Factors associated with regular consumption of obesogenic foods: National School-Based Student Health Hurvey, 2012

Fatores associados ao consumo regular de alimentos obesogênicos: Pesquisa Nacional de Saúde do Escolar, 2012

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A B S T R A C T

Objective

To investigate the frequency of consumption of obesogenic foods among adolescents and its association with sociodemographic, family, behavioral, and environmental variables.

Methods

Secondary data from the National School-Based Student Health Hurvey were analyzed from a representative sample of 9th grade Brazilian students (high school). A self-administered questionnaire, organized into thematic blocks, was used. The dependent variables were the consumption of deep fried snacks, packaged snacks, sugar candies, and soft drinks; consumption frequency for the seven days preceding the study was analyzed. Bivariate analysis was carried out to determine the empirical relationship between the regular consumption of these foods (≥ 3 days/week) with sociodemographic, family, behavioral, and school structural variables. *p*-value <0.20 was used as the criterion for initial inclusion in the multivariate logistic analysis, which was conducted using the "Enter" method, and the results were expressed as adjusted *odds ratios* with 95% confidence interval and *p*<0.05 indicating a statistically significance.

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Results

Regular food consumption ranged from 27.17% to 65.96%. The variables female gender, mobile phone ownership, Internet access at home, tobacco use, alcohol consumption, regular physical activity, eating while watching television or studying, watching television for at least 2 hours a day, and not willing to lose weight were associated in the final logistic models of all foods analyzed.

Conclusion

It was concluded that fried snacks, packaged snacks, sugar candies, and soft drinks are regularly consumed by adolescents and that such consumption was associated with the sociodemographic, family, behavioral, and school structural variables.

Keywords: Adolescent. Food consumption. Food habits. Industrialized foods.

R E S U M O

Objetivo

Analisar a frequência de consumo de alimentos obesogênicos entre adolescentes e sua associação com variáveis sociodemográficas, familiares, comportamentais e ambientais.

Métodos

Estudou-se dados secundários da Pesquisa Nacional de Saúde do Escolar, sendo a amostra representativa de alunos do 9º ano do ensino fundamental de escolas brasileiras. Utilizou-se questionário autoaplicável organizado em blocos temáticos. Foram consideradas variáveis dependentes o consumo de salgados fritos, salgadinhos de pacote, guloseimas e refrigerantes, cuja frequência se referiu aos sete dias anteriores à pesquisa. Para associação do consumo regular dos alimentos (≥3 dias/semana) às variáveis sociodemográficas, familiares, comportamentais e estruturais da escola, foi utilizada análise bivariada, adotando-se o critério de valor de p<0,20 para inclusão inicial na análise de regressão logística multivariada, a qual foi realizada pelo método "enter". Os resultados foram expressos por Odds Ratio ajustados com respectivos intervalos de confiança de 95%, considerando associação estatisticamente significativa o valor de p<0,05.

Resultados

O consumo regular dos alimentos variou de 27,17% a 65,96%. Sexo feminino, posse de telefone celular, acesso à Internet no domicílio, tabagismo, consumo de álcool, prática regular de atividade física, hábito de comer assistindo televisão ou estudando, assistir televisão no mínimo duas horas/dia e ausência de atitude visando perda de peso foram as variáveis que se associaram nos modelos logísticos finais de todos os alimentos.

Conclusão

Conclui-se que o consumo de salgados fritos, salgadinhos de pacote, guloseimas e refrigerantes é regular na dieta dos adolescentes, estando seu consumo associado a variáveis sociodemográficas, familiares, comportamentais e de estrutura escolar.

Palavras-chave: *Adolescente. Consumo de alimentos. Hábitos alimentares. Alimentos industrializados.*

I N T R O D U C T I O N

The term obesogenic refers to foods that promote gaining weight and that are not conducive to weight loss thus contributing to the obesity[1]. These foods include fast foods, mass-produced foods that are prepared and served very quickly, usually in quick-service or self-service restaurants using pre-prepared ingredients. Some examples are hamburgers, French fries, pizza[2], and ultra-processed foods, which refer to those that are ready for consumption or heating with little or no preparation, such as a packaged snacks, cookies and crackers, sweet hard candies (including lollipop sticks), and soft drinks[3].

The prevalence of obesity has increased dramatically in recent decades, affecting one in five adolescents in western countries[4]. Obesity in this population is of particular concern due to its negative psychological and health impacts with immediate and long term effects, including

increased prevalence of cardiovascular risk factors, insulin resistance, type 2 diabetes, some types of cancers, low self-esteem, and reduced quality of life[5].

Adolescent obesity can be attributed to endogenous causes related to specific behavioral characteristics defined by social bonding, social status, independence, and peer influence leading to sedentary behaviors, such as extensive television viewing and use of other electronic media, physical inactivity, eating away from home, and increased consumption of obesogenic foods[6].

These foods are high in calories, total fat (saturated and trans fat), sugars, sodium, chemical food additives, and preservatives[3], and are low in fiber, calcium, and iron. Their consumption is inversely associated with the consumption of fruits, vegetables, and milk[7].

Despite their harmful effects, convenience, affordability, palatability, and aggressive marketing are factors that contribute to keeping these food sin the daily diet. In Brazil, an analysis of the *Pesquisas de Orçamentos Familiares* (Household Budget Surveys) (1987-1988, 1995-1996, 2002-2003, and 2008-2009), showed that the caloric contribution of ultra-processed foods (soft drinks, sugary drinks, encased meats, cookies and crackers, chocolates, sweets, and packaged snacks) to the total caloric value of the diet in the households increased linearly and significantly from 18.7% to 29.6%[8].

Thus, the analysis of the consumption frequency of these foods has been included into the adolescent health risk factor surveillance systems, which has been implemented following a recommendation by the World Health Organization (WHO). Therefore, inspired by systems of other countries, such as the Health Behavior in School-Aged Children[9], Brazil conducted two national surveys in 2009 and 2012, which consisted of the *Pesquisa Nacional de Saúde do Escolar* (PeNSE, National School-Based Student Health Survey).

The present study aims, therefore, to investigate the frequency of consumption of obesogenic foods among adolescents and the sociodemographic, family, behavioral, and environmental factors associated with their regular consumption based on data from *PeNSE-2012*.

METHODS

Study population

This study analyzed data from the second edition of the *PeNSE,* conducted by the *Instituto Brasileiro de Geografia e Estatística* (IBGE, Brazilian Institute of Geography and Statistics) in partnership with the Ministry of Health. That survey was conducted from April to September 2012, and the study population was composed of 9th grade students (high school) attending public and private schools during the day.

This isa representative sample of the country, including the 5 macro-regions, the 26 state capitals, and the Federal District. Sample size was calculated considering 50% exposure prevalence, maximum error of 3%, and 95% Confidence Interval (95%CI).

The sample of each geographic stratum was allocated in proportion to the number of schools, according to their administrative dependency (private or public schools). For each of these strata, a two-stage cluster sampling was used; in the first stage, the schools were selected, and in the second stage, the eligible classes in these schools were selected (high school 9th graders). Thus, 132,123 students were invited to answer the questionnaire. However, at the time of data collection, only 110,873 were present, of which 1,651 declined to participate and 118 did not inform gender or age, and were thus excluded from the data base. The final sample was then composed of 109,104 students, representing a sample loss of 17.4%.

The sample weight used in the data analysis was assigned to each student in the final sample, taking into account the sample loss

mentioned above. Therefore, it should represent the target population, formed by high school 9th graders who were regularly attending private and public schools during the day in the state capitals and the Federal District.

Data collection

Data were collected using mobile phones (smartphones); a self-report structured questionnaire was uploaded on the mobile devices. The questionnaire was organized into thematic blocks that included: sociodemographic characteristics, diet, body image, physical activity, tobacco use, alcohol and drug consumption, social protection network, oral health, sexual behavior, violence, and accidents. In addition to the information listed above, data related to work, hygiene, mental health, use of healthcare services, and prevalence of asthma were also collected.

