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# Nutritional intervention with preschoolers using sensory workshops

## *Intervenção nutricional com pré-escolares utilizando oficinas sensoriais*

## Abstract

*Introduction*: Sensory workshops based on the Sapere method have shown promising results in reducing neophobia and in promoting healthy eating among preschoolers. *Objective*: To assess the effect of an intervention developed with sensory workshops to encourage consumption of fruits and vegetables by preschoolers. *Methods*: Non-randomized study in public preschools in Rio de Janeiro in 2018. A total of 270 children aged 4 to 6 years (91 in the control group and 179 in the intervention group) participated in the study. The intervention consisted of five sensory workshops using beans, fruits and vegetables. Consumption of vegetables, fruits and legumes was assessed, as well as of unhealthy foods, before and after the intervention, using a qualitative food frequency questionnaire. Weight condition was determined based on the body mass index for age. *Results*: The most important outcome was a reduced rejection of bean (13% vs. 5%; p<0.01) and vegetables (66% vs. 60%; p=0.008) in the intervention group, compared with the control group, after the sensory workshops. Overall, after the intervention, no significant changes were found in the children's eating habits; however, it is worthnoting that the children already ate adequate quantities of fruits and vegetables before the intervention, leaving little room for increases in the consumption of these foods. *Conclusion*: The sensory experiences as a strategy for nutrition and food education were well accepted by the children and proved to be suitable to promote positive changes in preschoolers' eating habits.

Keywords: Infant Feeding. Food and Nutrition Education. Intervention.

## Resumo

*Introdução*: Oficinas sensoriais baseadas no Método *Sapere* têm apresentado resultados promissores na redução da neofobia e na promoção da alimentação saudável em pré-escolares. *Objetivo*: Avaliar o efeito de intervenção para estimular o consumo de frutas e hortaliças em pré-escolares com o desenvolvimento de oficinas sensoriais. *Métodos*: Estudo de intervenção não randomizado realizado em duas escolas públicas de educação infantil do Rio de Janeiro em 2018. Participaram 270 pré-escolares de 4 a 6 anos de idade (91: grupo controle e 179: grupo intervenção). A intervenção foi constituída por cinco oficinas sensoriais utilizando feijão, frutas e hortaliças. O consumo de hortaliças, frutas, leguminosas e alimentos relacionados à alimentação não saudável foi avaliado antes e depois da intervenção utilizando questionário de frequência alimentar qualitativo. A condição de peso foi classificada com base no índice de massa corporal para a idade. *Resultados*: O resultado mais importante foi maior redução da rejeição ao feijão (13% vs. 5%; p<0,01) e às hortaliças (66% vs. 60%; p=0,008) no grupo intervenção, em comparação com o controle, após as oficinas sensoriais. De modo geral, após a intervenção não foram encontradas mudanças significativas nos hábitos alimentares das crianças; entretanto, assinala-se

que as crianças estudadas apresentavam consumo elevado de frutas e hortaliças antes da intervenção, o que deixou pouco espaço para incrementos na ingestão desses alimentos. *Conclusão*. As experiências sensoriais como estratégia para educação alimentar foram bem recebidas pelas crianças e mostraram-se adequadas para provocar mudanças positivas nos hábitos alimentares de pré-escolares.

Palavras-chave: Alimentação Infantil. Educação Alimentar e Nutricional. Intervenção.

## INTRODUCTION

The preschool phase, between four and six years of age, is marked by high vulnerability to nutritional problems.[1] In 2006, the *Pesquisa Nacional de Demografia e Saúde da Criança e da Mulher (PNDS)* (National Demographic and Health Survey of Children and Women) assessed approximately 5,000 children under five years and showed that 7.3% of these children were overweight for their height, representing a moderate exposure of this group to the risk of obesity.[2] Diet quality is one of the causes of this condition; however, in Brazil, there are few studies addressing food consumption in preschoolers, even though data from several locations in the country indicate a low consumption of fruits and vegetables, key markers of healthy eating by this population group.[3-5]

