

## Eating meals with parents is associated with better quality of diet for Brazilian adolescents

Fazer refeições com os pais está associado à maior qualidade da alimentação de adolescentes brasileiros

Comer con los padres está asociado a una mayor calidad en la alimentación de los adolescentes brasileños

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### Abstract

The objective was to investigate how often Brazilian adolescents eat meals with their parents and verify the association between this habit and quality of the diet. Data were from the Brazilian National Survey of School Health (PeNSE-2015). The sample consisted of adolescents enrolled in the ninth grade in public and private schools, ranging in age from 11 to 19 years. The target exposure was eating meals with parents (0-4 and  $\geq 5$  days/week) and the outcomes were frequent consumption ( $\geq 5$  days/week) of healthy and unhealthy dietary markers. Healthy diet scores (range 0-21) and unhealthy diet scores (range 0-35) were based on total days that the adolescent reported consuming each of the dietary markers. Poisson and linear regression models were used, adjusted by sociodemographic variables. Frequent sharing of meals with parents ( $\geq 5$  days/week) was seen in 74% (95%CI: 73.4-74.7) of the adolescents. Those reporting this habit showed higher likelihood of frequent consumption of beans (PR = 1.22; 95%CI: 1.19-1.26), fruits (PR = 1.34; 95%CI: 1.28-1.39), and vegetables (PR = 1.39; 95%CI: 1.34-1.44), and lower likelihood of frequent consumption of sweets (PR = 0.91; 95%CI: 0.88-0.94), ultra-processed salty foods (PR = 0.91; 95%CI: 0.87-0.94), and fried salty snacks (PR = 0.85; 95%CI: 0.80-0.90). Eating meals with parents was positively associated with healthy diet scores and inversely associated with unhealthy diet scores. Eating meals with parents is a common habit in Brazilian adolescents and is associated with better quality of diet.

Meals; Family; Food Consumption; Adolescent

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## Introduction

Obesity is a public health problem that affects children and adolescents at high rates worldwide <sup>1,2</sup>. In Brazil, prevalence of obesity in this age group is 14% <sup>3</sup>. Data from a national survey in 2014 showed that one out of four Brazilian adolescents had excess weight and 8.4% were already obese <sup>4</sup>. Meanwhile, adolescents' dietary habits have been characterized by high consumption of ultra-processed foods, high in fats, sugars, and sodium, and low consumption of fruits and vegetables <sup>5,6,7</sup>. Factors contributing to this scenario include the familiar environment, which plays an important role in the development of eating habits in children and adolescents <sup>8,9,10</sup>.

Studies have suggested that sharing meals with the family may serve as a protective factor against problems related to health conditions in childhood and adolescence <sup>11,12</sup>. Sharing meals also has great potential as a learning environment, where parents can demonstrate healthy eating habits and children can learn about foods and their preparation and eating behaviors and attitudes <sup>13</sup>.

A meta-analysis published in 2018 including 57 studies showed that family meals were associated with healthy diet and low body mass index in children and adolescents <sup>14</sup>. Still, these studies were conducted in high-income countries, the vast majority in the USA, followed by European countries. Studies assessing the family environment and its association with dietary patterns are still rare in Brazil. The existing scientific studies address anthropological aspects of sharing meals and the impacts of globalization on changes in eating practices <sup>15,16</sup>, or only report the prevalence of this practice and its association with some of the population's sociodemographic characteristics <sup>17</sup>. The current study thus aimed to investigate how often Brazilian adolescents eat meals with their parents and verify the association between this habit and quality of diet.

## Methods

### Study population, sampling, and data collection

We analyzed data from the third edition of the *Brazilian National Survey of School Health* (PeNSE), conducted in 2015 by the Brazilian Institute of Geography and Statistics (IBGE) in partnership with the Brazilian Ministries of Health and Education. PeNSE is a cross-sectional survey with a representative sample of Brazilian ninth-grade students ( $n = 102,072$ ) 11 to 19 years of age and enrolled in public and private schools ( $n = 3,040$  schools).

Schools were selected according to the number of classes and type of administration (public versus private). In each school in the sample, ninth-grade classes were selected randomly and with equal probabilities between classes existing in 2015, as follows: one class in each school that reported having up to two ninth-grade classes, and two classes in each school with three or more ninth-grade classes. All the students in the selected classes were invited to participate in the study.

Students answered a self-applied smartphone questionnaire with questions of sociodemographic characteristics, family and school context, and dietary practices. Further details on the sampling process can be assessed by the PeNSE publication <sup>18</sup>.

### Study variables

The habit of sharing meals (lunch or dinner) with the family was assessed with the following question: "Do you usually eat lunch or dinner with your mother, father, or guardian?", with the following answers: "Yes, every day"; "Yes, 5-6 days a week"; "Yes, 3-4 days a week"; "Yes, 1-2 days a week"; "Rarely"; or "No". The study adopted the term "parents" for "mother, father, or guardian", and eating meals with parents was categorized as 0-4 and  $\geq 5$  days per week, with the latter defined as frequent consumption.

Diet quality was assessed with the following question: "In the last 7 days, on how many days did you eat ...?", for each of the markers of healthy diet (beans, fruits, vegetables) and unhealthy diet (candy, hamburger, ham, baloney, salami, sausage, hotdog, instant noodles, packaged salty foods, crackers, fried salty snacks, sodas, and fast food). The term "ultra-processed salty foods" was used for the group

that included processed meats (hamburger, ham, baloney, salami, sausage, hotdog), packaged snacks, instant noodles, and crackers. Consumption of markers of healthy and unhealthy diet was categorized as frequent ( $\geq 5$  days a week) and not frequent (0-4 days a week). Next, two scores were created for the continuous analysis. Healthy diet score was based on the sum of days of the week that the adolescent reported consuming each of the three healthy markers, and could vary from zero (did not consume any of these foods on any day) to 21 (consumed all of the foods on all 7 days). The unhealthy diet score was created in the same way, but adding the frequency of consumption of the five unhealthy markers, ranging from zero to 35. The higher the score, the higher the consumption of these dietary markers. The scores were created to allow consolidating healthy and unhealthy indicators, and not only each single variable.