Dependent variables

The dependent variables were the consumption of four foods, food groups, or prepared foods: deep fried snacks - such as French fries or *coxinha de galinha* (popular food in Brazil consisting of chopped or shredded chicken meat, covered in dough, molded into a shape resembling a chicken leg, battered and fried), deep fried kebab, *pastel* (a traditional deep fried Brazilian pastry filled with various sweet or savory ingredients), *acarajé* (a dish made from peeled beans formed into a ball and then deep-fried in palm oil), etc., - packaged snacks (including potato chips), sugar candies (sweets, hard candies, chocolates, chewing gum, and lollipop sticks), and soft drinks. Their consumption frequency for seven days preceding the study was analyzed.

Food consumption was expressed as absolute and relative frequencies, according to gender. For purposes of analysis, the variables were categorized as follows: consumption 3 or more days and 2 or fewer days in the seven days preceding the study[10,11].

Independent variables

The independent variables were divided into sociodemographic: gender (male or female), age (≤14 years or >14 years), currently employed (yes or no), household composition (≤4 persons or >4 persons); home computer ownership (yes or no), Internet access at home (yes or no), mobile phone ownership (yes or no); family characteristics: maternal level of education (<9 years or ≥9 years), living with the mother (yes or no), living with the father (yes or no); Behavioral: current use of tobacco (yes or no), current consumption of alcohol (yes or no), physical activity (≥3 days or <3 days in the last 7 days), eating family meals (parents or guardians) (≥3 days a week or <3 days a week), eating while watching television or studying (≥3 days a week or <3 days a week), breakfast habits (≥3 days a week or <3 days a week), time spent watching television (≥2 hours, <2 hours), willingness to lose weight (yes or no); school structural: cafeteria (yes or no) and sports facilities (yes or no).

With regard to the variables current use of tobacco and current consumption of alcohol, use and consumption frequency for thirty days preceding the administration of the questionnaire was analyzed.

Data analysis

For the descriptive analysis, the independent variables were categorized estimating the total population proportion, according to the gender.

According to sociodemographic, family, behavioral, and school structural characteristics, regular food consumption (≥3 days a week) was determined by simple frequency and confidence intervals. Bivariate analysis was used to investigate the factors associated with this eating habit. The chi-square test with Yates correction for dichotomous variables was used to compare the categorical variables of the groups, considering the *p*-value for statistical significance as *p*<0.05.

To analyze the factors associated with regular food consumption, four multiple logistic regression models were used with the following outcomes: fried snacks, packaged snacks, sugar candies, and soft drinks. The variables with $p<0.20$ in the bivariate analysis were selected for initial inclusion in the multivariate logistic regression analysis. *Odds ratios* of regular food consumption (crude and adjusted for confounders) were calculated for each exposure variable.

Multiple logistic regression analysis was carried out using the "Enter" method. The results were expressed as adjusted *ratios* with 95%CI, and variables with $p<0.05$ indicated a statistically significance.

Statistical analyses were performed using the Stata® software version 13.0 (Stata Corp, College Station, TX, USA) with the svy commands (survey commands), which are used for complex survey data analysis and include the required sampling weights, strata, and Primary Sampling Unit. The variables that were not answered (missing values) were excluded from the analysis.

Ethical aspects

Pesquisa Nacional de Saúde do Escolar was approved by the *Comissão Nacional de Ética em Pesquisa* (CONEP), appointed by the Ministry of Health (Protocol n°16.805), and authorized by the State and Municipal Departments of Education and the school board of the selected schools in each municipality.

R E S U L T S

The sociodemographic characterization of the 109,104 adolescents studied showed a predominance of females (57.1%) and age range of 11-19 years or more; the highest number of adolescents were aged below 14 years (68.4%). Most students did not have a job and did not have a computer, mobile phone, and Internet access at home. With regard to the family aspects,

about 10% and 30% of the students did not live with their mother and father, respectively (Table 1). As for the behavioral characteristics, less than half reported doing physical activities 3 or more days a week, with the higher percentage among the boys. It was also found that more than 75% of the students frequently (3 or more days a week) at eat least one of the meals with their parents or guardians, ate while watching television or studying, and did not eat the food offered at school.

In terms of the consumption of the food groups investigated in the present study (fried snacks, packaged snacks, sugar candies, and soft drinks), it was found that the proportion of students who regularly (three or more days a week) consumed these foods ranged between 27.17% and 65.96%. The proportion of students who regularly consumed sugar candies (60.9%) and soft drinks (56.2%) was higher than that of those who regularly consumed packaged snacks (27.1%) and fried snacks (35.6%) (Table 2).

Analyzing these indicators of obesogenic food consumption, according to the sociodemographic variables for the students evaluated (Table 3), it was observed that the percentage of regular consumption of all foods analyzed was higher ($p<0.05$) among those that had Internet access and owned a home computer and a mobile phone.

The analysis of the association between the variables related to behavioral characteristics, the consumption of obesogenic foods was higher among those who smoked, consumed alcohol, did physical activities three days or more days a week, watched television for more than two hours, and usually ate while watching TV or studying (Table 3). The same results were found in all final explanatory models after adjusting the variables (Table 4).

Table 4 shows the crude and adjusted *odds ratios* of the explanatory variables in relation to the consumption of fried snacks, packaged snacks, sugar candies, and soft drinks in the

Table 1. Distribution of the population studied according to sociodemographic, family, behavioral, and school structural characteristics. Brazil, 2012.

Variables	Total		Boys		Girls	
	n[1]	%[2]	n[1]	%[2]	n[1]	%[2]
Sociodemographic						
Age (n=109,104)						
≤14 years	73,343	68.4	32,388	63.7	40,955	72.8
>14 years	35,761	31.6	19,627	36.3	16,134	27.2
Currently employed (n=108,984)						
Yes	14,318	13.1	91,01	17.4	5,217	9.2
No	94,666	86.9	42,853	82.6	51,813	90.8
Household composition (n=108,517)						
≤4	59,900	55.0	28,843	55.8	31,057	54.4
>4	48,617	45.0	22,859	44.2	25,758	45.6
Home computer ownership (n=108,978)						
Yes	74,350	66.0	36,624	68.5	37,726	63.7
No	34,628	34.0	15,332	31.5	19,296	36.3
Internet access (n=108,965)						
Yes	69,233	60.4	33,984	62.6	35,249	58.4
No	39,732	39.6	17,961	37.4	21,771	41.6
Mobile phone ownership (n=108,984)						
Yes	94,212	85.0	43,653	82.3	50,559	87.5
No	14,772	15.0	83,05	17.7	6,467	12.5
Family						
Maternal level of education (n=90,577)						
<9 years	33,322	42.3	14,768	40.0	18,554	44.4
≥9 years	57,255	57.7	28,104	60.0	29,151	55.6
Living with the mother (n=109,041)						
Yes	97,016	90.6	46,206	90.6	50,810	90.7
No	12,025	09.4	57,71	9.4	6,254	9.3
Living with the father (n=108,942)						
Yes	69,280	66.2	34,488	68.8	34,792	63.7
No	39,662	33.8	17,450	31.2	22,212	36,3
Behavioral						
Use of tobacco (n=108,826)						
Yes	57,48	5.1	29,37	5.1	28,11	5.0
No	103,078	94.9	48,928	94.9	54,150	95.0
Consumption of alcohol (n=108,668)						
Yes	27,763	26.1	12,759	25.2	15,004	26.9
No	80,905	73.9	39,001	74.8	41,904	73.1
Physical activity (n=108,752)						
≥3 days a week	46,788	41.4	27,625	51.2	19,163	32.5
<3 days a week	61,964	58.6	24,195	48.8	37,769	67.5
Meals with parents or guardians (n=108,888)						
≥3 days a week	91,817	84.7	44928	86.8	46,889	82.8
<3 days a week	17,071	15.3	6970	13.2	10,101	17.2
Eating while watching television or studying (n=108,823)						
≥3 days a week	83,322	77.4	41,104	80.1	42,218	75.0
<3 days a week	25,501	22.6	10,755	19.9	14,746	25.0
Breakfast (n=108,856)						
≥3 days a week	94,783	87.0	46,450	89.8	48,333	84.6
<3 days a week	14,073	13.0	5,434	10.2	8,639	15.4

Table 1. Distribution of the population studied according to sociodemographic, family, behavioral, and school structural characteristics. Brazil, 2012.