This picture suggests the need for earlier interventions aiming at promoting eating habits that include adequate amounts of fruits and vegetables since the first years of life, as these foods are essential for a healthy diet. The Food and Agriculture Organization (FAO) and the World Health Organization (WHO) recommend a daily intake of 400g of fruits and vegetables for all population groups.[6] Likewise, the *Guia Alimentar da População Brasileira* (Dietary Guidelines for the Brazilian Population) recommends the consumption of a large variety of fresh or minimally processed foods, especially of plant origin, such as fruits, vegetables, leafy greens, grains, roots and tubers.[7]

Eating habits in childhood have been the focus of studies and actions aimed at understanding and expanding this matter. French chemist and ethnologist Jacques Puisais, in the 1970s, developed the Sapere method, which was designed to sensitize small children on foods and flavors through practical workshops that make use of the senses of smell, taste, sight, hearing and feeling.[8] Experiences with this method have contributed to increase intake of fruits and vegetables, as children, by having more contact with foods and participating in preparations, developed culinary skills and started eating a larger variety of foods.[9-11] When stimulated by the activities developed with the Sapere method in the school, the children also began to participate in food preparation at home and were more willing to taste new foods. In addition, activities such as eating in group contributed to encourage the more reluctant children to try new foods.[8]

The present study aimed to appraise the effect of an intervention project developed to stimulate preschoolers to eat fruits and vegetables based on sensory workshops.

## METHODS

It is a non-randomized intervention study developed in two Early Childhood Education units in the city of Rio de Janeiro, selected by convenience, including children aged 4-6 years. One school was drawn from other schools to carry out the intervention (n=231 children) and another one for control (n=152). The project was approved by the Research Ethics Committee of the Hospital Universitário Clementino Fraga Filho (CAAE 85829518.2.0000.5257), and the study was registered at the Brazilian Registry of Clinical Trials with number RBR-5b6zrg. To participate in the study, the parents or guardians were asked to sign the Informed Consent Form, and then 179 children were included in the intervention school and 91 in the control school.

The study was carried out from June to November 2018 in four stages: (a) sensitization stage: teachers and teaching assistants were informed about the goals and dynamics of the study in a training session with oral presentation followed by discussions (June); (b) baseline study:

interviews with parents/guardians to complete the questionnaire and measurements of children's body weight and height (Aug-Sept); (c) intervention: sensory workshops (Sept-Oct); and (d) data collection after the intervention to assess the effectiveness of the method (Nov.).

The field researcher team, made up of nutrition and gastronomy students received training to collect data and conduct the workshops. A manual was prepared to standardize the procedures used in the research.

In the baseline study and in the post-intervention study, questionnaires were used with the parents/guardians, which were administered before and after the children's class times, when also the anthropometric measures were taken.

A four-section structured questionnaire was built to obtain data about the child and family: (a) sociodemographic data; (b) eating habits of the child and family and parental feeding style; (c) child's food consumption (specific food frequency questionnaire [FFQ] to assess consumption of fruits, vegetables, grains, as well as typical unhealthy foods such as fast food, snacks and candies).

The 50 food items included in the questionnaire were selected based on the questionnaire validated for adolescents in Rio de Janeiro,[12] which were then separated into the following food groups: (a) Fruits; (b) Leafy vegetables; (b) Vegetables; (c) Sugar-sweetened beverages (prepared and processed); (d) Savories and processed meats; (e) Sweets and desserts; (f) Candies and chocolates (g) Snacks and fast foods; (h) Sausages; (i) Cookies and cakes. The options for reporting food consumption frequency were defined differently for the diverse items of the questionnaire, according to the eating habits, which ranged from "less than once a month of never" and "5 or more times a week" or "1 or more times a day" or "2 or more times a day". The FFQ was completed based on the child's food intake in the last three months.

Parental feeding style refers to a series of attitudes directed and communicated to the children in the eating context, creating some emotional states.[13,14] To characterize such feeding style, the Parental Feeding Style Questionnaire (PFSQ) developed by Wardle et al.[15] was used, which has 27 questions covering four dimensions: emotional feeding (five questions), instrumental feeding (four questions), encouragement to eat (eight questions) and control over eating (ten questions). Each question describes a behavior, and the respondents must mark the option, among five ones, that indicates the frequency with which such behavior occurs. The responses are scored on a Likert scale, ranging from never (1 point) to always (5 points), except for the five questions relating to the style of control over eating, which are scored inversely. For each dimension, the mean score (sum of the points divided by the number of questions) is estimated, and the highest mean score of the four dimensions indicate the parents' tendency to adopt one of the four parental feeding styles assessed by the instrument.

