

## Psychosocial aspects related to fruit and vegetable consumption in adolescents

Aspectos psicossociais relacionados ao consumo de frutas e hortaliças em adolescentes

Thaís Meirelles de Vasconcelos (<https://orcid.org/0000-0003-0108-8991>)<sup>1</sup>

Luana Silva Monteiro (<https://orcid.org/0000-0003-3599-6947>)<sup>2</sup>

Rosely Sichieri (<https://orcid.org/0000-0001-5286-5354>)<sup>3</sup>

Rosângela Alves Pereira (<https://orcid.org/0000-0002-9886-9796>)<sup>1</sup>

**Abstract** *This study aimed at assessing the association between psychosocial aspects and fruit and vegetable consumption in adolescents. Cross-sectional study developed with 327 adolescents from a public school in Brazil. A questionnaire developed for adolescents was applied to assess the influence of self-efficacy, family, peers, and body image on the consumption of fruits and vegetables. Specific questions assessed the intake frequency of fruits and vegetables, and the mean consumption was estimated using two 24-hour recalls. Scores related to psychosocial aspects were described as mean and median and the weight status was classified based on the body mass index. The average daily consumption of fruits and vegetables was 36.2 g and 45.4 g, respectively. Self-efficacy and the influence of peers were associated with an increase in the amount and frequency of fruits and vegetables consumption. Adolescents with higher scores of self-efficacy had greater average consumption of fruits and vegetables when compared to those with lower scores. The same was observed for the influence of peers. Self-efficacy and the influence of peers were the factors that most influenced the consumption of fruits and vegetables in adolescents.*

**Key words** *Psychosocial aspects, Adolescents, Fruits, Vegetables, Questionnaire*

**Resumo** *O objetivo do estudo foi avaliar a associação entre aspectos psicossociais e o consumo de frutas e hortaliças em adolescentes. Estudo transversal desenvolvido com 327 adolescentes de uma escola pública do Brasil. Um questionário desenvolvido para adolescentes foi aplicado para avaliar a influência da autoeficácia, família, pares e imagem corporal sobre o consumo de frutas e hortaliças. Questões específicas avaliaram a frequência de ingestão de frutas e hortaliças e o consumo foi estimado por meio de dois recordatórios de 24 horas. Os escores relacionados aos aspectos psicossociais foram descritos por média e mediana e a condição de peso foi classificada com base no índice de massa corporal. O consumo diário médio de frutas e hortaliças foi de 36,2 g e 45,4 g, respectivamente. A autoeficácia e a influência dos pares associaram-se ao aumento da quantidade e da frequência de consumo de frutas e hortaliças. Os adolescentes com maiores valores no escore para autoeficácia apresentaram maior média de consumo de frutas e hortaliças quando comparados àqueles com menores escores. O mesmo foi observado para a influência dos pares. A autoeficácia e a influência dos pares foram os fatores que mais influenciaram o consumo de frutas e hortaliças em adolescentes.*

**Palavras-chave** *Aspectos psicossociais, Adolescentes, Frutas, Hortaliças, Questionário*

<sup>1</sup> Departamento de Nutrição Social e Aplicada, Universidade Federal do Rio de Janeiro. Av. Carlos Chagas Filho 373, Edifício do Centro de Ciências da Saúde, Bloco J, 2º andar, Cidade Universitária. 21941-590 Rio de Janeiro RJ Brasil. [thaismvasconcelos@gmail.com](mailto:thaismvasconcelos@gmail.com)

<sup>2</sup> Curso de Nutrição, Universidade Federal do Rio de Janeiro. Macaé RJ Brasil.

<sup>3</sup> Instituto de Medicina Social, Universidade do Estado do Rio de Janeiro. Rio de Janeiro RJ Brasil.

## Introduction

Fruit and vegetable consumption is widely recommended for their health protection properties, being associated with a reduced risk of developing cancer, cardiovascular diseases<sup>1</sup>, depression<sup>2</sup>, and excessive weight gain<sup>3</sup>.

