire addressed to mothers of school-aged children. Data were collected between July – September 2025 in primary schools located in the Pomeranian Province in northern Poland. The survey was prepared using Google Forms and distributed in cooperation with school administrative staff through official school websites, social media channels, and the Librus electronic communication system commonly used in Polish schools. Participation in the study was voluntary. Before completing the questionnaire, respondents were informed about the purpose of the study and provided electronic informed consent. The study protocol complied with the ethical principles of the Declaration of Helsinki and with the requirements of the General Data Protection Regulation (GDPR 679/2016). The research was approved by the Bioethics Committee of the Medical University of Gdańsk (Approval No. KB/322/2025).

Assessment of the level of food neophobia (CFNS) from the mother's perspective. In the first stage of the study, the mother completed a questionnaire based on *the Child Food Neophobia Scale* (CFNS). Each of the 10 items was rated on a 7-point scale, where 1 meant 'strongly disagree' and 7 meant 'strongly agree'. The total score ranged from 10–70 points. Questions relating to neophilic attitudes (openness to new products) were coded inversely. A higher score indicated a stronger level of neophobia. The reliability of the tool was confirmed by Cronbach's alpha coefficient ($\alpha = 0.93$; $n = 1113$). Three categories based on the distribution of scores in the sample were adopted for interpretation: low level of neophobia (score < mean − 0.25 SD), neutral (mean ± 0.25 SD), and high level of neophobia (score > mean + 0.25 SD). For the purposes of analysis, the results were divided into 3 categories: high level of neophobia above 48 points, neutral between 41–48 points, and low below 41 points. The CFNS questionnaire used was originally developed by Pliner and Hobden [18]. The total score on the Food Neophobia Scale (CFNS) was calculated as the sum of the responses to 10 questions, with questions relating to neophilic attitudes (openness to new products) coded inversely. Based on the distribution of total scores, participants were divided into three groups: low, neutral, and high food neophobia, using cut-off values defined as the mean ± 0.25 standard deviation. The distribution of participants in the groups is presented as frequencies and percentages. For each question in the Food Neophobia Scale (CFNS), the mean score and standard deviation were calculated separately for the entire sample and for each group.

The assessment made by mothers reflects both their own perception of their child's behaviour and the parenting strategies they use. Mothers' attitudes and the way they regulate access to food can have a significant impact on the development of food neophobia. For this reason, this study compared the level of food neophobia in children (measured using the CFNS) with parenting strategies (CFPQ). This allowed assessment of the extent to which parenting practices are associated with the severity or reduction of neophobia in children.

Comprehensive Feeding Practices Questionnaire. The Comprehensive Feeding Practices Questionnaire (CFPQ) was developed by Musher-Eizenman and Holub (2007) to examine the different ways in which parents shape their children's eating habits. It originally consists of 49 questions grouped into 12 subscales, including monitoring, emotion regulation, control, environment, use of food as a reward, nutrition education, health and weight restrictions, child control, modelling, involvement, and promoting variety and balance in the diet.

Only 16 items relating to 8 selected subscales were used in the study. This selection was based on previous analyses (Musher-Eizenman et al., 2019), which indicated that some subscales overlap theoretically, or are rarely used in parenting studies. For this reason, the subscales 'teaching about nutrition', 'pressure', 'restriction for weight', and 'child involvement' were omitted. The reason was their lower relevance to school-age children or significant similarity to other scales (e.g., 'restriction for weight' and 'restriction for health', or 'pressure' and 'child control'). The aim of the modification was to create a shortened yet representative version of the tool, including two questions from each of the 8 key subscales. A similar solution was used and positively verified in earlier studies with both mothers and fathers

[19, 20, 21, 22]. This adaptation was intended to reduce respondent burden while preserving the key constructs most relevant to food neophobia in school-aged children. Similar abbreviated versions of the CFPQ have demonstrated acceptable psychometric properties in previous studies (Tschann et al., 2015; Penilla et al., 2017). In the present sample, the internal consistency of the shortened instrument was acceptable (Cronbach's α = 0.71), further supporting the methodological validity of this approach.

All items were rated using a 5-point Likert scale [23], where 1 meant 'never/strongly disagree' and 5 meant 'very often/strongly agree', with intermediate values: 2 – 'rarely/partially disagree', 3 – 'sometimes/neutral', 4 – 'often/partially agree'.

