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Food pyramid intake and nutrient profiles of Brazilian girls

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Abstract

Purpose – This paper aims to evaluate the impact of the groups from the Brazilian Food Pyramid on macro and micronutrient content of food consumed by adolescent girls from a school-based study.

Design/methodology/approach – Baseline data from "Healthy Habits, Healthy Girls" school-based randomized control trial was used for this study. A sample of the girls aged 14 to 18 years old ($n = 253$) from ten schools in Brazil was evaluated. Participants completed validated food frequency questionnaire, from which, the total kilocalories and/or grams from each food groups were calculated. Descriptive statistics, *t*-student test and linear regression were used for the analysis with a significant level of $p < 0.05$.

Findings – Mean daily intake of the girls was 2,887.09 (standard error 91.50) kcal/day. There was a positive significant association between relative intake of the "Oil and Fats" group and protein (ranged from 24.95 to 96.12 kcal/d), fats (48.36 to 192.62 kcal/d), iron (56.93 to 162.85 kcal/d) and sodium (208.08 to 699.69 kcal/d) contents. In regards to the intake of "Sugars and Sweets" group, there was a positive significant association for carbohydrates (97.53 to 491.70 kcal/day), total fiber (0.56 to 2.64 kcal/d), iron (0.85 to 4.40 kcal/d) and sodium (175.59 to 838.48 kcal/d) content.

Originality/value – Findings demonstrate that girls over consumed the "Oils and Fats" and "Sugars and Sweets" groups reflecting on increased of important macro and micronutrients of their diet. Therefore, consuming up to 1 serving size of these groups is a good way to promote healthy eating among this population.

Keywords Adolescents, Diet, Nutrients, Dietary intake, Girls, Food guide pyramid

Paper type Research paper

Introduction

Diet is an important determinant factor for unhealthy weight gain, which is associated with several chronic non-communicable diseases. Adolescence is a time when many diet behaviors are established, and there is a high likelihood of these behaviors tracking into adulthood (WHO, 2012). Establishing and maintaining healthy dietary habits are crucial to the transition from adolescence to adulthood, due to the fact youth move from dependence to independence on their food choices and meals in regarding to their parents/caregivers (Whitrow *et al.*, 2016).

Most Brazilian adolescents do not meet the current guidelines for healthy eating (Philippi and Barco Leme, 2015; Azeredo *et al.*, 2014) despite the demonstrated benefits of having an adequate dietary intake (Leme *et al.*, 2013). A national cross-sectional study showed that diets of 14-18 year-old Brazilian adolescents were not adequate in terms of vitamin A, calcium and iron, while the intake of fat and sugar were above the recommendations. Also, compared to the boys, girls had higher inadequacy of micronutrients (Leal *et al.*, 2010). In respect of low-energy nutrient-dense food items, many adolescent failed to meet the Brazilian food pyramid guideline: showing an inversion of the groups. For instance, the fruits and vegetables groups were located on the top and the sugars and fats groups on the basis of the icon (Leal *et al.*, 2010).

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Furthermore, a national representative study with 11- to 15-year-old (or older) adolescents from all the Brazilian states and the Federal District showed that girls vs boys had the worst unhealthy dietary makers for the following food items: bagged salty snacks (14.97 vs 10.93 per cent), fried salty snacks (17.34 vs 14.17 per cent), processed meat (15.51 vs 13.72 per cent), sweet biscuits (48.14 vs 33.79 per cent) and sweets (48.14 vs 33.79 per cent) (Azeredo *et al.*, 2014). Therefore, there is a continued need to assess nutrient profile diet of community-based sample of adolescents, especially those from middle- and low-income countries to pinpoint the flaws or improvements, as well as to the development of public health strategies.