The sociodemographic variables were: sex; age bracket ( $\leq 13$  years, 14, 15,  $\geq 16$  years); maternal schooling (incomplete elementary, complete elementary, complete secondary; complete university); school administration (public versus private); race/color (white, black, brown, Asian-descendent, indigenous); geographic region of school and student's residence (North, Northeast, Southeast, South, Central); municipality of residence (state capital and non-capital); family arrangement (lives with mother and father, only with mother, only with father, or with neither); and household assets and services score. The assets and services score was based on the following reported items: landline, mobile phone, computer, internet access, car, and housemaid services three or more days a week. Each item was assigned a weight, the equivalent to the inverse frequency of possession of assets or presence of services in the total sample. The sum of the weights produced the score for each individual, later divided into tertiles <sup>19</sup>.

### **Ethical aspects**

The PeNSE 2015 survey was approved by the National Committee for Research Ethics of the National Health Council (CNS), under case review n. 1.006.467 of March 30, 2015. Students and schools were advised as to guaranteed data confidentiality and anonymity.

### **Data analysis**

We calculated the prevalence rates and confidence intervals for frequent consumption of the dietary markers, as well as frequent consumption of meals with parents, according to the socioeconomic variables.

Multiple imputation by chained equations was performed for the variable maternal schooling, which showed 26.9% of losses. Sociodemographic and dietary variables were used as predictive variables in the imputation because they were part of subsequent analytical models <sup>20</sup>. The other variables showed losses less than 0.3%.

The association between eating meals with parents and frequent consumption of each healthy and unhealthy dietary marker was assessed as prevalence ratio (PR), obtained by Poisson regression models. The association between eating meals with parents and healthy and unhealthy diet scores was assessed with linear regression models. Covariables with  $p < 0.20$  in the univariate models with the outcome were used for adjustment in the multiple models.

All the analyses used Stata 14.1 (<https://www.stata.com>), considering the sample's complexity and setting statistical significance at  $p < 0.05$ .

## **Results**

Tables 1 and 2 show frequent consumption of markers of healthy and unhealthy diet according to the sociodemographic characteristics of Brazilian adolescents. More than half (52.8%; 95%CI: 51.8-53.8) showed frequent consumption of beans, and about one-third ate fruits (32.7%; 95%CI: 32.1-33.4) and vegetables (37.7%; 95%CI: 37.0-38.4) at least 5 days a week. As for unhealthy dietary markers, 41.6% (95%CI: 41.0-42.3) of the adolescents reported frequent consumption of sweets, 31.3% (95%CI: 30.7-32.0) of ultra-processed salty foods, 13.7% (95%CI: 13.2-14.2) of fried salty snacks, 26.7% (95%CI:

**Table 1**

Frequent consumption of healthy dietary markers according to sociodemographic characteristics of Brazilian adolescents. *Brazilian National Survey of School Health (PeNSE)*, 2015.

