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Association of dietary intake with eating behavior, screen time, and physical activity among Brazilian adolescents

Asociación entre consumo y comportamiento alimentario, tiempo de pantalla y actividad física entre adolescentes Brasileños

ABSTRACT

The purpose of this article was to investigate the association of dietary intake with eating behavior, screen time, and physical activity among Brazilian adolescent students. This was a cross-sectional study with 14,653 adolescents attending ninth grade in 281 public and private schools in Brazilian state capitals and the Federal District. Data were collected using a self-administered online questionnaire. We investigated food consumption, eating behaviors (including family meals and place where meals were eaten), screen time, and physical activity level. The consumption of healthy foods was associated with: having lunch or dinner with parents every day, having lunch at home every day, and doing physical activity for more than 4 hours/week. Whereas the consumption of unhealthy foods was associated with: eating in front of a television or a computer on a frequent basis as well as watching television and using a computer for more than 2 hours/day. Therefore, public health promotion policies aimed at adolescent students should focus on encouraging this group to have meals with their family and at home along with adopting an active lifestyle.

Key-words: Dietary intake; Eating behavior; Screen time; Physical activity; Adolescent.

RESUMEN

El propósito de este artículo fue investigar la asociación del consumo de alimentos con el comportamiento alimentario, con el tiempo frente a pantallas y con la actividad física entre estudiantes adolescentes brasileños. Este fue un estudio transversal con 14.653 adolescentes de noveno grado en 281 escuelas públicas y privadas de las capitales de los estados brasileños y el Distrito Federal. Los datos fueron recolectados utilizando cuestionario en línea auto-administrado. Investigamos el consumo de alimentos, los comportamientos alimentarios (incluso hacer comidas en familia y el lugar donde se realizaban las comidas), el tiempo de pantalla y el nivel de actividad física. El consumo de alimentos saludables se asoció con: almorzar o cenar con los padres todos los días, almorzar en casa todos los días y realizar actividad física durante más de 4 horas por semana, mientras que el consumo de alimentos no

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saludables se asoció con: comer delante de la televisión o computadora con frecuencia y viendo/usando la televisión o computadora por más de 2 horas/día. Por tanto, las políticas de promoción de la salud pública dirigidas a estudiantes adolescentes deberían centrarse en alentar a este grupo a comer con sus familias y en el hogar y adoptar un estilo de vida activo.

Palabras clave: Consumo de alimentos; Comportamiento alimentario; Tiempo frente a la pantalla; Actividad física; Adolescente.

INTRODUCTION

The prevalence of overweight and obesity has been rising around the world. In Brazil, those problems affect

17.1% and 8.4% of adolescents, respectively¹. This may be attributed to changes in dietary patterns over the past few decades, reduced physical activity, and more time spent in sedentary leisure activities^{2,3,4}. The high consumption of ultra-processed foods has been associated with a greater risk of overweight and obesity at a young age². More than 40% of Brazilian adolescents eat candies more than five times a week and around a quarter of them consume soft drinks almost every day⁵. When overweight, 62.0% are sedentary⁶.

The adoption of healthy eating habits during childhood and adolescence is a determining factor to maintain these habits into adulthood⁷, especially those established in the family environment^{8,9}. The habit of having family meals has been found to reduce risk behaviors for obesity among adolescents. Additionally, it is associated with a higher consumption of healthy foods and a lower consumption of unhealthy foods, as well as with a lower risk of childhood overweight and obesity^{10,11,12}.

Physical activity is related to health promotion and disease prevention in adolescence, and its consequences have an impact throughout life¹³. Conversely, sedentary leisure activities are considered to have a negative influence on adolescents' health and diet. Extensive screen time is associated with low intake of fruits and vegetables, excessive intake of high-calorie foods such as soft drinks, and low energy expenditure, all of which contribute to overweight^{14,15}. In Brazil, the 2015 National Adolescent School-Based Health Survey (PeNSE - Pesquisa Nacional de Saúde do Escolar) found that only 34.4% of adolescent students were considered physically active, i.e., performed at least 300 minutes of physical activity per week⁵.