Evidence demonstrates that meeting the current dietary guidelines reduce the risk of obesity, chronic non-communicable diseases and premature death, and aid in healthy weight management by adopting the smart food concept (i.e. substituting fruits and vegetables for energy-dense poor-nutrient food items) (Banfield *et al.*, 2016; Moore *et al.*, 2016). As the US (Kromhout, 2015) and Australian (Australia, 2013) guidelines, the Brazilian Food Pyramid have expressed changes, with historical emphasis on nutrient profiles progressively complemented by the use of food groups and daily servings. In this sense, the Brazilian Food Pyramid (Philippi, 2014) provides age-specific recommendations about the number of daily servings from the eight food groups and adopted the concept of smart food choices. Smart food choices are to choose low-energy, nutrient-dense food items instead of energy-dense nutrient-poor food items, for example, substituting fruits, vegetables and whole-wheat products to fried/fatted snacks, industrialized products (ready-to-eat items and sugar sweetened beverages) and sweets (Leme and Philippi, 2014; Philippi and Barco Leme, 2015). Also, the Food Guide Pyramid recommended a balance intake of a variety of foods and beverages from the eight food groups.

To date, little research has been conducted using middle- and low-income countries data on adolescents' consumption of the Brazilian Food Pyramid associated to the energy density of the diets. Therefore, the contents of macronutrients and micronutrients could demonstrate potential characteristics of these foods items related to the increase on the risk of unhealthy weight and chronic diseases. Moreover, researchers and practitioners should be able and be free to choose which dietary reference they want to use in their work. This work might provide useful data to use as framework (Leal *et al.*, 2010; Azeredo *et al.*, 2014; Leme and Philippi, 2014; Philippi and Barco Leme, 2015; Whitrow *et al.*, 2016). Given this, the present study evaluated the impact of the groups from the Brazilian Food Pyramid on macro and micronutrient content of food consumed by adolescent girls from a school-based study.

Methods

Study design

Baseline data from the "Healthy Habits, Healthy Girls – Brazil (H3G-Brazil)" randomized controlled trial were used for this study (Leme and Philippi, 2015). These data were collected in February 2014, prior to the beginning of the intervention program. The H3G-Brazil was a six-month multicomponent obesity prevention intervention for adolescent girls from public schools in low-income areas of the city of São Paulo. The intervention was culturally adapted from the Australian NEAT Girls study (Lubans *et al.*, 2010) based on Social Cognitive Theory with the following components: physical education classes for girls, interactive seminars, nutrition workshops, school-break physical activity (PA) sessions, nutrition and physical activity handbooks, parent newsletters, food and PA diaries and *WhatsApp*® weekly messages. Ethics approval for the study was obtained from the School of Public Health, University of São Paulo. Written informed consent to participate in the study was obtained from school principals, parents/caregivers and students. Also, authorization to culturally adapt the NEAT girls study was obtained.

Participants

Governmental public technical high schools were eligible to participate. The ages of the adolescents range between 14 and 18 years old and the students spend the whole day at school. In this sense, part of the day is allocated to regular high school and the other to technical education in several different areas (e.g. chemistry, environmental science, visual communication, health and business and management). Governmental schools that offer nutrition and dietetics technical course (13 of 43 schools) in the city of São Paulo were selected for the current study because they provided opportunities for partnership with accredited dietitians teachers and allow their students to work as research assistants. Furthermore, there is a lack of methodological rigorous school-based studies conducted in Brazil (Guerra *et al.*, 2014). This study followed the "Strengthening the Reporting of Observational Studies in Epidemiology" (STROBE) statement (von Elm *et al.*, 2007).

Girls reported their parents/caregivers school level of education and the neighborhood they live. In Brazil, parents' education level is considered an income proxy. In agreement with the social economic of the city of São Paulo, the schools and neighborhoods are in areas of high vulnerability (e.g. government housing and slums, demonstrating areas of low socio-economic position). Therefore, the girls were from low-income socio-economic status. Once schools agreed to participate in the study, teachers invited the girls to voluntarily participate in this study. Therefore, ten schools were successfully recruited with an average of 25 students per school. On total 253 adolescents participated on this study.

Dietary intake

The diet of each study girl was assessed using the Brazilian Food Frequency Questionnaire based on the Food Pyramid (FFQ-FP); a validated semi-quantitative with 50 food and beverage items designed specifically to assess usual dietary intake in adolescents attending public schools from the city of São Paulo (Martinez *et al.*, 2013). Girls were asked to report how often they consumed a list of food and beverage items over the previous 12 months, with option ranging from "never" to "≥2 times per day". Portion size data were determined from the Brazilian Food Pyramid for the adolescent population and "usual" serving sizes for items such as fruit unit, glass of milk, steak, unit of bread rolls, etc. The students reported the quantity of each food item consumed, and this quantity was transformed in daily serving using codes (codes represent an estimate of daily servings) (Philippi and Barco Leme, 2015).