Despite these benefits, overall, fruit and vegetable consumption are low in Brazil, especially among adolescents<sup>4,5</sup>. Data from the latest National School Health Survey (PeNSE, 2015) reiterated these findings in adolescents, since the consumption for at least five days a week of fresh fruits was reported by 32.7% and vegetables by 37.7% of the adolescents<sup>4</sup>.

Given the increase in overweight rates and the low fruit and vegetable consumption in adolescents, intervention studies have been developed with the aim of acting in obesity prevention and in promoting healthy eating in this population group<sup>6,7</sup>. However, the effects of such interventions, in general, are less than desired<sup>8,9</sup>. This failure may be related to the fact that several aspects that make up the complex interrelationship of biological, environmental and psychosocial factors that influence the food consumption of adolescents are not considered in these interventions<sup>10</sup>. It has been shown that the release of information on food and nutrition alone are not enough to provoke changes in eating habits; therefore, intervention aiming to improve eating habits should apply further strategies to obtain positive results<sup>11</sup>. Additionally, health promotion and the prevention of undesirable health conditions should also rely on information concerning psychosocial aspects, such as, social relationships, lifestyle, and satisfaction with life<sup>12</sup>.

In this context, the psychosocial aspects involved in food choices can be important predictors of adherence to nutritional interventions to promote healthy eating. Studies that assessed the role of psychosocial factors related to food choices in adolescents have been carried out in different contexts<sup>13,14</sup>, yet, in Brazil, these studies are still scarce and, until this moment, no similar studies were found. Thus, the present study aims to assess the association between psychosocial aspects and the fruit and vegetable consumption in adolescents.

## Material and methods

This is a cross-sectional study carried out in a public school, selected by convenience, in the city

of Niterói, Rio de Janeiro, Brazil. Were invited to the study all students between 10 and 19 years old enrolled from the 5<sup>th</sup> to the 9<sup>th</sup> grades. Adolescents with disabilities that prevented to obtain anthropometric measurements, pregnant adolescents, and those who were undergoing any treatment that required changes to the diet were not eligible to the study. From the 429 eligible students, 387 agreed to participate in the study and 327 (76.5%) presented complete information on food consumption and on psychosocial aspects related to the fruit and vegetable consumption, which were included in the present analysis.

Data collection was carried from August to December 2015. A self-administered questionnaire was applied using a PDA (Personal Digital Assistant) in the classroom, after guidance and under the supervision of the researchers. To guarantee the quality of the data, programming was carried out on the PDA that prevented the omission of answers. In addition, the questionnaires were revised when there was doubt or an answer considered inconsistent, the researchers confirmed the information with the respondents. Two 24-hour recalls (24hR) were applied and measurements of weight and height were taken.

## Measurement procedures and data processing

### Psychosocial aspects related to fruit and vegetable consumption habits

Psychosocial aspects were assessed using the questionnaire “Psychosocial Aspects Associated with Nutrition and Physical Activity of Adolescents”, developed by Monge-Rojas *et al.*<sup>15</sup>. This questionnaire was chosen for being developed specifically for adolescents and because it allows assessing simultaneously five psychosocial aspects (self-efficacy, family, peers, body image, and media/environment) related to food consumption. The questionnaire was submitted to cross-cultural adaptation study<sup>16</sup>; therefore, the process of translation and adaptation of the questions followed the script proposed by Beaton *et al.*<sup>17</sup> and Reichenheim and Moraes<sup>18</sup>. Along with the cross-cultural adaptation, a reproducibility evaluation and the assessment of the instrument’s multidimensional structure were also carried out, in order to confirm whether it could be applied to Brazilian adolescents. In this process, issues related to the “media/environment” dimension did not show acceptable psychometric indicators and were excluded<sup>16</sup>.

Additionally, the questionnaire was applied to a group of adolescents comparable to the study

group, in order to assess the degree of difficulty in understanding and filling it out. Since some degree of difficulty was found, experts in nutrition and psychology revised and modified the instrument in order to make it easier to be completed by the adolescents. Then, another pre-test was carried out to verify the level of understanding of the instrument, which was, then, considered adequate.

