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At-home and away-from-home dietary patterns and BMI z-scores in Brazilian adolescents

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ABSTRACT

Background: Away-from-home food intake has been associated with high rates of overweight among children and adolescents. However, there are no studies comparing at-home and away-from-home eating patterns among adolescents.
Objectives: The objective of this paper was to identify at-home and away-from-home dietary patterns among adolescents in Brazil, and to evaluate the relationship between these patterns and body mass index (BMI) z-scores.
Design: Data from the Brazilian National Dietary Survey 2008—2009 were analyzed in this cross-sectional study. Dietary intake was assessed by completion of written food records on two non-consecutive days.
Participants/setting: Five thousand two hundred sixty-six adolescents 10—19 years of age living in urban areas of Brazil were included in the analysis.
Statistical analysis: Thirty-two food groups were examined by factor analysis, stratified by at-home and away-from-home eating. The associations between the food patterns and BMI z-scores were ascertained using linear regression analysis.
Results: In general, mean at-home food intake was greater than away-from-home food intake, but the ratio of away-from-home/at-home was greater than 30% for baked and deep-fried snacks, soft drinks, sandwiches, pizza, and desserts, and was lower than 10% for rice and beans. Three main similar dietary patterns were identified both at-home and away-from-home: the "Traditional pattern", the "Bread and Butter pattern" and the "Western pattern"; however, away-from-home patterns encompassed more overall food items. Only the at-home "Western pattern" was positively associated with BMI z-scores ($\beta = 0.0006$; $p < 0.001$).
Conclusion: Our results indicate that unhealthy dietary pattern consumed at home is associated to BMI z-score, while away-from-home food consumption is not associated.

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1. Introduction

A number of studies have indicated that away-from-home food consumption may play a role in the increasing rates of obesity among children and adolescents (Bowman, Gortmaker, Ebbeling, Pereira, & Ludwig, 2004; Nago, Lachat, Dossa, & Kolsteren, 2014; Rosenheck, 2008; Thompson et al., 2004; Viner & Cole, 2006). In Brazil, data from the first National Dietary Survey (NDS) of 2008—2009 indicated that the consumption of items such as sodas, alcoholic beverages, and pizza occurs mainly outside of the home (Bezerra, Souza Ade, Pereira, & Sichieri, 2013). In addition, data

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based on the purchase of food over a 1-week period showed that 30% of adolescents reported eating away-from-home, and that sweets, soft-drinks, and deep-fried or baked snacks were the most frequently purchased items (Bezerra & Sichieri, 2010). In general, foods consumed away-from-home have been found to contain low micronutrient and high energy content than foods consumed at-home (Lachat et al., 2012). Many studies have shown that adolescents who consume food away-from-home have a higher energy intake and a poor quality diet (Bowman et al., 2004; French, Story, Neumark-Sztainer, Fulkerson, & Hannan, 2001; Schmidt et al., 2005; Zoumas-Morse, Rock, Sobo, & Neuhouser, 2001). In a study conducted in the large metropolitan city of São Paulo, in southeast Brazil, the nutritional quality of lunches consumed away-from-home was lower than the nutritional quality of lunches consumed at-home (Gorgulho, Fisberg, & Marchioni, 2013).

The identification of dietary patterns has been considered a more realistic representation of the eating habits of a studied population than the evaluation of consumption of isolated foods and nutrients. People usually consume different types of food and an interaction between various food components is expected to occur due to competition, antagonism, or alteration in the bioavailability of nutrients (Ocke, 2013). However, to our knowledge, no studies have compared whether away-from-home dietary patterns differ from at-home dietary patterns among adolescents.

The aim of this study is to investigate at-home and away-from-home dietary patterns among adolescents in Brazil and to evaluate the relationship between these patterns and BMI z-scores. Since studies consistently identify at least one healthy or traditional pattern and one unhealthy pattern, typically labeled "junk food" or "Western," this study evaluated at-home and away-from-home dietary patterns, hypothesizing that away-from-home dietary patterns would be unhealthier than at-home dietary patterns.

