

Away-from-home Food Intake and Risk for Obesity: Examining the Influence of Context

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Objective: This study examined sociodemographic and cultural determinants of away-from-home food consumption in two contexts and the influence of frequency of away-from-home food consumption on children's dietary intake and parent and child weight status.

Methods and Procedures: Parents of children ($N = 708$) in grades K-2 were recruited from 13 elementary schools in Southern California. Parents were asked through a questionnaire the frequency with which they eat meals away from home and the restaurant they frequented most often. The height and weight of the parents and their children were measured to calculate BMI.

Results: Consuming foods at least once a week from relatives/neighbors/friends (RNF) homes was associated with children's dietary intake and children's risk for obesity. For example, children of parents with weekly or greater RNF food consumption drank more sugar-sweetened beverages. Parents of families who ate at restaurants at least weekly reported that their children consumed more sugar-sweetened beverages, more sweet/savory snacks, and less water compared with families who did not frequent restaurants this often. The type of restaurant visited did not affect diet intake or obesity. More acculturated families exhibited less healthy dietary behaviors than less acculturated families.

Discussion: Restaurants remain an important setting for preventing child and adult obesity, but other settings outside the home need to be considered in future intervention research. This may especially involve eating in the homes of RNF.

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INTRODUCTION

Research from the US Department of Agriculture estimates that between 1985 and 2000 daily per capita energy consumption increased by 12% or 300 calories per day (1). One eating behavior contributing to this increase in energy consumption is the increase in frequency of away-from-home food consumption. Away-from-home foods are generally defined as “full meals and single ready-to-eat items (including takeaway foods) purchased at restaurants, prepared-food counters at grocery stores, and other outlets” (p. 5) (2). Away-from-home foods are higher in fat and lower in fiber (3) and frequent consumption of fast food, in particular, is associated with poorer diet quality and risk for obesity for both children (4) and adults (5). In 1999–2000, 41% of US adults reported eating away-from-home foods at least weekly (6), and 25% of adults and 30% of children 4–19 years old reported eating fast food at least daily (4). Purchasing away-from-home foods now accounts for ~46% of Americans' annual food budget compared with 26% in 1970 (ref. 2), and opportunities for consuming away-from-home foods are easier given that the number of foodservice establishments has nearly doubled in the past 30 years, from 491,000 in 1972 to 878,000 in 2004 (2).

Notwithstanding the importance of traditional definitions of away-from-home foods on diet quality and risk for obesity, several other contexts also have been identified and examined, including day-care centers (7), schools (8), and worksites for adults (9). This study adds to this body of research by examining a relatively unexplored context in which food consumption occurs, namely relatives, neighbors, and friends (RNF) homes. This context may be particularly important for immigrant families given their reliance on informal sources of child care (10), and among Latinos who exhibit greater involvement with immediate and extended family members (11), often living in close proximity to relatives (12), and a stronger familial bond compared with a white population (13). Importantly, RNF often gather to celebrate life events during which high-fat foods are consumed (14). Finally, although home vs. away-from-home environments are generally considered healthier dietary environments (e.g., toddlers' mean energy intake at lunch was 281 kcal at home vs. 308 kcal away from home and 332 kcal at day care) (15), the relative influence of RNF environments has not been examined.

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Examining behavioral determinants of dietary intake and weight status is important given the prevalence of obesity among Latino children in the US. National prevalence rates using measured height and weight from the National Health and Nutrition Examination Survey indicate that 19.5% of Mexican-American children 3–5 years old were overweight compared with 13.9% of all children in this age group (16). Rates of being at-risk-for overweight in this age group were similarly different (32.6% among Mexican-American children vs. 26.2% overall).

This study was informed by two frameworks, both of which have explained dietary behaviors and risk for obesity. The Socioecological Framework recognizes that individual behavior is nested within contexts and systems that influence an individual's behaviors and health status (17,18). Social Cognitive Theory proposes that individual behavior is reciprocally determined by the environments in which the behaviors occur or are engaged in (19). This examination of dietary intake and risk for obesity by context reflects the direct influence that the environment has on behavior, as well as the individual's response to the environment (20).