Studying the determinants that may influence adolescents' dietary intake, especially the potentially modifiable factors, is a promising approach to help in the fight against the obesity epidemic, because it may guide public policies and nutritional interventions aimed at promoting adolescent health. Therefore, the aim of the present study was to investigate the association of dietary intake with eating behavior (eating meals with parents or in front of a television or computer), screen time, and physical activity among students in the ninth grade (the last year of primary school in Brazil) from Brazilian state capitals and the Federal District.

MATERIALS AND METHODS

This cross-sectional study was part of a larger research project, which aimed to investigate food culture (knowledge on national and regional food and preparations) and eating behaviors among adolescents in Brazil. We investigated ninth-grade students attending public and private schools in the capital cities of the 26 Brazilian states and in the Federal District between September 2011 and November 2012. Our sample design was similar to the 2009 National Adolescent School-Based Health Survey (PeNSE) to obtain comparable data¹⁶. A random probability sampling was used to select public and private schools that met the following inclusion criterion: having a ninth-grade class and a computer laboratory

for students to access the Internet. Exclusion criteria included: schools aimed exclusively at the education of young people and adults, schools located in indigenous areas or in quilombos (communities of descendants of former fugitive slaves), and schools with less than 15 students. Schools were ordered in a random list and invited to participate in the research until participant sample size was reached. All ninth-grade students attending school on the day of data collection were eligible for the study. The final sample size consisted of 14,653 adolescents, recruited in 281 schools, which corresponds to a maximum sampling error of 5% and a 95% confidence interval (95% CI).

Data were collected using a self-administered online questionnaire with objective questions designed to collect the following data: gender, age, dietary intake, eating behavior, screen time, and physical activity. Dietary intake was assessed using the same methodology used in the 2009 PeNSE¹⁶, which asked how often the students consumed healthy foods (beans, vegetables, fruits, and milk) and unhealthy foods (soft drinks, French fries, fried snacks, sweets, cold cuts, cookies, and crackers) during the 7 days prior to the research. Participants were asked to consider their overall dietary intake, including what they consumed at home, on the street, at snack bars, at restaurants, or at any other place. Based on data from the adolescents' answers, we calculated the mean number of days they reported eating each type of food during the week prior to data collection.

In our study, eating behavior was assessed by asking how often respondents had lunch and dinner with their parents, had lunch at home, and ate in front of a television or computer. The first two were investigated with the questions: "How often do you have lunch or dinner with your parents during the week?" and "How often do you have lunch at home?". Possible answers for both questions were: never, rarely, once or twice a week, three or four times a week (which were grouped into the category "Not frequently consumed" for analysis purposes), and five or more times a week/every day (which comprised the category "Frequently consumption"). Questions focused on lunch because, in Brazil, most adolescents attend school only in the morning or in the afternoon, which enables them to have lunch at home. Lunch is also the main meal during day. We also asked: "Do you usually eat in front of a television?" and "Do you usually eat in front of a computer?", with the following possible answers: never, rarely, sometimes (grouped as "Not frequently" for analysis purposes), often, and always (grouped as "Frequently").

Adolescents' daily screen time was assessed using the question: "How many hours of television do you watch per day?" and "How many hours do you spend on a computer or the Internet per day?", with possible answer options: less than 2 hours, from 2 to 4 hours, and more than 4 hours. Physical activity time was measured by asking: "How many hours of physical activity, such as playing ball games, swimming, walking, cycling, running, or others, do you do per week?". Possible answers were: less than 1 hour, from 1 to 2 hours, from

2 to 4 hours, and more than 4 hours. The questionnaire was tested in 2011 with 1,049 ninth-grade adolescents attending public schools in Brasília, Federal District.