The adapted questionnaire consists of 36 statements describing positive and negative behaviors related to the following dimensions: (a) family influence (8 questions); (b) peers influence (7 questions); (c) body image (9 questions); and (d) self-efficacy (14 questions) in relation to fruit and vegetable consumption. The adolescents were asked to assign each statement as true or false. For calculating scores, 1 (one) point was assigned for the answers in which positive behaviors were marked as “True” and for negative behaviors that were marked as “False”. Otherwise, that is, in case of a positive behavior marked as false or a negative behavior marked as true, the score for the question was zero (0). Thus, raw scores were estimated for each psychosocial aspect assessed by the sum of the points of each question, ranging from 0 to 14 for self-efficacy, 0 to 8 for peers, 0 to 8 for family and 0 to 10 for body image. To allow the comparison among the estimated scores for each aspect considered, the estimated raw scores were converted to values in base 10, which was performed using the “rule of three”. Thus, the raw score is multiplied by ten and the result is divided by the number of questions in each aspect evaluated by the questionnaire. Then, the scores in base 10 were standardized, considering the following steps: (1) for each psychosocial aspect, the mean and standard deviation (SD) of the score at base 10 were calculated; (2) for each individual, the base-10 score was reduced from the mean and divided by the standard deviation of the distribution. Therefore, the standardized scores means were equal to zero (0) and their variances were equal to one (1), so that the comparison among the different strata was in units of standard deviation.

These standardized values represent the individual score in units of the standard deviation. For the analyses on the association of psychosocial aspects with fruit and vegetable consumption, the standardized scores were categorized into less than or equal to the mean (score $\leq$ 0), which represented less influence, and greater than the mean (score $>$ 0), representing greater influence of the studied aspect.

### Food intake

Food intake was assessed using two 24-hour recalls. Additionally, three screening questions on fruit, vegetable (not counting potatoes and cassava), and salad frequency of consumption in the last month were asked, with the following response options: never or less than once a month; 1-3 times a month; once a week; 2-4 times a week; 5-6 times a week; once a day; and 2 or more times a day. The frequency of fruits, vegetables, and salad consumption in the last month was later categorized into: never or rarely (never or less than once a month), low or moderate frequency (once a month to four times per week), and high frequency ( $\geq$ 5 times per week).

A 24hR was applied in two non-consecutive days through an in-person interview conducted by nutritionists. Respondents were asked to report all food and beverages consumed during the day before the interview, which was conducted based on the Multiple Passage Method<sup>19</sup> with the support of the computer program applied in the Study of Cardiovascular Risks in Adolescents (ERICA)<sup>20</sup>. The mean usual intake of fruits and vegetables was estimated using the Multiple Source Method (MSM) to estimated means corrected by intra-individual variability<sup>21,22</sup>.

### Weight status

Weight status was assessed based on Body Mass Index (BMI=weight/ height<sup>2</sup>). The adolescents were measured wearing light clothing and no shoes. Their weight was measured using a Tanita BC-558 portable electronic scale, with capacity for up to 150 kg and a variation of 50 g. Height was measured according to recommendations of Gordon *et al.*<sup>23</sup> using a portable stadiometer (brand AlturaExata) with an extension of 200 cm and a variation of 0.1 cm.

Weight status was categorized into four categories (underweight, adequate weight, overweight, and obesity) based on the z-scores of the BMI to age and sex distribution curves proposed by the World Health Organization (WHO)<sup>24</sup>. Subsequently, for the analyses, the BMI was categorized as non overweight (underweight and adequate weight) and overweight (overweight and obesity).

### Sociodemographic characteristics

Information about sex was self-reported and recorded in the PDA by the field researcher. Age

was calculated as the difference between the date of data collection and the date of birth provided by the school and was categorized into two age groups: <13 years old and  $\geq 13$  years old.

### Statistical analysis

The psychosocial aspect scores were described by raw and standardized medians for the total evaluated group and according to sex, age group, and weight status.

Daily usual consumption of fruits and vegetables, estimated through deattenuated means of two 24h-R, was described in means (and standard deviations) in grams per day (g/day). In addition, fruit, vegetable, and salad frequency of consumption was described by absolute and relative (%) frequencies, as well as weight status, sex, and age group categories. All estimates were stratified according to psychosocial aspects categorized into less than or equal to the mean (score $\leq 0$ ) and greater than the mean (score $> 0$ ).

