

Training 7-10 year-old students to complete a food diary

Treinamento de escolares de 7 a 10 anos para o preenchimento de um Diário Alimentar

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RESUMO

Introdução: É reconhecida a eficiência de um treinamento para melhorar a qualidade no relato do consumo alimentar em adultos, porém poucos estudos avaliam esta eficiência em crianças. **Objetivo:** Investigar o efeito da realização de um treinamento para o desenvolvimento de habilidades para um correto preenchimento de um Diário Alimentar, por escolares de 7 a 10 anos. **Metodologia:** O estudo foi conduzido em uma escola pública da cidade de São Paulo e envolveu a realização de 3 sessões de treinamento de 30 minutos cada direcionadas a 40 escolares, de ambos os sexos. Para verificação do efeito do treinamento 3 examinadores avaliaram o preenchimento dos dados antes e após o mesmo. Foram atribuídos escores de 0 a 5 para aspectos relativos à identificação, detalhamento e quantificação do alimento consumido e calculado o escore médio a partir dos escores de cada examinador para cada aspecto. Utilizou-se o teste de *Wilcoxon* para comparação de amostras dependentes. **Resultados:** Foi constatada evidência estatística de diferença entre os escores antes e após o treinamento para os três aspectos: identificação ($p < 0,001$), detalhamento ($p = 0,003$) e quantificação do alimento ($p < 0,001$), sendo grande parte dos valores após o treinamento maiores que os iniciais. **Conclusão:** É possível aumentar a habilidade de escolares de 7 a 10 anos no preenchimento de um Diário Alimentar a partir da realização de um treinamento nos moldes apresentados neste artigo.

Palavras-chave: treinamento, diário alimentar, consumo alimentar, estudantes, criança.

ABSTRACT

Introduction: Although the effectiveness of training to improve the accuracy of diet self-reporting in adults is recognized, few studies evaluate its success in children. **Objective:** To investigate the effectiveness of training 7-to-10-year school children in their ability to complete a food diary (FD) correctly. **Methodology:** The study was carried out in a public school in the city of São Paulo. Forty schoolchildren of both genders participated in the training, which consisted of 3 sessions of 30 minutes each. The effectiveness of the training was assessed by 3 examiners, who evaluated data completion before and after the training sessions. The examiners attributed scores ranging from 0 to 5 to aspects such as identification, detailing and quantification of foods in FDs. Medium score for each aspect was subsequently calculated. Wilcoxon test was used to compare dependent samples. **Results:** There was evidence of statistical difference in the three aspects when before- and after-training scores were assessed: identification ($p < 0.001$), detailing ($p = 0.003$) and quantification ($p < 0.001$) of foods. Most values were higher after training. **Conclusion:** It is possible to increase 7-10-year-old school children's ability to complete a food diary after participating in a training program similar to the one presented in this paper.

Key-words: training, food diaries, dietary intake, students, child.

INTRODUCTION

Investigating child food consumption is a challenging task and there is no consensus on the best method and best respondent in the literature. If, on the one hand, a child may need help from adults to report its consumption, on the other, parents may be unaware of what their child eats, once they do not follow it all the time, which may result in lack of precision¹. The literature describes the influence of social desire in responses given by the mother or responsible adult: desire for social adjustment causes them to provide more socially acceptable or desirable information, regardless of its veracity, adding morally, emotionally and socially conditioning factors to their account.

In addition to the possibility of error inherent in the measurement process, common at any age, epidemiological studies indicate that children have difficulty in memorizing foods consumed, lack attention during consumption and feel confused when distinguishing between real and imaginary events, due to their different cognitive process levels³⁻⁵.

Livingstone and Robson⁶ affirmed that studies on child ability to estimate portion size were inconclusive and contradictory. However, there are reports in the literature about children, aged between 8 and 15 years, being able to estimate the amount of foods with 10% of precision⁷. A study performed in Brazil with children aged between 7 and 8 years showed rapid increase in the ability to answer a food survey. In addition, it showed that children aged between 10 and 12 years were able to answer the survey with a high level of precision⁸.

Considerations about these factors influence the decision to choose the most suitable method to assess food consumption⁸⁻¹⁰. Among those most used in epidemiological studies with children is the Food Diary (FD). This method has the advantage of memory, when compared to the remaining methods, once foods or drinks are recorded as soon as they are eaten or drunk, thus enabling greater precision of data obtained¹¹.