Variables	Total		Boys		Girls	
	n[1]	%[2]	n[1]	%[2]	n[1]	%[2]
Behavioral						
Time spent watching television (n=108,792)						
≥2 hours a day	67,672	63.6	30,821	60.5	36,851	66.6
<2 hours a day	41,120	36.4	21,024	39.5	20,096	33.4
Willingness to lose weight (n=108.447)						
Yes	29,144	26.3	11,119	21.1	18,025	31.1
No	79,303	73.7	40,493	78.9	38,810	68.9
School food consumption (n=108,854)						
≥3 days a week	22,753	20.9	12,079	23.3	10,674	18.7
<3 days a week	86,101	79.1	39,802	76.7	46,299	81.3
School structural						
Cafeteria (N=108,837)						
Yes	55,645	51.1	26,961	50.3	28,684	47.6
No	53,192	48.9	24,937	49.7	28,255	52.4
Sports facilities (N=108,795)						
Yes	88,534	79.4	42,609	81.0	45,925	77.9
No	20,261	20.6	9,270	19.0	10,991	22.1

Note: [1]Number of individuals in the unweighted sample; [2]Prevalence calculated as weighted confidence interval due to the sampling design.

Table 2. Distribution of the population studied in terms of the frequency of consumption of obsegenic foods according to gender. Brazil, 2012.

Foods	*Weekly consumption frequency (%)*								
	Total	4 days		5 days		6 days		7 days	
	n[1]	n[1]	%[2]	n[1]	%[2]	n[1]	%[2]	n[1]	%[2]
Fried snacks	108,889	7,482	6.8	5,326	4.7	2,773	2.7	8,888	8.4
Boys	51,904	3,466	6.7	2,383	4.5	1,206	2.4	3,703	7.3
Girls	56,985	4,016	7.0	2,943	5.0	1,567	2.9	5,185	9.4
Packaged snacks	108,804	5,407	5.3	4,024	4.1	2,696	2.8	5,942	6.1
Boys	51,863	2,506	5.2	1,649	3.6	1,019	2.2	2,353	5.1
Girls	56,941	2,900	5.5	2,375	4.6	1,677	3.3	3,589	7.0
Sugar candies	108,815	9,149	8.3	8,236	7.4	6,378	5.9	29,813	27.9
Boys	51,867	4,467	8.5	3,905	7.4	2,587	5.0	10,952	21.4
Girls	56,948	4,682	8.1	4,331	7.5	3,791	6.7	18,861	34.0
Soft drinks	108,858	10,552	9.5	8,867	7.9	6,361	5.9	20,373	19.4
Boys	51,874	5,403	10.3	4,448	8.4	2,900	5.7	9,760	19.5
Girls	56,984	5,149	8.7	4,419	7.5	3,461	6.1	10,613	19.3

Note: [1]Number of individuals in the unweighted sample; [2]Prevalence calculated as weighted confidence interval due to the sampling design.

multiple logistic regression analysis. Among the factors that remained in the final model as factors associated with the consumption of fried snacks and packaged snacks, the variables female gender, currently employed, Internet access, mobile phone ownership, consumption of alcohol, use of tobacco, and spending more than 2 hours a day watching television are some of the conditions that indicated greater probability of regular consumption of these foods.

Table 3. Regular consumption (≥3 days a week) of obesogenic foods among adolescents, prevalence, and respective 95% confidence intervals, according to sociodemographic, family, behavioral, and school structural characteristics. Brazil, 2012.

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Variables	Fried snacks				
	n[1]	n[1]	%[2]	(95%CI)[2]	p*
Sociodemographic					
Gender	108,889				
Male		17,615	34.6	32.87-36.33	0.0069
Female		20,765	36.7	35.16-38.32	
Age	108,889				
≤14 years		25,366	35.3	33.76-36.83	0.0223
>14 years		13,014	36.6	35-38.24	
Currently employed	108,845				
Yes		5,936	41.9	39.22-44.57	<0.0001
No		32,430	34.8	33.41-36.15	
Household composition	108,387				
≤4 persons		21,494	36.2	34.8-37.63	0.0718
>4 persons		16,738	35.1	33.46-36.86	
Home computer ownership	108,847				
Yes		28,090	38.5	37.37-39.61	<0.0001
No		10,269	30.3	27.95-32.71	
Internet access	108,831				
Yes		26,798	39.6	38.49-40.68	<0.0001
No		11,557	29.8	27.8-31.78	
Mobile phone ownership	108,848				
Yes		34,308	37.0	35.6-38.38	<0.0001
No		4,058	28.4	26.6-30.32	
Family					
Maternal level of education	90,456				
<9 years		10,661	32.7	30.63-34.8	<0.0001
≥9 years		21,701	38.7	37-3740	
Living with the mother	108,850				
Yes		34,090	35.6	34.14-37.16	0.3710
No		4,277	36.3	34.96-37.7	
Living with the father	108,761				
Yes		23,812	34.8	33.33-36.41	<0.0001
No		14,517	37.3	35.96-38.69	
Behavioral					
Use of tobacco	108,732				
Yes		2,673	45.2	42.9-47.43	<0.0001
No		35,639	35.2	33.83-36.58	
Consumption of alcohol	108,574				
Yes		12,400	44.7	42.71-46.71	<0.0001
No		25,852	32.5	31.19-33.88	
Physical activity	108,666				
≥3 days a week		17,543	38.4	36.61-40.12	<0.0001
<3 days a week		20,747	33.8	32.59-35.1	
Meals with parents or guardians	108,792				
≥3 days a week		31,796	35.2	33.83-36.63	<0.0001
<3 days a week		6,543	38.4	36.5-40.27	
Eating while watching television or studying	108,734				
≥3 days a week		30,069	36.6	35.09-38.14	<0.0001
<3 days a week		8,243	32.6	30.85-34.33	

Table 3. Regular consumption (≥3 days a week) of obesogenic foods among adolescents, prevalence, and respective 95% confidence intervals, according to sociodemographic, family, behavioral, and school structural characteristics. Brazil, 2012.

Variables	Fried snacks				
	n[1]	n[1]	%[2]	(95%CI)[2]	p*
Behavioral					
Breakfast	108,761				
≥3 days a week		33,041	35.4	33.89-37.03	0.0056
<3 days a week		5,287	37.4	36.26-38.6	
Time spent watching television	108,698				
≥2 hours a day		25,849	38.9	37.45-40.43	<0.0001
<2 hours a day		12,452	30.0	28.52-31.53	
Willingness to lose weight	108,355				
Yes		9,168	31.8	30.77-32.88	<0.0001
No		29,017	37.1	35.37-38.81	
School food consumption	108,766				
≥3 days a week		7,343	33.2	30.68-35.88	0.0359
<3 days a week		30,991	36.4	34.76-37.98	
Cafeteria	108,622				
Yes		20,698	37.7	36.17-39.18	0.0010
No		17,572	33.8	31.72-35.98	
Sports facilities	108,580				
Yes		31,723	36.6	35.14-38.15	0.0002
No		6,528	32.1	30.07-34.24	

Variables	Packaged snacks				
	n[1]	n[1]	%[2]	(95%CI)[2]	p*
Sociodemographic					
Gender	108,804				
Male		11,771	24.7	23.52-25.92	<0.0001
Female		15,405	29.4	28.3-30.61	
Age	108,804				
≤14 years		17,769	26.8	25.48-28.1	0.0934
>14 years		9,407	28.1	26.9-29.25	
Currently employed	108,762				
Yes		4,116	30.7	29.11-32.36	<0.0001
No		23,048	26.6	25.7-27.61	
Household composition	108,305				
≤4 persons		14,878	27.0	26.21-27.88	0.4468
>4 persons		12,160	27.4	26.06-28.67	
Home computer ownership	108,764				
Yes		19,390	28.4	27.74-29.04	0.0001
No		7,771	24.8	22.95-26.78	
Internet access	108,752				
Yes		18,455	29.0	28.36-29.73	<0.0001
No		8,700	24.3	22.8-25.91	
Mobile phone ownership	108,772				
Yes		24,214	28.0	26.98-29.09	<0.0001
No		2,952	22.4	21.1-23.68	
Family					
Maternal level of education	90,373				
<9 years		8,186	26.7	24.67-28.81	0.1424
≥9 years		14,656	28.1	27.48-28.65	

Table 3. Regular consumption (≥3 days a week) of obesogenic foods among adolescents, prevalence, and respective 95% confidence intervals, according to sociodemographic, family, behavioral, and school structural characteristics. Brazil, 2012.