To obtain the anthropometric measurements, the children were weighed with light clothes and barefoot. Body mass was measured using a Tanita portable digital scale, with a capacity up to 150 kg and 50g variation. Stature was measured twice, using a portable stadiometer (Altura Exata trademark), with extension up to 200 cm and 0.1 cm of precision. A maximum variation of 0.5 cm between two measurements was acceptable, and the mean value of both measures was considered to determine weight condition. The body mass index (BMI=weight/height$^2$) was calculated and used to rate the weight condition, based on the criterion proposed by the World Health Oganization.[16] Preschoolers aged up to 59 months were considered overweight with score-z > +2, and those aged ≥ 60 months with score-z > +1.[16]

The intervention stage consisted of five sensory workshops with a focus on vegetables, fruits and legumes. The workshops had an average duration of 20 minutes and were conducted weekly in a period of one and a half months. The selection of foods used in the workshops was based on the following criteria: (a) foods rejected by the children included in the study (data obtained from the baseline study); (b) regional foods; and (c) foods included in the school meals. The foods that met these criteria were preferably included in the workshops, such as papaya, banana, pear, kale, cauliflower, carrot, beet, rice and different varieties of tomato and bean. Each workshop corresponded to one of the five senses, and based on the participatory dynamics and on interactive and playful techniques, the interaction with food was stimulated; verbal expression was also encouraged, as proposed by the Sapere method.[8] Each workshop provided to the children the experience of interacting with the foods: for example, they were asked to identify the foods by touching them with eyes blindfolded or smelling them in sealed containers. Other activities were developed such as drawing foods, identifying the sound produced by different kinds of grains and seeds and tasting.

## Data analysis

The effect of intervention was assessed considering three outcomes: (a) changes in children's attitudes towards avoided/rejected foods; (b) changes in children's attitudes towards tasting new foods and flavors; and (c) changes in the daily frequency of consumption of the food groups.

To assess homogeneity of distribution of the categorical variables in the intervention and control schools, the chi-square test was used, and to assess changes in the variables of interest after the intervention, the McNamar's test was used. To assess changes in the intervention and control groups after the intervention, the size of the effect of the intervention on each outcome was calculated.[17] The changes in the frequency of daily consumption of food groups between the baseline and the intervention studies were assessed by mixed linear models,[18] using the PROC MIXED function in the SAS OnDemand for Academics. This modelling was chosen because of its advantage of enabling analysis of imbalanced data caused by loss to follow-up.[19] A p-value $< 0.05$ was considered for statistical significance.

## RESULTS

The studied group included 91 children in the control school (60% boys) and 179 children in the intervention school (51% boys); mean age was 5.4 years in both schools. In the post-intervention study, 60 children were examined in the control school (66% of children examined at baseline) and 103 in the intervention school (58% of the ones examined at baseline). In the control school, 34% of children were overweight, 34% were black/brown/indigenous individuals, and 70% of the families had monthly household income of up to one minimum wage *per capita*, and 74% of the households had more than three individuals sharing the same bedroom. In the intervention school, 31% of children were overweight, 51% were black/brown/indigenous, 62% of the families had monthly household income of up to one minimum wage *per capita,* and 83% of the households had more than three individuals sharing the same bedroom (Table 1).