This study examined the relationship between away-from-home eating, children's dietary intake, and children's and adults' weight status using three conceptualizations of away-from-home foods: frequency of eating at RNF homes, frequency of eating at restaurants, and the type of restaurant. Our sample consists of Latino families, predominantly Mexican/Mexican-American families, living along the United States–Mexico border in Southern California. Study hypotheses were:

1. Consumption of away-from-home foods at least once a week or more vs. less than once a week is associated with children's dietary intake and children's and adults' weight status in two contexts: RNF and restaurants.
2. Frequenting fast-food vs. sit-down or buffet restaurants is associated with children's dietary intake and a greater risk for obesity among children and adults.

Exploratory analyses examined whether families who frequented various away-from-home eating contexts at least once a week or more and those who choose fast-food vs. other restaurant types differed significantly on a number of demographic and cultural characteristics. By identifying attributes of families who engage in these unhealthy behaviors, interventions can be targeted and tailored with greater efficiency and efficacy (21–23).

METHODS AND PROCEDURES

Study design and recruitment

This secondary data analysis used baseline data from *Aventuras para Niños*, an obesity-prevention study. All study protocols were approved by the Institutional Review Board at San Diego State University.

Study participants were recruited from 13 schools in southern San Diego County, California that met the following criteria: (i) Latino enrollment of at least 70%; (ii) a defined attendance boundary (no charter or magnet schools); and (iii) no other obesity-prevention programs or additional physical education training for teachers within the past 4 years.

Parents were recruited directly on school grounds and during school presentations and through telephone calls and fliers sent home with students. Eligible families had a child in kindergarten, first or second grade at one of the thirteen schools and (i) had no major health problems; (ii) lived within the school attendance boundaries; and (iii) intended to stay in the area for at least 1 year. Parents received an incentive of \$20 to enroll and complete the baseline survey. A total of 812 parent–child (aged 4–7) dyads were recruited in two waves, the first from August 2003 to January 2004, and the second from May 2004 to December 2004. This study included only the Latino subsample (88%; $n = 708$) given our interest in Latino health promotion.

Procedures

Administration of the baseline assessment protocol occurred on the school grounds. After consenting to participate in the study, parents completed a self-administered 22-page survey in the language of their choice (Spanish or English). The survey included questions on frequency of away-from-home food consumption, type of restaurant frequented, and a 49-item food frequency screener assessing children's dietary intake. Trained bilingual, bicultural evaluators measured the child's and parent's height and weight using standard procedures. Twenty percent of the anthropometric measurements were randomly selected for reliability testing. Inter-rater reliability on the anthropometric measures was 97–99%.

Measures

Frequency of consuming away-from-home foods. Parents responded to five questions on the survey indicating how frequently their families ate away-from-home foods obtained in the following contexts: RNF homes; fast-food restaurants; sit-down restaurants; and restaurants in Tijuana, Mexico. The questions were presented with response options ranging from 1 = never, 2 = less than once a week, 3 = 1–2 times per week, 4 = 3–4 times per week, 5 = 5–7 times per week. For the primary analysis, responses specific to each setting were dichotomized and then used to create two composite scores reflecting whether the family consumed away-from-home foods at least once a week or more (1) vs. less than once a week (0) in RNF homes and in restaurants. The decision to use the former dichotomization related to frequency was based on evidence linking at least weekly consumption of fast food with BMI (24). In addition few respondents reported consuming away-from-home food three times a week or more: 2.4% relatives' homes, 0.9% neighbor/friends' homes, 3.9% fast food, 1.5% sit-down restaurant, and 0.4% in Tijuana, Mexico. Furthermore, we collapsed responses to RNF homes into one category corresponding to nonrestaurant away-from-home foods and responses related to fast-food, sit-down, and Tijuana restaurants into a second category labeled as restaurant foods. There are currently no published studies examining the contribution of RNF to total dietary intake, whereas there is substantial evidence related to consumption of restaurant foods.

Family's primary restaurant. Developed in a previous study (25), parents were asked in an open ended format: "What restaurant does your family eat at most often?" along with a request for the street address and city of that restaurant. Restaurants were recoded as fast-food, sit-down, or buffet using the North American Industry Classification System (26). Fast-food restaurants are characterized by ordering at a counter, paying before receiving the food, and most typically by food that is ready before it is ordered. Sit-down restaurants provide food service to people who order and are served, while seated, by wait service. Buffet restaurants allow patrons to eat unlimited quantities of food for a set price or by the plate weight. Nonchain restaurants were either visited in person or called to verify information necessary for classification. Six percent of restaurants were not classified because of insufficient information and 7% of respondents had missing data.

