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Skipping breakfast and associated factors among Brazilian adolescents

Omissão do desjejum e fatores associados entre adolescentes brasileiros

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ABSTRACT

Objective

To analyze the prevalence and factors associated with breakfast skipping among adolescents.

Methods

Cross-sectional study, with adolescents aged 10–17 years, evaluated between 2009 and 2011, belonging to a cohort study in the Central-West region of Brazil. Breakfast skipping was considered as not having breakfast every day. Demographic, socioeconomic, and lifestyle factors were evaluated through a questionnaire. Anthropometric assessment included measurement of weight and height, which were used to classify weight status using body mass index. Poisson regression was used to assess the association of breakfast skipping with demographic and socioeconomic variables, lifestyle factors, and weight status.

Results

Among 1,716 Brazilian adolescents evaluated, 36.2% reported not consuming breakfast every day, with the highest prevalence among girls (p=0.03). After adjusting for age and economic class, breakfast skipping was associated with not consuming breakfast with parents and morning shift at school, in both genders, and with obesity only in boys. Lifestyle factors such as alcohol consumption, physical activity, diet quality, and smoking were not associated with skipping breakfast.

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Conclusion

The omission of breakfast was observed in more than a third of adolescents, being associated with demographic and lifestyle factors. In the public health perspective, the importance of encouraging the consumption of this meal is highlighted, with actions involving the school environment and the family.

Keywords: Adolescent. Breakfast. Life style. Obesity.

RESUMO

Objetivo

Analisar a prevalência e os fatores associados à omissão do desjejum entre adolescentes.

Métodos

Estudo transversal com adolescentes de 10 a 17 anos de idade, avaliados entre 2009 e 2011, pertencentes a um estudo de coorte na região Central do Brasil. A omissão do desjejum, variável desfecho, foi considerada como a não realização diária dessa refeição. Foram avaliados, por meio de questionário, os fatores demográficos, socioeconômicos e de estilo de vida. A avaliação antropométrica incluiu a mensuração do peso e estatura, utilizados para a classificação do peso segundo as recomendações da Organização Mundial da Saúde. A regressão de Poisson foi utilizada na análise múltipla para estimar a associação da omissão do desjejum e variáveis demográficas, socioeconômicas, estilo de vida e condição de peso.

Resultados

Dos 1 716 adolescentes avaliados, 36,2% referiram não consumir o desjejum diariamente, sendo a prevalência maior entre as meninas (p=0,03). Após ajustes por idade e classe econômica, a omissão do desjejum foi associada a não realização dessa refeição com os pais e ao turno escolar matutino, em ambos os sexos, e à obesidade apenas entre os meninos. Fatores do estilo de vida como consumo de bebidas alcoólicas, atividade física, qualidade da dieta e tabagismo não se associaram à omissão do desjejum.

Conclusão

A omissão do desjejum foi observada em mais de um terço dos adolescentes, sendo associada a fatores demográficos e de estilo de vida. Na perspectiva de saúde pública, destaca-se a importância de encorajar o consumo dessa refeição, com ações envolvendo o ambiente escolar e a família.

Palavras-chave: *Adolescente. Desjejum. Estilo de vida. Obesidade.*

INTRODUCTION

Epidemiological research has tried to find simplified markers that can be applied to the screening of population groups to identify possible health risk factors [1,2]. Thus, breakfast skipping is a good indicator of adolescents' health, because it is associated with other important risk behaviors common in this age group, such as tobacco use, alcohol consumption, and insufficient physical activity [3].

The habit of having breakfast plays an important role in ensuring good health and well-being. However, studies on the eating habits of different populations and age groups show that this meal is often omitted [4-6]. In the first meal of the day, the body receives nutrients and energy required for daily activities, leading to the acceleration of metabolism and decreased appetite throughout the day [7,8].

Studies have found that children and adolescents who regularly consume breakfast are more likely to have adequate nutrient intake, including higher intake of dietary fiber, protein, and total carbohydrates, as well as lower intake of total fat and cholesterol, thereby contributing to meeting the daily requirements for micronutrients and maintenance of normal weight. Breakfast consumption is also associated with other healthy lifestyle factors, such as fruits and vegetables consumption and physical activity [9-12]. In a Brazilian study of adolescents in *São*

Paulo, breakfast consumption was associated with reduced risk of overweight [13], which was also observed in a systematic review with European adolescents [14].