Table 1. Children (4 to 6 years old) from public schools enrolled in a nutrition intervention study according to demographic and anthropometric characteristics. Control and intervention groups at baseline and post-intervention study. Rio de Janeiro, Brazil, 2018.

| Characteristics | Control | | | | Intervention | | | |
|---|---|---|---|---|---|---|---|---|
| | Baseline (n=91) | | Post intervention (n=60) | | Baseline n=179) | | Post intervention (n=103) | |
| | N | % | n | % | n | % | N | % |
| Sex[1] | | | | | | | | |
| Female | 36 | 40 | 21 | 35 | 87 | 49 | 53 | 52 |
| Male | 55 | 60 | 39 | 65 | 92 | 51 | 50 | 48 |
| Age | | | | | | | | |
| 4-4 years and 11 months | 29 | 32 | 20 | 33 | 52 | 30 | 29 | 28 |
| 5-5 years and 11 months | 62 | 68 | 40 | 67 | 127 | 70 | 74 | 72 |
| Skin color[2] | | | | | | | | |
| White | 58 | 64 | 37 | 62 | 79 | 44 | 41 | 40 |
| Black/Brown/Indigenous | 31 | 34 | 23 | 38 | 91 | 51 | 57 | 55 |
| Not informed | 2 | 2 | | | 9 | 5 | 5 | 5 |
| Weight status | | | | | | | | |
| Normal | 53 | 58 | 34 | 57 | 116 | 65 | 67 | 65 |
| Overweight | 31 | 34 | 22 | 36 | 55 | 31 | 33 | 32 |
| Not informed | 7 | 8 | 4 | 7 | 8 | 4 | 3 | 3 |
| Number of family members | | | | | | | | |
| < 3 people | 38 | 42 | 28 | 47 | 93 | 52 | 62 | 60 |
| ≥4 people | 53 | 58 | 32 | 53 | 83 | 46 | 41 | 40 |
| Not informed | | | | | 3 | 2 | | |
| Monthly per capita family income (in multiples of official minimum wage) | | | | | | | | |
| <1 | 64 | 70 | 45 | 75 | 112 | 62 | 69 | 67 |
| ≥1 | 7 | 8 | 4 | 7 | 17 | 10 | 9 | 9 |
| Not informed | 20 | 22 | 11 | 18 | 50 | 28 | 25 | 24 |
| Number of residents per bedroom[3] | | | | | | | | |
| ≤ 3 | 67 | 74 | 48 | 80 | 148 | 83 | 89 | 86 |
| > 3 | 22 | 24 | 11 | 18 | 23 | 13 | 12 | 12 |
| Not informed | 2 | 2 | 1 | 2 | 8 | 4 | 2 | 2 |

[1] p<0.05 (Chi-square test) comparing control group vs. intervention group in the post-intervention

[2] p<0.05 (Chi-square test) comparing control group vs. intervention group at baseline and post-intervention

[3] p<0.05 (Chi-square test) comparing control group vs. intervention group in the baseline study

The parental feeding style "encouragement to eat" was mostly cited by the parents/guardians of the children studied, both in the control school (79.4%) and the intervention school (89.3%). In the intervention group, the percentage of parents who reported that their children tasted new foods when encouraged was 35% in the baseline study, and increased to 47% after intervention (p=0.12). In both the intervention group and the control group, there was a reduction in the

number of children who refused to taste new foods (intervention group 25% vs. 16%; p=0.12; control group: 22% vs. 10%; p=0.14) (data not shown).

The mixed model analysis showed that, after intervention, there were no significant changes in the average daily frequency of consumption of the food groups in both the control and intervention schools. The models were adjusted for sex and parental style, since the other covariables were not associated with the outcomes assessed (Table 2).

**Table 2.** Mean daily frequency intake of selected food groups and estimated variation[1] between baseline and post-intervention study. Children (4 to 6 years old) from public schools enrolled in a nutrition intervention study. Rio de Janeiro, Brazil, 2018.