Eating behavior, screen time, and physical activity time were assessed by univariate analysis and expressed in percentages with 95% CI. The Student's *t* test was used to analyze the association between adolescents' dietary intake and eating behavior (having lunch and dinner with parents, having lunch at home, and eating in front of a television or computer), considering the mean number of days of frequent and not frequent consumption of selected foods. Additionally, analysis of variance (ANOVA) with Welch's correction was performed to investigate the association between adolescents' dietary intake and screen time (time spent watching television or using a computer) and weekly physical activity levels. In both tests, statistical significance level was 5%. The statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 21.0.

The Research Ethics Committee of the University of Brasília approved this research. The authors declare no conflicts of interest.

RESULTS

The adolescent's average age was 14.0 ± 1.0 years. Of these, 53.3% ($n = 7,809$) were female and 71.1% ($n = 10,413$) attended public schools (data not showed in tables).

Most adolescents had lunch or dinner with their parents every day in the week prior to the survey (56.8%). Around two thirds of the adolescents investigated reported to have lunch at home on a daily basis (74.7%), and 54.6% of

adolescents reported frequently eating in front of a television. Regarding daily screen time, most students reported that they spend between 2 and 4 hours per day watching television (37.8%) and less than 2 hours per day using a computer or the Internet (42.2%). Only 18.2% participated in physical activities such as playing ball games, swimming, walking, cycling, or others more than 4 hours per week (Table 1).

The adolescents who had had lunch or dinner with their parents or who had frequent meals at home (five or more days a week) had a healthier diet, with higher mean days of consumption of beans, vegetables, cooked vegetables, and milk. Conversely, they had less frequent consumption of French fries, fried snacks, cold cuts, sweets, and soft drinks during the week. Dietary intake was poorer among those who ate in front of a television or computer on a frequent basis, with higher consumption of all unhealthy foods and lower consumption of healthy foods (Table 2).

More time spent watching television resulted in higher mean days of consumption of fried snacks, cold cuts, crackers, cookies, sweets, and soft drinks. We found that the mean days of consumption of vegetables, raw salad, and cooked vegetables were inversely proportional to the time spent watching television. Adolescents who watched television for more than 4 hours per day reported more frequent consumption of French fries and less frequent consumption of beans, fruits, and milk compared with those who watched television from 2 to 4 hours per day. Similarly, those who used a computer or the Internet for more than 4 hours per day had lower consumption of beans, vegetables, raw salad, cooked vegetables, and fruits compared with those who

Table 1. Distribution (%) of the indicators of eating behavior, screen time, and physical activity time among students from Brazilian state capitals and the Federal District, Brazil, 2011/2012.

Eating behavior	Never	Rarely	Once or Twice a Week	Three to Four Times a Week	Every Day
Frequency of having lunch or dinner with parents during the week	4.9	13.2	9.8	15.2	56.8
Frequency of having lunch at home	1.1	5.3	4.6	14.4	74.7
	Never	Rarely	Sometimes	Often	Always
Frequency of eating in front of a television	7.5	11.3	26.6	18.6	36.0
Frequency of eating in front of a computer	42.2	18.4	21.9	7.7	9.8
Screen Time (Hours/Day)	Less than 2 hours	Between 2 and 4 hours	More than 4 hours		
Time watching television	30.7	37.8	31.5		
Time spent on a computer or on the internet	42.2	28.8	29.0		
Physical Activity (Hours/Week)	Less than 1 hour	Between 1 and 2 hours	Between 2 and 4 hours	More than 4 hours	
	29.9	25.5	26.4	18.2	

Table 2. Mean days of consumption of selected foods, according to the eating behavior among students, Brazil, 2011/2012.