The omission or replacement of main meals, such as breakfast, for snacks with consumption of unhealthy foods affects adolescents' nutritional status, contributing to overweight [15-17]. Furthermore, skipping breakfast has been associated to higher blood pressure and metabolic disorders [5].

Adolescent eating behavior may be strongly influenced by social environments, including friends and family, particularly the parents, who can contribute to the development and maintenance of healthy eating habits [18-20]. In addition, family meals can act as a protective factor against nutritional problems that may appear during childhood and adolescence, such as overweight, unhealthy diets, and eating disorders [21].

In Brazil, few studies have evaluated breakfast skipping in adolescents. Assessment of this habit becomes necessary for health promotion in this age group, providing information for possible intervention programs. Thus, this study aimed to assess the prevalence of skipping breakfast and to identify the factors associated with this practice among adolescents.

METHODS

This was a cross-sectional study of 1,716 adolescents aged 10–17 years, belonging to a cohort born between 1994 and 1999 in *Cuiabá* city, Central-West Region, Brazil (baseline sample=2,405. Ten years following the first study, conducted between 1999 and 2000 [22], it was possible to locate the adolescents in public and private schools in the country through the Brazilian school census (*Educacenso*). Further details about the search and location of the adolescents have been reported previously [23].

The participants or their parents/guardians completed a questionnaire containing questions related to demographic, socioeconomic, and lifestyle characteristics, and anthropometric measurements were made in all adolescents. Breakfast skipping, the outcome variable of this study, was assessed by the question: "How many times a week do you make breakfast?" The answer choices were as follows: daily, 5–6 times a week, 3–4 times a week, 1–2 times a week, and never or almost never. Breakfast skipping was considered when the adolescents said that they did not have breakfast every day. Another variable analyzed was having breakfast with parents or guardians, considering daily and non-daily consumption (no have breakfast everyday with parents or guardians).

For demographic and socioeconomic variables, age was defined in years, and adolescents were classified into three age groups: 10–11 years, 12–13 years, and 14 years or more. Socioeconomic position was defined according to the criteria established by the *Associação Brasileira de Empresas de Pesquisa* [24], which calculates the existing material goods at home (home appliances and cars), the presence of a salaried maid, and education of the household head. The categories range from level A (highest) to E (lowest). For analysis, socioeconomic position was grouped into two categories: "A and B and C, D, and E.

Maternal education was assessed in full years of study, and categorized into four levels: 0–4 years, 5–8 years, 9–11 years, and 12 years or more. In addition, school shift was assessed because in Brazil, adolescent students usually go to school in a single day shift. Two categories were considered: morning shift and others (afternoon shift, night shift, and full), due to the small number of students in the afternoon, night, and full shifts. This variable was evaluated because it could show differences in behavior based on breakfast consumption, considering the time available for the adolescents to have breakfast, depending on the time at which they go to school.

Sedentary behaviors were evaluated by hours spent watching television and/or

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using computer/video games, for a time equal to or greater than 4 hours/day [25]. Physical activity level was assessed by questions about displacement activities for school, leisure activities, and practice of physical activity during school time, quantifying the duration and frequency of these activities. Insufficiently active adolescents practiced up to 299 minutes of exercise per week, and active adolescents practiced 300 minutes or more weekly [26].

Factors related to risky behavior such as alcohol and tobacco experimentation were also considered. This information was obtained through the questions: "Have you tried alcohol at least once in your life?", and "Have you tried smoking cigarettes in your life, even if it was one or two puffs?". Response options were yes or no for both questions.

Diet quality was assessed using the Brazilian Healthy Eating Index – Revised (BHEI-R) [27]. This index is composed of scores between distributed components that characterize different aspects of the diet. The total BHEI-R score ranged from 0–100 and higher scores indicated healthy diets, while low scores characterize a diet that is far from ideal. In the present study, the BHEI-R included only 11 components due to lack of specifications on the type of cereals in the FFQ; thus, points assigned to "whole grains" were added to "total cereals", maintaining a score equal to 100. Further details regarding the analysis of BHEI-R in this population have been published previously [28].

Weight and height were measured according to the techniques recommended by Gordon *et al.* [29]. Weight was measured using body composition analyzer Tanita (UM-080 model, Arlington Heights, Illinois, United States) with a variation of 0.1kg and capacity of 150kg. Height was measured in parallel using a portable stadiometer (Sanny, *São Paulo*, SP, Brazil), with a variation of 0.1cm, assuming maximum variation of 0.5cm between the measures. The mean of the two measurements was considered for analysis.