Based on the responses in the CFPQ (Comprehensive Feeding Practices Questionnaire), scores were calculated for 8 subscales:
1) Monitoring
2) Emotion Regulation
3) Control
4) Environment
5) Food as Reward
6) Modeling
7) Encourage
8) Restriction for Health.

For each subscale, the arithmetic mean ($\bar{x}$) and standard deviation (SD) were calculated, which allowed determination of the overall level of use of individual feeding strategies by mothers. The internal consistency of the individual subscales of the CFPQ questionnaire was assessed using Cronbach's alpha coefficient. The result obtained (α = 0.71) indicates that the tool is sufficiently reliable. All questions within the strategies studied are consistent with each other, and their values range from 0.62–0.75, which is considered acceptable.

Participants. A total of 1,146 mothers completed the questionnaire. After excluding incomplete responses (n = 33), data from 1,113 participants were included in the final analysis. The study population consisted of mothers of children aged 7–15 years attending primary schools. No specific exclusion criteria were applied, which allowed for a broad and heterogeneous sample reflecting the general school population. Socio-demographic characteristics, including maternal age, employment status, family structure, and number of children in the household, were collected through self-report questions. Mothers were classified as living with a partner if they declared shared responsibility for childcare with a spouse or partner; otherwise, they were categorized as single mothers (Tab. 1).

Statistical analysis. The statistical analysis was performed using the PQStat Software (2023) v.1.8.6.102. Nonparametric tests (Kruskal–Wallis, and in the case of significance, Dunn's *post-hoc* test with Bonferroni/Holm correction) were used to analyze differences between groups. For questions with categorical answers, a chi-square goodness-of-fit test was performed to check for deviations from uniform distribution. The relationship between the child's level of food neophobia and the mothers' feeding strategies was assessed using one-way analysis of variance (ANOVA) with Tukey's *post-hoc* test. The relationship between feeding strategies and the level of neophobia was analyzed using linear regression, in which the dependent variable was food neophobia (CFNS) and the independent variables were individual feeding strategies (CFPQ). The statistical significance of the model was assessed at a level of $p < 0.05$, reporting standardized regression coefficients (β), p-values, and the R^2 index for the entire model. The assumptions of the model were verified using the Shapiro-Wilk test. 0.05, reporting standardized regression coefficients (β), p-values, and R^2 for the entire model. The model assumptions were verified using the Shapiro–Wilk test and the Durbin–Watson test. In addition, a principal component analysis was performed to identify broader dietary styles, which were then compared between groups of children with different levels of neophobia using ANOVA analysis with Tukey's *post-hoc* test. The effect size in the ANOVA analyses was presented as η^2, with the following interpretation: 0.01 – small, 0.06 – medium, ≥0.14 – large. A p-value < 0.05 was accepted as the level of statistical significance.

Table 1. Socio-demographic characteristics of the mothers

Variable	Category	n	%
Age	21–29	266	23.92
	30–39	644	57.86
	40 years and above	203	18.22
Employment status	Employed	669	60.08
	Not working	444	39.92
Family status	Raising a child/children with a partner/husband	879	78.99
	Raising child/children alone	234	21.01
Number of children in the household	One child	552	49.79
	2 children	463	41.59
	3 children	76	6.81
	4 or more	22	1.81

n – number of mothers; % – percentage of mothers

RESULTS

Level of neophobia in children assessed subjectively by their mothers. The first stage involved a subjective assessment of the level of neophobia in children by their mothers. In the analyzed sample, the largest percentage of mothers reported a low level of neophobia in their children (n = 477). This means that a large proportion of children were open to trying new foods and had a positive attitude towards new taste experiences. The mothers of these children often emphasized their willingness to experiment and try a variety of products, including those from other countries. A similar percentage of mothers noticed a high level of neophobia in their children (n = 474). Children in this group were more likely to be distrustful of new foods, refuse to try dishes they were not familiar with, and be cautious about products with unknown ingredients. The ambivalent group, representing a neutral level of neophobia, was the smallest and comprised 14.56% of the study population (n = 162). Children in this group had mixed reactions. Some of them readily accepted new products, while others showed hesitation or distrust towards new products. The Kruskal–Wallis test showed significant differences between the 3 groups ($p < 0.05$). *Post hoc* analysis (Dunn's test with Bonferroni/Holm correction) confirmed that there were statistically significant differences between the groups for all 10 CFNS questions. No questions

Table 2. Distribution of children according to food neophobia intensity

CFNS category	n	%	Score range
1 (low level of neophobia)	477	42.86	<41
2 (neutral level of neophobia)	162	14.56	41–48
3 (high level of neophobia)	474	42.58	>48
All	1113	100	

CFNS – Child Food Neophobia Scale; $p < 0.05$ – Kruskal–Wallis test

were found in which there were no differences between the groups (Tab. 2).