Variables	Packaged snacks				
	n[1]	n[1]	%[2]	(95%CI)[2]	p*
Family					
Living with the mother	108,766				
Yes		24,123	27.2	26.15-28.19	0.7142
No		3,043	27.4	26.12-28.63	
Living with the father	108,680				
Yes		16,907	26.6	25.5-27.75	<0.0001
No		10,233	28.3	27.36-29.22	
Behavioral					
Use of tobacco	108,673				
Yes		2,084	39.2	36.56-41.83	<0.0001
No		25,057	26.5	25.67-27.43	
Consumption of alcohol	108,515				
Yes		9,042	34.8	32.87-36.86	<0.0001
No		18,047	24.5	23.67-25.27	
Physical activity	108,612				
≥3 days a week		12,564	29.3	27.77-30.93	<0.0001
<3 days a week		14,560	25.7	24.96-26.39	
Meals with parents or guardians	108,733				
≥3 days a week		22,605	26.9	25.82-27.92	0.0033
<3 days a week		4,553	28.9	27.55-30.35	
Eating while watching television or studying	108,673				
≥3 days a week		21,553	28.0	27.01-29.05	<0.0001
<3 days a week		5,581	24.2	23.1-25.38	
Breakfast	108,706				
≥3 days a week		23,472	27.1	26.07-28.14	0.0649
<3 days a week		3,676	27.7	26.8-28.63	
Time spent watching television	108,639				
≥2 hours a day		18,907	30.3	29.16-31.53	<0.0001
<2 hours a day		8,226	21.6	20.9-22.41	
Willingness to lose weight	108,294				
Yes		6,210	23.3	22.19-24.43	<0.0001
No		20,812	28.5	27.38-29.67	
School food consumption	108,703				
≥3 days a week		5,566	26.8	25.61-28.01	0.3037
<3 days a week		21,582	27.3	26.26-28.32	
School structural					
Cafeteria	108,537				
Yes		13,657	27.1	25.21-29.13	0.9359
No		13,456	27.2	25.74-28.8	
Sports facilities	108,495				
Yes		22,085	27.7	26.74-28.62	0.0455
No		5,017	25.3	23.24-27.55	

Variables	Sugar candies				
	n[1]	n[1]	%[2]	(95%CI)[2]	p*
Sociodemographic					
Gender	108,815				
Male		28,291	54.7	51.7-57.58	<0.0001
Female		37,675	66.7	64.17-69.07	

Table 3. Regular consumption (≥3 days a week) of obesogenic foods among adolescents, prevalence, and respective 95% confidence intervals, according to sociodemographic, family, behavioral, and school structural characteristics. Brazil, 2012.

Variables	Sugar candies				
	n[1]	n[1]	%[2]	(95%CI)[2]	p*
Sociodemographic					
Age	108,815				
≤14 years		45,824	63.0	60.7-65.19	<0.0001
>14 years		20,142	56.5	54.48-58.45	
Currently employed	108,773				
Yes		8,711	61.5	60.11-62.96	0.5608
No		57,237	60.8	58.11-63.52	
Household composition	108,317				
≤4 persons		36,722	61.7	58.6-64.69	0.1117
>4 persons		28,994	60.1	58.05-62.17	
Home computer ownership	108,775				
Yes		46,569	63.2	60.02-66.34	<0.0001
No		19,376	56.4	54.38-58.46	
Internet access	108,763				
Yes		43,730	63.7	60.4-66.93	<0.0001
No		22,210	56.7	54.5-58.8	
Mobile phone ownership	108,780				
Yes		58,138	62.3	59.61-64.84	<0.0001
No		7,810	53.3	51.96-54.66	
Family					
Maternal level of education	90,384				
<9 years		19,210	58.0	55.57-60.37	<0.0001
≥9 years		35,728	63.2	60.26-66	
Living with the mother	108,775				
Yes		58,771	61.0	58.35-63.52	0.6294
No		7,175	60.5	59.16-61.9	
Living with the father	108,689				
Yes		41,616	60.6	57.83-63.26	0.0384
No		24,294	61.6	59.6-63.67	
Behavioral					
Use of tobacco	108.680				<0.0001
Yes		3,918	69.0	66.47-71.32	
No		61,973	60.5	58.1-62.86	
Consumption of alcohol	108,531				<0.0001
Yes		18,969	68.7	66.71-70.63	
No		46,841	58.2	55.61-60.77	
Physical activity	108,621				<0.0001
≥3 days a week		29,267	63.5	60.92-65.99	
<3 days a week		36,603	59.2	56.72-61.55	
Meals with parents or guardians	108,744				<0.0001
≥3 days a week		55,077	60.3	57.81-62.8	
<3 days a week		10,849	64.3	61.66-66.9	
Eating while watching television or studying	108,683				
≥3 days a week		50,939	61.4	59.04-63.74	0.0001
<3 days a week		14,953	59.2	56.25-62.15	
Breakfast	108,712				<0.0001
≥3 days a week		56,905	60.4	57.83-62.93	
<3 days a week		9,008	64.5	62.26-66.68	

Table 3. Regular consumption (≥3 days a week) of obesogenic foods among adolescents, prevalence, and respective 95% confidence intervals, according to sociodemographic, family, behavioral, and school structural characteristics. Brazil, 2012.

Variables	Sugar candies				
	n[1]	n[1]	%[2]	(95%CI)[2]	p*
Behavioral					
Time spent watching television	108,655				
≥2 hours a day		43,905	65.2	62.27-68.04	<0.0001
<2 hours a day		21,978	53.5	51.47-55.49	
Willingness to lose weight	108,309				
Yes		17,105	59.1	56.13-61.95	<0.0001
No		48,604	61.6	59.3-63.94	
School food consumption	108,716				
≥3 days a week		13,131	57.7	56.19-59.26	<0.0001
<3 days a week		52,781	61.8	58.92-64.56	
School structural					
Cafeteria	108,548				
Yes		34,423	62.7	60.11.65.27	0.0001
No		31,357	59.2	57.34.60.97	
Sports facilities	108,506				
Yes		54,115	61.8	59.04-64.46	0.1054
No		11,639	57.6	53.3-61.69	

Variables	Soft drinks				
	n[1]	n[1]	%[2]	(95%CI)[2]	p*
Sociodemographic					
Gender	108,858				
Male		30,004	58.1	56.57-59.65	<0.0001
Female		30,986	54.2	51.71-56.58	
Age	108,858				
≤14 years		40,537	55.5	54.32-56.62	0.2258
>14 years		20,453	57.3	53.44-61.06	
Currently employed	108,814				
Yes		8,995	62.8	61.33-64.35	<0.0001
No		51,973	55.0	52.92-57.12	
Household composition	108,359				
≤4 persons		34,098	57.5	56.08-58.92	0.0001
>4 persons		26,658	54.4	51.79-56.98	
Home computer ownership	108,814				
Yes		44,195	60.4	59.35-61.49	<0.0001
No		16,772	47.6	44.02-51.12	
Internet access	108,800				
Yes		41,650	61.4	60.37-62.31	<0.0001
No		19,313	48.0	44.75-51.24	
Mobile phone ownership	108,817				
Yes		54,031	57.5	55.73-59.26	<0.0001
No		6,940	47.7	44.23-51.26	
Family					
Maternal level of education	90,412				
<9 years		17,211	51.7	48.97-54.4	<0.0001
≥9 years		33,459	59.2	57.52-60.87	
Living with the mother	108,817				
Yes		54,192	56.0	54.04-58.04	0.9659
No		6,778	56.1	54.14-57.98	

Table 3. Regular consumption (≥3 days a week) of obesogenic foods among adolescents, prevalence, and respective 95% confidence intervals, according to sociodemographic, family, behavioral, and school structural characteristics. Brazil, 2012.