Weight was classified using Body Mass Index (BMI), measured by weight over height squared (kg/m^2), classified by sex and age [30], expressed in Z-scores, and adopting the following classification: underweight (<-2), eutrophic (≥-2 and ≤+1), overweight (>+1 and ≤+2), and obese (>+2). In the analyses, three categories were considered: not overweight (underweight and eutrophic), overweight, and obese.

Statistical analysis were stratified by gender due to the difference in the prevalence of breakfast skipping and based on studies that verified differences between genders in similar analyses [31-34]. In the bivariate analysis, we used the Chi-square test in order to test differences in proportions according to gender. The prevalence of breakfast skipping (outcome), prevalence *ratio* of breakfast skipping, and their respective confidence intervals of 95% were estimated according to demographic and socioeconomic variables, lifestyle, and weight status.

Poisson regression was used in multivariate analysis to assess the association of each lifestyle variables and weight status with breakfast skipping, adjusted for age and socioeconomic position, because these two variables are potential confounders [5,16,33]. In the final models, the significance level was fixed at 5%. Statistical analyses were performed using Stata (College Station, Texas, United States) software, version 12.

The present study was approved by the Research Ethics Committee at Julio Müller University Hospital under Protocol nº 651/CEP-HUJM/2009. Parents or guardians who allowed teens to participate signed the Informed Consent Form prior to data collection.

RESULTS

A total of 1,716 adolescents were evaluated (71.3% of the cohort). Among them, 50.7% were boys and 55.9% were between 10 and 11 years old. Most belonged

to socioeconomic position C, D, and E (59.8%). Approximately half of the mothers (49.0%) had between 9 and 11 years of study, and 51.9% of the adolescents studied on the morning shift (Table 1).

Among the evaluated adolescents, 36.2% reported not eating breakfast every day, and 61.7% did not have breakfast with parents and/or guardians. These habits were most common among girls (p=0.03). Approximately 50.0% of adolescents were classified as insufficiently active, with a higher prevalence among girls compared to boys (60.2 *versus* 39.9%, p<0.01). The prevalence of smoking experimentation and alcoholic beverage consumption was 3.8% and 38.9%, respectively, with no difference between genders (p=0.26 and 0.49, respectively). Overweight and obesity were observed in 18.4% and 9.3% of the sample, respectively, with no significant difference (p=0.50) between genders (Table 2). In the bivariate analysis, no significant association was observed between breakfast skipping and demographic or socioeconomic variables (Table 3).

Breakfast skipping was associated with not having breakfast with parents and/or guardians (boys: PR=4.60; 95% Confidence Interval–95%CI=3.30, 6.42; p<0.01; girls: PR=5.96; 95%CI=4.02, 8.83; p<0.01) and the morning shift at school (boys: PR=1.29; 95%CI=1.02, 1.62; p=0.03; girls: PR=1.47; 95%CI=1.17, 1.84; p=0.01) in both genders, after adjustment for age and socioeconomic position (Table 4 and 5). In general, the prevalence of skipping breakfast was linearly associated with body weight status (p<0.01), but after adjustment, it was significantly associated with obesity only for boys (PR=1.76; 95%CI=1.28, 2.44; p=0.01). On the other hand, alcohol experimentation was associated with breakfast skipping for girls, however after adjustment this association was removed.

Table 1. Socioeconomic and demographic characteristics of the adolescents according to sex, 2009-2011. *Cuiabá* (MT), Brazil.

Variables	Total (N=1,716)		Male (n=870)		Female (n=846)		p-value*
	n	%	n	%	n	%	
Age (years old)							0.60
10–11	960	55.9	496	57.0	464	54.8	
12–13	505	29.4	247	28.4	258	30.5	
≥14	251	14.7	127	14.6	124	14.7	
*Socioeconomic position***							0.38
A–B (high-income)	689	40.2	353	40.6	336	39.7	
C–D–E (low-income)	1027	59.8	517	59.4	510	60.3	
*Maternal education (years)****							0.25
≥12	259	15.1	138	16.6	121	14.6	
9–11	841	49.0	403	48.4	438	52.7	
5–8	460	26.8	242	29.1	218	26.2	
≤4	103	6.0	49	5.9	54	6.5	
School shift							0.11
Morning	890	51.9	438	50.4	452	53.4	
Others*****	825	48.1	431	49.6	394	46.6	

Note: Missing values: Maternal schooling: 53; school shift: 1.