If the abilities to correctly complete a form, identify and detail the foods consumed, and quantify them in cooking measures are developed, the FD can be highly recommended to children aged between 7 and 10 years. Studies performed by Haraldsdottir and Hermansen¹² and Van Horn et al.¹³ suggest that the ability to remember and understand the concept of time, necessary to complete the diary without help from parents, begins at the age of 7 years.

The literature shows positive results from a training course aimed at improving the estimate of portion size and the accuracy of report of food consumption in adults¹⁴⁻¹⁶. However, few studies have been performed with children.

Considering the fact that children are making their own food choices earlier and earlier in life, this group is identified as a potential food survey respondent and, as a result, studies performed with this population are justified. Thus, the present study aimed to observe the effectiveness of training sessions to develop abilities to correctly complete a FD in children aged between 7 and 10 years.

METHODS

An intervention study was performed at the *Escola de Aplicação da Universidade de São Paulo - USP* (São Paulo University Elementary School), between May and July 2007, aiming to increase the ability to complete a FD in children aged between 7 and 10 years. The hypothesis in this study was that training sessions enable these school children to improve their performance to complete the instrument in three aspects: food identification, detailing and quantification. Browner et al.'s¹⁷ proposed formula, for dependent samples with $\alpha = 0,05$; $\beta = 0,20$, size effect of 0.9, and standard deviation of 1.5 with one-tailed test, was used to calculate sample size, thus resulting in 34 children. A total of 20% was added to compensate for losses, totaling 40 children. Sample was randomly selected from all the students enrolled between grades 1 and 4 of

this Elementary school (n=240).

The training sessions aimed to develop an educational process that enabled school children to report their food consumption as completely as possible by filling out a diary that included three aspects: a) food identification; b) food detailing; and c) identification of food portions, according to size and cooking measures.

In the "food identification" aspect, children were supposed to record the name of food or drink consumed (milk, bread, sugar, juice, rice and beans, for example). In the "food detailing" aspect, they should record the type of food (white rice, whole rice, black bean, brown bean, for example), brand of manufactured foods, flavor (strawberry, grape, chocolate or vanilla pudding, for example), ingredients used in preparations (for example: chicken sandwich – bread, lettuce, tomato, mayonnaise, chicken breast and cheese) and way of cooking (baked, cooked, grilled, stewed, fried, Parmigiana, Milanese). Inclusion of food brand as a detail to be recorded by children was selected as a way to specify the food consumed more accurately and enable better data transcription into nutrient conversion programs, in addition to improving child ability to read labels.

There were three training sessions lasting 30 minutes each, conducted in the school itself, and aimed at groups of five school children on average.

There was the engagement of four Nutrition students, trained, according to predefined guidelines, which aimed to homogenize the form of communication and the information provided.

Assessment of training was made based on the information about food consumption before (first session) and after this education process (third session). Before the beginning of training, school participants were asked to write the foods consumed during break time, as detailed as possible, on a piece of paper. While at school, after the training session, they completed a FD concerning the previous day's consumption at lunch.

A score from zero to five was used to assess quality of completion, five being the

maximum score attributed to a completely filled aspect. Criteria were established to attribute scores from an ideal completion model, as shown on Figure 1. Criteria were designed by undergraduate students in Nutrition, and checked and improved by nutritionists participating in the study. As an example, a participant who recorded consumption of 1 ladle of beans exclusively (not mentioning the type of bean, ladle size and whether it was full or not) was given by an examiner a score 5 for the food identification aspect, 0 for detailing, and 2 for quantification.

Given the subjectivity of the FD assessment, three examiners were included and the child was given the mean score for each aspect as final score. Wilcoxon test was employed to compare dependent samples (before and after the training sessions), using the Stata software, version 9.

The three training sessions are described below and summarized in the diagram shown on Figure 2. In session 1, general instructions on how to complete the FD were given, omitting concepts of preparations or detailing of food types and amounts, once participants' basic level of knowledge was considered to plan the following sessions.

After this session, children took a FD home to be completed on the following day. These data were included in the training course, but not in its assessment.