Table 3 presents the results obtained in the Child Food Neophobia Scale, divided into 3 groups differing in the level of food neophobia. Analysis using the Kruskal–Wallis test showed statistically significant differences between groups I, II, and III in all 10 questions ($p < 0.05$). In order to identify pairs of groups that differ from each other in individual questions, Tukey's *post hoc* test was additionally applied. In questions concerning willingness to try new foods (CFNS 1 and 6), children from the low neophobia group scored significantly lower than children from the high neophobia group, which reflected their greater openness to new taste experiences. In questions relating to distrust of new products (CFNS 2 and 3), the neutral group occupied an intermediate position and differed significantly from both the low and high groups. In the case of questions about ethnic food (CFNS 4 and 5), the differences were particularly pronounced between the low and high groups, with the neutral group falling between them. In questions describing fear and caution towards new products (CFNS 7 and 8), there were significant differences between all 3 groups, confirming a gradual increase in caution with increasing levels of neophobia. In turn, in questions about dietary flexibility (CFNS 9 and 10), children from the low neophobia group were significantly more open than children from the high group, with the neutral group occupying an intermediate position. Statistically significant differences occurred in all questions, with the most consistent contrasts between the extreme groups, low and high neophobia.

General characteristics of mothers' feeding strategies. The study evaluated 8 strategies related to the control and regulation of eating behaviours: monitoring, emotion regulation, control, environment, food as reward, encourage, modelling, and restriction for health.

For the entire study group, the average scores indicate that the highest values were for the variables encourage ($\bar{x}$ 3.82) and modelling ($\bar{x}$ 3.75). This means that mothers most often used these parenting practices in the context of nutrition, i.e., they encouraged their children to try new foods and participate in meal preparation. In contrast, modelling often involved presenting positive eating patterns within the family, e.g., eating healthy foods in the presence of the child and talking about their benefits. In turn, the lowest average value was observed in the case of monitoring ($\bar{x}$ 3.44), which may indicate that mothers less frequently use practices involving active control of what and how often their children eat, especially with regard to products considered unhealthy, such as sweets or salty snacks. The results suggest that the study group prefers to base their nutritional strategies on encouraging and promoting proper eating behaviours, thereby limiting the benefits of controlling and monitoring (Tab. 4).

Table 4. Mothers' dietary strategies

Nutrition strategy	$\bar{x}$	SD
Monitoring	3.44	1.77
Emotion regulation	3.46	2.01
Control	3.54	1.79
Environment	3.60	1.83
Food as reward	3.49	1.89
Modelling	3.75	1.74
Encouragement	3.82	1.67
Restriction for health	3.69	1.81

CFPQ – Comprehensive Feeding Practices Questionnaire; $\bar{x}$ – mean; SD – standard deviation

The analysis of mothers' feeding behaviours towards their children identified a number of important attitudes and habits that may have a significant impact on shaping children's preferences and lifestyle. Based on the results obtained and the chi-square (χ^2) test performed, it was found that the distribution of responses for all 16 questions differed significantly from the random distribution ($p < 0.05$), confirming that the mothers surveyed exhibit clear, established patterns of behaviour. An analysis of mothers'