The food items in the current analysis were divided into the eight groups according to the Food Pyramid:

(1) rice, pasta, potato and cassava;
(2) fruits;
(3) vegetables;
(4) milk, yoghurt and cheese;
(5) meat and eggs;
(6) beans and nuts;
(7) oils and fats; and
(8) sugars and sweets (Philippi and Barco Leme, 2015).

Furthermore, foods from the "Oils and Fats" and "Sugars and Sweets" groups were classified as energy-dense nutrient-poor food items and were considered into the analysis (Philippi, 2014). These food items were associated with unhealthy weight gain and chronic

non-communicable diseases in adolescents. These are the major public health concern with adolescents worldwide (Martinez Steele *et al.*, 2016). The girls were classified into four categories in accordance with their intake of the groups:

(1) oils and fats; and

(2) sugars and sweets groups.

These categories are related to quartiles of the girls' distribution according to the contribution of "Oils and Fats" and "Sugars and Sweets" groups to the total energy value of their diet.

The nutrients assessed were carbohydrates, proteins, total fats, saturated fats, polyunsaturated and monounsaturated fats and total fiber. The micronutrients evaluated were calcium, iron and sodium. They were identified as insufficient or excessive in previous Brazilian survey (Leal *et al.*, 2010) and/or most relevant to growth, development and health in adolescence. The total energy intake of the adolescent girls that where <500 kcal and >5,000 kcal were removed from database (6 from baseline) (Collins *et al.*, 2014).

Statistical analysis

Descriptive statistics to characterize the sample and their nutrient profiles were used. Differences between nutrient content and the food pyramid groups were obtained through *t*-student test. The girls were classified into four strata in accordance with their intake of "Oils and Fats" and "Sugars and Sweets" food groups. These strata corresponded to quartiles of the sample distribution according to the contribution of energy-dense nutrient poor foods to the total caloric value of the diet. The macro and micronutrients of the diet in these data were then evaluated. Linear regression analyses were used to identify the associations between the quartiles of relative energy-dense nutrient poor foods intake and nutrients content of the diet, adjusted for school level. All analyses were examined using the SPSS (version 21.0 for MAC) with alpha levels set at $p < 0.05$.

Results

Table I provides the descriptive characteristics of dietary intake of the adolescent girls in regards to the mean daily intake and the intake contribution (percentage) of each food pyramid group. Therefore, the mean daily energy intake by the adolescent girls was 2.88709 [standard error (SE) 91,50] kcal. Based on the mean daily intake the contribution of each of the following food groups were: 32.02 per cent (SE 1.11) from the "Rice, Bread, Pasta and Cassava" group; 3.70 per cent (SE 0.12) from the "Vegetables" group; 30,31 per cent (SE 0.73) from the "Fruits" group; 27.73 per cent (SE 1.61) from the "Milk, Cheese and Yoghurt" group; 6.59 per cent (SE 0.34) from "Meat and Eggs" group; 5.37 per cent (SE 0.22) from "Beans and Nuts" group; 6.99 per cent (SE 0.24) per cent from the "Oils and Fats" group; and 8.77 per cent (SE 0.44) from the "Sugars and Sweets" group.

Table II demonstrates the micronutrients content of diet in each of the eight food pyramid groups. Therefore, the significant findings were found between the following micronutrients and food pyramid groups: calcium and "Vegetables" group [Mean = 66.19 (se 3.18) kcal/day) and "Beans" group [M = 109.78 (SE 7.91) kcal/day]; iron and "Vegetables" group [M = 1.26 (SE 0.05) kcal/d], "Beans" group [M = 1.84 (SE 0.09) kcal/d], "Oils" group [M = 2.46 (SE 0.12) kcal/d] and "Sugars" group [M = 3.06 (SE 0.18) kcal/d]; and sodium and "Rice" group [M = 2,169.56 (SE 105.47) kcal/d], "Vegetable" group [M = 251.81 (SE 12.23) kcal/d], "Fruit" [M = 2,053.05 (SE 88.67 kcal/d], "Oils" group [M = 489.44 (SE 24.03) and "Sugars" group [M = 614.29 (SE 38.78) kcal/d].