The Kolgomorov-Smirnov test was applied to verify the symmetry of continuous variable distributions. Psychosocial aspects and food intake variables were asymmetrically distributed and were tested by the Mann-Whitney and Chi-square tests (5% statistical significance). The Mann-Whitney test was used to verify possible differences among the values of the standardized median of psychosocial aspects according to gender, age group and weight status and for the analysis of the quantities of consumption of fruits and vegetables according to the evaluated aspects. The Chi-square test was applied to verify differences between the frequency of fruit and vegetable consumption according to psychosocial aspects. A statistical significance of 5% was adopted. Data were analyzed using the Statistical Package for Social Sciences (SPSS), version 19 (IBM SPSS Statistics).

### Ethical aspects

The study was approved by the Research Ethics Committee of the "blinded", under opinion No. 1.188.890, of August 17<sup>th</sup>, 2015. Participation in the research was conditioned to the signing of the Term of Informed Consent by the guardian or individuals who were 18 years of age or older.

## Results

Among the studied adolescents (n=327), 51% (n=165) were males, 32% (n=101) were overweight, and 54% were 13 years old or older, while the ages ranged between 10 to 16 years old (mean age=12.7 years old, SD=1.6) (Table 1).

From the 24hR data, it was estimated that the average daily consumption of fruits and vegetables was 36.2 g and 45.4 g, respectively (Table 1). It was found at 24hR, that only 29% of the evaluated adolescents reported consuming fruits, 52% consumed vegetables, and 63% consumed fruits and vegetables. Assessing exclusively adolescents who reported consuming fruits and vegetables, we observed an average consumption of 124 g and 87 g, respectively (data not shown). High frequency of fruit consumption ( $\geq 5x$  per week) was reported by 56% of adolescents, vegetables, by 68%, and salads by 53%. The analyses also showed that 18% of the students rarely consumed fruits and vegetables (never or almost never) (Table 1).

Self-efficacy (average of the standardized score=0.400) and the influence of peers (0.126) were the factors that influenced fruit and vegetable consumption the most in adolescents, since they showed higher medians in the standardized scores than the influence of body image (0.085) and the family (0.050). These findings were confirmed in the sex strata, both for females and males, in adolescents under 13 years old of age and in those who were not overweight (Table 2). However, for those aged 13 years old and over and those who were overweight, it was observed that the food choices for fruits and vegetables were basically influenced by peers (0.126). The self-efficacy scores showed significant differences for the age and weight status categories (Table 2).

Standardized scores greater than zero, which indicated greater influence of the psychosocial aspect, were observed for roughly 60% of the adolescents for all domains evaluated. Fruit and vegetable consumption was influenced by self-efficacy, as shown in Table 3. The usual average consumption of fruits (25.7 vs. 45.9 g/day) and vegetables (38.3 vs. 51.9 g/day), fruits and vegetables (68.2 vs. 99.8 g/day) was significantly greater among adolescents with higher self-efficacy (score $> 0$ ), when compared to those with the lowest self-efficacy influence. Similar results were observed for fruit intake among adolescents with higher peer influence (score $> 0$ ) compared to those less influenced by this aspect (25.9 vs. 42.8 g / day) (Table 3).

**Table 1.** Characterization of the sample, frequency of consumption of fruits, vegetables and salad, and usual daily intake means (g/day). Adolescents from a public school (n=327). Niterói-RJ, 2015.

	n	%
Sex		
Males	165	51.0
Females	162	49.0
Age		
<13 years old	150	46.0
≥13 years old	177	54.0
Weight status <sup>1</sup>		
Non-Overweight	215	68.0
Overweight	101	32.0
<b>Frequency of consumption</b>		
Fruits		
Never or almost never	60	18.0
Low or moderate frequency*	85	26.0
High frequency (≥5 times per week)	182	56.0
Vegetables		
Never or almost never	60	18.0
Low or moderate frequency*	46	14.0
High frequency (≥5 times per week)	221	68.0
Salad		
Never or almost never	98	30.0
Low or moderate frequency*	56	17.0
High frequency (≥5 times per week)	173	53.0
Average usual daily intake <sup>2</sup> (grams/day)	<b>mean</b>	<b>standard deviation</b>
Fruits	36.2	64.6
Vegetables	45.4	56.1
Fruits and Vegetables	84.6	87.0

<sup>1</sup>Only individuals with anthropometric data (n=316). <sup>2</sup>Estimated from two 24-hour recalls and corrected by intraindividual variability with the MSM (<https://msm.dife.de/>). \*Once a month to four times per week.