| Variables                    | Beans |           | Fruits |           | Vegetables |           |
|------------------------------|-------|-----------|--------|-----------|------------|-----------|
|                              | %     | 95%CI     | %      | 95%CI     | %          | 95%CI     |
| <b>Total</b>                 | 52.8  | 51.8-53.8 | 32.7   | 32.1-33.4 | 37.7       | 37.0-38.4 |
| Sex                          |       |           |        |           |            |           |
| Male                         | 57.3  | 56.1-58.5 | 33.3   | 32.5-34.0 | 37.1       | 36.3-38.0 |
| Female                       | 48.5  | 47.3-49.7 | 32.2   | 31.3-33.1 | 38.2       | 37.4-39.1 |
| Race/color                   |       |           |        |           |            |           |
| White                        | 50.2  | 48.8-51.6 | 32.9   | 31.8-34.0 | 40.1       | 39.0-41.3 |
| Black                        | 58.8  | 57.0-60.6 | 33.1   | 31.6-34.7 | 34.9       | 33.3-36.6 |
| Asian-descendent             | 50.2  | 47.4-52.9 | 32.6   | 30.2-35.2 | 40.5       | 37.8-43.3 |
| Brown                        | 53.2  | 52.1-54.4 | 32.4   | 31.6-33.2 | 36.5       | 35.7-37.3 |
| Indigenous                   | 54.0  | 51.0-57.1 | 33.0   | 30.4-35.8 | 34.0       | 31.3-36.8 |
| Age (years)                  |       |           |        |           |            |           |
| ≤ 13                         | 53.6  | 51.5-55.7 | 33.4   | 31.7-35.1 | 39.8       | 38.3-41.4 |
| 14                           | 52.7  | 51.5-53.9 | 33.5   | 32.6-34.4 | 39.3       | 38.3-40.2 |
| 15                           | 52.5  | 51.0-53.9 | 31.2   | 30.2-32.3 | 35.0       | 33.9-36.1 |
| ≥ 16                         | 52.4  | 50.7-54.1 | 30.6   | 29.2-32.0 | 31.7       | 30.3-33.2 |
| p-value                      |       | 0.328     |        | < 0.001   |            | < 0.001   |
| Maternal schooling           |       |           |        |           |            |           |
| Incomplete Elementary School | 55.8  | 54.6-57.0 | 29.3   | 28.3-30.3 | 32.2       | 31.2-33.2 |
| Complete Elementary School   | 54.2  | 52.5-56.0 | 32.3   | 30.9-33.8 | 37.0       | 35.4-38.5 |
| Complete Secondary School    | 52.4  | 50.9-53.9 | 34.2   | 33.0-35.4 | 40.4       | 39.2-41.7 |
| Complete University          | 45.6  | 43.7-47.4 | 37.7   | 36.3-39.2 | 45.4       | 43.7-47.1 |
| p-value                      |       | < 0.001   |        | < 0.001   |            | < 0.001   |
| Type of school               |       |           |        |           |            |           |
| Public                       | 54.9  | 53.9-55.9 | 32.6   | 31.9-33.3 | 36.8       | 36.1-37.5 |
| Private                      | 40.6  | 38.1-43.1 | 33.3   | 31.5-35.2 | 42.8       | 40.8-44.9 |
| Assets and services score    |       |           |        |           |            |           |
| 1 <sup>st</sup> tertile      | 52.7  | 51.5-53.9 | 29.4   | 28.6-30.3 | 32.2       | 31.3-33.1 |
| 2 <sup>nd</sup> tertile      | 55.4  | 54.2-56.5 | 32.8   | 31.7-33.8 | 38.0       | 37.0-39.0 |
| 3 <sup>rd</sup> tertile      | 50.4  | 48.8-52.0 | 35.7   | 34.6-36.9 | 42.5       | 41.3-43.7 |
| p-value                      |       | 0.009     |        | < 0.001   |            | < 0.001   |
| Geographic Region            |       |           |        |           |            |           |
| North                        | 32.7  | 30.9-34.5 | 29.8   | 28.6-31.0 | 36.4       | 35.2-37.7 |
| Northeast                    | 49.7  | 48.4-51.0 | 31.3   | 30.5-32.2 | 31.0       | 30.2-31.9 |
| Southeast                    | 61.7  | 59.9-63.5 | 34.2   | 32.9-35.5 | 40.9       | 39.6-42.3 |
| South                        | 39.3  | 37.0-41.6 | 31.9   | 30.6-33.2 | 38.9       | 37.5-40.4 |
| Central                      | 59.6  | 58.2-61.1 | 34.7   | 33.6-35.8 | 43.6       | 42.3-44.8 |
| Municipality of residence    |       |           |        |           |            |           |
| State capital                | 47.3  | 45.7-48.9 | 32.8   | 32.0-33.7 | 38.3       | 37.3-39.2 |
| Non-state capital            | 54.4  | 53.2-55.6 | 32.7   | 31.9-33.5 | 37.5       | 36.7-38.4 |
| Family arrangement           |       |           |        |           |            |           |
| Mother and father            | 54.0  | 52.8-55.2 | 33.3   | 32.5-34.2 | 38.8       | 38.0-39.6 |
| Mother only                  | 50.9  | 49.5-52.2 | 31.9   | 30.9-32.9 | 36.3       | 35.2-37.3 |
| Father only                  | 54.2  | 51.6-56.8 | 32.3   | 29.9-34.8 | 37.3       | 34.8-39.9 |
| Neither                      | 50.0  | 47.8-52.1 | 31.1   | 29.2-33.1 | 34.4       | 32.3-36.4 |

95%CI: 95% confidence interval.

**Table 2**

Frequent consumption of unhealthy dietary markers according to sociodemographic characteristics of Brazilian adolescents. *Brazilian National Survey of School Health (PeNSE)*, 2015.