*Chi-square test; **_Associação Brasileira de Empresas de Pesquisa_ [24]; ***Missing data for: 53 adolescents; *****Others: Afternoon shift, night shift, and full.

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Table 2. Adolescents' lifestyle variables, diet quality and weight status according to sex, 2009–2011. *Cuiabá* (MT), Brazil.

Variables	Total (n=1,716)		Male (n=870)		Female (n=846)		*p*-value*
	n	%	n	%	n	%	
Breakfast consumption							0.03
Daily	1,094	63.8	574	66.0	520	61.5	
Non-daily	622	36.2	296	34.0	326	38.5	
Having breakfast with parents and/or guardians							<0.01
Daily	658	38.3	362	41.6	296	35.0	
Non-daily	1,058	61.7	508	58.4	550	65.0	
*BHEI-R***							0.06
≤percentile 25 (score ≤72.0)	429	25.0	203	23.3	226	26.7	
>percentile 25 (score >72.0)	1,287	75.0	667	76.7	620	73.3	
*Sedentary behaviors***							0.14
<4 hours/day	719	41.9	376	43.2	343	40.5	
≥4 hours/day	997	58.1	494	56.8	503	59.5	
Physical activity (minutes/week)							<0.01
Active (≥300)	864	50.3	527	60.6	337	39.8	
Insufficiently active (<300)	852	49.7	343	39.4	509	60.2	
Tobacco experimentation							0.26
Yes	65	3.8	36	4.1	29	3.4	
No	1,651	96.2	834	95.9	817	96.6	
Alcohol experimentation							0.49
Yes	668	38.9	338	38.9	330	39.0	
No	1,048	61.1	532	61.1	516	61.0	
Weight status							0.50
Normal weight	1,241	72.3	632	72.6	609	72.0	
Overweight	315	18.4	152	17.5	163	19.3	
Obese	160	9.3	86	9.9	74	8.7	

Note: *Chi-square test; **Time spent in sedentary activity Brazilian Healthy Eating Index – Revised.

DISCUSSION

More than one third of the evaluated adolescents reported skipping breakfast. Skipping breakfast was more prevalent among girls, and showed a significant association with the morning school shift and not having this meal with parents or guardians in both genders. It was also associated with obesity in boys.

The prevalence of skipping breakfast estimated in this study was similar to that found in another Brazilian study with adolescents from *São Paulo* (38.0%) [31]. In a review of papers published from 1996 to 2009, Trancoso *et al*. [3] found that the prevalence of breakfast skipping ranged from 5% to 55%. These differences might be explained in part by the criteria for classifying breakfast skipping. Some studies have assessed frequency groups of breakfast consumption [5,11,32,35-37], while others are based on 24-hour recall [7,26], and still others classified as daily or not daily consumption [38,39], as in this study. This criterion was used because it had the best discriminatory power in this population, and because higher frequency of breakfast consumption is desirable, as it has

Table 3. Crude Prevalence *Ratio* (PR) and 95% Confidence Interval (95%CI) of the breakfast skipping, according to demographic and socioeconomic variables among adolescents, by sex, 2009–2011. *Cuiabá* (MT), Brazil.

Variables	Male			Female		
	PR	95%CI	*p*-value	PR	95%CI	*p*-value
Age (years old)			0.75			0.32
10–11	1	-		1	-	
12–13	0.91	(0.69; 1.18)		1.13	(0.89; 1.45)	
≥14	0.94	(0.67; 1.31)		1.23	(0.91; 1.68)	
Socioeconomic position[*]			0.64			0.28
C–D–E (low-income)	1	-		1	-	
A–B (high-income)	1.05	(0.84; 1.33)		1.13	(0.90; 1.40)	
Maternal education (years)			0.57			0.32
≤4	1	-		1	-	
5–8	0.98	(0.56; 1.71)		1.48	(0.86; 2.56)	
9–11	1.18	(0.69; 2.01)		1.34	(0.78; 2.27)	
≥12	1.18	(0.66; 2.11)		1.60	(0.90; 2.84)	

Note: [*]*Associação Brasileira de Empresas de Pesquisa* [24].

protective effects, particularly against obesity [15,37].