Table 3. Maternal feeding practices across CFNS categories

CFNS	Item	All n-1113	low n-477	neutral n-162	high n-474
		$\bar{x}$ [SD]	$\bar{x}$ [SD]	$\bar{x}$ [SD]	$\bar{x}$ [SD]
CFNS 1	My child tries new and different foods all the time	4.08 [1.76]	2.78 [1.29]	3.73 [1.14]	5.51 [1.18]
CFNS 2	My child does not trust new foods	4.44 [1.72]	3.19 [1.40]	4.35 [1.12]	5.74 [1.13]
CFNS 3	If my child does not know what is in a food, I will not try it?	4.46 [1.76]	3.17 [1.50]	4.44 [1.23]	5.76 [1.07]
CFNS 4	My child likes foods from different countries	4.41 [1.80]	3.08 [1.43]	4.25 [1.33]	5.81 [1.08]
CFNS 5	My child thinks ethnic foods are too strange to eat	4.43 [1.78]	3.09 [1.44]	4.33 [1.17]	5.81 [1.07]
CFNS 6	My child will try new foods	4.36 [1.87]	2.87 [1.41]	4.43 [1.34]	5.83 [1.11]
CFNS 7	My child is afraid to eat things he/she has never eaten before	4.46 [1.75]	3.14 [1.49]	4.63 [1.24]	5.74 [1.03]
CFNS 8	My child pays special attention to what he/she will eat	4.50 [1.76]	3.23 [1.53]	4.48 [1.33]	5.77 [1.04]
CFNS 9	My child will eat almost anything	4.53 [1.76]	3.29 [1.59]	4.53 [1.24]	5.78 [1.05]
CFNS 10	My child likes to try new ethnic restaurants	4.44 [1.79]	3.13 [1.43]	4.55 [1.32]	5.73 [1.20]
Mean		44.12	30.97	43.72	57.49

$\bar{x}$ – mean; SD, standard deviation; group I (low level of neophobia), group II (neutral level of neophobia), group III (high level of neophobia); Child Food Neophobia Scale; $p < 0.05$ – Kruskal–Wallis test.

responses to questions about their children's eating behaviours revealed a number of ambivalent and diverse practices. On the one hand, the results of the monitoring subscale indicate that many mothers declare awareness of the amount and frequency of their child's consumption of sweets and salty snacks, which may indicate active supervision of these aspects of the diet. At the same time, however, there is a noticeable tendency to use food as a tool for regulating emotions, both in the context of boredom and sadness, by offering the child food regardless of whether they feel hungry. Among the mothers surveyed, it was quite common to give in to the child's preferences, such as preparing alternative meals when the child does not accept what has been served, or allowing them to choose their food freely. Over 50% of mothers often prepared a different dish if their child did not like the meal. In the sample studied (49.58%), mothers admitted that they allowed their children to consume foods according to their preferences. This indicates an attempt to reduce conflicts while weakening the nutritional structure. On the other hand, many mothers demonstrated positive modelling, try to eat healthily in front of their children, talk to them about the benefits of healthy food, and actively encourage them to eat a variety of foods. It is also worth noting the presence of inconsistent control strategies. Some mothers admitted that they reward their children with sweets for good behaviour, while at the same time restricting their access to them in response to undesirable behaviour. Mothers did not feed their children in response to their sadness (19.85%) and when they did not regularly control their children's consumption of sweets (17.16%). This indicates that some mothers completely avoid emotional feeding. When the child does not like the meal served, the mother occasionally prepares something else for them (19.59%). This shows that some mothers are flexible towards their child's preferences, but this happens only to a limited extent.

Comparison of mothers' feeding strategies between groups with different levels of neophobia (CFNS). Analysis showed that in most CFPQ strategies, no significant differences were observed between mothers of children with low, neutral, and high neophobia ($p > 0.05$). However, in 2 scales, the differences were statistically significant ($p < 0.05$). In the case of the monitoring strategy, ANOVA showed significant differences between groups ($p = 0.004$). *Post-hoc* analysis (Tukey's test) revealed that the mothers of children with high levels of neophobia used this feeding strategy significantly more often than the mothers of children with low and neutral levels of neophobia ($p < 0.05$). Similarly, significant differences between groups were found on the Emotion Regulation scale ($p = 0.013$). The *post-hoc* test showed that mothers of children with neutral levels of neophobia used this feeding strategy significantly more often than mothers of children with low levels of neophobia ($p < 0.05$) (Tab. 5).

Of all the feeding strategies analyzed, only the Monitoring and Emotion regulation scales showed significant differences between groups of children with low, neutral, and high levels of neophobia ($p < 0.05$).