Variables	Soft drinks				
	n[1]	n[1]	%[2]	(95%CI)[2]	p*
Family					
Living with the father	108,728				
Yes		38,428	55.6	53.6-57.62	0.1371
No		22,502	56.9	54.62-59.22	
Behavioral					
Use of tobacco	108,721				
Yes		3,875	65.6	62.12-68.99	<0.0001
No		57,043	55.6	53.55-57.54	
Consumption of alcohol	108,570				
Yes		18,355	65.5	63.72-67.23	<0.0001
No		42,465	52.7	50.46-54.99	
Physical activity	108,655				
≥3 days a week		27,269	58.8	56.57-61.05	<0.0001
<3 days a week		33,611	54.1	52.33-55.86	
Meals with parents or guardians	108,794				
≥3 days a week		51,237	55.9	53.93-57.83	0.0318
<3 days a week		9,724	57.0	54.76-59.14	
Eating while watching television or studying	108.729				
≥3 days a week		47,507	57.1	54.94-59.19	<0.0001
<3 days a week		13,410	52.5	50.55-54.44	
Breakfast	108,759				
≥3 days a week		52,655	55.7	53.76-57.63	<0.0001
<3 days a week		8,286	58.4	56.22-60.55	
Time spent watching television	108,694				
≥2 hours a day		40,195	59.4	57.57-61.2	<0.0001
<2 hours a day		20,698	50.2	47.96-52.44	
Willingness to lose weight	108,348				
Yes		15,237	52.2	50.9-53.54	<0.0001
No		45,476	57.4	55.1-59.71	
School food consumption	108,760				
≥3 days a week		12,165	52.8	49.83-55.66	<0.0001
<3 days a week		48,774	56.9	55.08-58.75	
School structural					
Cafeteria	108,591				
Yes		32,108	57.8	50.03-58.62	0.1195
No		28,728	54.4	56.82-58.82	
Sports facilities	108,549				
Yes		50,383	57.5	56.19-58.83	0.0025
No		10,432	50.4	45.19-55.67	

Note: *p-value - Pearson's chi-square test; [1]Number of individuals in the unweighted sample; [2]Prevalence and 95% confidence intervals (95%CI), calculated as weighted confidence interval due to the sampling design.
95%CI : 95% Confidence Interval.

It is worth mentioning that the existence of cafeteria at school was not associated with the consumption of packaged snacks and soft drinks (*p*>0.05) in the crude analysis. After adjustment of the model to the other independent variables in the final model, the existence of cafeteria at school was associated only with sugar candies (OR 1.8; 95%CI 1.05 to 1.12) (Table 4).

Table 4. Multiple logistic regression analysis for the regular consumption of obesogenic foods among adolescents, according to sociodemographic, family, behavioral, and school structural characteristics. Brazil, 2012.

Variables	Fried snacks					
	Crude odds Ratio			Adjusted odds Ratio		
	OR[1]	(95%CI)[2]	p	OR[1]	(95%CI)[2]	p
Sociodemographic						
Gender						
Male	1	-	-	-	-	-
Female	1.09	1.02- 1.17	0.007	0.007	1.11-1.29	<0.0001
Age						
≤14 years	1	-	-	-	-	-
>14 years	1.05	1.00-1.11	0.022	0.022	1.00-1.13	0.027
Currently employed						
Yes	1.35	1.25-1.35	<0.0001	<0.0001	1.18-1.43	<0.0001
No	1	-	-	-	-	-
Household composition						
≤4 persons	1	-	-	-	-	-
>4 persons	0.95	0.90-1.00	0.070	0.070	1.00-1.11	0.043
Home computer ownership						
Yes	1.54	1.45-1.63	<0.0001	<0.0001	1.40-1.60	<0.0001
No	1	-	-	-	-	-
Internet access						
Yes	1.47	1.42-1.53	<0.0001	<0.0001	1.23-1.35	<0.0001
No	1	-	-	-	-	-
Family						
Maternal level of education						
<9 years	0.76	0.70-0.83	<0.0001	<0.0001	0.78-0.91	<0.0001
≥9 years	1	-	-	-	-	-
Living with the mother						
Yes	1	-	-	-	-	-
No	1.11	1.07-1.15	<0.0001	<0.0001	1.03-1.16	0.003
Living with the father						
Yes	1.51	1.42-1.61	<0.0001	<0.0001	1.04-1.26	0.004
No	1	-	-	-	-	-
Behavioral						
Use of tobacco						
Yes	0.67	0.62-0.72	<0.0001	<0.0001	1.48-1.60	<0.0001
No	1	-	-	-	-	-
Consumption of alcohol						
Yes	1	-	-	-	-	-
No	0.82	0.79-0.85	<0.0001	<0.0001	0.82-0.86	<0.0001
Physical activity						
≥3 days a week	1	-	-	-	-	-
<3 days a week	1.14	1.09-1.20	<0.0001	<0.0001	1.04-1.14	<0.0001
Meals with parents or guardians						
≥3 days a week	1	-	-	-	-	-
<3 days a week	0.83	0.78-0.89	<0.0001	<0.0001	0.78-0.94	0.002
Eating while watching television or studying						
≥3 days a week						
<3 days a week						

Table 4. Multiple logistic regression analysis for the regular consumption of obesogenic foods among adolescents, according to sociodemographic, family, behavioral, and school structural characteristics. Brazil, 2012.

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Variables	Fried snacks					
	Crude odds Ratio			Adjusted odds Ratio		
	OR[1]	(95%CI)[2]	p	OR[1]	(95%CI)[2]	p
Behavioral						
Breakfast						
≥3 days a week	1.48	1.42-1.54	<0.0001	1.46	1.40-1.53	<0.0001
<3 days a week	1	-	-	1	-	-
Time spent watching television						
≥2 hours a day	1	-	-	1	-	-
<2 hours a day	1.26	1.18-1.34	<0.0001	1.39	1.31-1.48	<0.0001
Willingness to lose weight						
Yes	1	-	-	1	-	-
No	1.26	1.18-1.34	<0.0001	1.39	1.31-1.48	<0.0001

Variables	Packaged snacks					
	Crude odds Ratio			Adjusted odds Ratio		
	OR[1]	(95%CI)[2]	p	OR[1]	(95%CI)[2]	p
Sociodemographic						
Gender						
Male	1	-	-	1	-	-
Female	1.27	1.20-1.33	<0.0001	1.38	1.33-1.44	<0.0001
Age						
≤14 years						
>14 years						
Currently employed						
Yes	1.22	1.16-1.27	<0.0001	1.19	1.15-1.24	<0.0001
No	1	-	-	1	-	-
Household composition						
≤4 persons						
>4 persons						
Home computer ownership						
Yes	1.27	1.19-1.25	<0.0001	1.26	1.18-1.34	<0.0001
No	1	-	-	1	-	-
Internet access						
Yes	1.25	1.35-1.45	<0.0001	1.20	1.12-1.29	<0.0001
No	1	-	-	1	-	-
Family						
Maternal level of education						
<9 years						
≥9 years						
Living with the mother						
Yes						
No						
Living with the father						
Yes	1.78	1.61-1.97	<0.0001	1.37	1.20-1.58	<0.0001
No	1	-	-	1	-	-
Behavioral						
Use of tobacco						
Yes	1.65	1.53-1.77	<0.0001	1.52	1.38-1.67	<0.0001
No	1	-	-	1	-	-
Consumption of alcohol						
Yes	1	-	-	1	-	-
No	0.83	0.78-0.88	<0.0001	0.79	0.75-0.84	<0.0001

Table 4. Multiple logistic regression analysis for the regular consumption of obesogenic foods among adolescents, according to sociodemographic, family, behavioral, and school structural characteristics. Brazil, 2012.