In session 2, each aspect of the FD was discussed in detail: food identification, detailing and quantification, according to cooking measures. During the session, participants were also asked to complete the two first FD aspects concerning foods consumed on the previous day. After this activity, children were shown actual food portions (rice, beans, French fries, chicken and beef, tomato and lettuce salad) and replicas; food labels of different sizes and types to develop abilities to identify food brand, type, flavor, amount and volume; and samples of kitchen utensils (small, medium and large glasses; tea cup; tablespoons, serving spoons, dessertspoons, and teaspoons; medium skimmer; medium ladle). Portions and cooking measures were in accordance with Zabotto¹⁸. Each utensil was explained and information about how to read food labels and quantify preparations was provided. After this session, children took a FD home to be completed on the following day.

Session 3 consisted in the review of concepts previously mentioned and completion

Identification	Detailing	Quantity and size
Bean	Black	1 full medium ladle
Bread	French	1 medium unit
Soft cheese	Light	1 tip of a knife, small amount
Banana	<i>Prata</i>	1 medium unit
Chicken	Fried chicken breast filet	1 large filet
Rice	Cooked white	1 level serving spoon
Carrot	Cooked	2 heaped tablespoons
Lettuce	Raw	2 small leaves
Oil	Olive oil	1 teaspoon on the salad
Juice	<i>Ades</i> (brand of soy bean juice), passion fruit	1 package of 200ml
Sandwich	White loaf bread	2 slices
	Ham	1 thin slice
	<i>Cheese, mozzarella</i>	1 thin slice
Beef	Ground, stewed	4 level tablespoons
Soft drink	Coca-cola, regular	1 medium glass

Figure 1 – Examples of adequate completion of the FD for foods and drinks consumed.

Figura 1 - Alguns exemplos de preenchimento ideal do DA para alimentos e bebidas consumidas

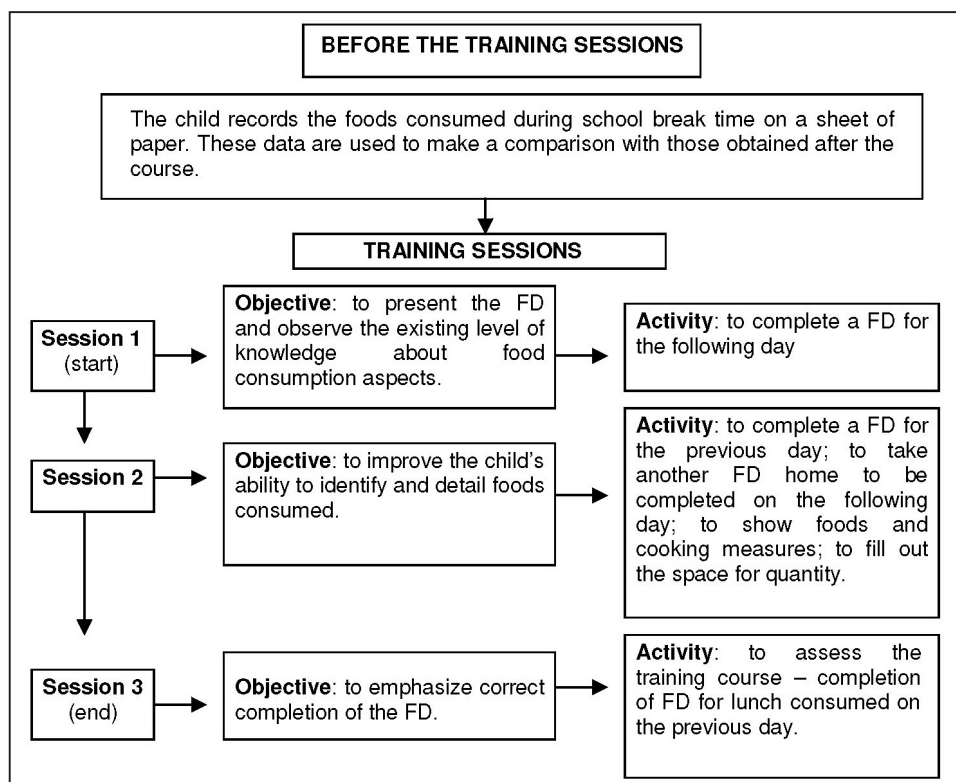


Figure 2 – Diagram of training sessions aimed at children aged from 7 to 10 years of the *Escola de Aplicação da USP* (São Paulo University Elementary School), São Paulo, SP, Brazil, 2007.

Figura 2 – Esquema das sessões do treinamento direcionado a crianças de 7 a 10 anos da *Escola de Aplicação da USP* do município de São Paulo, 2007.

of a FD, at school, considering the previous day's food consumption at lunch.