Variables		Lunch or Dinner	Lunch at Home with Parents	Eating in Front of a Television	Eating in Front of a Computer
Beans	I	3.38 ± 1.84a	3.21 ± 1.89a	3.66 ± 1.75b	3.65 ± 1.75a
	F	3.82 ± 1.68	3.77 ± 1.70	3.58 ± 1.80	3.43 ± 1.92
Vegetables	I	2.37 ± 2.01a	2.43 ± 2.04a	2.76 ± 2.00a	2.61 ± 2.02a
	F	2.71 ± 2.03	2.61 ± 2.03	2.21 ± 2.03	2.17 ± 2.09
Raw Salad	I	2.16 ± 2.03a	2.27 ± 2.04	2.45 ± 2.04a	2.33 ± 2.03a
	F	2.40 ± 2.05	2.31 ± 2.04	2.00 ± 2.01	1.94 ± 2.05
Cooked Vegetables	I	1.36 ± 1.69a	1.39 ± 1.74a	1.61 ± 1.78a	1.52 ± 1.75a
	F	1.59 ± 1.79	1.52 ± 1.76	1.27 ± 1.68	1.19 ± 1.70
Fruits	I	2.88 ± 1.89a	2.96 ± 1.87	3.11 ± 1.86a	3.02 ± 1.87a
	F	3.10 ± 1.87	3.02 ± 1.89	2.82 ± 1.92	2.83 ± 1.98
Milk	I	3.23 ± 2.08a	3.22 ± 2.09a	3.46 ± 2.01a	3.37 ± 2.05b
	F	3.45 ± 2.04	3.40 ± 2.05	3.16 ± 2.13	3.22 ± 2.14
French Fries	I	1.26 ± 1.56b	1.46 ± 1.64a	1.16 ± 1.48a	1.16 ± 1.50a
	F	1.17 ± 1.53	1.13 ± 1.50	1.30 ± 1.64	1.72 ± 1.81
Fried Snacks	I	2.09 ± 1.82a	2.25 ± 1.83a	1.87 ± 1.74a	1.91 ± 1.76a
	F	1.89 ± 1.76	1.88 ± 1.76	2.16 ± 1.85	2.54 ± 1.95
Cold Cuts	I	2.59 ± 1.77	2.69 ± 1.78a	2.42 ± 1.73a	2.47 ± 1.75a
	F	2.45 ± 1.75	2.45 ± 1.75	2.67 ± 1.81	2.93 ± 1.85
Crackers	I	2.81 ± 1.93b	2.83 ± 1.93	2.77 ± 1.91a	2.83 ± 1.92a
	F	2.89 ± 1.92	2.86 ± 1.93	3.00 ± 1.95	3.07 ± 1.97
Cookies	I	2.89 ± 1.88	2.91 ± 1.89	2.71 ± 1.87a	2.80 ± 1.89a
	F	2.84 ± 1.90	2.84 ± 1.89	3.11 ± 1.90	3.36 ± 1.87
Sweets	I	3.50 ± 1.74a	3.61 ± 1.69a	3.25 ± 1.79a	3.34 ± 1.79a
	F	3.29 ± 1.82	3.30 ± 1.81	3.61 ± 1.75	3.77 ± 1.73
Soft Drinks	I	3.40 ± 1.76a	3.52 ± 1.75a	3.21 ± 1.78a	3.26 ± 1.78a
	F	3.26 ± 1.79	3.25 ± 1.78	3.52 ± 1.75	3.89 ± 1.64
I: Not frequently consumption (never, rarely, and sometimes); F: Frequently consumption (often and always); Student's t test: ^a P< .001; ^b P< 0.05.					

used a computer or the Internet for less than 2 hours per day. More time spent on a computer or the Internet meant more frequent consumption of unhealthy foods and less frequent consumption of healthy foods (Table 3).

We also found that spending more time doing physical activity during the week was positively associated with a healthier diet. Those who reported doing more than 4

hours of physical activity per week had more frequent consumption of beans, vegetables, raw salad, cooked vegetables, fruits, milk, and crackers, and less frequent consumption of sweets compared with participants who did less than 2 hours of physical activity per week. Physical activity time was directly proportional to frequency of fruit consumption (Table 4).

Table 3. Mean days of consumption of selected foods in the week prior to the survey according to screen time per day, Brazil, 2011/2012.