| | Control group | | Intervention group | | Δ[1] (SD) | P-value |
|---|---|---|---|---|---|---|
| Food groups | Baseline (n=91) | Post-intervention (n=60) | Baseline (n=179) | Post-intervention (n=103) | | |
| Fruits | 2.5 | 2.4 | 2.7 | 2.5 | -0.049 (0,26) | 0.854 |
| Leafy vegetables | 0.4 | 0.4 | 0.3 | 0.3 | -0.042 (0,06) | 0.466 |
| Vegetables | 1.7 | 1.5 | 1.7 | 1.6 | 0.035 (0.20) | 0.860 |
| Beans | 0.8 | 1.3 | 1.4 | 1.4 | 0.168 (0.12) | 0.163 |
| Sugar-sweetened beverages | 2.9 | 2.8 | 2.5 | 2.6 | 0.169 (0.20) | 0.393 |
| Luncheon meats | 0.5 | 0.5 | 0.4 | 0.4 | -0.013 (0.06) | 0.842 |
| Candies and chocolate | 0.5 | 0.5 | 0.4 | 0.4 | 0.025 (0.06) | 0.682 |
| Fast Foods | 0.8 | 0.8 | 0.6 | 0.6 | -0.093 (0.09) | 0.309 |
| Sweets and deserts | 0.2 | 0.2 | 0.2 | 0.2 | -0.042 (0.04) | 0.288 |
| Cookies and crackers | 1.2 | 1.0 | 1.0 | 0.9 | -0.030 (0,12) | 0.793 |

[1] Δ: variation between baseline and post-intervention study estimated with mixed linear models adjusted by sex and parenting style.

Between the baseline study and the post-intervention study, there was a reduction in the number of children who rejected fruits both in the intervention school (20% vs. 13%; p<0.01) and in the control school (20% vs. 17%; p<0.01). And only in the intervention school there was a reduction of refusal of vegetables (66% vs. 60%; p=0.008) and beans (13% vs. 5%; p<0.01) (Table 3).

Table 3. Foods rejected by children (4 to 6 years old) from public schools enrolled in a nutrition intervention study: control and intervention groups at baseline and post-intervention study. Rio de Janeiro, Brazil, 2018.

| | Control group | | | | Intervention group | | | |
|---|---|---|---|---|---|---|---|---|
| | Baseline (n=60) | | Post-intervention (n=60) | | Baseline (n=103) | | Post-intervention (n=103) | |
| | n | % | n | % | n | % | n | % |
| Number of reported rejected foods | | | | | | | | |
| 0 | 3 | 5 | 4 | 7 | 10 | 10 | 4 | 4 |
| 1 | 8 | 13 | 7 | 12 | 11 | 11 | 21 | 20 |
| 2 | 4 | 7 | 19 | 32 | 20 | 19 | 34 | 33 |
| 3 | 45 | 75 | 30 | 50 | 62 | 60 | 44 | 43 |
| Children rejecting at least one fruit | 12 | 20 | 10 | 17 | 21 | 20 | 13 | 13 |
| Children rejecting at least one vegetable | 40 | 67 | 38 | 63 | 68 | 66 | 62 | 60 |
| Children rejecting at least one leafy vegetable | 9 | 15 | 13 | 22 | 25 | 24 | 25 | 24 |
| Children rejecting beans | 7 | 12 | 10 | 17 | 13 | 13 | 5 | 5 |
| Children rejecting any kind of food | 36 | 60 | 33 | 55 | 52 | 50 | 51 | 50 |

## DISCUSSION

This work used the Sapere, or sensory method,[8] which is a strategy for nutrition and food education based on the senses, in an intervention study carried out with the purpose of increasing preschoolers' acceptance of fruits, vegetables and beans. After five sensory workshops conducted in the school, behavioral changes were observed with respect to foods intake. However, changes in the average frequency of daily consumption of foods of the healthy groups among the preschoolers were not observed. The most noteworthy outcome was a reduced refusal to eat beans and vegetables in the intervention group, which was not found in the control school. In addition, the children in the intervention school were more willing to taste new foods. Also in the intervention school, there was an increased number of parents who reported that the child always eats healthy foods, and the percentage of parents who said their child is sometimes, rarely or never willing to eat healthy foods diminished.

In a similar study developed in Finland, Hoppu et al.[9] obtained results comparable to those observed in the present study. The authors studied children aged 3-6 years in two daycare centers, one for the intervention (n=44) and another one for control (n=24). The intervention consisted of five sessions of food and eating education based on the sensory method, with a focus on five

vegetables and three fruits typical of the region, which took place on a weekly basis during five weeks. A tasting protocol was conducted with the children before and after the intervention. When the authors assessed the foods used in the workshops, they found that the willingness to eat these foods increased significantly in the intervention school, while no significant changes was observed in the control.[9]

Favorable outcomes were also observed in Finland and England in studies carried out with different durations. Kähkönen et al.[10] compared nine early education centers with children aged 3-5 years. In six centers (n=68), sensory-based food education actions were developed during two years, and the other three units were considered as control (n=62), where these activities were not performed. The experiment consisted of exposing small groups of children to a buffet containing 11 different fruits, vegetables and berries. The authors observed that among the children exposed to the sensory method, there was a higher tendency to choose these foods than the children in the control group, and this association was higher among children of mothers with low education level.

