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A cross-cultural comparison of eating behaviors and home food environmental factors in adolescents from São Paulo (Brazil) and Saint Paul/Minneapolis (USA)

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Abstract

Objective—Describe cross-cultural differences in nutrition-related factors among adolescents from São Paulo, Brazil and St. Paul/Minneapolis, U.S.

Design—Two large- population-based studies with cross-cultural comparisons

Setting—12 São Paulo and 10 St. Paul/Minneapolis high schools in 2009-2010

Participants—1148 adolescents from São Paulo; 1632 adolescents from St. Paul/Minneapolis

Main outcome measure(s)—Meal consumption, family meals, fast food consumption and home food availability

Analysis—Binomial regressions, weighted for age distributions and adjusted for gender, were used to compare identical measures from each sample.

Results—Generally, São Paulo adolescents reported healthier nutritional outcomes than St. Paul/Minneapolis adolescents. São Paulo adolescents were seven times less likely to report high fast food consumption than St. Paul/Minneapolis adolescents ($p < 0.001$). While most measures of the home environment indicated healthier home environments in São Paulo, more São Paulo

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adolescents reported that sugar-sweetened beverages was usually available at home than St. Paul/Minneapolis adolescents ($p < 0.001$).

Conclusions and implications—São Paulo youth tended to have healthier eating behaviors and home food environment factors than St. Paul/Minneapolis youth. Brazilian eating patterns tend to be healthier and support a connection with food and culture. Interventions are needed to encourage youth and their families to maintain these patterns.

Keywords

cultural comparison; food pattern; adolescents; Brazil; United States of America

Introduction

In Brazil, as in other countries within Latin America, nutritional transitions have been observed, resulting in an emergence of over-nutrition and increased risk for childhood overweight/obesity.¹ National data indicate that the prevalence of overweight status among Brazilian youth has tripled in girls and has increased 6-fold in boys during the 30-year period from 1975 to 2002.² Secular trends show that the traditional diets in Brazil, characterized by rice and beans, have been rapidly replaced by industrialized foods, which are rich in sugar, salt, fat and empty calories.¹⁻⁹

Worldwide, adolescents generally report low consumption of fruits and vegetables, skipping meals, consuming a large portion of their diet from fast food restaurants and not having family meals.¹⁰⁻¹³ Research has indicated that the home food environment may contribute to adolescent eating behaviors.⁹ Very little is known about eating behaviors and the home food environment among Brazilian youth, and how these compare to those of U.S. youth, who are exposed to a more “advanced” stage of the nutrition transition.¹⁴⁻²¹ Identifying similarities and differences across these 2 distinct cultures can help in understanding the types of factors that may influence current eating patterns and health outcomes of Brazilian youth, and inform the development of interventions to prevent a progression to problems prevalent among U.S. youth. For example, differences across countries may suggest the importance of local influences (e.g., local food availability, cultural patterns) while similarities may suggest more global influences (e.g., media, fast food chains).¹⁵⁻²¹ Thus, the purpose of this paper is to describe similarities and differences in eating behaviors and home food environmental factors in 2 large metropolitan samples of adolescents living in São Paulo, Brazil and St. Paul/Minneapolis. It was hypothesized that adolescents from São Paulo would, in general, have healthier behaviors and a healthier home food environments, such as reporting lower consumption and home availability of unhealthy foods, less meal skipping and higher frequency of family meals.

Methods

Study design and population

Project EAT was designed to examine nutrition, physical activity, weight-related factors in a population-based sample of adolescents in St. Paul/Minneapolis, Minnesota. Project EAT incorporates a repeated-cross sectional design; previous waves of the study informed the

items used the survey completed in 2009-2010.^{22,23} Similarly, the São Paulo study was developed to assess eating and weight-related attitudes and behaviors among adolescents in Brazil and mirrored the study design of an earlier version of the Project EAT survey.^{12,13,23,24} Thus, many of the items across the 2 studies were identical, allowing cross-cultural comparisons.