	Time Spent Watching Television (Hours)			Time Spent on a Computer or the Internet (Hours)		
	Less than 2	Between 2 to and 4	More than 4	Less than 2	Between 2 to and 4	More than 4
Beans	3.63 ± 1.78	3.69 ± 1.73 ^c	3.57 ± 1.80	3.70 ± 1.72	3.67 ± 1.72 ^c	3.50 ± 1.87 ^b
Vegetables	2.80 ± 2.05	2.59 ± 1.99	2.31 ± 2.03 ^a	2.68 ± 2.01	2.63 ± 2.00 ^c	2.36 ± 2.07 ^b
Raw Salad	2.47 ± 2.05	2.36 ± 2.02	2.04 ± 2.02 ^a	2.31 ± 2.03	2.44 ± 2.02	2.14 ± 2.05 ^a
Cooked Vegetables	1.62 ± 1.81	1.49 ± 1.72	1.36 ± 1.71 ^a	1.62 ± 1.78	1.50 ± 1.73	1.29 ± 1.70 ^a
Fruits	3.07 ± 1.90	3.02 ± 1.85 ^c	2.93 ± 1.91 ^b	3.05 ± 1.87	3.08 ± 1.84 ^c	2.89 ± 1.94 ^b
Milk	3.44 ± -2.03	3.39 ± 2.03 ^c	3.23 ± 2.12 ^b	3.34 ± -2.05	3.42 ± -2.03	3.33 ± -2.1
French Fries	1.12 ± 1.46	1.15 ± 1.47 ^c	1.39 ± 1.69 ^b	1.00 ± 1.42	1.28 ± 1.54	1.46 ± 1.67 ^a
Fried Snacks	1.76 ± 1.72	1.95 ± 1.74	1.95 ± 1.74 ^a	1.74 ± 1.71	2.05 ± 1.77	2.25 ± 1.87 ^a
Cold Cuts	2.35 ± 1.76	2.51 ± 1.71	2.68 ± 1.81 ^a	2.31 ± 1.74	2.60 ± 1.72	2.74 ± 1.80 ^a
Crackers	2.68 ± 1.94	2.81 ± 1.90	3.07 ± 1.93 ^a	2.85 ± 1.90	2.79 ± 1.92 ^c	2.93 ± 1.97
Cookies	2.59 ± 1.91	2.83 ± 1.84	3.16 ± 1.89 ^a	2.70 ± 1.88	2.86 ± 1.87	3.10 ± 1.90 ^a
Sweets	3.11 ± 1.84	3.36 ± 1.75	3.67 ± 1.73 ^a	3.17 ± 1.83	3.48 ± 1.73	3.60 ± 1.74 ^a
Soft Drinks	3.07 ± 1.82	3.28 ± 1.75	3.61 ± 1.73 ^a	3.02 ± 1.81	3.39 ± 1.72	3.70 ± 1.69 ^a

ANOVA test with Welch's correction: ^a P < 0.02 between all groups; ^b P < 0.05 between the first and the last group; ^c P < 0.05 between the groups "between 2 and 4 hours" and "more than 4 hours."

Table 4. Mean days of food consumption of selected foods in the week prior to the survey according to physical activity time, Brazil, 2011/2012.

Variables	Physical Activity Time (Hours/Week)			
	Less than 1	Between 1 and 2	Between 2 and 4	More than 4
Beans	3.42 ± 1.874	3.62 ± 1.75	3.75 ± 1.69	3.83 ± 1.702
Vegetables	2.17 ± 2.024	2.59 ± 1.99	2.78 ± 2.00	2.87 ± 2.052
Raw Salad	1.95 ± 2.00	2.35 ± 2.02	2.46 ± 2.02	2.56 ± 2.082
Cooked Vegetables	1.26 ± 1.674	1.51 ± 1.71	1.58 ± 1.76	1.71 ± 1.884
Fruits	2.56 ± 1.93	2.99 ± 1.83	3.24 ± 1.81	3.45 ± 1.811
Milk	2.99 ± 2.184	3.33 ± -2.05	3.57 ± -1.96	3.69 ± 1.912
French Fries	1.16 ± 1.55	1.19 ± 1.51	1.27 ± 1.55	1.25 ± 1.57
Fried Snacks	1.99 ± 1.84	1.92 ± 1.75	2.01 ± 1.77	1.98 ± 1.77
Cold Cuts	2.49 ± 1.80	2.48 ± 1.73	2.57 ± 1.72	2.52 ± 1.79
Crackers	2.79 ± 1.98	2.80 ± 1.91	2.87 ± 1.90	3.00 ± 1.914
Cookies	2.90 ± 1.92	2.76 ± 1.88	2.86 ± 1.87	2.95 ± 1.89
Sweets	3.53 ± 1.774	3.31 ± 1.80	3.32 ± 1.76	3.30 ± 1.824
Soft Drinks	3.32 ± 1.81	3.26 ± 1.78	3.36 ± 1.74	3.34 ± 1.77