Children's dietary intake. A 49-item food frequency screener assessed children's dietary intake. Parents were asked to rate how often their child consumed each food item from never (1) to five or more times per day (10), with responses recoded to reflect number of times the child consumed that food daily. If consumption of a particular food occurred less than once a day, it was coded as 0. Food items included in the survey were identified from previous studies with the target population (27). Four dietary intake variables were created: number of sodas and other sugar-sweetened beverages consumed daily; number of servings of water consumed daily; number of sweet and savory snacks/desserts consumed daily including chips, crackers, cookies/cakes/pastries, candy, chocolate, ice cream, and popsicles; and number of fruits and vegetables consumed daily including green salad.

Child and parent BMI. Trained evaluators calculated BMI by taking the average height in meters and weight in kilograms based on three measurements for each parent and children, and then dividing kilograms by meters squared. Adult overweight was defined by the World Health Organization as a BMI of normal at 25–29.9, obesity at 30–39.9, and excess obesity at >40 (28). Children are considered overweight if they fall above the 95th percentile of sex-specific BMI-for-age charts outlined by the 2000 CDC growth charts (29,30).

Demographic variables. Parents responded to open- and closed-ended questions on the following variables which were then recoded as follows: age, gender (male vs. female), marital status (married or living as married vs. not married), household size, level of education (<high school vs. ≥high school), employment status (employed vs. unemployed), household income (<\$1,500 per month vs. ≥\$1,500 per month), homeownership (own a home or condo vs. not a homeowner), mobility (can drive vs. cannot drive), and immigrant generation status. Acculturation of the parent was measured using the Acculturation Rating Scale for Mexican-Americans-II developed by Cuéllar and colleagues (31). The scale consists of 30 items measuring Mexican orientation (13 items) and Anglo orientation (17 items), with a response option of 1 = not at all to 5 = often/almost always. Parents received an acculturation score reflecting greater acculturation to the Anglo culture with a higher/less negative score ($\alpha = 0.72$).

Statistical analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences software, version 13.0 for Windows. α -Levels of 0.05 indicated statistical significance. Descriptive statistics were used to characterize the sample on demographic variables, child dietary intake, adult and child BMI, and away-from-home food consumption behaviors.

Hypothesis testing. (i) Analysis of covariances were used to examine differences between families who consumed away-from-home foods in RNF homes and in restaurants at least once a week or more on children's dietary intake. Income was controlled for in all analyses. χ^2 -Tests were used to examine the relationship between consumption of away-from-home foods in RNF homes and in restaurants at least once a week or more and child and adult BMI category; (ii) analysis of covariances were used to examine for differences in children's dietary intake by type of restaurant frequented: fast-food vs. sit-down or buffet restaurants. χ^2 -Tests were used to examine whether children and adults who frequent fast-food restaurants vs. sit-down or buffet restaurants were more likely to be in a higher BMI category.

Exploratory analysis. Two multivariate logistic regression analyses were conducted to examine demographic and sociocultural correlates of away-from-home food consumption: consumption in RNF homes at least once a week or more and consumption in restaurants at least once a week or more. Variables entered simultaneously into the two models included: parent age (continuous), male/female, married/not married, household size (continuous), high school educated/less than high

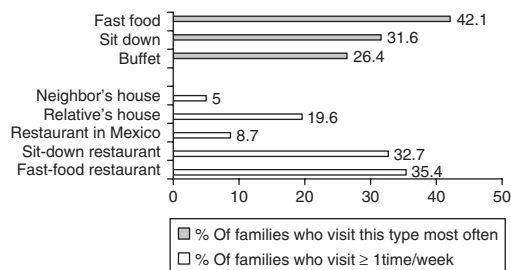


Figure 1 Percentage of families reporting primary restaurant type and percentage who consume away-from-home foods at least once a week or more by setting.

school, employed/unemployed, income >\$1,500 per month/less, homeowner/nonhomeowner, drive/do not drive, acculturation (continuous), and second generation/first generation. Similar procedures were used to examine demographic and sociocultural correlates of those who visited fast-food restaurants vs. sit-down or buffet restaurants.