Moreover, Table II demonstrates the macronutrients and total fiber content of diet in each of the food groups. For instance, carbohydrates and "Rice" group [M = 1,261.62 (SE 59.50) kcal/d],

Table I.
Means and confidence interval of the food groups and nutrients intake of girls attending the "healthy habits, healthy girls – Brazil"

Food group	Recommendations	Mean (SE)	Confidence interval	Adequacy (SE) (%)
Rice, bread, pasta, potato and cassava (kcal/d)	975 kcal/d*	704.71 (24.36)	656.70 to 752.71	32.02 (1.11)
Vegetables (kcal/d)	67,5 kcal/d*	81.49 (2.56)	76.44 to 86.54	3.70 (0.12)
Fruits (kcal/d)	245 kcal/d*	666.82 (15.98)	635.33 to 698.29	30.31 (0.73)
Milk, cheese and yogurt (kcal/d)	300 kcal/d*	610.10 (35.43)	540.30 to 679.90	27.73 (1.61)
Meat and eggs (kcal/d)	380 kcal/d*	145.02 (7.48)	130.29 to 159.75	6.59 (0.34)
Beans and nuts (kcal/d)	82,5 kcal/d*	118.11 (4.88)	108.49 to 127.72	5.37 (0.22)
Oils and fats (kcal/d)	73 kcal/s*	153.95 (5.29)	143.53 to 164.36	6.99 (0.24)
Sugars and sweets (kcal/d)	110 kcal/d*	193.05 (9.62)	174.08 to 212.00	8.77 (0.44)
Total energy (kcal/d)	2,200 kcal*	2887.09 (91.50)	2706.88 to 3067.31	131.23 (4.16)
Carbohydrates (kcal/d)	45-65%**	1731.47 (59.46)	1641.41 to 1477.00	45.25 (1.55)
Proteins (kcal/d)	10-30%**	382.13 (15.22)	352.15 to 412.09	3.65 (0.15)
Fats (kcal/d)	25-30%**	773.53 (31.66)	711.19 to 835.88	11.60 (0.47)
Total fiber (grams/d)	26 g/d***	9.65 (0.33)	8.99 to 10.31	37.12 (1.28)
Calcium (mg/d)	1,300 mg/d***	772.02 (26.94)	718.97 to 825.08	59.39 (2.07)
Iron (mg/d)	15 mg/d***	14.78 (0.43)	13.92 to 15.63	98.52 (2.89)
Sodium (mg/d)	1,500 mg/d***	2956.56 (98.74)	2762.10 to 3151.03	197.10 (6.58)

Notes: *Recommendations based on the Brazilian Food Guide Pyramid for adolescent girls; **acceptable Macronutrient Range (RDAS) for adolescents; ***recommended Dietary Allowance (RDA) for girls from 14 to 18 years: SE: Standard Error

Table II.
Mean (standard error) of nutrients content in total food consumption and in fractions of this consumption relating to food pyramid groups items