Linear regression analysis predicting the level of food neophobia based on mothers' feeding strategies. A regression model was used to assess the relationship between feeding strategies and the level of neophobia. This method allows determination about whether individual strategies have a significant impact on the severity of neophobia. After preliminary analysis, linear regression was used because the dependent variable, i.e., the level of food neophobia, is continuous, and this method allows for a simple assessment of how different parenting strategies are associated with the severity of neophobia. Linear regression allows for the simultaneous consideration of multiple factors and the determination of which of them most increase or decrease the risk of neophobia in children. In the analyzed research model, the dependent variable is the level of food neophobia. The independent variables are selected parenting strategies, including: Monitoring, Emotion Regulation, Control, Environment, Food as a Reward, Encouragement, Modelling, and Restriction for Health. The R^2 coefficient of determination was used to assess the fit of the model. The analysis was performed at a significance level of $p < 0.05$. The Durbin–Watson test was 1.47, indicating no serious autocorrelation of the residuals. Thus, the relationships obtained between feeding strategies and the severity of food neophobia did not result from systematic model errors, but reflect actual relationships in the sample studied. The linear regression analysis included both unnormalized regression coefficients (B) and standardized regression coefficients (β). Interpretation of the results is based on the B value, which indicates the direction and strength of the relationship between individual strategies and the level of neophobia, and on the β value, which allows for a comparison of the relative importance of predictors in the model. In addition, standard errors (SE), p-values, and 95% confidence intervals for B are presented, allowing for the assessment of the significance and precision of the estimates.

Table 6 presents the results of multiple linear regression. The coefficient of determination is $R^2 = 0.294$, which expresses a certain, though not dominant, part of the variance, shared and the best combination and explanatory variable.

The analysis showed that the significant factors associated with the severity of food neophobia were emotion regulation ($B = 1.29$), control ($B = 0.92$), environment ($B = 1.06$), and the use of food as a reward ($B = 1.28$). All these strategies were positively associated with CFNS levels, which means that their more frequent use promotes higher levels of food neophobia in children. High β values indicate a stronger influence of a given explanatory variable on the severity of neophobia. The strongest factor was emotion regulation ($\beta = 0.19$), which indicates that its presence differentiated the level of neophobia in the study sample to the greatest

Table 5. Mothers' feeding strategies and children's level of food neophobia

CFPQ scale	Group I CFNS $\bar{x}$	Group II CFNS $\bar{x}$	Group III CFNS $\bar{x}$	F	p
Monitoring	3.21	3.34	3.89	6.21	0.004*
Emotion regulation	2.45	3.02	2.77	4.56	0.013*
Control	2.42	2.49	2.53	0.88	0.417
Environment	3.44	3.52	3.57	0.73	0.485
Food as reward	2.12	2.18	2.22	0.67	0.523
Modelling	3.12	3.19	3.28	1.44	0.242
Encouragement	3.02	3.09	3.15	0.97	0.381
Restriction for weight	2.55	2.61	2.70	1.25	0.29

$\bar{x}$ – mean; group I (low level of neophobia), group II (neutral level of neophobia), group III (high level of neophobia); CFNS – Child Food Neophobia Scale; CFPQ – Comprehensive Feeding Practices Questionnaire; F – ANOVA; $p < 0.05$ – Tukey test

Table 6. Results of multiple linear regression predicting the severity of food neophobia (CFNS) based on eating strategies (CFPQ)

Subscale	B (SE)	β (stand.)	p	95% CI
Monitoring	0.14 (0.27)	0.02	0.601	-0.39–0.68
Emotion regulation	1.29 (0.29)	0.19	0.001	0.71–1.87
Control	0.92 (0.34)	0.12	0.007	0.26–1.59
Environment	1.06 (0.32)	0.14	0.001	0.44–1.68
Food as a reward	1.28 (0.31)	0.17	0.001	0.66–1.89
Encouragement	0.04 (0.32)	0.01	0.888	-0.58–0.67
Modelling	0.42 (0.33)	0.05	0.213	-0.22–1.06
Restriction for health	0.16 (0.28)	0.02	0.564	-0.39–0.71

CFPQ – Comprehensive Feeding Practices Questionnaire; B – unstandardized coefficient; SE – standard error; 95% CI – confidence interval for B; β – standardized regression coefficient; * – $p < 0.05$

extent. The results indicate that among the parenting strategies analyzed, emotion regulation, control, shaping the environment, and using food as a reward are significantly associated with higher levels of food neophobia in children.