After each session, a staff meeting was held to assess the practical activities developed with the school children, discussing their involvement and receptivity, difficulties in understanding information, contents brought by participants and language used by instructors; analysis of material provided by school children; and identification of content to be worked on in the remaining sessions. For this reason, an interval of at least 15 days between sessions was required.

Parents of participating children received and signed an informed consent form. The present study was submitted and approved by the *Comitê de Ética em Pesquisa da Faculdade de Saúde Pública da USP (COEP/FSP-USP)* – São Paulo University School of Public Health Research Ethics Committee). No conflict of interest was declared by authors.

RESULTS

A total of 33 school children, 15 boys and 18 girls, participated in this study, with a mean age of 8 years (10 children were aged 7 years, 9 were 8 years, 10 were 9 years, and 4 were 10 years). A total of seven school children (17.5%) were excluded from the training course assessment, because they did not record any food consumption in the assessment before the training sessions, or because they were absent during the assessment after this education process.

Mean scores obtained by each school child before and after the training sessions, according to the three aspects assessed, are shown on Table 1. The majority of school children showed an increase in mean scores for all aspects analyzed, after training.

Wilcoxon sign test indicated the existence of a statistically significant difference between the moments assessed for the three

aspects: food identification ($p < 0.001$), detailing ($p = 0.003$) and quantification ($p < 0.001$), showing the existence of training effect on the improvement in quality of food consumption report.

As regards the "food identification" aspect, scores obtained before training were already high and, after the sessions,

were found to be even higher, suggesting that training enabled the improvement in performance to identify foods, even among children who already had good knowledge about this aspect. Of all the children assessed, seven (21%) maintained their initial scores, of which six had shown the maximum score in the beginning. A small

Table 1 – Mean score values obtained per student, before and after the training sessions, according to the following categories: food identification, detailing and quantification. São Paulo, SP, Brazil, 2007.

Tabela 1 - Valores das médias do escore obtido por aluno antes e após o treinamento, segundo as categorias identificação do alimento, detalhamento e quantificação. São Paulo, SP, 2007

School child	Food identification		Food detailing		Quantification	
	Before	After	Before	After	Before	After
1	4.67	5.00	2.50	1.88	-	3.17
2	4.89	5.00	3.33	2.50	-	4.33
3	5.00	5.00	-	1.25	2.67	5.00
4	4.44	5.00	0.83	1.25	-	4.50
5	5.00	4.92	2.50	0.63	-	5.00
6	3.11	5.00	3.33	3.00	-	4.87
7	3.83	5.00	2.50	3.33	-	5.00
8	4.17	5.00	2.50	3.75	2.33	4.58
9	3.33	4.58	2.50	3.13	1.00	4.58
10	5.00	5.00	-	5.00	-	5.00
11	2.50	4.67	-	-	2.50	4.33
12	4.17	4.44	1.25	2.67	0.50	4.89
13	4.50	5.00	1.25	2.50	-	3.22
14	3.33	5.00	2.50	1.67	3.17	5.00
15	5.00	5.00	-	3.13	0.67	4.50
16	3.33	5.00	2.50	0.42	-	3.39
17	3.33	5.00	2.50	4.17	-	-
18	3.83	5.00	-	-	-	3.67
19	1.67	5.00	0.63	0.83	-	-
20	3.17	5.00	1.25	2.50	-	4.42
21	3.89	5.00	-	2.50	-	2.33
22	3.89	5.00	2.50	4.28	-	1.33
23	5.00	5.00	-	-	-	5.00
24	5.00	5.00	2.50	4.17	-	3.78
25	4.50	5.00	0.63	0.83	-	3.00
26	1.67	5.00	-	0.83	-	-
27	5.00	5.00	0.50	2.17	-	5.00
28	3.33	5.00	0.50	0.67	-	1.00
29	4.53	4.53	1.50	2.50	-	-
30	3.33	5.00	0.63	1.88	-	3.58
31	3.75	5.00	-	1.67	-	4.50
32	1.67	5.00	1.00	1.17	-	-
33	4.17	3.75	-	0.21	-	0.25

- score = zero

proportion of children (n=2; 6.1%) showed lower scores after the training course.

