








Picky eating and the role of school: do children who attend school regularly have a greater food repertoire?

Mariana Correia Stevenson Braga¹ , Luana Romão Nogueira² , Arissa Matsuyama Okuizumi³ , Nilvane Oliveira Rocha¹ , Andrea Romero de Almeida¹ , Priscila Maximino² , Mauro Fisberg² 

ABSTRACT

Objective: To compare the number of foods accepted by children aged 0 to 5 years old with picky eating who attended school or not. **Methods:** Retrospective cross-sectional study with data from 94 children aged 0 to 5 years with picky eating attended at a feeding difficulty (FD) reference center. The patient's diagnosis is based on the Kerzner classification and the food repertoire was assessed using the food recall. The child's attendance at school or not was reported by the child's parent/caregivers. Chi-square and t-student tests were used for possible differences. **Results:** Most children were male (64.9%), older than 2 years old (78.7%), normal weight (86.0%), mild picky (77, 7%) and without an organic disease (63.7%). The average number of foods accepted by the sample was 19.2±SD 7.7 foods. 67.0% of the children attended school regularly. Although there was a lower number of accepted foods between those not attending vs. attending school (17.8±7.3 vs. 20.8±7.8), there was no significant difference (p=0.074). Overall, a higher number was found when there was school attendance. Children at risk for being overweight/overweight or who were exclusively breastfed until 6 months of age attending school have a higher number of accepted foods when compared to those who did not attend (p = 0.002 and p = 0.046, respectively). **Conclusion:** Severe picky eaters were less enrolled in schools than mild picky eaters; fewer accepted foods were found when not attending school. Children at risk of being overweight/overweight who did not attend school are more severe picky.

Keywords: Picky eating, Child nutrition, Food consumption.

1. Universidade Presbiteriana Mackenzie, São Paulo,(SP), Brasil

2. Instituto PENSI - Hospital Infantil Sabará/Fundação José Luiz Egydio Setúbal, São Paulo, (SP), Brasil

3. Universidade Federal de São Paulo, (SP), Brasil



INTRODUCTION

Eating behaviors evolve during the first years of life¹, despite unstable and modifiable risk factors during the life course^{2,3}. This process is influenced by genetic and environmental factors, and can be consolidated into food preferences¹. Food choices are determined by several biological, economic, physical, social, and psychological factors⁴⁻⁶. Considering that the acceptability of certain foods can be influenced by different variables, such as mothers/fathers' lifestyle behaviors, there is a need to repeat the exposure of foods until the child accepts it^{5,6}.

Food refusal is considered a common behavior during childhood years. It can result in negative experiences for certain foods⁷, fear of unknown foods⁸, and organic conditions (e.g., neuromotor disabilities, prematurity, and gastroesophageal reflux disease)^{9,10}. Therefore, the term feeding difficulties (FD) emerged and describes any problem causing a negative impact and hindering dietary intake. This is a concern because it cannot prevent maintaining a healthy weight status and adequate social relationships⁹.

Different types of FD have been identified, and picky eating is the most common FD type among pre-school age children¹¹, and might be consolidated during adulthood¹². Picky eating can be classified according to its level of severity. Mild picky eaters are children that can try new foods, but, eat only certain food groups. These children can have adequate growth and development. Alternatively, severe picky eaters demonstrate a food acceptance that translates into 10-15 foods, and can affect the normal oral motor functions⁹.

Evidence demonstrates that the family¹³, teachers and peers¹⁴, sometimes described as "pairs", influenced the development of the children food patterns and preferences. Social learning, through observing a role model is one of the most common ways to change kids habits¹⁵. Thus, the school provides social control via human behavior influences, including social life and eating habits^{7,15,16}. Evidence shows that interventions developed in the school environment showed positive results¹⁷ and are most accepted by students¹⁸. Thus, the importance

of the school on this reality. Considering the aspects above, the purpose of the present study was to compare the number of accepted foods by picky eaters aged 0 to 5 years attending or not school.

MATERIAL AND METHODS

This was a retrospective cross-sectional study with 94 picky eating children aged 0-5years old from a reference center in feeding difficulties from the city of São Paulo, Brazil. The data collection occurred from August 2014 to December 2019, having up to 5 years and foods were reported by the children's parents. Children older than 6 years old and with other than a picky eating diagnosis, were excluded from the study.