		Food intake fractions							
Nutrients	Total intake	Rice group	Vegetables group	Fruit group	Meat group	Milk group	Beans group	Oils group	Sugars group
Mean (Standard error)									
Carbohydrate (kcal/1,000 kcal)	6246.42 (469.87)	1261.62 (59.50)*	153.82 (7.90)*	1183.92 (50.62)*	249.09 (14.47)	1051.31 (68.86)	209.63 (10.89)	275.91 (13.16)	358.66 (251.14)*
Protein (kcal/1,000 kcal)	1365.42 (117.09)	280.24 (15.19)	32.97 (1.69)*	261.55 (12.16)	52.29 (3.91)	231.57 (15.53)	49.25 (3.23)*	66.67 (3.68)*	77.70 (4.73)
Fats (kcal/1,000 kcal)	2833.56 (266.50)	588.54 (33.56)*	67.96 (3.74)*	529.07 (24.93)	111.11 (6.62)	472.92 (31.03)	100.02 (6.79)*	132.49 (7.29)*	156.42 (9.47)
Total fiber (g/1,000 kcal)	32.41 (2.63)	7.00 (0.33)*	0.79 (0.04)	6.74 (0.30)	1.67 (0.11)*	6.95 (0.52)*	1.19 (0.06)	1.50 (0.07)	2.01 (0.13)*
Calcium (mg/1,000 kcal)	2623.99 (193.04)	593.71 (27.97)	66.19 (3.18)*	524.70 (23.35)	118.36 (7.73)	484.89 (31.12)	109.78 (7.91)*	123.77 (6.12)	152.29 (8.82)
Iron (mg/1,000 kcal)	50.35 (3.39)	10.63 (0.45)	1.26 (0.05)*	10.28 (0.41)*	2.19 (0.12)	9.46 (0.65)	1.84 (0.09)*	2.46 (0.12)*	3.06 (0.18)*
Sodium (mg/1,000 kcal)	10484.54 (773.39)	2169.56 (105.47)*	251.81 (12.23)*	2053.05 (88.67)*	419.43 (23.88)	1787.96 (115.18)	359.42 (18.76)	489.44 (24.03*)	614.29 (38.78)*

Note: *Value significantly different ($p < 0.05$) from the value that was estimated for the food groups and nutrients

"Vegetables" group [M = 153.82 (SE 7.90) kcal/d], "Fruits" group [M = 1,183.92 (SE = 50.62) kcal/d] and "Sugars" group [M = 358.66 (SE 251.14) kcal/d]; proteins and "Vegetables" group [M = 32.97 (SE 1.69) kcal/d], "Beans" group [Mean = 49.25 (SE 3.23) kcal/d] and "Oils" group [M = 66.67 (SE 3.68) kcal/d]; fats and "Rice" group [M = 588.54 (SE 33.56) kcal/d], "Vegetables" group [M = 67.96 (SE 3.74) kcal/d], "Beans" group [M = 100.02 (SE 6.79) kcal/d] and "Oils" group [M = 132.49 (SE 7.29) kcal/d]. Finally, the total fiber content was associated with "Rice" group [M = 7.00 (SE 0.33) kcal/d], "Meat" group [M = 1.67 (SE 0.11) kcal/d], "Milk" group [6.95 (SE 0.52) kcal/d] and, "Sugars" group [M = 2.01 (SE 0.13) kcal/d].

Tables III and IV describes the adjusted analyses of the association between the quartiles of relative intake of the "Oils and Fats" and "Sugars and Sweets" groups and nutrient content in the diet. There was a positive significant association between relative intake of the "Oil and Fats" group and protein (ranged from 24.95 to 96.12 kcal/d), fats (ranged from 48.36 to 192.62 kcal/d), iron (56.93 to 162.85 kcal/d) and sodium (208.08 to 699.69 kcal/d) contents. Although no statistically significant, there was a negative association to total fiber content (ranged from 0.63 to 2.04 kcal/d).

In regards to the intake of "Sugars and Sweets" group, there was a positive significant association for carbohydrates (ranged from 97.53 to 491.70 kcal/day), total fiber (0.56 to 2.64 kcal/d), iron (0.85 to 4.40 kcal/d) and sodium (175.59 to 838.48 kcal/d) content. For this food group, there was no negative association (Table IV).

Discussion

The findings of this study supported the use of food icons, such as the food pyramid as important dietary intake measurement tools to be used with the youth population from low and middle-income countries. Furthermore, the results of this study demonstrated that the

Table III.
Mean of nutrients content in the diet according to quintiles of oils and fat groups contribution to total energy consumption. The healthy habits, healthy girls – Brazil, São Paulo, 2014

