



Short Communication

Is frequency of fast food and sit-down restaurant eating occasions differentially associated with less healthful eating habits?

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ABSTRACT

Studies have shown that frequency of fast food restaurant eating and sit-down restaurant eating is differentially associated with nutrient intakes and biometric outcomes. The objective of this study was to examine whether frequency of fast food and sit-down restaurant eating occasions was differentially associated with less healthful eating habits, independent of demographic characteristics. Data were collected from participants in 2015 enrolled in a worksite nutrition intervention trial ($n = 388$) in North Carolina who completed self-administered questionnaires at baseline. We used multiple logistic regressions to estimate associations between frequency of restaurant eating occasions and four less healthful eating habits, controlling for age, sex, race, education, marital status, and worksite. On average, participants in the highest tertile of fast food restaurant eating (vs. lowest tertile) had increased odds of usual intake of processed meat (OR = 3.00, 95% CI = 1.71, 5.28), red meat (OR = 2.30, 95% CI = 1.33, 4.00), refined grain bread (OR = 2.25, 95% CI = 1.23, 4.10), and sweet baked goods and candy (OR = 3.50, 95% CI = 2.00, 6.12). No associations were found between frequency of sit-down restaurant eating and less healthful eating habits. We conclude that greater frequency of fast food restaurant eating is associated with less healthful eating habits. Our findings suggest that taste preferences or other factors, independent of demographic characteristics, might explain the decision to eat at fast food or sit-down restaurants.

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1. Introduction

In recent years, the proportion of United States adults' calorie intake from food prepared away from home has steadily risen (Lin and Guthrie, 2012). Fast food restaurants and sit-down restaurants (also referred to as “table-service” and “full-service” restaurants) are the two major contributors of away-from-home calories in the United States. Fast food restaurants typically offer inexpensive food catering to price-sensitive individuals (Kim and Leigh, 2011). In contrast, sit-down restaurants range from lower-priced casual dining to higher-priced upscale fine dining establishments. On average, an individual's daily energy intake increases by 134 cal for every meal prepared away from home (Todd et al., 2010). The increasing popularity of away-from-home food sources may have contributed to the rapid growth of overweight and obesity nationally.

An emerging body of research suggests that regularly eating meals from fast food restaurants is more adversely associated with obesity-related outcomes than regularly eating meals from sit-down restaurants.

Longitudinal data from the National Health and Nutrition Examination Survey (NHANES) 2003–2010 found that consumption of fast food and full-service restaurant food was differentially associated with daily nutrient intakes (An, 2016). For example, fast food consumption was associated with greater amounts of daily sugar intake and lesser amounts of fiber intake while full-service restaurant food consumption did not show similar associations. Daily intake of calories, total fat, and saturated fat, however, was comparable between fast food and full-service restaurant types.

In cross-sectional and longitudinal analyses of Coronary Artery Risk Development in Young Adults (CARDIA) data, Duffey and colleagues found that frequency of fast food restaurant eating was prospectively associated with higher levels of poorer metabolic outcomes as compared with sit-down restaurant eating (Duffey et al., 2007, 2009). Compared to people in the lowest quartile of baseline fast food eating, those in the highest quartile had higher weight, waist circumference, and plasma triglycerides concentrations, and lower HDL cholesterol concentrations after 13 years of follow-up. In contrast, baseline sit-down restaurant food consumption was not associated with weight or metabolic outcomes after 13 years of follow-up.

The present study uses baseline cross-sectional data from a worksite nutrition intervention to evaluate whether frequency of eating at fast

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food or sit-down restaurants is differentially associated with four less healthful eating habits associated with chronic disease outcomes: usual intake of processed meat (Micha et al., 2010), red meat (Micha et al., 2012), refined grain bread (Liu, 2002), and sweet baked goods and candy (Johnson et al., 2009). We hypothesized that frequency of eating at fast food restaurants would be associated with higher odds of all four less healthful eating habits, whereas sit-down restaurant frequency would not. Additionally, we hypothesized that socioeconomic status, using educational attainment as a proxy measure, would moderate the relationship between frequency of restaurant eating occasions and less healthful eating habits in order to evaluate the differential impact that economic conditions may have on eating out options.

2. Methods

2.1. Sample

We used baseline cross-sectional data from the Physical Activity Calorie Expenditure (PACE) study conducted in three worksites of a health insurer in North Carolina. The study is testing the effectiveness of PACE food labeling in changing calorie purchasing and physical activity among workers regularly purchasing meals from a worksite cafeteria. The eligibility criteria included employees who were 18 years or older and reported purchasing lunch or were willing to purchase lunch from the cafeteria at least three times per week. At the time of this analysis, 388 participants were enrolled in the study and constitute the sample. All aspects of the study were approved by the Institutional Review Board of University of North Carolina at Chapel Hill.