Source: Authors.

**Table 2.** Median of raw and standardized scores of psychosocial aspects for the total sample and according to sex, age, and weight status. Adolescents from a public school (n=327). Niterói-RJ, 2015.

	Psychosocial Aspects			
	Self-efficacy	Peers	Family	Body Image
Median scores at base 10*	7.14	5.0	7.50	7.0
Standardized scores (median)**				
Total	0.400	0.126	0.085	0.050
Sex				
Males	0.206	0.126	0.085	0.050
Females	0.400	0.126	0.085	0.050
Age				
<13 years old	0.400 <sup>a</sup>	0.126	0.085	0.050
≥13 years old	0.013	0.126	0.085	0.050
Weight status <sup>1</sup>				
Non-Overweight	0.400 <sup>a</sup>	0.126	0.085	0.050
Overweight	0.013	0.126	0.085	0.050

\*Values ranging from 0-10; \*\*Standardized scores: in standard deviation units; mean equal to zero and variance equal to one.

<sup>a</sup>Mann Whitney Test p<0.05. <sup>1</sup>Only individuals with anthropometric data (n=316).

Source: Authors.

**Table 3.** Distribution of adolescents according to the categories psychosocial aspect standardized scores and mean (and standard deviations) of daily usual fruit and vegetable consumption<sup>1</sup> (grams per day). Adolescents from a public school (n=327). Niterói-RJ, 2015.

Psychosocial aspects (standardized scores)	n	Estimated usual daily intake (grams per day)						
		%	Fruits		Vegetables		Fruits and Vegetables	
			Mean (SD)	P-value*	Mean (SD)	P-value*	Mean (SD)	P-value*
Self-efficacy								
Score≤0	119	36.4	25.7 (53.3)	0.008	38.3 (51.5)	0.03	68.2 (76.8)	0.002
Score>0	208	63.6	45.9 (72.4)		51.9 (59.4)		99.8 (93.1)	
Peers								
Score≤0	129	39.4	25.9 (53.3)	0.04	40.0 (54.0)	0.11	71.6 (75.9)	0.07
Score>0	198	60.6	42.8 (70.3)		48.9 (57.2)		93.0 (92.6)	
Family								
Score≤0	135	41.3	38.5 (69.6)	0.87	43.2 (54.5)	0.58	85.0 (89.5)	0.92
Score>0	192	58.7	34.6 (60.9)		46.9 (57.9)		84.3 (85.4)	
Body Image								
Score≤0	119	36.4	35.5 (69.0)	0.44	46.5 (55.2)	0.75	85.6 (89.9)	0.99
Score>0	208	63.6	36.6 (62.1)		44.7 (56.7)		84.0 (85.4)	

<sup>1</sup>Data obtained through two 24-hour recalls and corrected by intraindividual variability with the MSM (<https://msm.dife.de/>).

\*Mann Whitney test.

Source: Authors.

Regarding consumption frequency, it was observed that among the individuals who showed greater influence of self-efficacy and family (score>0) there was a significant higher proportion of individuals reporting high frequency of consumption of fruits (self-efficacy: 45.4 vs. 64.0%; family influence: 38.9 vs. 66.5%), vegetables (self-efficacy: 62.5 vs. 72.6%; family influence: 59.5 vs. 73.5%) and salads (self-efficacy: 41.4 vs. 64.6%; family influence: 38.2 vs. 64.3%) (Table 4).

## Discussion

Among the adolescents investigated, the psychosocial aspects that influenced fruit and vegetable consumption the most were self-efficacy and peers. The influence of family and self-efficacy was associated with a higher consumption frequency of fruit, vegetable, and salad intake. Low consumption of fruits and vegetables was observed among the studied adolescents. Even among those who reported daily consumption of fruits and vegetables, ingestion represented only 30% of the 400-grams recommendation<sup>25</sup>.