| Variables                    | Sweet   |           | Ultra-processed salty foods |           | Fried snacks |           | Sodas   |           | Fast food |         |
|------------------------------|---------|-----------|-----------------------------|-----------|--------------|-----------|---------|-----------|-----------|---------|
|                              | %       | 95%CI     | %                           | 95%CI     | %            | 95%CI     | %       | 95%CI     | %         | 95%CI   |
| <b>Total</b>                 | 41.6    | 41.0-42.3 | 31.3                        | 30.7-32.0 | 13.7         | 13.2-14.2 | 26.7    | 26.0-27.3 | 5.2       | 4.9-5.4 |
| Sex                          |         |           |                             |           |              |           |         |           |           |         |
| Male                         | 35.5    | 34.7-36.3 | 29.1                        | 28.3-29.9 | 12.9         | 12.4-13.5 | 28.7    | 27.8-29.5 | 5.5       | 5.2-5.9 |
| Female                       | 47.4    | 46.5-48.4 | 33.4                        | 32.5-34.3 | 14.4         | 13.8-15.1 | 24.7    | 23.9-25.6 | 4.8       | 4.4-5.2 |
| Race/color                   |         |           |                             |           |              |           |         |           |           |         |
| White                        | 41.0    | 40.0-42.1 | 33.4                        | 32.5-34.3 | 12.5         | 11.8-13.3 | 27.3    | 26.2-28.4 | 5.2       | 4.7-5.7 |
| Black                        | 42.3    | 40.7-44.0 | 29.8                        | 28.4-31.2 | 15.1         | 13.9-16.4 | 29.2    | 27.7-30.8 | 5.9       | 5.2-6.7 |
| Asian-descendent             | 40.6    | 37.8-43.5 | 33.6                        | 31.2-36.0 | 16.0         | 14.0-18.3 | 26.9    | 24.7-29.2 | 6.6       | 5.4-8.0 |
| Brown                        | 42.1    | 41.2-43.1 | 29.9                        | 28.9-30.8 | 14.0         | 13.4-14.7 | 25.2    | 24.4-26.1 | 4.7       | 4.3-5.0 |
| Indigenous                   | 39.8    | 37.1-42.5 | 30.6                        | 28.0-33.3 | 13.7         | 11.7-15.9 | 27.7    | 24.9-30.7 | 6.2       | 4.9-7.8 |
| Age (years)                  |         |           |                             |           |              |           |         |           |           |         |
| ≤ 13                         | 44.7    | 43.0-46.4 | 33.8                        | 32.5-35.1 | 13.4         | 12.3-14.5 | 25.0    | 23.6-26.4 | 3.9       | 3.4-4.6 |
| 14                           | 42.2    | 41.2-43.1 | 31.7                        | 30.9-32.6 | 12.9         | 12.3-13.5 | 25.6    | 24.8-26.5 | 4.5       | 4.2-4.9 |
| 15                           | 39.9    | 38.7-41.1 | 29.7                        | 28.6-30.9 | 14.8         | 13.9-15.7 | 30.0    | 28.9-31.1 | 6.6       | 6.0-7.3 |
| ≥ 16                         | 36.9    | 35.4-38.4 | 28.2                        | 26.8-29.7 | 16.1         | 15.1-17.2 | 28.2    | 26.9-29.5 | 7.6       | 6.8-8.4 |
| p-value                      | < 0.001 |           | < 0.001                     |           | < 0.001      |           | < 0.001 |           | < 0.001   |         |
| Maternal schooling           |         |           |                             |           |              |           |         |           |           |         |
| Incomplete Elementary School | 39.6    | 38.6-40.6 | 27.3                        | 26.3-28.4 | 12.4         | 11.7-13.1 | 23.9    | 22.9-24.8 | 4.0       | 3.6-4.5 |
| Complete Elementary School   | 42.4    | 40.9-43.8 | 32.3                        | 30.9-33.6 | 13.8         | 12.7-14.8 | 27.8    | 26.3-29.3 | 5.4       | 4.7-6.0 |
| Complete Secondary School    | 43.1    | 42.0-44.2 | 33.4                        | 32.4-34.4 | 14.5         | 13.7-15.4 | 28.7    | 27.6-29.8 | 5.6       | 5.1-6.1 |
| Complete University          | 42.8    | 41.2-44.5 | 35.1                        | 33.8-36.5 | 14.9         | 13.7-16.1 | 27.6    | 26.0-29.1 | 6.4       | 5.8-7.1 |
| p-value                      | < 0.001 |           | < 0.001                     |           | < 0.001      |           | < 0.001 |           | < 0.001   |         |
| Type of school               |         |           |                             |           |              |           |         |           |           |         |
| Public                       | 41.6    | 40.9-42.3 | 29.9                        | 29.2-30.5 | 13.7         | 13.2-14.2 | 26.5    | 25.8-27.2 | 5.1       | 4.8-5.4 |
| Private                      | 41.7    | 39.9-43.4 | 39.9                        | 38.3-41.6 | 13.8         | 12.7-15.1 | 27.5    | 25.7-29.5 | 5.5       | 4.9-6.2 |
| Assets and services score    |         |           |                             |           |              |           |         |           |           |         |
| 1 <sup>st</sup> tertile      | 38.7    | 37.8-39.7 | 26.8                        | 25.9-27.6 | 12.5         | 11.8-13.2 | 21.1    | 20.3-22.0 | 3.9       | 3.6-4.3 |
| 2 <sup>nd</sup> tertile      | 42.3    | 41.3-43.3 | 31.3                        | 30.4-32.4 | 13.8         | 13.1-14.5 | 27.1    | 26.2-28.0 | 4.7       | 4.3-5.1 |
| 3 <sup>rd</sup> tertile      | 43.6    | 42.5-44.8 | 35.6                        | 34.6-36.6 | 14.7         | 13.9-15.6 | 31.3    | 30.0-32.5 | 6.8       | 6.3-7.4 |
| p-value                      | < 0.001 |           | < 0.001                     |           | < 0.001      |           | < 0.001 |           | < 0.001   |         |
| Geographic region            |         |           |                             |           |              |           |         |           |           |         |
| North                        | 36.1    | 34.8-37.4 | 24.0                        | 22.9-25.1 | 13.7         | 12.8-14.6 | 23.8    | 22.7-24.9 | 5.3       | 4.9-5.8 |
| Northeast                    | 37.8    | 36.9-38.8 | 30.6                        | 29.7-31.5 | 14.7         | 14.0-15.4 | 21.7    | 20.9-22.6 | 5.1       | 4.7-5.4 |
| Southeast                    | 45.1    | 43.9-46.4 | 32.9                        | 31.6-34.1 | 13.8         | 12.9-14.7 | 30.0    | 28.7-31.3 | 5.2       | 4.7-5.8 |
| South                        | 39.6    | 38.2-41.1 | 33.6                        | 32.3-34.9 | 11.7         | 10.8-12.6 | 25.0    | 23.7-26.3 | 4.3       | 3.8-4.9 |
| Central                      | 45.6    | 44.4-46.8 | 30.9                        | 29.8-31.9 | 12.8         | 12.1-13.5 | 32.0    | 30.8-33.2 | 6.1       | 5.7-6.5 |
| Municipality of residence    |         |           |                             |           |              |           |         |           |           |         |
| State capital                | 41.8    | 40.9-42.6 | 34.0                        | 33.2-34.9 | 14.5         | 13.7-15.2 | 28.8    | 27.9-29.8 | 6.0       | 5.7-6.4 |
| Non-state capital            | 41.6    | 40.7-42.4 | 30.5                        | 29.7-31.3 | 13.5         | 12.9-14.1 | 26.0    | 25.2-26.8 | 4.9       | 4.6-5.2 |
| Family arrangement           |         |           |                             |           |              |           |         |           |           |         |
| Mother and father            | 40.7    | 39.8-41.6 | 31.1                        | 30.3-31.9 | 12.8         | 12.3-13.4 | 25.5    | 24.6-26.3 | 4.8       | 4.5-5.1 |
| Mother only                  | 43.7    | 42.6-44.7 | 32.2                        | 31.2-33.1 | 14.7         | 14.0-15.5 | 28.0    | 27.0-29.0 | 5.6       | 5.1-6.1 |
| Father only                  | 41.1    | 38.6-43.6 | 30.4                        | 28.0-32.9 | 15.7         | 13.9-17.8 | 31.5    | 29.2-33.9 | 5.7       | 4.6-7.0 |
| Neither                      | 41.1    | 38.9-43.3 | 30.2                        | 28.5-32.1 | 15.7         | 14.2-17.4 | 28.0    | 26.0-30.0 | 6.2       | 5.3-7.3 |