The clinical practices were conducted by a multidisciplinary team, including; pediatricians, speech pathologists, and dietitians. To conclude the diagnosis and plan definition, periodical multidisciplinary meetings are conducted to provide a better action plan. The clinical practice protocol was published elsewhere¹⁹. The child diagnosis was based on the classification of Kerzner¹⁰. The classification for feeding difficulties are: parents' misinterpretation, being picky, excitement with poor appetite, food phobia, having an organic disease, a child with a psychological disorder or neglected, and crying while eating. The reference center considers the following classification for FD: picky eating, food phobia, and limited appetite. In the current study, it was used only data with children classified with picky eating.

Data was obtained based on the interview conducted with the child's parent/caregiver during the first multidisciplinary counseling, after analyses of medical records. One of the tools used by the service was a dietary recall to evaluate all the child's diet intake. Foods were identified by a parent/caregiver as accepted, not accepted, and rejected by the child²⁰. A posteriori, the record is revised and completed during counseling by a dietitian through checking all the possible foods consumed – in all forms of presentation – which is part of the child eating routine. Children attending school or not was reported by the parent/caregiver.

The following variables were collected from the medical records, and included in the present study:

- Sex (female, male);
- Age group (≤ 2 years, >2 to ≥ 5 years);
- Body Mass Index (BMI) classification by age and sex (underweight, normal weight, risk for overweight or overweight) according to Brazilian Pediatric Society²¹;
- Picky eating classification (severe picky – up to 15 accepted foods; and mild picky – more 15 foods accepted);
- Organic disease (yes or no);
- Phase for reporting the complaints of feeding difficulties (breastfeeding, complementary eating, family feeding).
- Duration of exclusive breastfeeding (less than 6 months, 6 months);
- Attending or not school (yes or no).

Data was organized on the Microsoft Excel software and analyzed with STATA version 13.0. The qualitative variables were demonstrated through frequency in frequency and percentage and presented in tables. The quantitative variables had their mean and standard deviation calculated. Chi-squared and t-students tests were used for possible calculating possible differences. For all analyses, were considered the significance level of 5%.

All the children presented consent forms signed by their parents/caregivers. Both the use of the medical records data (CAAE 32939314.0.0000.5567) and this study (CAAE 28256720.9.0000.5567) were approved by the Institutional Review Board from the reference center.

RESULTS

The majority of the sample was male (64.9%) with more than 2 years old (78.7%), normal weight (86.0%), mild picky (77.7%), and without an organic disease (78.7%). The most common phase for showing the complains were the family feeding (50.0%), as well being common the exclusive breastfed for up to 6 months (67.4%) (table 1). The mean of food accepted by the sample was 19.2 ± 7.7 foods. Regarding attending or not school, 67.0%

were regularly attending school, and 66.7% were studying part-time.

In table 1, the outcomes of interest were described as attending or not school. There were significant differences for the age group ($p=0.000$) and picky eating classification ($p=0.032$). Younger children were attending less school (70.0%) than children older than 2 years old (23.0%). Moreover, 52.4% of children classified as severe picky were not attending school, while only 27.4% of mild picky children were not attending.

Although there was a lower mean for foods when not attending vs. attending school (17.8 ± 7.3 vs. 20.8 ± 7.8), there is no significant difference ($p=0.074$).

Table 2 showed mean and standard deviation values for the number of foods accepted according to the outcome of interest. Overall, were found a higher mean for attending school. Children being overweight and exclusively breastfed for ≥ 6 months that attended schools showed a higher number of foods accepted than those not attending ($p=0.002$ and $p=0.046$, respectively).

DISCUSSION

The majority of the picky eaters was attending school and classified as mild picky. Severe were attending less school than mild picky eaters, and, an average of a small number of foods accepted was found when they were not attending school. Moreover, children being at risk for overweight or with overweight and exclusively breastfed until 6 months of age attending school had a higher number of accepted foods when compared to those that were not attending. For the authors' knowledge, there were no studies with similar analyses to compare. However, several studies focus on the role of the school to develop and modify eating habits^{7,16,22,23}.