Nutrients	Quartiles of oils and fats group intake Q1	Q2	Q3	Q4	Adjusted regression coefficient	*p*-value
Carbohydrate (kcal/1,000 kcal)	116.18	231.48	286.57	382.80	0.110	0.092
Protein (kcal/1,000 kcal)	24.95	49.07	67.49	96.12	0.318	0.000
Fats (kcal/1,000 kcal)	48.36	106.62	134.63	192.62	0.259	0.000
Total fiber (g/1,000 kcal)	0.63	1.26	1.64	2.04	−0.004	0.953
Calcium (mg/1,000 kcal)	56.93	103.39	131.53	162.85	0.79	0.230
Iron (mg/1,000 kcal)	0.99	2.09	2.67	3.54	0.282	0.000
Sodium (mg/1,000 kcal)	208.08	417.73	528.16	699.69	0.244	0.000

Table IV.
Mean of nutrients content in the diet according to quintiles of sugars and sweets groups contribution to total energy consumption. The healthy habits, healthy girls – Brazil, São Paulo, 2014

Nutrients	Quartiles of oils and fats group intake Q1	Q2	Q3	Q4	Adjusted regression coefficient	*p*-value
Carbohydrate (kcal/1,000 kcal)	97.53	287.39	349.52	491.70	0.178	*0.006*
Protein (kcal/1,000 kcal)	20.09	58.22	77.00	113.61	0.085	0.197
Fats (kcal/1,000 kcal)	40.99	124.85	162.69	234.03	0.063	0.334
Total fiber (g/1,000 kcal)	0.56	1.55	1.96	2.64	0.156	*0.017*
Calcium (mg/1,000 kcal)	53.59	117.37	160.38	222.10	0.036	0.580
Iron (mg/1,000 kcal)	0.85	2.53	3.30	4.40	0.178	*0.006*
Sodium (mg/1,000 kcal)	175.59	498.19	629.42	838.48	0.168	*0.010*

girls' intake of the food groups are above the recommendations of the nutrient profiles, especially for the amount of protein, total fat, iron and sodium in reference to the "Oils and Fats "group; and for carbohydrates, total fiber, iron and sodium for the "Sugars and Sweets" group. This might indicate that food items clustered in the top food pyramid groups (i.e. "Sugars and Sweets"; "Oils and Fats" groups) met the recommendations for the nutrients (Giabbanelli and Adams, 2016) and/or that the adolescents' intake might be above the recommendations for the food groups, and this could reflect in the amount of nutrient intake (Philippi and Barco Leme, 2015).

It is not a surprise that the content of protein, fat and sodium may have been increased in the "Oils and Fats" group, as well as the content of carbohydrates and sodium in the "Sugar and Sweets" group. The food items pertained to those groups is generally high in these nutrients. The Brazilian Food Pyramid for adolescent girls based on a diet of 2,200 kcal recommends the intake of up to 1 serving per day for the "Oil and Fat" and "Sugar and Sweets" groups (Juzwiak and Frutuoso, 2015). An unhealthy diet, i.e. consuming more than the recommendations for these food groups, is the key contributor to obesity, a risk factor for a range of chronic diseases (Rodriguez *et al.*, 2016; Moore *et al.*, 2015).

On the other hand, a higher consumption of the "Oils and Fat" and "Sugar and Sweets" groups were associated with a higher content of protein, iron and total fiber. This finding might be related to how these food items were aggregated into the food groups. For instance, flavored milk was aggregated into the "Milk, Cheese and Yoghurt" and "Sugars and Sweets" groups. This food item contains proteins and calcium. Another example is the ready-to-eat cereals. Some of the girls reported the intake of granola/muesli, which is a fiber source, and might have reflected an increased amount of fiber associated with the "Sugars and Sweets" group. This item was aggregated into the "Rice, Bread, Pasta, Cassava and Potato" and "Sugars and Sweets" groups (Philippi and Barco Leme, 2015).

Considering the majority of the adolescents, there was an adequate intake of important nutrients for growth and development during this period of life. However, their energy intake was derived from foods that were poor in nutrients. Comparing with historical surveys of similar age groups, this suggests that their average energy intake was higher than the average intake, which explains the prevalence of unhealthy weight gain in this population as whole. Although the "Oil and Fats" and the "Sugar and Sweets" food groups can contribute to the necessary nutrient intakes when consumed in a balanced way, saturated fat, sugar and sodium are also present in these groups. Careful attention should be taken to avoid overconsumption.