95%CI: 95% confidence interval.

26.0-27.3) of sodas, and 5.2% (95%CI: 4.9-5.4) of fast food. Frequent consumption of beans was higher in public school students, in black, brown, or indigenous students compared to whites, and in those not living in state capitals, and was inversely associated with the household assets/services score and maternal schooling. Consumption of fruits and vegetables showed a direct association with the assets/services score and maternal schooling. Frequent consumption of vegetables was higher in private school students and white students compared to black, brown, and indigenous (Table 1). Frequent consumption of all unhealthy dietary markers was higher in students reporting higher maternal schooling and in the higher tertiles of household assets/services. Frequent consumption of ultra-processed salty foods, which included processed meats, packaged salty snacks, and crackers was also higher in private school students (Table 2).

Approximately 74% (95%CI: 73.4-74.7) of the adolescents reported eating meals with parents at least 5 days a week, a habit that was more frequent in boys, younger adolescents, children of mothers with less schooling, public school students, and those not living in state capitals (Table 3).

Table 4 shows the association between frequency of eating meals with parents and frequent consumption of healthy and unhealthy dietary markers. Eating meals with parents at least 5 days a week was positively associated with frequent consumption of beans (PR = 1.22; 95%CI: 1.19-1.26), fruits (PR = 1.34; 95%CI: 1.28-1.39), and vegetables (PR = 1.34; 95%CI: 1.28-1.39) and negatively associated with frequent consumption of sweets (PR = 0.91; 95%CI: 0.88-0.94), ultra-processed salty foods (PR = 0.91; 95%CI: 0.87-0.94), and fried salty snacks (PR = 0.85; 95%CI: 0.80-0.90). There was no significant association for consumption of sodas and fast food ( $p > 0.05$ ).

The analysis of consolidated indicators via dietary scores showed that eating meals with parents was positively associated with the healthy diet score ( $\beta = 1.86$ ;  $p < 0.001$ ) and inversely associated with the unhealthy diet score ( $\beta = -0.62$ ;  $p < 0.001$ ) (Figure 1).

## Discussion

This study aimed to assess the association between eating meals with parents as a family environment characteristic and quality of diet in Brazilian adolescents. The results showed that eating meals with parents was associated with better diet quality in adolescents, specifically more frequent consumption of beans, fruits, and vegetables, and less frequent consumption of sweets, ultra-processed salty foods, and fried salty snacks. Sharing meals frequently with parents was positively associated with healthy diet score and inversely with unhealthy diet score.

Eating meals with parents was a frequent habit in Brazilian adolescents, more than 70% of whom reported sharing meals with them at least 5 days of week. This was similar to another Brazilian study that found 68% of adolescents always or almost always eating meals with parents<sup>17</sup>. In our study, this habit was more frequent in boys, younger adolescents, public school students, and those living with the mother and father.

More than half of the adolescents ate beans frequently, but fewer than one-third reported frequent consumption of other healthy dietary markers (fruits and vegetables). Meanwhile, unhealthy markers stood out, with more than 30% of adolescents reporting frequent consumption of sweets and ultra-processed salty foods. These results are consistent with previous studies showing that Brazilian adolescents' diet is still marked by consumption of traditional foods like beans, but that these foods are being replaced by ultra-processed products like sweets, cookies, sodas, and fast food<sup>6,7,19,21</sup>. A recent study also using data from the PeNSE 2015 survey showed that although the amounts consumed daily were not evaluated, it is worrisome that four out of ten Brazilian adolescents already reported consuming ultra-processed foods on a daily basis<sup>22</sup>.

Socioeconomic differences in the consumption of healthy and unhealthy dietary markers in Brazilian adolescents were found in a previous study by Azeredo et al. using data from PeNSE 2012<sup>21</sup>, in which the relations were similar to the more recent study. We found that older adolescents shared meals less frequently with their parents, corroborating a previous study by Barufaldi et al.<sup>17</sup>, and consumed more fried snacks, fast food, and sodas. A possible explanation is that as they grow older, adolescents gain greater independence and autonomy to purchase and consume their own meals without their parents' presence<sup>23</sup>. The relationship between frequency of eating with parents and indicators