ANOVA test with Welch's correction: ¹ P < 0.02 between all groups; ² P < 0.05 between the first and the last group; ³ P < 0.05 between the groups "between 2 and 4 hours" and "more than 4 hours"; ⁴ P < 0.05.

DISCUSSION

We found a significant association of dietary intake with eating behaviors, screen time, and physical activity among Brazilian adolescent students. Our findings show that having meals with parents was a positive influence for adolescents, since it seems to favor a healthy diet. Previous studies have shown that the availability of healthy foods in the household, as well as the adoption of a healthy diet by parents, leads to a higher consumption of healthy foods by children^{17,18,19}. When parents and adolescents have similar personal motivation to eat health food, they have similar increases fruit and vegetable intake²⁰. Berge et al. (2015) found that having meals with the family during adolescence was a protective factor against the development of overweight and obesity in young adulthood¹¹.

Moreover, in our study, having meals at home was found to be associated with a healthier diet. This is in line with national data which found that healthier foods such as rice, beans, meat, chicken, milk, roots, cassava, potatoes, fruits, fish, vegetables, and eggs are consumed at home by the Brazilian population²¹. Knowing this, the Dietary Guidelines for the Brazilian Population recommends that the population cook and pack lunch at home²². Similarly, other studies have verified that the presence of the child or adolescent at home was positively associated with the consumption of healthy foods²³.

However, a study conducted in the United Kingdom found a decrease in the time spent cooking at home²⁴, which indicates that it can be challenging to prepare packed lunches in that environment. Therefore, based on our findings, it is essential to identify ways to overcome these barriers, since adolescents who reported eating at home consumed a healthier diet.

Conversely, the food groups most commonly consumed outside of the home for adolescents are fried and baked snacks and sandwiches²⁵, a dietary profile associated with weight gain and greater energy intake^{26,27}. Thus, to promote a healthy diet, it is important for adolescents to have meals at home whenever possible, encouraging the consumption of fresh or minimally processed foods and restricting the use of ultra-processed products. These recommendations are mentioned in the Dietary Guidelines for the Brazilian population²¹.

These guidelines also recommend that meals should be eaten in a calm environment, which means turning off the television, sitting at the table, and paying attention to what one is eating²¹. This recommendation is based on the fact that, when people eat while watching television or performing another activity, they lose their sense of the amount of food consumed, the attention and the perception of what is consumed, and the sense of satiety is impaired. In addition, when distracted, people do not chew sufficiently and do not evaluate properly what and how much they are eating, which favors increased caloric intake and thus obesity²⁸. Our results reinforce this advice, considering that unhealthy eating was associated with eating in front of a television or computer. Eating while watching television has a quantitative and qualitative influence on diet, and it is related to a higher consumption of meat, pizza, and snacks and to a lower consumption of

fruits and vegetables²⁹.

In addition to favoring physical inactivity, the time spent watching television and using other screens may contribute to the adoption of inadequate dietary practices, as shown in our findings. Several studies found that more time spent on sedentary leisure activities, such as watching television, playing video game, and using a computer, is associated with inadequate consumption of healthy foods (vegetables) and consumption of unhealthy foods (snacks, soft drinks, industrialized juice, and sweets)^{4,14,29,30,31}.