2.2. Measures

We collected baseline demographic and eating behavior data using a self-administered questionnaire. The demographic questions included age, sex, race/ethnicity, marital status and educational attainment. Educational attainment was used in this analysis as a proxy for socioeconomic status (Shavers, 2007). The questionnaire also included questions on frequency of eating breakfast, lunch, and dinner purchased from fast food restaurants (“such as McDonald’s or Domino’s”) and sit-down restaurants (“such as Applebee’s or Olive Garden”), whether dine-in or carry-out in the past month. The response options were: 1) 0–2 times/month; 2) 3–5 times/month; 3) 6–10 times/month; 4) 11–20 times/month, and 5) more than 20 times/month. We created a continuous variable representing overall frequency of fast food and sit-down restaurant eating occasions by collapsing breakfast, lunch, and dinner responses into a measure of overall frequency of eating occasions per restaurant type. We then calculated tertiles of each continuous variable. We used the categorical tertile variables in our modeling with the lowest tertile as the referent.

A 26-item food frequency questionnaire was used to measure usual intake of foods including processed meat, sweet baked goods and candy, red meat, and refined grain bread. The food frequency questionnaire was a modified version of a Dietary Risk Assessment for southern United States populations created by Ammerman et al. (1991) and revised by Jilcott et al. (2007). The reference period and response options for each food category varied (see Supplementary material). Based on the distribution of responses, we generated dichotomous dependent variables of processed meat (1 = ≥ 3 servings/week; 0 = 0–2 servings/week), red meat (1 = ≥ 2 servings/day; 0 = 0–1 serving/day), refined grain bread (1 = ≥ 2 servings/day; 0 = 0–1 serving/day), and sweet baked goods and candy (1 = ≥ 2 servings/week; 0 = 0–1 servings/week).

2.3. Data analysis

We examined univariate statistics, multicollinearity, and presence of outliers. Data for one participant were excluded for an implausibly low

age value. Logistic regression was used to evaluate associations between frequency of fast food and sit-down restaurant eating occasions (independent variables) with usual intake of processed meat, red meat, refined grain bread, and sweet baked goods and candy (dependent variables). First, we examined the relationship between fast food and sit-down restaurant eating frequency with each less healthful eating habit (Model 1). Second, we estimated models controlling for demographic characteristics: age in years (continuous), sex (dichotomous; 1 = female, 0 = male), race (dichotomous; 1 = non-white, 0 = white), education (dichotomous; 1 = Bachelor’s Degree and Above, 0 = Below Bachelor’s Degree), and marital status (categorical) (Model 2). Third, we tested effect modification by educational attainment through inclusion of interaction terms for education-by-fast-food and education-by-sit-down restaurant eating frequency in Model 2. We conducted Wald tests to assess the joint significance of each set of dummy variables representing the categorical-by-categorical variable interactions. Education-by-fast-food and education-by-sit-down restaurant interaction terms were not statistically significant in any of the models (Wald $p = 0.12$ – 0.88) and consequently removed. We used fixed effects for worksite in all models to control for the clustering of observations in three worksites and used a complete case analysis approach for handling missing data, therefore excluding participants without complete data on all variables in the model. We used Stata version 11.2 (College Park, TX, USA) for all analyses.

3. Results

The analytic sample size was 387 participants. The sample was predominantly female (78%), non-white (55%), and more than one-third had less than a bachelor’s degree (Table 1).

Table 2 shows the associations between eating out occasions and the four eating behaviors in the two models. In Model 1, the highest tertile for fast food restaurant eating frequency was associated with increased odds of all four less healthful eating habits. Compared to employees in the lowest tertile of fast food restaurant eating frequency, those in the

Table 1
Demographic and eating habit characteristics (North Carolina, United States, 2015) ($n = 387$).

	<i>n</i> (%)
<i>Demographic characteristics</i>	
Age ^a	42.4 (10.3)
Female	301 (77.8)
Non-white	211 (54.5)
<i>Education</i>	
Less than Bachelor’s degree	145 (37.5)
Bachelor’s degree and above	242 (62.5)
<i>Marital status</i>	
Single, never married	111 (28.7)
Married/domestic partnership	200 (51.7)
Divorced/separated/widowed	76 (19.6)
<i>Fast food restaurant frequency, by tertile</i>	
Low tertile	144 (37.2)
Mid tertile	130 (33.6)
High tertile	113 (29.2)
<i>Sit-down restaurant frequency, by tertile</i>	
Low tertile	170 (43.9)
Mid tertile	133 (34.4)
High tertile	84 (21.7)
<i>Less healthful eating habits</i>	
Processed meat, (≥ 3 servings/week)	140 (36.2)
Red meat, (≥ 2 servings/day)	155 (40.1)
Refined grain bread, (≥ 2 servings/day)	110 (28.4)
Sweet baked goods and candy, (≥ 2 servings/week)	157 (40.6)

^a Mean (SD).

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