**Table 3**

Frequency of meals with parents according to sociodemographic characteristics of Brazilian adolescents. *Brazilian National Survey of School Health (PeNSE), 2015.*

| Variables                    | Frequency of meals with parents (days/week) |           |                |           |
|------------------------------|---|-----------|----------------|-----------|
|                              | 0-4 days                                    |           | 5 or more days |           |
|                              | %   | 95%CI     | %              | 95%CI     |
| <b>Total</b>                 | 26.0  | 25.3-26.6 | 74.0           | 73.4-74.7 |
| Sex                          |   |           |                |           |
| Male                         | 22.5  | 21.7-23.3 | 77.5           | 76.7-78.3 |
| Female                       | 29.2  | 28.4-30.0 | 70.8           | 70.0-71.6 |
| Race/color                   |   |           |                |           |
| White                        | 24.4  | 23.5-25.4 | 75.6           | 74.6-76.5 |
| Black                        | 27.5  | 26.1-28.8 | 72.5           | 71.2-73.9 |
| Asian-descendent             | 30.2  | 27.7-32.7 | 69.8           | 67.3-72.3 |
| Brown                        | 26.2  | 25.4-27.0 | 73.8           | 73.0-74.6 |
| Indigenous                   | 29.1  | 26.6-31.8 | 70.9           | 68.2-73.4 |
| Age (years)                  |   |           |                |           |
| ≤ 13                         | 23.7  | 22.4-25.1 | 76.3           | 74.9-77.6 |
| 14                           | 25.1  | 24.4-25.9 | 74.9           | 74.1-75.6 |
| 15                           | 28.2  | 27.1-29.3 | 71.8           | 70.7-72.9 |
| ≥ 16                         | 29.6  | 28.2-31.1 | 70.4           | 68.9-71.8 |
| p-value                      |   | < 0.001   |                |           |
| Maternal schooling           |   |           |                |           |
| Incomplete Elementary School | 25.2  | 24.3-26.2 | 74.8           | 73.8-75.7 |
| Complete Elementary School   | 25.6  | 24.3-27.0 | 74.4           | 73.0-75.7 |
| Complete Secondary School    | 26.1  | 25.0-27.3 | 73.9           | 72.7-75.0 |
| Complete University          | 27.4  | 26.1-28.8 | 72.6           | 71.2-73.9 |
| p-value                      |   | 0.012     |                |           |
| Type of school               |   |           |                |           |
| Public                       | 25.2  | 24.5-25.9 | 74.8           | 74.1-75.5 |
| Private                      | 30.4  | 28.8-32.1 | 69.6           | 67.9-71.2 |
| Assets and services score    |   |           |                |           |
| 1 <sup>st</sup> tertile      | 27.6  | 26.6-28.5 | 72.4           | 71.5-73.4 |
| 2 <sup>nd</sup> tertile      | 24.8  | 24.0-25.7 | 75.2           | 74.3-76.0 |
| 3 <sup>rd</sup> tertile      | 25.6  | 24.5-26.8 | 74.4           | 73.2-75.5 |
| p-value                      |   | 0.011     |                |           |
| Geographic region            |   |           |                |           |
| North                        | 25.1  | 23.9-26.3 | 74.9           | 73.7-76.1 |
| Northeast                    | 28.0  | 27.0-28.9 | 72.0           | 71.1-73.0 |
| Southeast                    | 26.3  | 25.1-27.6 | 73.7           | 72.4-74.9 |
| South                        | 22.6  | 21.4-23.8 | 77.4           | 76.2-78.6 |
| Central                      | 22.9  | 21.9-23.9 | 77.1           | 76.1-78.1 |
| Municipality of residence    |   |           |                |           |
| State capital                | 30.8  | 30.0-31.7 | 69.2           | 68.3-70.0 |
| Non-state capital            | 24.5  | 23.7-25.3 | 75.5           | 74.7-76.3 |
| Family arrangement           |   |           |                |           |
| Mother and father            | 20.7  | 20.0-21.4 | 79.3           | 78.6-80.0 |
| Mother only                  | 32.5  | 31.4-33.5 | 67.5           | 66.5-68.6 |
| Father only                  | 34.4  | 31.9-37.0 | 65.6           | 63.0-68.1 |
| Neither                      | 39.8  | 37.8-41.8 | 60.2           | 58.2-62.2 |

95%CI: 95% confidence interval.

**Table 4**

Associations between consumption of healthy and unhealthy dietary markers and habit of eating meals with parents. *Brazilian National Survey of School Health (PeNSE), 2015.*