Subtle differences were observed in the influence of psychosocial factors on the consumption of fruits and vegetables for the estimates obtained

by the 24hR (self-efficacy and peers) and by the screening questions (self-efficacy and family). We can consider that these results are complementary, since the 24hR and the screening questions capture particular aspects of the diet: mean intake and frequency of intake.

The reduced consumption of fruits and vegetables among adolescents has been observed in other Brazilian studies. Souza *et al.*<sup>26</sup>, studying data from the first National Food Survey (INA), found that adolescents were the only age group that failed to mention any vegetable among the 20 most consumed foods. Data from PeNSE (2015) showed that consumption of fresh fruits, at least five days a week, was reported by 32.7% of adolescents and vegetables, by 37.7%<sup>4</sup>. Souza *et al.*<sup>5</sup>, evaluating ERICA data, also observed a low prevalence of fruit consumption, and found that fruits were among the 20 most consumed only among males aged 12 to 13 years old, mentioned by 18.0% of them.

The results of the present study are comparable to similar studies carried out with children and adolescents in other countries, which observed that self-efficacy and family influence were associated with fruit and vegetable consumption<sup>27,28</sup>. The results are also consistent with the findings by Salvy *et al.*<sup>29</sup> in a literature review on this subject, which indicated the importance

**Table 4.** Distribution of adolescents according to fruit, vegetable, and salad frequency of consumption and to categories of psychosocial aspects. Adolescents from a public school (n=327). Niterói-RJ, 2015.

Frequency of consumption	Psychosocial Aspects (%)											
	Self-efficacy			Peers			Family			Body Image		
	Score ≤0	Score >0	p-value <sup>1</sup>	Score ≤0	Score >0	p-value <sup>1</sup>	Score ≤0	Score >0	p-value <sup>1</sup>	Score ≤0	Score >0	p-value <sup>1</sup>
Fruits												
Never or almost never	23.7	14.6		20.2	18.2		24.4	15.1		23.5	16.4	
Low or moderate frequency*	30.9	21.3	0.004	31.5	22.4	0.12	36.6	18.4	<0.001	27.0	25.4	0.22
High frequency (≥5 times per week)	45.4	64.0		48.4	59.4		38.9	66.5		49.6	58.2	
Vegetables												
Never or almost never	25.0	11.6		19.4	17.2		27.5	11.4		20.0	16.9	
Low or moderate frequency*	12.5	15.9	0.008	16.9	12.5	0.42	13.0	15.1	0.001	9.6	16.9	0.19
High frequency (≥5 times per week)	62.5	72.6		63.7	70.3		59.5	73.5		70.4	66.2	
Salad												
Never or almost never	40.8	19.5		53.2	53.6		38.9	23.2		33.0	27.9	
Low or moderate frequency*	17.8	15.9	<0.001	16.1	17.2	0.95	22.9	12.4	<0.001	20.9	14.4	0.11
High frequency (≥5 times per week)	41.4	64.6		30.6	29.2		38.2	64.3		46.1	57.7	

<sup>1</sup>Chi-Square Test. \*Once a month to four times per week.

Source: Authors.

of peer influence on healthy eating among children and adolescents. Pearson *et al.*<sup>27</sup>, evaluated 11-12-year-old adolescents in central Denmark schools and found that self-efficacy and social environment were significantly associated with the consumption of fruits and vegetables. Similar results were observed by Gebremariam *et al.*<sup>28</sup>, in a cross-sectional study with 742 adolescents from 11 secondary schools located in the Eastern part of Norway. The authors observed that self-efficacy related to healthy eating is positively associated with the consumption of fruits and vegetables. According to Pearson *et al.*<sup>30</sup>, self-efficacy is a strong predictor of healthy eating during adolescence. Thus, it highlights the importance of addressing self-efficacy in studies that aim to promote healthy eating in adolescents<sup>30,31</sup>.

According to Lubans *et al.*<sup>32</sup>, dietary self-efficacy is related to the perceived ability to make healthy food choices, even when facing an obstacle. It is noteworthy, that self-efficacy was associated with food choices and healthy eating

behaviors in the present study. These findings were consistent with the results observed in other studies, which observed that knowledge about health associated with self-efficacy can be a more effective determinant for the choices of adolescents<sup>33,34</sup>.