RESULTS

Participants

Seven hundred and eight Latino parents completed the survey. The average age of the respondents was 35 years old (s.d. = 7.5) and the average child's age was 6 years old (s.d. = 0.94). Most of the respondents were female (97.7%) and married (78.2%), while slightly over half of the children were female (51.9%). Approximately 37% of the households reported an income of <\$1,500 per month, with a median household size of five individuals. Nearly 40% of respondents did not graduate from high school, and 63.9% were employed either full or part-time outside the home.

In terms of health status, nearly one-third of the children (31.1%) were classified as overweight according to CDC guidelines (>95th percentile for their age and gender). Another 16.6% had a BMI >85th percentile but <95th percentile and therefore were classified as at-risk for overweight. The adults were classified as either under-to-normal weight (24.5% with BMI < 18–24.99), overweight (34.7% with BMI > 25–29.99), obese (33.9% BMI > 30–39.99) or excess obese (6.9% with BMI ≥ 40). The average adult BMI was 29.6 (s.d. = 6.33).

Fast-food and sit-down restaurants were the most common contexts where families ate at least once a week or more, followed by relative's homes, restaurants across the United States–Mexico border, and finally in neighbors/friends' homes (Figure 1). Significantly more families reported preferring to eat at fast-food restaurants followed by sit-down restaurants and then buffet restaurants ($P \leq 0.05$; see Figure 1). Overall, 45.9% of the sample reported consuming away-from-home foods at least weekly from any type of restaurant and 37.5% from RNF homes.

Hypothesis 1

Table 1 illustrates differences in children's diet intake and child and adult BMI status by frequency of consuming away-from-home foods in RNF homes and restaurants. Children of parents who reported at least weekly RNF food consumption reported that their children drank more sugar-sweetened

Table 1 Differences in children’s dietary intake, child BMI, and parent BMI by away-from-home context

Sample size (%)	Relative/neighbor/friend			Fast food/buffet/sit down		
	<1 Time/week 489 (62%)	≥1 Time/week 303 (38%)	Significance	<1 Time/week 416 (53%)	≥1 Time/week 376 (47%)	Significance
Mean number per day (s.d.)						
Sugar-sweetened beverages	0.76 (1.29)	1.04 (1.54)	≤0.01	0.71 (1.26)	1.06 (1.53)	≤0.01
Water	2.78 (1.73)	2.56 (1.71)	n.s.	2.86 (1.69)	2.52 (1.76)	≤0.001
Sweet and savory snacks	1.23 (1.77)	1.44 (1.87)	n.s.	1.08 (1.67)	1.58 (1.94)	≤0.001
Fruits and veggies	1.76 (1.78)	1.85 (1.78)	n.s.	1.84 (1.79)	1.76 (1.78)	n.s.
Child BMI			≤0.05			≤0.05
Under-to-normal	56.0% (238)	46.3% (119)		56.8% (212)	46.8% (148)	
At-risk-for overweight	15.1% (64)	19.5% (50)		14.5% (54)	19.3% (61)	
Overweight	28.9% (123)	34.2% (88)		28.7% (107)	33.9% (107)	
Adult BMI			n.s.			≤0.05
Under-to-normal	25.2% (108)	22.7% (58)		26.1% (97)	22.6% (72)	
Overweight	34.6% (148)	34.9% (89)		34.7% (129)	34.9% (111)	
Obese	33.9% (145)	34.5% (88)		34.7% (129)	32.7% (104)	
Excess obesity	6.3% (27)	7.8% (20)		4.6% (17)	9.7% (31)	

All analyses controlled for income.
n.s., not significant.

Table 2 Differences in children’s dietary intake, child BMI, and parent BMI by primary restaurant type

	Fast food	Buffet	Sit-down	
Mean number per day (s.d.)				
Sugar-sweetened beverages	0.92 (1.39)	0.94 (1.53)	0.79 (1.31)	n.s.
Water	2.58 (1.72)	2.82 (1.74)	2.52 (1.72)	n.s.
Sweet and savory snacks	1.42 (1.87)	1.34 (1.79)	1.14 (1.76)	n.s.
Fruits and veggies	1.66 (1.70)	2.16 (1.86)	1.62 (1.71)	≤0.01
Child BMI				n.s.
Under-to-normal	52.3% (134)	49.4% (79)	52.6% (100)	
Risk of overweight	16.8% (43)	14.4% (23)	17.9% (34)	
Overweight	30.9% (79)	36.3% (58)	29.5% (56)	
Adult BMI				n.s.
Under-to-normal	26.8% (69)	21.9% (35)	23.6% (45)	
Overweight	33.1% (85)	34.4% (55)	38.2% (73)	
Obese	31.5% (81)	33.8% (54)	35.6% (68)	
Extreme obesity	8.6% (22)	10.0% (16)	2.6% (5)	