We also found an association between healthy eating and a more active lifestyle, as previously described in other studies^{33,34}. It seems plausible that interventions to prevent obesity and improvements in dietary practices among adolescents should also consider physical activity promotion as a structural component to achieve effective results.

Our study has some limitations, such as a possible bias of social desirability when adolescents report "ideal" food consumption rather than their real habits. However, the participants answered the questionnaires in an individualized manner and were clearly told that their answers would not be personally identified in the research results. Another limitation of this study is that the use of other electronic devices was not considered in the screen time investigated. It is important to note that in Brazil 49.9% of adolescents between 10 and 14 years old had a cell phone in 2013, and this percentage increased to 54.1% in 2015³². Thus, data collected on screen time may be underestimated, although we have already found that adolescents with more than 2 hours of screen time per day had a higher consumption of unhealthy foods and lower consumption of healthy foods.

CONCLUSIONS

This study verified an association between dietary intake and eating behavior, screen time, and physical activity among adolescents. Participants who ate the healthiest foods were those who frequently ate lunch or dinner with their parents, had lunch at home, and practiced physical activity more than 4 hours per week. On the other hand, participants who consumed the unhealthiest foods were those who ate in front of a television or computer and spent a lot of time, more than 4 hours a day, watching television or using a computer. Our findings should provide guidance for public policies directed to adolescent health and focused on improving the quality of life of this population.

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REFERENCES

1. Bloch KV, Klein CH, Szklo M et al. ERICA: prevalences of hypertension and obesity in Brazilian adolescents. *Rev Saúde Pública* 2016; 50(Suppl 1): 9.
2. Louzada ML, Baraldi LG, Steele EM et al. Consumption of