The Project EAT survey was guided by a theoretical framework that integrated aspects of social cognitive theory and an ecological perspective,²⁵⁻²⁷ expert review, qualitative work with adolescents,²⁸ a review of previous surveys, and extensive pilot testing with adolescents. The measures included in Project EAT have strong psychometrics and test-retest reliability. For the São Paulo-based study, the 1998-1999 version of the Project EAT student survey was translated into Portuguese by the research team and back-translated to English by a dietitian fluent in English language who had no previous contact with the survey. Only measures used in both the St. Paul/Minneapolis-based and São Paulo-based survey were included in the current analyses (English versions of the survey items are reported here). The Brazilian version of the survey was developed in 2009-2010 and was based on the first wave of Project EAT, and a pilot test took place in a public school (not included in the final sample) before the data collection in March, 2009, in order to test adolescents' understanding of the items.

São Paulo-based sample

A cross-sectional study was conducted in 2009-2010 in 12 technical schools in the city of São Paulo, Brazil. In Brazil, a technical school provides the same curriculum as the regular public schools; however, students have more options in the courses they take. Students can select their electives from fields such as business, agriculture, chemistry, engineering, computer science, and nutrition. After 3 years (graduation), students are able to work in these fields. The study sample included 1167 adolescents, ages 14 to 19 years. Participants missing their date of birth were excluded (n=19); thus, the São Paulo analytical sample included 1148 adolescents (49% female; mean age= 16.5 ± 1.0 years). All participating adolescents provided parental signed consent forms approved by University of São Paulo School of Public Health ethical committee.

St. Paul/Minneapolis-based sample

Surveys were completed during the 2009-2010 school year by adolescents from 20 public middle schools and high schools in the St. Paul/Minneapolis metropolitan area of Minnesota, which serve socioeconomically and racially/ethnically diverse communities. The current analysis includes adolescents aged 14-19 years (n=1632) in order to allow for the comparison of similarly aged youth in both countries, limiting the sample to 10 schools. Participants in the analytic sample were equally divided by gender (53% female) and had a mean age of 16.2±1.2 years. Parental consent for study participation was received by each student under 18 at least 10 days prior to data collection. All participating students provided assent. The University of Minnesota's Institutional Review Board Human Subjects Committee and the school districts' research boards approved all study protocols for the St. Paul/Minneapolis-based sample.

Measures

Eating behaviors

Frequency of meal consumption was assessed through the question: “During the past week, how many days did you eat breakfast/lunch/dinner?” (response options: “never,” “1-2 days,” “3-4 days,” “5-6 days,” “every day”). *Frequency of family meals* was assessed with the question: “During the past 7 days, how many times did all, or most, of your family living in your house eat a meal together?”. Students selected 1 of 5 response options ranging to “never” to “every day.” Items that assessed meals and family meals were trichotomized to “never” (0 times per week), “irregular” (1-4 times per week), and “regular” (5 or more times per week) based on overall distribution. *Frequency of fast food* was assessed with the item: “In the past week, how often did you eat something from a fast food restaurant?”.²⁹ Participants chose from 1 of 6 responses, ranging from “never” to “more than 7 times.” Because of its distribution, fast food frequency was trichotomized to “never” (0 times per week), “low” (1-2 times per week), and “high” (more than 3 times per week).

Home food availability

Home food availability was defined as the foods and drinks that were present at the household. Home food availability was assessed with several questions developed for previous waves of Project EAT.³⁰ Participants were asked to report healthy (fruit and vegetables, fruit juice and milk served at meals) and unhealthy home food availability (chips and salty snacks, chocolate and candy, and sugar-sweetened beverages). For each of these items, participants were asked to report how often each item was available in their home: “never,” “sometimes,” “usually,” or “always”. Items that assessed home food availability were dichotomized to “never/sometimes” and “usually/always”.

Sociodemographics

Participants were asked to report their birth date and *gender* (male/female) on the student survey. *Age* was calculated using birth date and the date the survey was completed.