The school environment is important for picky eaters to allow autonomy²² and connection for a greater variety of foods^{18,22}. Raulio, Pietikäinen e Prättälä²⁴ assessed the eating habits of Finish preschoolers during the school-year. They demonstrated that lunch at school was associated with more fruit and vegetables, bread, milk and dairy

Table 1 – Distribution of qualitative variables according to attending school. São Paulo, 2019

	Total	Enrolled in School		P-value*
	n (%) or mean±SD	Yes n(%) or mean±SD	No n(%) or mean±SD	
<i>Accepted foods</i>	19,2±7,7	20,8±7,8	17,8±7,3	0,074
<i>Sex</i>				
Female	33(35.1)	19(57.6)	14(42.4)	0.152
Male	61(64.9)	44(72.1)	17(27.9)	
<i>Age group (age)</i>				
≤2 years	20(21.3)	6(30.0)	14(70.0)	0,000
>2 a ≤5 year	74(78.7)	57(77.0)	17(23.0)	
<i>BMI classification</i>				
Underweight	1(1.1)	1(100.0)	-	0.776
Normal weight	80(86.0)	53(66.3)	27(33.7)	
Risk for overweight or overweight	12(12.9)	8(66.7)	4(33.3)	
<i>Picky eating classification</i>				
Severe picky	21(22.3)	10(47.6)	11(52.4)	0.032
Mild picky	73(77.7)	53(72.6)	20(27.4)	
<i>Organic disease</i>				
No	58(63.7)	38(65.5)	20(34.5)	0.478
Yes	33(36.3)	24(72.7)	9(27.3)	
<i>Phase of showing eating complains</i>				
Breastfeeding	4(4.3)	2(50.0)	2(50.0)	0.053
Complementary eating	43(45.7)	24(55.8)	19(44.2)	
Family feeding	47(50.0)	37(78.7)	10(21.3)	
<i>Time of breastfeeding</i>				
Less than 6month	62(67.4)	41(66.1)	21(33.9)	0.710
6 months	30(32.6)	21(70.0)	9(30.0)	

chi square or student t test

products. In contrast, the non-consumption of lunch was related to a greater intake of French fries, potato chips, hamburgers, meat pies, ice cream, sweets, and chocolates.

Staiano et al.²⁵ analyzed the influence of an image model for food acceptance with 42 preschoolers and demonstrated that those exposed

to a behavior had higher odds to repeat. Similarly, Birch²⁶, compared target-child with model-child to choose and eat foods classified as non-preferred by target-child for 4 days, and this experience was adequate to demonstrate the first non-preferred food choice by a target-child. This suggests that a routine

Table 2 – Quantitative analysis of the number of foods accepted according to variables of interest and according to school attendance. São Paulo, 2019.

	Attending School		P-value*
	Yes Mean (SD)	No Mean (SD)	
<i>Sex</i>			
Female	22.4 (9.1)	19.4 (7.3)	0.362
Male	20.2 (7.2)	16.5 (7.3)	0.079
<i>Age group (years)</i>			
≤2 years	22.0 (6.7)	17.9 (6.2)	0.198
>2 a ≤5 years	20.8 (8.0)	17.8 (8.3)	0.191
<i>Body Mass Index classification</i>			
Underweight	8 (0.0)	-	-
Normal weight	21.1 (8.1)	18.9 (7.0)	0.238
Risk for overweight or overweight	21.8 (4.2)	10.5 (4.8)	0.002
<i>Organic disease</i>			
No	20.7 (8.1)	19.7 (6.5)	0.462
Yes	19.1(8.0)	19.8 (6.8)	0.118
<i>Phase of showing complaints</i>			
Breastfeeding	18.3 (6.1)	13.0 (0.0)	0.184
Complementary eating	19.3 (8.3)	18.1 (6.4)	0.846
Family eating	20,7(8,2)	24.5 (4.0)	0.101
<i>Time of breastfeeding</i>			
Less than 6months	19.9 (7.4)	20.4 (6.7)	0.525
6 months	21.0 (9.2)	17.8 (5.5)	0.046

student t test

to exposure children with different preferences of their own can lead to a greater acceptance of foods.