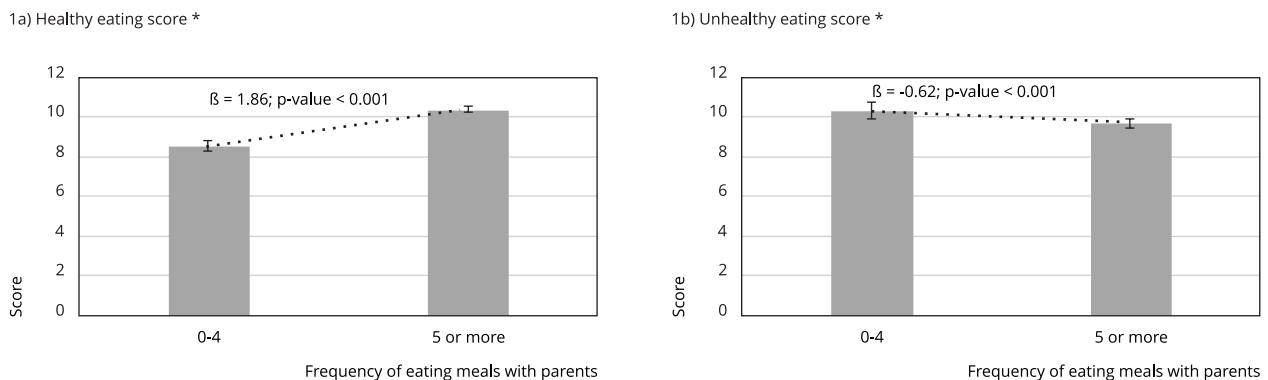
| Markers                      | Crude model |           |         | Adjusted model * |           |         |
|------------------------------|-------------|-----------|---------|------------------|-----------|---------|
|                              | PR          | 95%CI     | p-value | PR               | 95%CI     | p-value |
| Healthy diet                 |             |           |         |                  |           |         |
| Beans                        | 1.26        | 1.22-1.29 | < 0.001 | 1.22             | 1.19-1.26 | < 0.001 |
| Fruits                       | 1.33        | 1.28-1.39 | < 0.001 | 1.34             | 1.28-1.39 | < 0.001 |
| Vegetables                   | 1.39        | 1.34-1.44 | < 0.001 | 1.39             | 1.34-1.44 | < 0.001 |
| Unhealthy diet               |             |           |         |                  |           |         |
| Sweets                       | 0.89        | 0.86-0.91 | < 0.001 | 0.91             | 0.88-0.94 | < 0.001 |
| Ultra-processed salted foods | 0.88        | 0.85-0.92 | < 0.001 | 0.91             | 0.87-0.94 | < 0.001 |
| Fried salty snacks           | 0.81        | 0.76-0.85 | < 0.001 | 0.85             | 0.80-0.90 | < 0.001 |
| Sodas                        | 0.95        | 0.91-0.99 | 0.015   | 0.97             | 0.93-1.01 | 0.098   |
| Fast food                    | 0.85        | 0.77-0.94 | 0.001   | 0.91             | 0.82-1.00 | 0.051   |

95% CI: 95% confidence interval; PR: prevalence ratio.

\* The covariables included in each model were: (a) beans: sex, color, type of school, maternal schooling, assets and services score, region, type of municipality, family arrangement; (b) fruits: sex, age, maternal schooling, assets and services score, region, family arrangement; (c) vegetables: sex, color, age, type of school, maternal schooling, assets and services score, region, family arrangement; (d) sweets: sex, color, age, maternal schooling, assets and services score, region, family arrangement; (e) ultra-processed salty foods: sex, color, age, type of school, maternal schooling, assets and services score, region, type of municipality, family arrangement; (f) fried salty snacks, sodas, and fast food: sex, color, age, maternal schooling, assets and services score, region, type of municipality, family arrangement.

**Figure 1**

Associations between healthy and unhealthy diet scores and habit of eating meals with parents. *Brazilian National Survey of School Health (PeNSE), 2015.*



Note: the covariables included in each model were: (a) healthy diet score: sex, age, type of school, maternal schooling, goods/assets and services score, region, type of municipality, family arrangement; (b) unhealthy diet score: sex, age, type of school, maternal schooling, goods assets and services score, region, type of municipality, family arrangement.

\* Healthy diet scores (ranging from 0 a 21) and unhealthy diet score (ranging from 0 to 35) were calculated as the sum of the days of the week on which the adolescent reported consuming each of the respective dietary markers. The higher the score, the higher the consumption of these food markers.



of social vulnerability such as maternal schooling, household assets/services, and race/color is not clear. Although such characteristics favor consumption of meals with parents, they are also associated with less frequent consumption of fruits and vegetables, showing that other factors such as prices and availability of these foods in regions with lower socioeconomic status may influence the consumption of healthy foods in this population group<sup>24,25</sup>.

The association in our study between eating meals with the family and better quality of diet in adolescents is corroborated by other studies, conducted in high-income countries<sup>26,27,28,29,30,31</sup>. American adolescents that eat meals with parents tend to consume more fruits and vegetables<sup>26,27,28</sup>. In New Zealand, adolescents that share meals with the family perceive more support from parents for a healthy diet, have limits on the time they spend watching television, and are more prone to having fruits and vegetables available at home every day<sup>30</sup>. A systematic literature review identified household availability of fruits and vegetables, frequent family meals, and parental support for a healthy diet as potential determinants of consumption of fruits and vegetables by children and adolescents<sup>31</sup>. These findings underline parents' crucial role in children's eating patterns through their eating behaviors, attitudes, and styles<sup>10</sup>.

The experiences of shared meals can also have positive long-term effects. Data from a population-based cohort in Minnesota, USA, showed that regular meals with the family were associated with healthier eating patterns both in adolescence and later in adulthood<sup>32,33</sup>. Recent analyses in this same cohort, followed for 15 years, showed that family eating practices were carried over to the next generation<sup>34</sup>. The results evidenced that adolescents' family environment can shape their eating practices in adulthood.

Meals with the family promote not only improved diet quality<sup>26,27</sup> and lower levels of excess weight in adolescents<sup>29,30</sup>, but also provide an opportunity for dietary education (improvement of culinary skills and healthy habits, for example)<sup>35</sup> and social living, promoting commensality<sup>36</sup> and psychological well-being<sup>28</sup>. Thus, sharing meals with family represents a key sociocultural element in health promotion for adolescents<sup>23</sup>. Due to the potential short- and long-term impact of parents' dietary practices on their children, it is important to invest in family interventions aimed at encouraging shared healthy meals, a practice recommended by the Food Guide for the Brazilian Population<sup>36</sup>.