All analyses controlled for income.
n.s., not significant.

beverages compared with families who ate at RNF homes less often. Parents of families who ate at restaurants at least weekly reported that their children consumed more sugar-sweetened beverages, more sweet/savory snacks and less water compared by families who did not frequent restaurants this often.

Table 3 Multivariate analysis of demographic and sociocultural correlates of at least weekly away-from-home food consumption by context

	Relative/neighbor/friend	Fast food/buffet/sit down
	OR (95% CI)	OR (95% CI)
Age	0.99 (0.97, 1.01)	0.97 (0.94, 0.99)
Gender (male vs. female)	2.30 (0.69, 7.70)	2.56 (0.70, 9.29)
Married	1.16 (0.73, 1.87)	0.79 (0.50, 1.26)
Mean household size	0.88 (0.80, 0.98)	0.97 (0.88, 1.07)
High school educated	1.26 (0.86, 1.84)	0.95 (0.66, 1.38)
Employed	1.13 (0.78, 1.64)	1.01 (0.70, 1.45)
Income > \$1,500 month	1.14 (0.77, 1.68)	0.89 (0.61, 1.30)
Homeowner	1.06 (0.69, 1.63)	1.67 (1.09, 2.56)
Drive a car	0.90 (0.59, 1.37)	1.17 (0.76, 1.78)
Acculturation level	1.17 (0.98, 1.39)	1.37 (1.14, 1.63)
Second generation immigrant	1.27 (0.78, 2.07)	1.15 (0.71, 1.87)

All variables were entered simultaneously into the two multivariate logistic regression models.
CI, confidence interval; OR, odds ratio.

In terms of BMI status, children whose families ate at RNF homes or restaurants at least once a week or more were more likely to be overweight (see **Table 1**). The prevalence of childhood overweight was ~5% higher among families who ate at RNF homes at least once a week or more vs. those who did not. No such relationship was observed among adults. A similar

pattern to RNF food consumption was observed between the children's weight status and restaurant food consumption; however, unlike RNF, twice as many adults were classified as excess obese if their families visited restaurants at least once a week or more.

Hypothesis 2

As shown in [Table 2](#), in contrast to our hypothesis, few associations were observed between children's diet intake and type of restaurant frequented. Parents of families who preferred buffet restaurants reported more consumption of fruits and vegetables compared with those who preferred fast-food and sit-down restaurants. No associations were observed between child and adult BMI and type of restaurant frequented.

Exploratory analyses

To better tailor future interventions to parent and family/household characteristics, we examined several important demographic and sociocultural correlates of away-from-home food consumption in RNF homes and restaurants. All variables were entered simultaneously into the two multivariate logistic regression models. Households with fewer members were more likely to consume away-from-home foods at least once a week or more in RNF homes (see [Table 3](#)). With respect to restaurants, parent age, homeownership, and acculturation level were significantly related to consuming foods in restaurants at least once a week or more. Families who visited restaurants at least once a week consisted of a younger parent (33 years old vs. 35 years old), homeowners (54% vs. 46%), and were more acculturated to the US culture.

Similar analyses were not conducted to examine differences by the type of restaurant given the relatively null findings to Hypothesis 2.

DISCUSSION

Away-from-home food consumption is an important determinant of dietary intake and risk for obesity. Research indicates that foods consumed outside the home are generally less nutritious, including larger in portion size. Away-from-home foods contain more calories per eating occasion, higher levels of total fat and saturated fat, lower levels of fiber, calcium, and iron; and more sodium than foods prepared at home (3). This study examined the diet and health effects of at least weekly consumption of restaurant food among Latino parents and their young children, as well as the effects of at least weekly consumption in a previously unexplored context, specifically the homes of RNF. It was hypothesized that weekly consumption of away-from-home foods would be associated with children's dietary intake and child and adult BMI.