Horne et al.²⁷ using parental model and reward in a primary school-based intervention, found increased consumption of fruit and vegetables first at school, and then at home. This indicates behavioral change even when removing the interventions offered at first. Studies demonstrated more successful interventions when strategies had all components, including children, parents, teachers, other family members, and public venues^{28,29}. Therefore, it is

important to communicate to the school community about the role of each member in their education process to healthy eating.

Furthermore, there is a need to re-evaluate the development of the basic level in relation to several dimensions of eating, surpassing the view of biological aspects, re-evaluating teaching and learning strategies, as well as the references used³⁰.

Food and Nutrition Education (FNE) is an effective strategy for either prevention and control of the current food and nutrition problems, and

promoting healthy eating. FNE should be based on the principles proposed by national dietary guidelines^{31,32}, aiming to provide more awareness for parents and children on the meanings of meals and the importance of food variety and healthy eating. A study carried on by Glaglianone et al³³ observed that nutrition education in schools could positively impact the students' preferences and awareness.

In 2018, it was implemented a law (#13.666/2018) determining the inclusion of FNE in the school curriculum for middle and high-school³⁴. Thus, the law is an opportunity for schools to bring more knowledge on food and nutrition for children. Although there is the law, their implementation is still recent and it was not possible to evaluate the effects.

Kupolati et al³⁵ suggested that the school can influence students eating behaviors and food choices, especially when FNE is approached effectively, with the participation and support of students, teachers, and school principals. It is important to highlight that eating behaviors are characterized by an effective non-cognitive component²⁶, decision on food choices covering the environment³⁶ and, perceptions and pressure from friends/peers¹⁸.

Moreover, Brown, Mellveen e Strugnell³⁷ reported that some students had some nutrition and food knowledge, but showed a gap between theory and practice forced by their food choices. The students who are aware and put on practice their adequate behaviors can be an agent for their community's health behaviors. Alternatively, the school food environment can be a challenge for children with feeding difficulties. Factors such as limiting time for meals and several distractions can make healthy eating difficult, and should be considered by the parents and schools to minimize the negative effects.

In the current study, overweight children that are enrolled in schools accepted twice more different foods when compared to those that are not enrolled in schools. This result is interesting, given that a greater range of foods is offered with a better diet quality for children during meals. Carter³⁸ highlighted that the school environment with the encouragement of physical activity programs and school meals showed a potential influence on students' beliefs

and attitudes to nutrition and weight control and, consequently, impact on weight gain determinants.

Alternatively, a study conducted in South Korea³⁹ interviewed 15 overweight children and their parents about difficulties for healthy eating adherence. The issues raised by the participants were related to the schools as barriers: less pleased on the environment for the meals, teachers' attitudes, inadequate nutrition education, and non-healthy environment in the school surroundings. Health in the school environment presents several factors and should be better incorporated.

Considering exclusive breastfeeding, it is important to highlight that the evidence shows that breastfeeding helps the inclusion of new foods. The human milk has sensory characteristics that can be changed to the mothers' food consumption, enabling the infant to try diverse flavors and smells^{40,41}.

Finally, a study by Taylor and Emmett⁴² concluded that picky eating tends to be resolved spontaneously, but there is no clear understanding how. A possible reason might involve a large variety of foods given that children are more socially active in the school environment and gain more independence and autonomy with their peers/friends. This strengthens the school's role in dealing with picky eaters.

The study presents some limitations: (i) assessed only the number of accepted foods; (ii) Nutrition Education (NE) is a practice that needs continue and regular actions, and that takes time. The sample was composed of children from 0 to 5 years old, and some of the effects on eating during school might not have been assessed and could be presented in future studies. Despite these limitations, the current study has a novel feature, because there were no studies that assessed the number of accepted foods by picky eating children who attend or do not attend school. Finally, the research was conducted in a FD reference with a multidisciplinary team that follows clinical and research protocols.

CONCLUSION

Severe picky eating children are less enrolled in schools than mild picky eaters. Overweight and

at risk for being overweight that are not enrolled in schools presented more severe picky eating. Future longitudinal investigations are important to improve the definition of the school's role in picky eaters.

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Corresponding Author:
Luana Romão Nogueira
luanarnog@gmail.com

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