In England, Coulthard and Sealy[11] conducted an experiment with 62 children aged 3-4 years assigned to three groups: the first group was exposed to a sensory play with fruits and vegetables; in the second group, to a sensory non-food play; and the third group, to visual exposure of fruits and vegetables. Right after the plays, the children were invited to taste fruits and vegetables. Analyses of variance adjusted for food neophobia and food preference in the baseline study showed that children who participated in sensory-based plays with foods were more willing to taste fruits and vegetables than the ones who participated in non-food plays and in the visual exposure to foods. These findings were observed for foods used in the sensory activity as well as for other foods.

Limitations of this study are related to the convenience sampling and losses to follow-up. So, the results must be interpreted with caution and their extrapolation to other groups is impaired. However, analyses with mixed linear models enable to assess all individuals investigated at some point in the study, even with loss of follow-up, thus optimizing the intervention assessment.[19] The period of the intervention may be considered insufficient and may have influenced the results found; however, it should be underlined that the five workshops addressed the five senses and the foods rejected by children. Thus, future studies using the sensory method should consider interventions with longer duration and a larger number of workshops.

The sample size used, a positive factor in this study, was greater than the samples of Brazilian studies that developed interventions on food and nutrition education with preschoolers[20,21] and in international studies that applied the sensory method in nutritional interventions with early education children.[9-11]

This is the first time that a study used sensory workshops based on the Sapere method with preschoolers, with the main objective of stimulating healthy eating in Brazil. It should be noted that these workshops are in line with the actions recommended by the *Programa Nacional de Alimentação Escolar*[1] (National School Feeding Program), which recommends the use of several techniques to introduce new foods, involving playful activities with foods brought to the classroom to be tasted,[1] and by the *Guia Alimentar da População Brasileira*[7] (Dietary Guidelines for the Brazilian Population), by promoting the consumption of fresh foods and autonomy in food choices. Furthermore, the activities developed do not require sophisticated resources, are low cost and can be easily applied in schools by teachers of early childhood education. Thus, sensory workshops

are promising alternatives for nutritional education, familiarization with varied diets, and formation of healthy eating habits at early ages.

The experiment provided favorable, although modest, results on food-related behaviors of preschoolers. Before the intervention, the children studied consumed fruits 2.5 times a day and vegetables 1.7 times a day on average, leaving little room for increases in the intake of these foods.

## CONCLUSION

Although in the intervention group no significant changes were observed in the intake of fruits and vegetables, the children that attended the sensory workshops were ready and willing to taste new foods, and there was a reduction in the refusal of beans and vegetables. The sensory method can be considered promising for developing nutritional education activities with children.