Variables	Packaged snacks					
	Crude odds Ratio			Adjusted odds Ratio		
	OR[1]	(95%CI)[2]	p	OR[1]	(95%CI)[2]	p
Behavioral						
Physical activity						
≥3 days a week						
<3 days a week						
Meals with parents or guardians						
≥3 days a week	1	-	-	1	-	-
<3 days a week	0.82	0.79-0.85	<0.0001	0.84	0.81-0.87	<0.0001
Eating while watching television or studying						
≥3 days a week	1	-	-	1	-	-
<3 days a week	1.03	0.99-1.06	0.065	0.96	0.93-0.99	0.032
Breakfast						
≥3 days a week	1.57	1.53-1.62	<0.0001	1.53	1.47-1.58	<0.0001
<3 days a week	1	-	-	1	-	-
Time spent watching television						
≥2 hours a day	1	-	-	1	-	-
<2 hours a day	1.31	1.22-1.40	<0.0001	1.44	1.33-1.55	<0.0001
Willingness to lose weight						
Yes	1	-	-	1	-	-
No	1.31	1.22-1.40	<0.0001	1.44	1.33-1.55	<0.0001

Variables	Sugar candies					
	Crude odds Ratio			Adjusted odds Ratio		
	OR[1]	(95%CI)[2]	p	OR[1]	(95%CI)[2]	p
Sociodemographic						
Gender						
Male	1	-	-	1	-	-
Female	1.62	1.62-1.68	<0.0001	1.76	1.70-1.82	<0.0001
Age						
≤14 years	1	-	-	1	-	-
>14 years	0.76	0.69-0.83	<0.0001	0.81	0.76-0.85	<0.0001
Currently employed						
Yes						
No						
Household composition						
≤4 persons	1.32	1.16-1.51	<0.0001	1.11	1.05-1.17	<0.0001
>4 persons	1	-	-	1	-	-
Home computer ownership						
Yes	1.34	1.18-1.52	<0.0001	1.15	1.06-1.25	<0.0001
No	1	-	-	1	-	-
Internet access						
Yes	1.44	1.34-1.55	<0.0001	1.19	1.14-1.25	<0.0001
No	1	-	-	1	-	-
Family						
Maternal level of education						
<9 years	0.80	0.73-0.87	<0.0001	0.90	0.86-0.95	<0.0001
≥9 years	1	-	-	1	-	-
Living with the mother						
Yes						
No						

Table 4. Multiple logistic regression analysis for the regular consumption of obesogenic foods among adolescents, according to sociodemographic, family, behavioral, and school structural characteristics. Brazil, 2012.

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Variables	Sugar candies					
	Crude odds Ratio			Adjusted odds Ratio		
	OR[1]	(95%CI)[2]	p	OR[1]	(95%CI)[2]	p
Behavioral						
Use of tobacco						
Yes	1.44	1.35-1.54	<0.0001	1.22	1.12-1.33	<0.0001
No	1	-	-	1	-	-
Consumption of alcohol						
Yes	1.57	1.48-1.67	<0.0001	1.52	1.42-1.62	<0.0001
No	1	-	-	1	-	-
Physical activity						
≥3 days a week	1	-	-	1	-	-
<3 days a week	0.83	0.81-0.85	<0.0001	0.75	0.73-0.77	<0.0001
Meals with parents or guardians						
≥3 days a week	1	-	-	1	-	-
<3 days a week	1.18	1.12-1.25	<0.0001	1.11	1.06-1.15	<0.0001
Eating while watching television or studying						
≥3 days a week	1	-	-	1	-	-
<3 days a week	0.91	0.87-0.95	<0.0001	0.91	0.88-0.94	<0.0001
Breakfast						
≥3 days a week	1	-	-	1	-	-
<3 days a week	1.19	1.15-1.23	<0.0001	1.07	1.04-1.11	<0.0001
Time spent watching television						
≥2 hours a day	1.63	1.53-1.73	<0.0001	1.56	1.45-1.67	<0.0001
<2 hours a day	1	-	-	1	-	-
Willingness to lose weight						
Yes	1	-	-	1	-	-
No	1.11	1.07-1.15	<0.0001	1.30	1.26-1.34	<0.0001
School food consumption						
≥3 days a week	1	-	-	1	-	-
<3 days a week	1.18	1.09-1.28	<0.0001	1.07	1.02-1.12	0.005
School Structural						
Cafeteria						
Yes	1.16	1.07-1.24	<0.0001	1.08	1.05-1.12	<0.0001
No	1	-	-	1	-	-

Variables	Soft drinks					
	Crude odds Ratio			Adjusted odds Ratio		
	OR[1]	(95%CI)[2]	p	OR[1]	(95%CI)[2]	p
Sociodemographic						
Gender						
Male	1	-	-	1	-	-
Female	0.85	0.81-0.88	<0.0001	0.89	0.85-0.93	<0.0001
Age						
≥14 years						
>14 years						
Currently employed						
Yes	1.08	1.00-1.14	0.043	1.36	1.31-1.41	<0.0001
No	1	-	-	1	-	-

Table 4. Multiple logistic regression analysis for the regular consumption of obesogenic foods among adolescents, according to sociodemographic, family, behavioral, and school structural characteristics. Brazil, 2012.

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Variables	Soft drinks					
	Crude odds Ratio			*Adjusted odds Ratio*		
	OR[1]	(95%CI)[2]	*p*	OR[1]	(95%CI)[2]	*p*
Sociodemographic						
Household composition						
≤4 persons	1.68	1.49-1.90	<0.0001	1.21	1.10-1.34	<0.0001
>4 persons	1	-	-	1	-	-
Home computer ownership						
Yes	1.72	1.54-1.91	<0.0001	1.40	1.32-1.50	<0.0001
No	1	-	-	1	-	-
Internet access						
Yes	1.48	1.36-1.60	<0.0001	1.27	1.19-1.35	<0.0001
No	1	-	-	1	-	-
Family						
Maternal level of education						
<9 years	0.73	0.67-0.80	<0.0001	0.89	0.85-0.95	<0.0001
≥9 years	1	-	-	1	-	-
Living with the mother						
Yes	1	-	-	1	-	-
No	1.38	1.29-1.48	<0.0001	1.05	0.98-1.13	0.137
Behavioral						
Use of tobacco						
Yes	1.52	1.38-1.68	<0.0001	1.22	1.15-1.29	<0.0001
No	1	-	-	1	-	-
Consumption of alcohol						
Yes	1.70	0.63-0.76	<0.0001	1.59	1.52-1.66	<0.0001
No	1	-	-	1	-	-
Physical activity						
≥3 days a week	1	-	-	1	-	-
<3 days a week	0.82	0.80-0.84	<0.0001	0.88	0.85-0.92	<0.0001
Meals with parents or guardians						
≥3 days a week						
<3 days a week						
Eating while watching television or studying						
≥3 days a week	1	-	-	1	-	-
<3 days a week	0.83	0.76-0.90	<0.0001	0.85	0.82-0.88	<0.0001
Breakfast						
≥3 days a week	1	-	-	1	-	-
< days a week	1.11	1.07-1.15	<0.0001	1.07	1.03-1.12	<0.0001
Time spent watching television						
≥2 hours a day	1.45	1.40-1.49	<0.0001	1.44	1.33-1.55	<0.0001
<2 hours a day	1	-	-	1	-	-
Willingness to lose weight						
Yes	1	-	-	1	-	-
No	1.26	1.16-1.30	<0.0001	1.34	1.27-1.42	<0.0001
School food consumption						
≥3 days a week						
<3 days a week						

Table 4. Multiple logistic regression analysis for the regular consumption of obesogenic foods among adolescents, according to sociodemographic, family, behavioral, and school structural characteristics. Brazil, 2012.