Statistical Analysis

Data were weighted to balance the age distributions. Cross-tabulations were used to compare identical measures of meal frequency and the home food environment between São Paulo and St. Paul/Minneapolis youth. Regression models (log-link, binomial error) adjusted for gender and weighted for age were also tested, but produced very similar results; thus, these results are not included here (Statistical Analysis Systems 9.2, Cary, NC, US).

Race/ethnicity carries different importance in the 2 countries and thus cannot be compared. Measures of socio-economic status (SES) differed in the 2 samples and are not comparable. In the St. Paul/Minneapolis sample SES is largely based on parental education, whereas in the São Paulo sample it is based on family income.

Results

São Paulo adolescents reported consuming breakfast, lunch, and family meals significantly more often than St. Paul/Minneapolis youth (Table 1). For example, 69% of São Paulo adolescents regularly consumed breakfast (at least 5 times a week) as compared to 47% of St. Paul/Minneapolis adolescents ($P<0.001$). Similarly, 50% of São Paulo youth reported having family meals at least 5 times a week, as compared to 40% of St. Paul/Minneapolis youth ($P<0.001$). São Paulo youth also reported significantly less fast food intake than St. Paul/Minneapolis youth; only 3% of São Paulo adolescents had fast food at least 3 times/week as compared to 21% of St. Paul/Minneapolis adolescents ($P<0.001$).

All measures of home food availability were significantly different between São Paulo and St. Paul/Minneapolis ($P<0.001$). In general, findings showed healthier home food environments in São Paulo, with greater fruit and vegetable availability and lower percentages of home with salty snacks readily available (Table 2). Additionally, 81% of São Paulo adolescents reported usually/always having milk served at meals as compared to only 37% of St. Paul/Minneapolis adolescents. However, there were some notable exceptions; for example, 56% of São Paulo adolescents reported that sugar-sweetened beverages was usually available at home in comparison to 44% of St. Paul/Minneapolis adolescents.

Discussion

This cross-cultural study was designed to compare eating behaviors and home food availability across adolescents living in 2 different cultural, socio-economic, and physical locations. Differences were found that generally indicated that adolescents from São Paulo had healthier nutrition-related factors than adolescents from St. Paul/Minneapolis. These differences suggest that local influences may be at play that favor healthier eating patterns in Brazil. However, across countries, there were also similarities, suggesting that concerns about poor eating patterns and obesity are pervasive across adolescents from different parts of the world. Findings have implications for understanding factors related to adolescent eating patterns and for the development of interventions to prevent the nutrition transition from getting worse in Brazil and for reversing unhealthy eating patterns among U.S. youth.

Frequent consumption of fast food intake (at least 3 times a week) was much lower among the São Paulo adolescents (3%) than the St. Paul/Minneapolis adolescents (21%). Previous U.S.-based research indicates that regular consumption of fast food is associated with poorer dietary outcomes such as higher intakes of sodium, and saturated fat.³³⁻³⁵ While fast food outlets have been in São Paulo for over 30 years,³⁶ a recent Brazilian study found that fast food restaurants tend to be expensive and low-income populations often do not have financial access to these outlets.^{35, 36} Policy makers would be wise to prevent the widespread infiltration of fast food restaurants in Brazil in order to preserve the low intakes of fast food found among youth in the current study, and in particular within its low-income neighborhoods given that with time, these populations may begin to eat at fast food outlets more due to factors such as convenience or social norms. Additionally, low income families receive financial support from the government in conditional cash transfer (CCT) in Brazil and recent studies have found that families receiving this financial support

are eating foods that were not previously available to them. One recent study in Brazil found that families that receive the CCT changed their food intake, with an increase of processed foods and high energy density foods.³⁵

Meal consumption and family meals were observed at a higher prevalence in São Paulo adolescents compared to St. Paul/Minneapolis adolescents. Previous studies have shown the importance of having regular meals in order to prevent weight gain, improve cognition, and increase consumption of foods and nutrients typical to certain meals (e.g., milk and calcium for breakfast).^{11,23} Family meals offer an important opportunity to engage in healthier eating and to connect with other family members.¹² Family meals have been found to be associated with lower prevalence of unhealthy behaviors such as tobacco, alcohol, and drug use and engaging in unhealthy weight control behaviors such as self-induced vomiting, use of diet pills, laxatives and diuretics.^{12,13}