Regarding gender, as in this study, other studies have observed higher prevalence of breakfast skipping among girls [13,38,40]. One possible explanation for this relationship may be dissatisfaction with body image and the intention to lose weight due to media pressure and desire for thinness [32,41]. On the other hand, some authors [37,42], found no gender difference in breakfast skipping prevalence.

The morning school shift was significantly associated with breakfast skipping in this study. The lack of time to have meals reported by adolescents may contribute to breakfast skipping because of the difficulty organizing schedules [43]. It was assumed that the lack of time to have breakfast may be related to sleep habits, as adolescents tend to sleep later. Therefore, it is expected that among those who study in the morning shift, waking up in time to have this meal before going to school is more difficult. In addition, skipping breakfast – mainly by students of the morning shift – may promote consumption of snacks in schools or in nearby environments where products with high energy density, sugars, fats and salt, such as fast food, soft drinks, and snacks are widely available [44,45].

The habit of having meals with one's family is a lifestyle factor that is associated with consumption of breakfast. Similar to the present study, a positive association between breakfast consumption and having meals with parents has been observed among Brazilian adolescents, participants in the Study of Cardiovascular Risk in Adolescents [8], and among American adolescents participants of a longitudinal study Project EAT: Eating Among Teens [46]. However, gathering the family to have meals has become increasingly difficult due to parents' work schedules and extensive adolescent routines [34].

It is noteworthy that parents' eating behavior has a significant impact on the development of eating habits in their children [18,46]. Food choices and adolescents' meal patterns reflect the practices of the parents. In this context, a study in Australia found that the chance of children skipping breakfast was higher among those whose mothers skipped meals [47].

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Table 4. Crude and adjusted Prevalence *Ratio* (PR) and 95% Confidence Interval (95%CI) of the breakfast skipping, according to lifestyle variables and weight status among male adolescents, 2009–2011. *Cuiabá* (MT), Brazil.

Variables	PR crude	95%CI	*p*-value	PR adjusted*	95%CI	*p*-value
Having breakfast with parents and/or guardians			<0.01			<0.01
Daily	1	-		1	-	
Non-daily	4.56	(3.27; 6.36)		4.60	(3.30; 6.42)	
BHEI-R			0.28			0.26
>25 percentile (score ≤72.0)	1	-		1	-	
≤25 percentile (score >72.0)	1.15	(0.89; 1.49)		1.16	(0.89; 1.51)	
School shift			0.033			0.03
Morning	1	-		1	-	
Others**	1.28	(1.02; 1.62)		1.29	(1.02; 1.62)	
*Sedentary behaviors****			0.63			0.67
<4 hours	1	-		1	-	
≥4 hours	0.94	(0.75; 1.19)		0.95	(0.75; 1.20)	
Physical activity (minutes/week)			0.18			0.17
Active (≥300)	1	-		1	-	
Insufficiently active (<300)	1.17	(0.93; 1.47)		1.17	(0.93; 1.48)	
Tobacco experimentation			0.71			0.81
No	1	-		1	-	
Yes	0.89	(0.90; 1.63)		0.93	(0.50; 1.72)	
Alcohol experimentation			0.81			0.71
No	1	-		1	-	
Yes	1.03	(0.81; 1.30)		1.04	(0.82; 1.33)	
*Weight status*****			<0.01			0.01
Normal weight	1	-		1	-	
Overweight	1.31	(0.98; 1.75)		1.31	(0.98; 1.75)	
Obese	1.78	(1.29; 2.95)		1.76	(1.28; 2.44)	

Note: *Adjusted models for age and economic class; **Others: Afternoon shift, night shift, and full; ***Time spent in sedentary activity; ****p-value <0.01 Chi-square test for linear trend.
BHEI-R: Brazilian Healthy Eating Index – Revised.

In this study, another factor associated with breakfast skipping was obesity in boys, similar to that observed in European adolescents in the (Healthy Lifestyle in Europe by Nutrition and Adolescents) (HELENA) study [6]. Although not investigated in the present study, there is a report in the literature of higher consumption of sweetened beverages among boys breakfast skippers compared to girls, which may explain, at least in part, the observed association between breakfast omission and obesity among boys [48].