2. Material and methods

2.1. Study design and setting

Data analyzed in this study was from the Brazilian NDS (IBGE, 2011a), a sub-sample of the 2008–2009 Household Budget Survey (HBS), conducted by the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatistica − IBGE) using a representative sample of Brazilian households.

A probabilistic sample of 68,373 households was selected by a two-stage cluster sampling technique to participate in the HBS. Census sectors were randomly selected from a Master Sample of Household Surveys, which includes a set of 12,800 sectors previously stratified according to different geographical areas and socioeconomic classes. In the first stage, the sectors were randomly selected from each stratum proportional to the number of households present. In the second stage, the households were selected by simple random sampling.

Twenty-four percent of the households were randomly selected to participate in the NDS (N = 16,764) with a non-response rate of 19%, yielding a final sample of 13,569 households included in the Brazilian NDS. All family members were listed, and those over 10 years old were selected to participate in the NDS (N = 38,340). Twelve percent of the residents did not agree to participate, providing a final sample of 34,003 individuals who were asked to keep two non-consecutive days of food records. For the present study, adolescents between 10 and 19 years-old were included (N = 7613). Pregnant and lactating women (N = 188), as well as adolescents with only one day of food records (N = 204) were excluded. Adolescents living in the rural area of Brazil (N = 1955) were not included because only 9% of them have away-from-home consumption of foods, yielding a final sample of 5266 adolescents

(2593 boys and 2673 girls).

This study was conducted according to the guidelines laid down in the Declaration of Helsinki. All procedures involving human subjects were approved by the Ethics Committee of the Social Medicine Institute of the State University of Rio de Janeiro (CAAE 0011.0.259.000−11) and informed consent was deemed exempt due use of de-identified data.

2.2. Measurements

2.2.1. Dietary intake

Adolescents participating in the NDS were asked to keep written food records for two randomly selected days, recording all types and amounts of food and beverages (except water) consumed, their preparation methods, and the time and place where foods were eaten (at home or away from home). They were provided a booklet instructing them on how to complete the records properly. The booklet contained pictures of household measuring tools and portion sizes to facilitate the estimation of the amount of food consumed (e.g. teaspoons, tablespoons, forks, small and big cups, different types of glasses, bowels, plates etc). If adolescents needed assistance in completing their food records, they were encouraged to seek help from another household member. Trained Interviewers reviewed all food records with study participants clarifying food details and probing for missing items before entering food records into the study database. Away-from-home eating was defined as all foods and beverages purchased and consumed away from home.

2.2.2. Anthropometric indicators

Weight was measured using a portable electronic scale with 150 kg capacity (brand not specified by IBGE). Height was measured using a portable stadiometer of KaWe brand, person-check(r) (KaWe, Germany), with an amplitude of 200 cm. All anthropometric measurements were conducted by trained interviewers and adolescents were asked to remove their shoes before being measured.

The classification of nutritional status of adolescents was based on their BMI-for-age z-scores, using the curves and cutoffs of the World Health Organization (WHO) and the software WHO Anthro-Plus 2007 (de Onis et al., 2007).

2.3. Data analysis

Reported food amounts were transformed to grams or milliliters using a food portion table specially developed for the survey (IBGE, 2011b). Nutrient content was estimated using a food composition table based on the Brazilian Table of Food Composition and the Nutrient Data System for Research (IBGE, 2011c). (REF). One thousand, nine hundred and seventy one food item were listed in the food records. The average consumption of each food item was calculated using the two non-consecutive day food records. These food items were compiled into 32 food groups, classified based on the nutritional content and the frequency of consumption as shown in Table 2. Some foods and beverages were kept in separate categories given their importance in the food consumption of adolescents, such as instant noodles, potato (usually consumed fried) and beer. The identification of dietary patterns was made using the FACTOR procedure of the Statistical Analysis System (SAS) software (version 9.3, 2006, SAS Institute Inc), with factors extracted by principal component analysis and taking into account the complexity of the HBS design. For this purpose, a correlation matrix was initially established to account for the complex sample design, using the GLM procedure of SAS. Factor analysis was performed using this correlation matrix as the "input," according to the methodology proposed in previous studies (Kerver, Yang, Bianchi, &