Although São Paulo youth tended to report healthier eating behaviors, they also reported a higher presence of sugar-sweetened beverages at home than St. Paul/Minneapolis youth. While home food availability does not represent real food consumption, the presence of a certain food or drink (or its absence) may lead to its consumption. The high home availability of sugar-sweetened beverages within the São Paulo sample corroborates national Brazilian data, which show an increase in sugar-sweetened beverages consumption of almost 500% in a 30-year period.³⁶ Data from a national research, National Dietary Survey, which tracks per capita consumption of foods and beverages in the Brazilian population, shows that sugar-sweetened beverages is the 5th most commonly consumed item (94.7 grams/day). Container sizes in grocery stores in Brazil are comparable to those in the US, ranging from 250 mL (8.4 ounces) to 3.3 liters (111.5 ounces). Since sugar-sweetened beverages are high in energy, and low in nutrients, and consumption has been found to be linked with obesity³⁷⁻⁴⁰ the inordinate home food availability of these beverages among São Paulo youth is of concern.

Aside from the high sugar-sweetened beverages availability within the Brazilian adolescents' homes, findings indicated that the home food environments of the participating adolescents were generally healthier in São Paulo than in St. Paul/Minneapolis. For example, higher percentages of São Paulo youth reported usually or always having fruits/vegetables at home, and having milk and vegetables served at meals, as compared to St. Paul/Minneapolis youth. While home food availability does not guarantee that individuals are consuming foods and beverages present at home, their presence may enhance consumption. The first representative studies developed in Brazil in a national sample, the Household Budget Survey in 1987/88, 2002/03⁵ showed an increase of sugar-sweetened beverages and industrialized foods by 400% and lack of the presence of fruits and vegetables at home.

This study has several strengths and limitations that should be taken into account in interpreting the findings. Cross-cultural studies on food and nutrition issues are an important tool that could help understand factors that influence eating behavior and the environmental variables both in global and local perspectives. This type of analysis has potential to identify new behaviors and risk factors for populations. This is the first study to assess such a

breadth of nutrition-related factors among a large sample of Brazilian adolescents. For example, studies that have assessed the home food environment of São Paulo adolescents have not been developed. In addition, a comparison study between adolescent samples in Brazil and the U.S. on eating behaviors and home food availability has never been done before. Given that the São Paulo survey was based on Project EAT; identical measures were employed, enhancing the ability for cross-cultural comparisons. Findings provide important baseline information for future studies; however, because adolescents from only São Paulo and St. Paul/Minneapolis were included in this study, findings may not be representative of national eating behaviors and home food environments in the 2 countries. An additional study limitation is that, although both studies used similar survey items, the reliability of items/scales was only checked in the Minnesota sample, and not in the Brazilian sample. Furthermore, few variables were assessed differently in each country, such as dietary data, socio-economic status, and race was not measured in the São Paulo sample, thus, analyses did not adjust for possible differences in these variables across the countries. Finally, these findings are cross-sectional and inferences about temporality or causality of relationships between variables cannot be drawn.