Factor analysis of mothers' feeding styles depending on the level of neophobia in children. Analysis of variance (ANOVA) allowed for a comparison of feeding styles between groups of mothers differing in the level of food neophobia in their children. Two main styles were distinguished: Control Style, based on a strategy of monitoring, control, and restriction, and the Supportive Style, which included encouragement, modelling, and environment. The Environment subscale was classified as the Supportive Style because it involves creating a feeding environment that encourages children to make positive choices. In the case of the Controlling Style, significant differences were observed between the groups ($p = 0.001$; $\eta^2 = 0.08$). Tukey's *post-hoc* test showed that the mothers of children with high neophobia were more likely to use control strategies than the mothers of children with neutral neophobia, who, in turn, were more likely than the mothers of children with low neophobia (all comparisons statistically significant; $p < 0.05$) (Tab. 11). Similarly, for the Supportive Style, the differences were also significant ($p = 0.001$; $\eta^2 = 0.06$). Here, the pattern was reversed, with mothers of children with low neophobia showing the highest level of use of supportive strategies, followed by the neutral group, and the lowest level was found among mothers of children with high neophobia (all $p < 0.05$) (Tab. 7).

Table 7. Comparison of feeding styles between groups differing in levels of food neophobia

Style	Group I ($\bar{x} \pm SD$)	Group II ($\bar{x} \pm SD$)	Group III ($\bar{x} \pm SD$)	F	p	Effect (η^2)
Control style	-0.18 ± 0.92	0.05 ± 1.01	0.32 ± 1.12	12.45	0.001	0.08
Supportive style	0.22 ± 0.98	-0.10 ± 0.94	-0.25 ± 0.89	9.7	0.001	0.06

$\bar{x}$ – mean; SD – standard deviation; group I (low level of neophobia), group II (neutral level of neophobia), group III (high level of neophobia); F – ANOVA; η^2 – effect size; $p < 0.05$

In summary, the results indicate that the mothers of children with higher levels of food neophobia are more likely to use a controlling approach, while the mothers of children with low neophobia prefer supportive strategies and positive modeling.

DISCUSSION

Food neophobia, defined as a reluctance to try new or unfamiliar foods, is a common phenomenon in the paediatric population, which can significantly limit dietary diversity and influence long-term eating habits.

The results of this study indicate that a significant proportion (42.58%) of the examined children aged 7–15 years presented a high level of food neophobia [24]. This percentage is lower than that reported by Kozioł-Kozakowska et al. [25], who observed an average level of neophobia in 76.9% of children aged 2.5–7 years. It should be noted, however, that both studies involved children at different developmental stages. Food neophobia is known to be more pronounced in early childhood and may decrease with age as children gain greater exposure to a variety of foods and develop more stable eating patterns. Therefore, the observed differences in prevalence may be at least partly explained by age-related factors, which limits the direct comparability of these results.

The underlying causes of neophobia may be multifactorial, combining personality, sensory, and environmental factors. People with high levels of neophobia often show a strong attachment to routine and familiar patterns, while novelty causes them anxiety and uncertainty, prompting them to avoid change [26]. Particularly worrying is the fact that neophobic behaviour patterns established in childhood tend to persist into adulthood, with the age of around 9 being considered critical for the final formation of food preferences [27]. The consequences of this phenomenon are serious, as Halland et al. [28] have shown that neophobic children have a significantly less varied diet, including lower consumption of raw vegetables. A key barrier at an early stage is sensory perception, especially the visual assessment of food, which determines a child's willingness to try it [29, 30, 31]. This is confirmed by the results of the current study, where mothers of children in the high neophobia group indicated that their children are afraid to eat foods they have not eaten before, and express distrust of foods with unknown ingredients.

The feeding strategies used by parents, especially mothers, who are most often the primary caregivers, play an extremely important role in shaping a child's eating attitudes [32]. In this study, mothers most often reported using positive strategies, such as encouragement and modelling, which is reflected in the highest mean scores on these subscales. These results are consistent with the findings of Yee et al. [33] and Mazza et al. [34], who showed that modelling healthy behaviours is strongly correlated with the better quality of a child's diet, and active encouragement, although with a slightly smaller impact, is an important element of support. In turn, the lowest level was declared in the case of monitoring, i.e., conscious control of unhealthy food consumption. Despite its less frequent use, this strategy, as in the study by Barbosa et al. [35], correlated with better eating patterns. Analysis of the correlations between strategies revealed strong links between control and food as a reward, as well as between control and emotion regulation. This observation confirms the findings of Baker et al. [36] and Fernandes et al. [37], that emotion-based strategies often co-occur, creating a specific, reactive eating style that can negatively affect a child's ability to self-regulate and increase the risk of emotional overeating [38].