Several studies have found a positive association between breakfast skipping and overweight in both genders [6,13,37,40,41,49,50]. In addition, a significant dose-response relationship between breakfast skipping and overweight was observed in Indian adolescents [37]. This association could be explained by mechanisms related to the regulation of appetite and diet quality. Omitting breakfast can lead to lower postprandial energy expenditure and contribute to changes in

Table 5. Prevalence *Ratio* (PR), crude and adjusted, and 95% Confidence Interval (95%CI) of the skipping breakfast, according to lifestyle variables and weight status among female adolescents, 2009–2011. *Cuiabá* (MT), Brazil.

Variables	PR crude	95%CI	*p*-value	PR adjusted	95%CI	*p*-value
Having breakfast with parents and/or guardians			<0.01			<0.01
Daily	1	-		1	-	
Non-daily	5.96	(4.02; 8.83)		5.91	(3.99; 8.77)	
*BHEI-R***			0.62			0.63
>25 percentile (score ≤72.0)	1	-		1	-	
≤25 percentile (score >72.0)	1.06	(0.83; 1.35)		1.06	(0.8; 1.35)	
School shift			<0.01			<0.01
Morning	1	-		1	-	
Others***	1.49	(1.19; 1.87)		1.47	(1.17; 1.84)	
*Sedentary behaviors****			0.92			0.62
<4 hours	1	-		1	-	
≥4 hours	0.99	(0.79; 1.23)		0.94	(0.75; 1.20)	
Physical activity (minutes/week)			0.14			0.29
Active (≥300)	1	-		1	-	
Insufficiently active (<300)	1.18	(0.94; 1.48)		1.13	(0.90; 1.43)	
Tobacco experimentation			0.10			0.15
No	1	-		1	-	
Yes	1.55	(0.95; 2.52)		1.44	(0.87; 2.39)	
Alcohol experimentation			0.02			0.05
No	1	-		1	-	
Yes	1.28	(1.03; 1.59)		1.24	(0.99; 1.56)	
Weight status			0.34			0.22
Normal weight	1	-		1	-	
Overweight	1.11	(0.85; 1.46)		1.14	(0.86; 1.50)	
Obese	1.28	(0.90; 1.83)		1.30	(0.91; 1.86)	

Note: *Adjusted models for age and economic class; **Brazilian Healthy Eating Index – Revised (27); ***Others: Afternoon shift, night shift, and full; ****Time spent in sedentary activity.

metabolism of carbohydrates and lipids, which can predispose adolescents to obesity and type 2 diabetes [51].

Another aspect that may interfere in the association between breakfast consumption and metabolic disorders is the quality of food consumed at breakfast, as whole foods rich in fiber promote satiety. Moreover, the intake of foods that contain high concentrations of refined carbohydrates and simple sugars at breakfast, or even breakfast skipping, can result in increased consumption of foods with high energy density at subsequent meals, contributing to weight gain [3,49,51].

This study was limited by a cross-sectional design that does not allow inference of causality between observed associations. However, similar associations between breakfast skipping and overweight have been observed in longitudinal studies [9,40]. It is noteworthy that biases due to selection or assessment measures were minimized by methodological rigor in field staff training and development of the steps related to managing and analyzing data.

Few Brazilian studies have analyzed the association of skipping breakfast with family meals and routine factors, such as school shift,

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among adolescents. These results highlight the importance of some behaviors related to food habits among adolescents, with emphasis on daily breakfast consumption, which is related to the habit of having meals with the family, school shift, and obesity.

The family habit of eating meals together can promote daily consumption of breakfast in adolescents, and thus act as a protective factor against obesity and consequently against development of non-communicable diseases. The association between school morning shift and breakfast skipping draws attention to the effect of adolescents' routines in developing unhealthy eating behaviors, which may interfere with the health of this age group.

CONCLUSION

This study contributes to fill a gap in the literature on factors related to skipping breakfast among Brazilian adolescents. This is an important eating behavior that may interfere with their health. Therefore, it is necessary to plan intervention actions to encourage the breakfast consumption in this age group, promoting strategies in school environment with participation of teachers, health professionals and parents. These interventions may contribute to improve the current and future health and quality of life.

CONTRIBUTORS

RFP FIUZA and MG FERREIRA participated in all aspects of the study, including the drafting of the manuscript, statistical analysis, interpretation, writing and final revision. AP MURARO contributed to the conception, data analysis, interpretation, manuscript conception, and final revision. PRM RODRIGUES participated in the statistical analysis, interpretation, and to the manuscript final revision. EMS SENA contributed to the statistical analysis and manuscript final revision. All authors read and approved the final version.

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