Variables	Soft drinks					
	Crude odds Ratio			Adjusted odds Ratio		
	OR[1]	(95%CI)[2]	p	OR[1]	(95%CI)[2]	p
School Structural						
Cafeteria						
Yes						
No						

Note: [1]OR: *Odds Ratio*, calculated as weighted odds *ratio* due to the sampling design; [2]95%IC: 95% Confidence Interval, calculated as weighted confidence interval due to the sampling design.

Additionally, the adolescents that had greater probability of eating eat sugar candies regularly were females who owned a home computer and a mobile phone, had Internet access, smoked, consumed alcohol, and showed a lower frequency of eating breakfast, eating meals with the family, and school food consumption. These girls also spent more time watching television and attended schools that did not have a cafeteria.

In the final logistic model, the probability of regular consumption of soft drinks was greater among adolescents who had a job, owned a home computer and amobile phone, had Internet access, did not live with their father, smoked, consumed alcohol, ate breakfast less than 3 three days a week, watched television for more than two hours daily, and did not display willingness to lose weight.

Moreover, maternal level of education of less than nine years was a protective factor in the final adjusted models for the regular consumption of fried snacks, sugar candies, and soft drinks among the Brazilian adolescents analyzed.

DISCUSSION

The distribution of the population studied in terms of the frequency of consumption of obsegenic foods showed that their regular and daily consumption was higher among girls, except for soft drinks (difference of 0.2% between the genders). An interesting fact is that more than one third of girls reported daily consumption of sugar candies. In the logistic models used, females also showed greater probability of regular consumption of fried snacks (OR=1.20; 95%CI 1.11 to 1.29), packaged snacks (OR=1:38; 95%CI 1.33 to 1.44), and sugar candies (OR=1.76; 95%CI 1.70-1.282). In general, adolescent girls were more susceptible to developing unhealthy behavior and eating habits (use of tobacco, low frequency of eating meals with parents or guardians, low-frequency physical activity, and excessive amount of time spent watching television).

Although the literature often addresses differences between genders in food consumption patterns, the results from many studies differ from those found in the present study[12,13]. Investigating a representative sample of children and adolescents in the United States, some authors found that on averageboys had higher daily caloric intake, and the portion sizes and energy density of their meals and snacks were larger than those of girls[12].

Yannakoulia *et al*.[13] evaluated the eating habits of Greek adolescents as part of a large school-based study called Health Behavior in School-Aged Children (HBSC), based on unhealthy food choicescores, among which the highest scores corresponded to the worst diet quality. The authors concluded that the girls had the lowest

scores, afinding that was significant in all three age groups investigated (11, 13, and 15 years old).

In addition to the high percentage of adolescents who regularly consumed fried snacks, packaged snacks, sugar candies, and soft drinks with regular frequency (ranging from 27.17% to 65.96%, as previously mentioned) in the final logistic regression model (after adjusting the variables), the consumption of these four types of food was statistically associated with mobile phone ownership, Internet access, watching television for more than 2 hours a day, use of tobacco, and consumption of alcohol. The low frequency (less than three days a week) of the habit of eating while watching television or studying was a protective factor (OR<1.0) for the regular consumption of all foods.

The grow thin mobile media use, such as mobile phones (smartphones) and tablets, has been the subject of many studies that aim to identify their impact on the lives of consumers, in particular the Generation Z (or also called Generation, cohort of people born between 1991-2000), which is the first generation born after the advent of the Internet and who are growing up in an era of global interaction[14].

There is a consensus that the time spent on social networking is positively associated with the consumption of unhealthy foods, which is also consistent with research carried out by Boynton--Jarret *et al.*[15]. These authors evaluated adolescents over a period of 19 months and found an inverse relationship between the time spent watching television and the intake of fruits and vegetables. They believe that this reflects a replacement of healthy foods with unhealthy ones, which are highly advertised on television.

In addition to the negative approach associating the use of media with physical inactivity, obesity, mental disorders, reduction in sleeping hours and rest, problems with interpersonal relationships, and learning difficulties in the classroom[16], these adolescents are subjected to the massive advertising for industrialized foods[15].

However, given the growing trend of technological advances and their rapidly spread among children and adolescents, confronting such reality does not appear to be an effective approach. A more appropriate strategy would be investing in electronic media to promote healthy eating, advertising health enhancing-foods, and transmitting appropriate nutrition education messages[17]. For example, Peterson *et al.*[18] used healthy eating videos for 20 minutes for 10 days to assess the eating habits of children aged 5 and 6 years. The results showed that the students learned nutrition concepts and displayed certain tendency towards healthy food consumption.

As for the findings related to use of tobacco and alcohol consumption, these variables, whichrefer to unhealthy life style habits, lead to harmful eating behaviors, a fact that is consistent with the literature[19].

Although in Brazil the law prohibits the consumption of alcoholic beverage by any person under 18 years, the allure of alcohol is due to the fact that it is not an illegal drug and therefore is not subjected to censorship as strict as that of illegal drugs. Early age alcohol use can be related to several factors, such aseasy access and influence of friends and family. Other countries have also revealed high frequency of alcohol consumption among adolescents. It has been reported that in *Coimbra, Portugal*, 65% of adolescents aged 12 to 18 have already consumed alcohol and 19% have already gotten drunk[20], and in Germany, it was found that 93% of adolescents aged 15 to 16 have already tried alcoholic berverages[21].

Moreover, based on data from the Project Eating Among Teens (EAT), a study designed to investigate socio environmental, personal, and behavioral factors associated with dietary intake in adolescents 11-18 years, Larson *et al.*[19] reported results regarding smoking and factors associated with it. The authors concluded that smoking among adolescents was inversely related to the frequency of meals (breakfast, lunch, and

dinner) and consumption of fruits, vegetables, grains, and some vitamins and minerals. Smoking frequency was directly related to the frequency of fast-food and soft drink consumption.

The results from the present study revealed that the like lihood that adolescents will consume fried snacks, packaged snacks, sugar candies, and soft drinks was higher among those who worked. Considering that all adolescents were attending schools, such association may reflect the fact that they had less time to have regular meals and frequently ate outside the home. Furthermore, given the characteristics of these food groups, it can be said that these preparations and foods have been replacing the major meals. Corroborating this assertion, a study found that one third of adolescents replaced lunch and half of them replaced dinner with snacks, a habit that was most common among girls. Sandwiches, savory snacks, pizzas, and hamburgers were the main meal replacements[22].

Similarly, our study found that adolescents who had breakfast less than three days a week were more likely to regularly consume packaged snacks, sugar candies, and soft drinks.

Skipping breakfast is common among adolescents and has been associated with higher body mass index, and attention and concentration problems, with possible impacts on adult health. A longitudinal study conducted in Australia showed that both children and adults who skipped breakfast had larger waist circumference, higher fasting insulin, and higher levels of total cholesterol and Low Density Lipoprotein cholesterol in adulthood when compared to those who ate breakfast during childhood and adulthood[23]. One reason for this finding is the association of this habit with other unhealthy lifestyle habits, such as low fruit and vegetable intake.

Within the same context, in a prospective study of adolescents participating in the National Longitudinal Study of Adolescent Health, Niemeier *et al.*[24] investigated whether fast food consumption and breakfast skipping were associated with weight gain during the transition from adolescence to adulthood. The authors found marked increases in the consumption of these foods and decreases in the consumption of breakfast for five years. Another important finding is that these dietary behaviors were associated with increased weight gain from adolescence to adulthood.