In the context of the home environment, the mothers surveyed often reported the constant availability of sweets

and salty snacks at home, which creates an environment conducive to food choices based on highly processed foods. At the same time, mothers showed a high level of awareness regarding their children's consumption of these products, indicating a discrepancy between knowledge and practice. Another important observation was the widespread use of food as a remedy, both in response to boredom and sadness, and as a reward for good behaviour. This mechanism, also noted by Jansen et al. [39], can lead to the perpetuation of incorrect associations, where food (especially sugar-rich food) becomes a tool for emotional regulation rather than satisfying hunger. In response to their children's preferences, a significant percentage of mothers reported giving in to them by preparing alternative meals when the dish served to the family was not accepted by the child [40]. This strategy, while reducing direct conflicts, may in the long run limit exposure to new flavours and reinforce selective preferences [41]. The study provides important insights into the relationship between mothers' feeding strategies and the level of food neophobia in school-age children. The results indicate that a feeding style based on control and restriction correlates with higher levels of neophobia, while supportive strategies, such as modelling and encouragement, are associated with greater openness to new foods in children.

Future research should focus on an in-depth analysis of environmental and family factors that may moderate the severity of neophobia, as well as on the development and evaluation of effective educational interventions targeting both children and parents. Programmes based on gradual, positive exposure to new flavours, using elements of gamification and involving children in the process of planning and preparing meals, may be particularly promising. Interventions aimed at parents and caregivers should focus on practical skills for creating a positive atmosphere around food, consciously modelling behaviour, and replacing maladaptive strategies (such as using food as a reward or a tool for regulating emotions) with practices that support children's autonomy and culinary curiosity. The implementation of such multidirectional measures can contribute significantly to alleviating neophobia and supporting the development of healthy, varied eating habits from an early age.

Limitations of the study. The limitations of this study primarily include potential reporting error related to the subjective assessment of mothers, who may have unconsciously overestimated or underestimated their child's level of neophobia. Despite the high reliability of the questionnaire scales used (CFNS, CFPQ), social desirability may have influenced the responses. The cross-sectional nature of the research project makes it impossible to draw causal conclusions.

In order to gain a deeper understanding of the dynamics of neophobia development and the role of feeding practices, longitudinal studies are needed to track these variables over time, as well as studies using observational methods to verify parents' statements in a natural feeding context. Future research should include an analysis of the relationship between age and the severity of food neophobia, preferably in a longitudinal perspective, which would allow for a better understanding of the development of this phenomenon during childhood and adolescence.

Although the model presented in this study identified several maternal feeding practices associated with food neophobia, it explained only a moderate proportion of variance ($R^2 = 0.294$), indicating that a substantial part of individual differences remains unexplained. Food neophobia is likely shaped by a complex interplay of biological, psychological, and environmental factors, including child temperament, sensory sensitivity, and broader socio-economic context.

Moreover, important potential confounders, such as age of the child, gender, BMI, parental education, and socio-economic status were not included in the analyses, which limits causal inference and may have influenced the observed relationships. Future research should incorporate these variables and employ longitudinal or multilevel designs to better capture developmental trajectories and moderating effects.

CONCLUSIONS

Food neophobia is very common among Polish school-age children, affecting almost half of the population. The results confirm that mothers' feeding strategies are closely related to children's willingness to accept new foods. Restrictive and control-oriented practices, such as monitoring, controlling, regulating emotions, and using food as a reward, were positively associated with higher food neophobia scores. These strategies seem to limit the child's autonomy, reinforce avoidance of novelty, and perpetuate negative emotional associations with food. In contrast, supportive practices, including modelling, encouragement, and creating a positive eating environment, were more common among the mothers of children with low levels of neophobia. Such strategies promote curiosity, openness to new experiences, and healthier eating.

Factor analysis identified 2 broader feeding styles: a control-oriented style, associated with higher levels of neophobia, and a supportive style, associated with lower levels of neophobia. This classification highlights the importance of parents' approach in shaping children's long-term eating behaviours.

The findings of the study underscore the need for educational and preventive interventions targeting parents, especially mothers, to raise awareness about the consequences of control-oriented strategies and promote supportive practices. Future research should build on these findings, using observational methods to confirm causal relationships and evaluate the effectiveness of interventions aimed at reducing food neophobia through supportive parenting strategies.

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