Implications for Research and Practice

This study assessed home food availability and environment and eating behaviors among adolescents from São Paulo, and compared findings with a sample of youth from St. Paul/Minneapolis. As hypothesized, adolescents from São Paulo had healthier behaviors and healthier home food environments, which may be a reflection of factors at the family and broader social and environmental levels, such as more traditional family structures and eating patterns, and social norms that are less supportive of fast food. Nutritionists and other health professionals working with youth in Brazil should encourage the maintenance of more traditional eating patterns as these patterns tend to be healthier compared to those of the U.S. youth examined in this study. For example, since having healthier foods at home has been found to predict greater consumption of fruits and vegetables in children;⁴¹⁻⁴³ nutritionists and health educators need to work to preserve these patterns among Brazilian households. Given the high energy and low nutrient density of sugar-sweetened beverages,⁴⁴ the high presence of sugar-sweetened beverages in the homes of the Brazilian youth is of concern. Findings from the current study point to the importance of working with parents to increase their awareness about healthier alternatives to sugar-sweetened beverages. Families, especially mothers who tend to be the main actors during decision processes regarding foods and drinks to be purchased and consumed at home, may need to be sensitized about the consequences of a consistent presence of soft drinks at home. However, given the pervasiveness of advertisements for sugar-sweetened beverages, it may not be enough to work with parents of youth. An integrated and joint action in different spheres, such as the family, the school, health professionals and the Government should be developed to reduce the presence and consequent consumption of soda pop in this population. Additional research is needed on eating patterns, dietary intake, and home food availability in Brazilian youth. More globally, studies are needed in order to better assess the magnitude of the nutrition transition on developing countries, explore causal pathways, and

test the effectiveness of intervention strategies within transitioning populations with emerging nutrition and weight-related problems.

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Table 1

Frequency of meal consumption, family meals and fast food in the past week among adolescents from São Paulo and St. Paul/Minneapolis.

	Never n (%)	Irregular (1-4 times) n (%)	Regular (5 times) n (%)	<i>P</i> *
<i>Breakfast</i>				<0.001
São Paulo	68 (6%)	294 (26%)	790 (69%)	
St. Paul/Minneapolis	180 (11%)	699 (42%)	771 (47%)	
<i>Lunch</i>				<0.001
São Paulo	-	205 (18%)	942 (82%)	
St. Paul/Minneapolis	59 (4%)	332 (20%)	1258 (76%)	
<i>Dinner</i>				0.877
São Paulo	21 (2%)	207 (18%)	918 (80%)	
St. Paul/Minneapolis	33 (2%)	288 (18%)	1328 (81%)	
<i>Family meals</i>				<0.001
São Paulo	61 (5%)	507 (45%)	560 (50%)	
St. Paul/Minneapolis	264 (16%)	713 (44%)	640 (40%)	
	Never	Low (1-2 times)	Regular (3 times)	<i>P</i>
<i>Fast food</i>				<0.001
São Paulo	630 (54%)	481 (42%)	39 (3%)	
St. Paul/Minneapolis	429 (26%)	867 (53%)	353 (21%)	

* t-tests used for continuous non-adjusted variables, chi-square tests used for categorical non-adjusted variables, and binomial regression adjusted for gender and weighted for age

Table 2

Home food availability as reported by adolescents in São Paulo and St. Paul/Minneapolis.

	Never/Sometimes n (%)	Usually/Always n (%)	<i>P</i> *
<i>Fruits/vegetables</i>			<0.001
São Paulo	71 (6%)	1080 (94%)	
St. Paul/Minneapolis	273 (17%)	1374 (83%)	
<i>Fruit Juice</i>			<0.001
São Paulo	512 (45%)	637 (55%)	
St. Paul/Minneapolis	455 (27%)	1188 (72%)	
<i>Vegetables served at dinner</i>			<0.001
São Paulo	316 (28%)	830 (72%)	
St. Paul/Minneapolis	573 (35%)	1073 (65%)	
<i>Milk served at meals</i>			<0.001
São Paulo	215 (19%)	927 (81%)	
St. Paul/Minneapolis	1027 (63%)	611 (37%)	
<i>Salty snacks</i>			<0.001
São Paulo	846 (73%)	304 (26%)	
St. Paul/Minneapolis	849 (52%)	796 (48%)	
<i>Chocolate or other candy</i>			<0.001
São Paulo	626 (54%)	524 (46%)	
St. Paul/Minneapolis	1114 (68%)	532 (32%)	
<i>Soda pop</i>			<0.001
São Paulo	504 (44%)	646 (56%)	
St. Paul/Minneapolis	910 (56%)	725 (44%)	

* t-tests used for continuous non-adjusted variables, chi-square tests used for categorical non-adjusted variables, and binomial regression adjusted for gender and weighted for age