- ultra-processed foods and obesity in Brazilian adolescents and adults. *Prev Med* 2015; 81: 9-15.
3. Christofaro DG, Fernandes RA, Martins C et al. Prevalence of physical activity through the practice of sports among adolescents from Portuguese speaking countries. *Cien Saude Colet* 2015; 20: 1199-11206.
4. Dutra GF, Kaufmann CC, Pretto AD, Albernaz EP. Television viewing habits and their influence on physical activity and childhood overweight. *J Pediatr* 2015; 91: 346-351.
5. Brazilian Institute of Geography and Statistics- IBGE. National School Health Survey 2015. Rio de Janeiro: IBGE; 2016.
6. Ferreira NL, Claro RM, Mingoti SA, Lopes ACS. Coexistence of risk behaviors for being overweight among Brazilian adolescents. *Prev Med* 2017; 100: 135-142.
7. Currie C, Molcho M, Boyce W et al. Researching health inequalities in adolescents: the development of the Health Behaviour in School-Aged Children (HBSC) family affluence scale. *Soc Sci Med* 2008; 66: 1429-1436.
8. Alm S, Olsen SO, Honkanen P. The role of family communication and parents' feeding practices in children's food preferences. *Appetite* 2015; 89: 112-121.
9. Larsen PS, Strandberg-Larsen K, Micali N, Andersen AM. Parental and child characteristics related to early-onset disordered eating: a systematic review. *Harv Rev Psychiatry* 2015; 23: 395-412.
10. Larson N, MacLehose R, Fulkerson JA, Berge JM, Story M, Neumark-Sztainer D. Eating breakfast and dinner together as a family: associations with sociodemographic characteristics and implications for diet quality and weight status. *J Acad Nutr Diet* 2013; 113: 1601-1609.
11. Berge JM, Wall M, Hsueh TF et al. The protective role of family meals for youth obesity: 10-year longitudinal associations. *J Pediatr* 2015; 166: 296-301.
12. Rodrigues PRM, Luiz RR, Monteiro LS et al. Adolescents' unhealthy eating habits are associated with meal skipping. *Nutrition* 2017; 42: 114-120.
13. World Health Organization. Nutrition in adolescence: issues and challenges for the health sector: issues in adolescent health and development. Geneva: WHO; 2005.
14. Christofaro DG, de Andrade SM, Mesas AE et al. Higher screen time is associated with overweight, poor dietary habits and physical inactivity in Brazilian adolescents, mainly among girls. *Eur J Sport Sci* 2016; 16: 498-506.
15. Braithwaite I, Stewart AW, Hancox RJ et al. The worldwide association between television viewing and obesity in children and adolescents: cross sectional study. *PLoS One* 2013; 8: e74263.
16. Brazilian Institute of Geography and Statistics- IBGE. National School Health Survey 2009. Rio de Janeiro: IBGE; 2009.
17. Leech RM, McNaughton SA, Crawford DA et al. Family food involvement and frequency of family dinner meals among Australian children aged 10-12years. Cross-sectional and longitudinal associations with dietary patterns. *Appetite* 2014; 75: 64-70.
18. Loth KA, MacLehose RF, Larson N et al. Food availability, modeling and restriction: How are these different aspects of the family eating environment related to adolescent dietary intake? *Appetite* 2016; 96: 80-86.
19. Pearson N, Biddle SJ, Gorely T. Family correlates of fruit and vegetable consumption in children and adolescents: a systematic review. *Public Health Nutr* 2009; 12: 267-283.
20. Dwyer LA, Bolger N, Laurenceau JP et al. Autonomous motivation and fruit/vegetable intake in parent-adolescent dyads. *Am J Prev Med* 2017; 52: 863-871.
21. Brazil. Brazilian Ministry of Health. Dietary guidelines for the Brazilian population. Brasília: Ministry of Health; 2014.
22. Brazilian Institute of Geography and Statistics- IBGE. Family Budget Survey 2008-2009: analysis of personal food consumption in Brazil. Rio de Janeiro: IBGE; 2011.
23. Cook LT, O'Reilly GA, DeRosa CJ et al. Association between home availability and vegetable consumption in youth: a review. *Public Health Nutr* 2015; 18: 640-648.
24. Adams J, Goffe L, Adamson AJ et al. Prevalence and socio-demographic correlates of cooking skills in UK adults: cross-sectional analysis of data from the UK National Diet and Nutrition Survey. *Int J Behav Nutr Phys Act* 2015; 12: 99.
25. Bezerra IL, Souza AM, Pereira RA, Sichieri R. Consumption of foods away from home in Brazil. *Rev. Saúde Pública* 2013; 47(Suppl 1): 200-211.
26. Sichieri R, Bezerra IN, Araujo MC et al. Major food sources contributing to energy intake--a nationwide survey of Brazilians aged 10 years and older. *Br J Nutr* 2015; 113: 1638-1642.
27. Brown CL, Halvorson EE, Cohen GM et al. Addressing childhood obesity: opportunities for prevention. *Pediatr Clin North Am* 2015; 62: 1241-1261.
28. Ogden J, Coop N, Cousins C et al. Distraction, the desire to eat and food intake. Towards an expanded model of mindless eating. *Appetite* 2013; 62: 119-126.
29. Thivel D TM, Chaput J-P. Modern sedentary behaviors favor energy consumption in children and adolescents. *Curr Obes Rep* 2013; 12: 50-57.
30. Lucena JM, Cheng LA, Cavalcante TL et al. Prevalence of excessive screen time and associated factors in adolescents. *Rev Paul Pediatr* 2015; 33: 407-414.
31. Bener A, Al-Mahdi HS, Vachhani PJ et al. Do excessive internet use, television viewing and poor lifestyle habits affect low vision in school children? *J Child Health Care* 2010; 14: 375-385.
32. Brazilian Institute of Geography and Statistics- IBGE. National survey by sample of households 2015: Internet access and television and cellular mobile phone use for use staff. Rio de Janeiro: IBGE; 2016.
33. Silva DA, Silva RJ. Association between physical activity level and consumption of fruit and vegetables among adolescents in northeast Brazil. *Rev Paul Pediatr* 2015; 33: 167-173.
34. Hobbs M, Pearson N, Foster PJ, Biddle SJ. Sedentary behaviour and diet across the lifespan: an updated systematic review. *Br J Sports Med* 2015; 49: 1179-1188.