In terms of the second aspect, “food detailing”, mean scores before training were lower than those observed in the “food identification” aspect. However, the majority of children (72.7%) increased their scores after providing the information required for good quality of completion of the diary. A total of three children (9.1%) maintained their results. It should be emphasized that, since the beginning, they showed a score equal to zero, suggesting that the training course did not have an effect in their case.

As regards the “quantification” aspect (Table 1), 26 children (78.8%) did not show any specific ability to quantify the foods consumed. Substantial improvement was observed after the training course and, regardless of the initial score, 28 (84.8%) school children increased their scores, thus indicating development of this ability. It should be emphasized that five children (15.2%) maintained the score of zero attributed before the course.

DISCUSSION

The FD includes aspects of identification, detailing and quantification of foods consumed, and the training sessions enabled higher precision of completion. It should be mentioned that the present study did not assess the accuracy of information about food consumption, it only observed whether there was improvement in record quality after the training sessions.

Even though the FD is a method that requires considerable participant involvement, the collaboration and adherence of children, who saw the diary completion as a school activity, was surprising in this study. While completing the FD, children are expected to ask for help from adults when necessary. However, for the purpose of assessing the training course, this study sought to conduct guided completion to enable child performance to be assessed.

Estimation of the amount of food consumed may extend beyond the intellectual

and cognitive ability of many children. According to Livingstone and Robson⁶, this activity requires children to be able to recognize and describe amounts in terms of the proportion of a whole unit, and to have an adequately developed concept of time in terms of frequency and averages. It also requires the assumption that children can think about foods in an abstract way, while observing general food models of different sizes and volumes or other tools, such as photographs of food. In addition, the problem can be aggravated by the fact that child food frequencies and portion sizes are not always constant.

The fact that few studies assessing the impact of training courses, aimed at improving food consumption report, have been published makes it difficult to compare the results obtained. Some results of training courses conducted with adult populations, whose aspects can also be useful for child populations, are then shown.

In a study with a control group, Bolland et al.¹⁴ observed the positive effects of a 10-minute training course, with statistically significant difference, thus indicating that the practice of using food models or kitchen utensils enabled the improvement in the ability to estimate portion size. Similar results were found by Yuhás et al.¹⁵ and Arroyo et al.¹⁶ by comparing trained and not trained adult students. Yuhás et al.¹⁵ observed that the training course enabled a more substantial improvement in the estimate of size of solid food portions in relation to liquid foods. This, as a result, was more accurate than the size of food portions that do not have a specific form, such as spaghetti.

Improvement in the “quantification” aspect after the training course present in this study is comparable to what was found by Weber et al.¹⁹, who observed significant progress in the ability to quantify foods after a 45-minute training course, performed with the purpose of improving the estimate of food portions consumed by children aged between 9 and 10 years. In spite of this, authors reported that the error in several foods remained higher than 100% of the

actual amount consumed, indicating that more than one session of training is necessary to produce more significant results in the long term.

The literature points to improvement in accuracy and precision of foods recorded as one becomes older and also differences in accuracy according to the type of food consumed²⁰. Despite the importance of this detailed analysis, differences in completion could not be assessed in this study, according to different types of foods reported, sex or age, because such assessment was not the initial objective, and the sample size was not sufficient for such statistical procedures.

These training sessions, specially, showed children actual food portions, replicas and containers, commonly used in this age group, in addition to kitchen utensils frequently used by the population studied. Recent studies on food consumption suggest that the estimate of portions consumed can be improved by using utensils of a size and shape similar to those used daily by participants,^{21,22} even though the application of such instruments with this purpose has been little studied in children⁶. A study performed by Foster et al.²³ observed that children aged between 4 and 16 years can estimate the size of food portions with ac-

curacy similar to that of adults, when photographs of foods and a computer system that assesses the size of the portion in an interactive way are used.

Based on the challenging aspects of the science of nutrition, including the measurement of child food consumption, the importance of promoting studies that use methods which minimize errors in food consumption estimate is identified. In such studies, cognitive development aspects, as well as individual and psychological characteristics and even diet patterns, should be considered, due to the complexity of the food consumption measurement process.

FINAL CONSIDERATIONS

By performing this study, it was possible to identify improvement in the quality of completion of a FD aimed at children aged between 7 and 10 years.

It is recommended that a training course should be involved in nutritional studies where participants have to record or report their consumption. In addition, more studies are necessary to observe the impact of such a course on the quality of record of types of foods and according to participant's sex and age.

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