With regard to the role of the family in the eating habits of adolescents, our findings revealed a significant association between low frequency of meals with parents or guardians (less than three days a week) and regular consumption of sugar candies and soft drinks. This variable remained in the explanatory model proposed after final adjustment.

An interesting finding was that low maternal level of education (less than 9 years) was as a protective factor (OR<1:00) for the consumption of fried snacks, sugar candies, and soft drinks since the regular consumption of these types of foods is frequently found among the children with mothers that have higher levels of education. Similarly, investigating the association between maternal determinants and dietary patterns of children, Villa *et al.*[25] found that children whose mothers had nine or more years of education consumed more "sugary drinks and snacks". These authors also showed that the probability of children having a diet rich in these food items increased by four times when maternal level of education was 12 or more years, compared to mothers who had less years of education.

However, these data challenge the assumption that higher level of education means greater access to health-related information and greater ability to distinguish between what is healthy and what is not. Thus, contrary to our results, a cross-sectional population study carried out in Spain, found that children whose mothers had lower level of education were more likely to follow the eating pattern called "Snacky", characterized by increased consumption of bakery products, salted snacks, sweets, and soft drinks[26].

Furthermore, the adolescents who did not reported willingness to lose weight (70%) had the highest frequency of consumption of all obesogenic foods investigated ($p<0.05$), and this variable remained in all final explanatory models after final adjustment of the other variables. This fact may indicate that body weight dissatisfaction among adolescents leads to behavior changes and reduced unhealthy food consumption to achieve weight loss.

It is known that during adolescence there are changes in anthropometric measures and body composition, and individuals acquire approximately 50% of their final weight and 20% of their final height. These common changes during puberty often trigger body dissatisfaction associated with the influence of psychological factors (search for a new identity and social and emotional independence), peers, friends, family, and the media. Therefore, the search for a thin body as a necessary attribute to achieve success, happiness, and beauty, results in increased body dissatisfaction and larger desire to lose weight. These facts consequently lead to dietary restrictions or compensatory behaviors to prevent weight gain, which are predictors of many eating disorders[27]. Although their mechanisms have not yet been defined, the literature has associated eating disorders, especially anorexia and bulimia, with lipid disorders and metabolic syndrome. It has been reported that these disorders occur due to physiological and hormonal changes and also by excessive intake of unhealthy foods followed by compensatory behaviors, typical of some eating disorders[28].

Finally, considering that *PeNSE* was conducted in the school context, it is worth highlighting that the regular consumption of the foods studied was higher among the students who attended schools that had a cafeteria and consumed school food less than three days a week. However, after adjustment in the multivariate analysis, there was no significant association between having a cafeteria and consuming school food with the consumption of fried snacks, packaged snacks, and soft drinks. In the final explanatory model, the variables remained associated only with the regular consumption of sugar candies among teenagers.

It is important to mention that although there are initiatives to improve school cafeteria food items, high energy density foods, which are rich in sugar, fat, and salt, such as fried snacks, packaged snacks, sugar candies, and soft drinks, are still available, indicating students' preference forthem[29]. This is due to the high prevalence of outsourced management of school cafeterias, with little interference from the school community, and thus the owner has autonomy and focuses primarily on profit generation at the expense of a healthy diet. Therefore, improving the nutritional quality of foods sold around schools should be a continuous integration effort among suppliers, school board, students, families, and the governement[29].

With regard to the consequences of the type of foods available in schools and school surroundings, Virtanen *et al*.[30] investigated the association among the proximity of fast food chains and grocery stores to schools and the food choices of Finnish adolescents. The authors found an association between the presence of these food establishments in the vicinity of schools and poor eating habits, such as skipping breakfast, low consumption of free school meals, and a 1.25-fold risk of overweight.

After discussing the factors associated with the regular consumption of obesogenic foods considering literature data and trying to understand these associations, it is important to add that there is a consensus in the literature on the negative consequences of this behavior[5].

In addition to the exponentially increased risk of overweight and obesity, the consumption of fried snacks, packaged snacks, sugar candies, and soft drinks contributes to Non Communicable Diseases (NCD). The incidence of NCD has increased in the past decades among adolescents[31]. These foods have high energy density, high sugar content, high levels of saturated fat and trans fat,

and are low in fibers[3], which affects the body's ability to maintain energy balance, increasing the risk of gaining too much weight, prevalence of dental caries, and morbidity and mortality due to cardiovascular disease, hypertension, diabetes, and several forms of cancers[5].

It should be added that, as demonstrated by Johnson & Kenny[32], like other substances (such as cocaine or heroin), unhealthy foods can be addictive. This is due to the fact that their consumption triggers progressive deterioration of the chemical balance in brain reward circuitries leading to the development of a pattern of compulsive eating, especially foods that are high in fats and calories, contributing to the maintenance of these food preferences throughout the life span.

The concept of tracking has been defined in epidemiology as the stability of a given variable over a period of time. Dietary tracking values can therefore be considered to illustrate the maintenance of dietary habits, nutrient intakes, or food consumption over time[33]. There is a tendency to change(or absence of 'tracking') in these standards, which appear to be negative, i.e., there is a decrease in dietary quality throughout the life span.

Based on data from the Framingham Children's study, which evaluated children aged 3 to 5 years over a span of up to 6 years six years, Singer et al.[34] showed a prevalence of tracking of 40-90% both in the highest and the lowest quintiles of intake, and 57% of the individuals remained in the highest quintile of fat intake for three years. The authors considered tracking as the proportion of children in the highest and lowest quintiles of nutrient density intake at baseline who remained in the same quintile or moved only one quintile in subsequent years. The study supports the idea that the levels of intake of nutrients are maintained in subsequent ages.

One limitation of our study is the cross-sectional design, which prevents cause-and-effect inferences. Therefore, the findings should be treated with caution until a longitudinal assessment of risk factors is carried out. Although cross-sectional studies do not enable causal inferences, they are essential for generating hypotheses and planning prospective studies that can establish clear relationships between the determinants of overweight among adolescents. Despite this limitation, the sampled population in the present study was representative of the of Brazilian schoolchildren, allowing the conclusion that the regular consumption of obesogenic foods is a major eating-related problem among this population.

CONCLUSION

Considering the objective of this study, it can be said that the consumption of fried snacks, packaged snacks, sugar candies, and soft drinks is regular in the diet of Brazilian adolescents. The consumption of these foods is associated with sociodemographic, family, behavioral, and school structural variables. It is worth highlighting that the variables female gender, mobile phone ownership, Internet access at home, use of tobacco, alcohol consumption, regular physical activity, eating while watching television or studying, watching television for at least 2 hours a day, and not willing to lose weight were associated with regular consumption in the final explanatory models of the four types of foods analyzed.

We hope our findings may lead to a new and better understanding of the profile of adolescents who regularly consume unhealthy and obesogenic foods. The identification of the factors that are associated with the consumption of these foods shows that strategies that promote healthy eating should consider sociodemographic, family, behavioral, and environmental characteristics.

Therefore, interventions should be designed aiming at a health promoting school, including, in a systematic way, the topic 'eating' into the regular school curriculum. These strategies must also be associated with the

availability of healthy food sand the restriction of the sale of obesogenic foods in schools and their surroundings.

CONTRIBUTORS

G LONGO-SILVA contributed to the conception and design of this study, data processing, analysis and interpretation, and manuscript writing. RCE MENEZES contributed to the conception and design of this study, data processing, analysis and interpretation, manuscript writing, and critical revision of the final version. CAN SOUZA contributed to the data analysis and interpretation and manuscript writing. PM MARINHO contributed to the data analysis and interpretation. MHA TOLONI contributed to the manuscript writing and revision. MAA OLIVEIRA contributed to the critical revision of the final version of the manuscript.

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