Another point that relates to the food choices of adolescents is the peers' influence<sup>29</sup>. In the present study, the usual consumption of fruits was higher among adolescents with highest peer-influence scores. Similar results were found by Habe and Hartmann<sup>35</sup>, who found that German children and adolescents ingested more fruits, when they realized that their friends also did. A study carried out with 2,764 European adolescents indicated that adolescents ingested healthy foods when their colleagues encouraged them to eat healthily, and this incentive stimulated a greater intake of fruits<sup>36</sup>. Review studies suggest that peers could be possible targets in interventions promoting healthy eating diets among adolescents<sup>37</sup>.

Parents influence the eating habits of adolescents by being the providers, models and regulators of family nutrition. Studies indicate that adolescents who eat meals with their parents report better food regulation and selection than those who do not eat regularly with their parents or guardians<sup>38,39</sup>.

Limitations of this study refer to the methods used to assess food consumption which are dependent on the memory of the subjects. However, different strategies were used to reduce measurement errors, such as rigorous training of interviewers and the application of the 24R with the support of a computer program<sup>5,40</sup> which is based on the multiple pass method<sup>19</sup>. Two 24hR were also applied in non-consecutive days, allowing the estimation of usual consumption corrected by intra-individual variability. In addition, the results are compatible with findings from similar studies<sup>4,5,26</sup>, so it is believed that the results regarding the consumption of fruits and vegetables are reliable. Another limitation is the fact that the sample was selected for convenience, which compromises the extrapolation of the results to other populations. However, the size of the sample evaluated (n=327) allows to observe differences in the proportions of up to 10% among the strata evaluated, with 0.05 alpha and 80% power<sup>41</sup>.

A strength of this study is the fact that it uses a questionnaire developed specifically for adolescents, which simultaneously evaluates four psychosocial aspects related to the specific consumption of fruits and vegetables. This instrument was cross-culturally adapted and its reproducibility was analyzed in a similar sample to the one evaluated in this study<sup>16</sup>.

In Brazil, there are no studies that examine the role of different psychosocial aspects of food

consumption in adolescents. This information is an important tool in understanding the factors that influence the eating habits of adolescents, especially in nutritional interventions. Intervention studies developed with the objective of promoting healthy eating in adolescents have limited impact<sup>6,7,9</sup>. Sichieri and Souza<sup>42</sup> suggest that the failure of these interventions may be related to the fact that they do not consider important aspects related to the individual, social, and family environment, which, in general, contribute to sedentary behaviors and caloric consumption above the required. According to Toral *et al.*<sup>43</sup>, psychosocial factors modulate the effect of nutritional interventions in terms of changing behaviors, attitudes and beliefs. The psychosocial factors associated with food consumption in adolescents is an important topic in the field of public health, which, however, has been little addressed in studies developed in the country<sup>43</sup>. These findings are a contribution to future actions of healthy eating promotion targeting adolescents.

The study allowed us to identify that self-efficacy is the psychosocial aspects that had the greatest influence on the consumption of fruits and vegetables in adolescents, and that, under its influence, adolescents increase not only the amount but also the frequency of consumption of these foods. In addition, the findings of this study also showed the influence of peers on fruit consumption and the family's influence on the frequency of consumption of fruits, vegetables and salad. These aspects should be considered when planning strategies that encourage the adoption of healthy eating habits, aiming to strengthen adolescents' self-efficacy and work on the positive influence that peers exert, thus contributing to encourage healthy eating.



## Collaborations

TM Vasconcelos participated in the collection, typing and analysis of data, interpretation of the results and writing the manuscript. LS Monteiro participated in the analysis and interpretation of data and in the text review. R Sichieri coordinated the research, participated in the analysis and interpretation of data and in the writing and final review of the manuscript. RA Pereira idealized the manuscript, participated in the analysis and interpretation of data and in the writing and final review of the manuscript. The participation of all authors in the preparation of the manuscript stands out and take responsibility for their content. All authors approved the final version sent.

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