The adolescents' higher intake of those groups might be due to their food preferences (especially girls that have a sweet tooth) and to the marketing strategies used by the food and beverages industry, for example, more colorful packages and health claims that are not evidence-based and special offers at the retailer store (Mallarino *et al.*, 2013; Conceicao *et al.*, 2017).

It is important to notice that even the "Oil and Fats" and "Sugar and Sweets" groups can be part of a healthy diet. However, individuals should keep in mind the concept of smart food choices. For example, choosing vegetable oil and/or olive oil instead of butter/margarine; preferring low-fat milk/dairies instead of whole milk/dairies; natural fruit juices or even raw fruits instead of sugar sweetened beverages (soft-drinks and powder/nectar juices). Moreover, some industrialized food items could be eaten depending on the occasion, frequency and amount consumed (Philippi and Barco Leme, 2015).

When working with adolescents restricted rules for dieting should be avoided, e.g. limiting the intake of some food groups. Research suggests that dieting and other unhealthy weight control behaviors (e.g. fasting, taking pills and using meal replacements) are associated with both obesity and eating disorders. Overweight individuals in general and

female adolescents in particular report unhealthy weight control behaviors (Haines and Neumark-Sztainer, 2006; Loth *et al.*, 2015).

The family plays an important role in the youth eating behaviors. For example, parents/caregivers' healthy food choices are associated with their children's adequate eating behaviors, such as an increased consumption of items from the "Fruits" and "Vegetables" groups, and a lower consumption of items pertained to the "Oils and Fats" and "Sugars and Sweets" groups. Younger adolescents are more prone to have better foods choices compared to older adolescents (Berge *et al.*, 2016; Haines *et al.*, 2016).

The strengths of this study are as follows: its school-based, representative sample of adolescent girls from the city of São Paulo, Brazil; a rigorous methodological design followed by STROBE standard; and the use of a FFQ to assess diet. The FFQ demonstrates the advantages of evaluating usual food intake (compared to other dietary methods, such as the 24-h recall); however, it is more time consuming than the 24-h recall or the usual dietary recall. Nevertheless, there are also some limitations. First, the use of all FFQ in general can include potential recall bias that lead to the challenge of remembering the frequency and amount of food items eaten over a specific period (mainly foods that are out of season), overestimation of frequency of food intake (Whitrow *et al.*, 2016) and social desirability bias (Smith *et al.*, 2014; Whitrow *et al.*, 2016). The dietary tool was designed and validated for adolescents in this age group in the Brazilian setting and was completed under the supervision of trained research assistants, which improves its reliability. Second, due to the targeted nature of the study (i.e. main study was a school-based intervention program), the results may not be generalizable to other groups, for example, male subjects, those from other socioeconomic strata and regions. The baseline data from this study might serve as a framework for future researchers and practitioners. Finally, some food items that are listed in the "Brazilian Food Tables" lack some important nutrients, especially the industrialized items in relation to vitamins, minerals and trace elements. To minimize these information gaps, the researchers decided to use the food items that have complete nutrient values. On the other hand, the researchers did not choose to use other international tables due to the food items that are found exclusively in Brazil.

Conclusion

The results related to the impact of consuming the "Oils and Fats" and "Sugars and Sweets" groups items on macro and micronutrients content in the diet of the adolescent girls, might have unfavorable outcome when eaten in amounts higher than recommended by the Brazilian Food Pyramid. The results of this study demonstrated that the adolescent girls are consuming above the recommendations for these groups. This might reflect in an increased intake of the macro and micronutrients and fiber content of the diet of the study population. This might be because of an increase in energy density and content of important macronutrients, such as carbohydrates and fats. However, fats and carbohydrates should not be avoided in the diet of the individuals. These nutrients, when chosen adequately, for instance unsaturated fats and whole-wheat sources of carbohydrates instead of saturated/trans-fat and simple carbohydrates (table sugar), provides adequate amounts of important micronutrients and other sources for the development and growth of the adolescents. Therefore, consuming up to 1 serving size of the "Oil and Fats" and "Sugar and Sweets" groups is a good way to promote healthy eating among this population.

Finally, this study supported the recommendations of the new edition of the Brazilian Food Pyramid (Philippi, 2014), particularly the recommendations of smart food choices distributed along the eight food groups.

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