Some limitations and weaknesses in the study merit discussion. This was the first population-based study to analyze the relationship between eating meals with parents and diet quality in Brazilian adolescents. Another strength is the use of the database from PeNSE 2015, a nationwide school-based survey including data on students from rural towns and state capitals and the Federal District. The survey's high response rate (82.2%) and high school coverage in this age bracket (97% from 6 to 14 years and 88% from 15 to 19 years) contributed to the study's external validity<sup>37</sup>. The study also assessed both regular consumption of single foods and healthy and unhealthy diet scores, and found consistency in the associations. The limitations feature the fact that the questionnaire used by PeNSE 2015 did not allow a more detailed quantitative analysis of the adolescents' diet, since it included a limited number of foods and did not consider the size of portions or whether the food was consumed more than once a day, but rather the number of days the student ate a given food in the previous week. In addition, the absence of data on the parents' diet prevented analyzing the association between quality of the adolescents' and parents' diet. Finally, residual unmeasured confounding or mediating factors may at least partially explain the associations. Nevertheless, the results were consistent for frequent consumption and for the diet scores. In addition, the cross-sectional design limits the capacity to assess causal associations between eating meals with parents and adolescents' diet quality.

## Conclusions

Our results showed that eating meals with parents is associated with more consumption of healthy foods and less consumption of unhealthy foods, thus suggesting that this habit reflects improved diet quality in Brazilian adolescents. Therefore, interventions focused on the promotion of healthy eating environments should address barriers to sharing meals in the family, besides acknowledging the role of this practice as an instrument for promoting healthy diet.

## Contributors

B. G. Martins and C. Z. Ricardo participated in the study design, in the data analysis and interpretation and writing of the article. P. P. Machado participated in the data analysis and interpretation and writing of the article. F. Rauber and C. M. Azeredo and complemented the writing of the article and collaborated in the data analysis and final revision. R. B. Levy worked in the imputation of missing data and final revision of the article; participated in the study design, and the writing. All authors have approved the final version for publication.

## Additional informations

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## Resumo

O objetivo foi investigar a frequência com que os adolescentes brasileiros realizam as refeições com os pais e verificar a associação deste hábito com a qualidade da dieta. Foram utilizados dados da Pesquisa Nacional de Saúde do Escolar – 2015 (PeNSE). A amostra foi composta por adolescentes matriculados no nono ano do ensino fundamental de escolas públicas e privadas, com idades entre 11 e 19 anos. A exposição de interesse foi realizar refeições com os pais (0-4 e  $\geq 5$  dias/semana) e os desfechos estudados foram consumo frequente ( $\geq 5$  dias/semana) de alimentos marcadores de alimentação saudável e não saudável. Escores de alimentação saudável (variação 0-21) e não saudável (variação 0-35) foram elaborados com base no somatório dos dias que o adolescente relatou consumir cada um dos marcadores de alimentação. Foram usados modelos de regressão de Poisson e linear, ajustados por variáveis sociodemográficas. A realização frequente de refeições com os pais ( $\geq 5$  dias/semana) foi observada em 74% (IC95%: 73,4-74,7) dos adolescentes. Aqueles que afirmaram ter esse hábito apresentaram maior probabilidade do consumo frequente de feijão (RP = 1,22; IC95%: 1,19-1,26), frutas (RP = 1,34; IC95%: 1,28-1,39) e hortaliças (RP = 1,39; IC95%: 1,34-1,44); e menor probabilidade de consumo frequente de guloseimas (RP = 0,91; IC95%: 0,88-0,94), ultraprocessados salgados (RP = 0,91; IC95%: 0,87-0,94) e salgados fritos (RP = 0,85; IC95%: 0,80-0,90). Realizar as refeições com os pais foi positivamente associado ao escores de alimentação saudável e inversamente associado ao escores de alimentação não saudável. O hábito de realizar refeições com os pais é frequente entre adolescentes brasileiros e está associado à melhor qualidade da alimentação.

Refeições; Família; Consumo de Alimentos;  
Adolescente

## Resumen

El objetivo fue investigar la frecuencia con la que los adolescentes brasileños comen con los padres y verificar la asociación de este hábito con la calidad de la dieta. Se utilizaron datos de la Encuesta Nacional de Salud del Escolar – 2015 (PeNSE). La muestra estaba compuesta por adolescentes matriculados en el noveno año de enseñanza fundamental de escuelas públicas y privadas, con edades entre 11 y 19 años. La exposición de interés fue realizar comidas con los padres (0-4 y  $\geq 5$  días/semana) y los resultados estudiados fueron consumo frecuente ( $\geq 5$  días/semana) de alimentos marcadores de alimentación saludable y no saludable. Los marcadores de alimentación saludable (variación 0-21) y no saludable (variación 0-35) se elaboraron basándose en el sumatorio de los días en los que el adolescente informó consumir cada uno de los marcadores de alimentación. Se usaron modelos de regresión de Poisson y lineales, ajustados por variables sociodemográficas. La realización frecuente de comidas con los padres ( $\geq 5$  días/semana) se observó en un 74% (IC95%: 73,4-74,7) de los adolescentes. Aquellos que afirmaron tener ese hábito presentaron una mayor probabilidad de consumo frecuente de frijoles (RP = 1,22; IC95%: 1,19-1,26), frutas (RP = 1,34; IC95%: 1,28-1,39) y hortalizas (RP = 1,39; IC95%: 1,34-1,44); y menor probabilidad de consumo frecuente de golosinas (RP = 0,91; IC95%: 0,88-0,94), aperitivos ultraprocessados (RP = 0,91; IC95%: 0,87-0,94) y aperitivos fritos (RP = 0,85; IC95%: 0,80-0,90). Realizar las comidas con los padres estuvo positivamente asociado al marcadores de alimentación saludable e inversamente asociado al marcadores de alimentación no saludable. El hábito de realizar comidas con los padres es frecuente entre adolescentes brasileños y está asociado a una mejor calidad de la alimentación.

Comidas; Família; Consumo de Alimentos;  
Adolescente

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