## REFERENCES

1. Brasil. Ministério da Educação. Fundo Nacional de Desenvolvimento da Educação (FNDE). Manual Orientação para a Alimentação Escolar na Educação Infantil, Ensino Fundamental, Ensino Médio e na Educação de Jovens e Adultos.; 2012.
2. Brasil. Ministério da Saúde. Pesquisa Nacional de Demografia e Saúde da Criança e da Mulher – PNDS 2006: dimensões do processo reprodutivo e da saúde da criança. Ministério da Saúde, Centro Brasileiro de Análise e Planejamento. (Série G. Estatística e Informação em Saúde). Brasília: Ministério da Saúde, p. 300, 2009.
3. Tuma RCFB, Costa THM, Schmitz BAS. Avaliação antropométrica e dietética de pré-escolares em três creches de Brasília. Revista Brasileira de Saúde Materno Infantil. 2005;5 (4):419-428.
4. Zveibrücker FP, Miraglia F. Avaliação do consumo alimentar de pré-escolares frequentadores de EMEIs no Município de Nova Santa Rita, RS. Revista de Iniciação Científica do Unilasalle. 2012;(1):63-77.
5. Spinelli MGN et al. Estado nutricional e consumo alimentar de pré-escolares e escolares de escola privada. Ciência & Saúde. 2013;6(2):94-101.
6. World Health Organization. Diet, nutrition and the prevention of chronic diseases. Geneva: World Health Organization and Food and Agricultural Organization. WHO Technical Report Series. 2003; 916. [acesso em 3 fev 2018]. Disponível em: http://whqlibdoc.who.int/trs/WHO_TRS_916.pdf
7. Brasil. Guia Alimentar para a População Brasileira. 2014. doi:10.1007/978-3-540-72604-3_154
8. Koistinen A, Ruhanen l. To the world of food with the aid of the senses the sapere method as a support for children's food and nutrition education in daycare centres. Sitra Finnish Innov Fund. 2009. [acesso em 3 fev 2018]. Disponível em: https://peda.net/hankkeet/sapere/sk/nimet%C3%B6n-7a6b/s:file/download/cdc266fd203f93483f7792276b194dd6ea52c063/Sapere_toolbook_in_english.pdf
9. Hoppu U, Prinz M, Ojansivu P, Laaksonen O, Sandell MA. Impact of sensory-based food education in kindergarten on willingness to eat vegetables and berries. Food Nutr Res. 2015;59. doi:10.3402/fnr.v59.28795
10. Kähkönen K, Rönkä A, Hujo M, Lyytikäinen A, Nuutinen O. Sensory-based food education in early childhood education and care, willingness to choose and eat fruit and vegetables, and the moderating role of maternal education and food neophobia. Public Health Nutr. 2018;21(13):2443-2453. doi:10.1017/S1368980018001106

11. Coulthard H, Sealy A. Play with your food! Sensory play is associated with tasting of fruits and vegetables in preschool children. Appetite. 2017;113:84-90. doi:10.1016/j.appet.2017.02.003
12. Brito AP et al. Validade relativa de questionário de frequência alimentar com suporte de imagens. Ciência & Saúde Coletiva. 2017. 22(2):457-468.
13. Darling N, Steinberg L. Parenting Style as Context: An Integrative Model. Psychological Bulletin. 1993.113(3):487-496.
14. Blissett J. Relationships between parenting style, feeding style and feeding practices and fruit and vegetable consumption in early childhood. Appetite. 2011.57(3):826-831.
15. Wardle J et al. Parental feeding style and the intergenerational transmission of obesity risk. Obesity Research. 2002.10(6):453-462.
16. World Health Organization. Child Growth Standards: Length/height-for-age, weight-for-age, weight-for length, weight-for-height and body mass index-for-age. Methods and development. WHO (non-serial publication), Geneva, Switzerland: WHO. 2006. [acesso em 3 fev 2018]. Disponível em: <https://www.who.int/childgrowth/standards/technical_report/en/>
17. Cohen JA. Psychological Bullettin. 1992.112:155-159.
18. Judith DS, John BW. Applied Longitudinal Data Analysis: Modeling Change And Event Occurrence. Oxford University Press, USA. 2003.
19. Fitzmaurice GM, Laird NM, Ware JH. Longitudinal and clustered data. Applied longitudinal analysis 2011:1-18.
20. Pereira AS, Peixoto NGA, Nogueira Neto JF, Lanzillotti HS, Soares EA. Estado nutricional de pré-escolares de creche pública: um estudo longitudinal. Cad Saúde Coletiva. 2013;21(2):140-147. doi:10.1590/S1414-462X2013000200007
21. Pereira MN, Sarmento CTM. Oficina de culinária: uma ferramenta da educação nutricional aplicada na escola. Univ Ciências da Saúde. 2012;10(2):87–94. doi:10.5102/ucs. v10i2.1542

**Contributors**

Coura CP and Pereira RA participated in the conception and design, data analysis interpretation and revision and approval of the final version of the manuscript; Monteiro LS participated in data analysis and interpretation, revision and approval of the final version; Sgambato MR participated in the data analysis and interpretation, revision and approval of the final version of the manuscript.

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