Similar to national data (6), 46% of participating families reported consuming restaurant food at least weekly. The most common restaurant types were fast-food and sit-down restaurants. As hypothesized, weekly consumption of restaurant food was associated with children's intake and child and adult BMI. These results are consistent with those of other researchers who have found that consuming restaurant food was

associated with daily energy and fat intake and body fatness among women (32), and with a high-fat diet and BMI among adults (33). However, when examining the effects of restaurant type on children's dietary intake and child and adult BMI, our hypotheses were not supported. This is inconsistent with previous research. For example, although "fast food" was not explicitly defined, French and colleagues found that frequency of fast-food restaurant use among women was associated with higher fat and calorie intake, and lower consumption of fruit and fiber (34). Similarly, a positive association was observed between fast-food consumption and the total calorie intake and BMIs of women (35). Nevertheless, other researchers have found that type of restaurant was not as important as frequency of consuming restaurant food in predicting BMI among adult men (36).

This study examined a previously unexplored context in which food consumption occurs, namely the homes of RNF. Evidence from other studies led the research team to hypothesize that these contexts may be associated with dietary intake and BMI given that visiting other people's homes is often associated with celebration and consumption of rich foods (14,37). In this study close to 40% of participating families reported consuming foods in these contexts at least weekly. Children who consumed foods in these contexts at least weekly were more likely to be overweight than those who did not. However, the same was not true for adults. Latino children may be particularly affected by what is available in these environments if future data support previous findings that child care is more likely to occur in this context than in formal day-care settings (10,38,39). A literature search in PubMed, PsycInfo, and Sociofile revealed no other studies examining this context and its effects on risk for obesity. Thus, the extent to which these findings may generalize to the larger US Latino population or to other ethnic groups in the United States is not yet known.

The problem of obesity is clear and present in this study. Nearly 50% of the children in this study were classified as at-risk-for overweight or overweight. These estimates are consistent with national data which indicate that the prevalence of at-risk-for overweight and overweight among Mexican-American children 3–5 years old is 51.8% based on 2003–2004 data (16) and similar to rates seen in past studies with Mexican-American children (40,41). The rate of overweight to excess obesity among the adults in the sample was slightly higher than the rates estimated by the CDC for Mexican-American women (28).

Limitations of this study include the lack of portion size information on the food frequency screener and reliance on self-reported data. In addition, although differences in the frequency of various foods consumed were statistically significant, additional research is needed to determine whether these differences are clinically meaningful. The response options to questions on frequency of eating out limits our ability to draw conclusions about the actual nutrient contributions of away-from-home foods. More rigorous methodologies, such as 24-h dietary recalls, should be considered for future studies to collect nutrient information by location (15). A higher reporting bias has been noted in the Latino population compared with

a non-Latino population. Reporting bias may be particularly relevant for questions regarding frequency of fast-food consumption, particularly because these families were recruited to participate in a childhood obesity-prevention intervention. However, given that these behaviors are likely to have been underreported due to social desirability and recall bias, the observed effects may be underestimations vs. overestimations of the true effects. Notwithstanding these limitations, a strength of this study is that it was conducted in a geographic area heavily affected by continued and long-standing Latino immigration. As a result, it offers insight into several important dietary behaviors of the largest ethnic minority population in the United States.

Conclusions

Foods consumed in other people's homes are unlikely to have the same diet quality as food prepared commercially and thus may not represent the same level of risk for obesity as foods prepared in restaurants. Nevertheless, these results clearly indicate that foods consumed in RNF contribute to a child's overall dietary intake and risk for obesity. Given evidence that one of the most important parenting behaviors related to childhood risk for obesity is monitoring (42), clearly more research is needed on how to teach parents to monitor and regulate the foods that their children consume in the homes of other people. Effective intervention strategies applied in formal child care settings could be adapted to this environment, including the use of train-the-trainer interventions (43) that are similar to lay health advisor models in which community leaders are trained to intervene with other community members (21). Several studies have examined correlates of fast-food dining. Few have considered other contexts, such as buffet and sit-down restaurants, and the homes of RNF. Through revealing the influences behind frequency of consuming away-from-home foods and restaurant selection, this study may further contribute to the development of effective interventions for the Latino community.

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DISCLOSURE

The authors declared no conflict of interest.

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