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Assessing the Effects of Gender and Education on the Influence of Menu Labels Among Latino Consumers

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Assessing the Effects of Gender and Education on the Influence of Menu Labels Among Latino Consumers

A thesis submitted in partial satisfaction

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by

Aresha Maree Martinez-Cardoso

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ABSTRACT OF THE THESIS

Assessing the Effects of Gender and Education on the

Influence of Nutritional Content Labels Among Latino Consumers

by

Aresha Maree Martinez-Cardoso

Master of Science in Public Health

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Professor Gilbert C Gee, Chair

Nutritional content labels on fast food and restaurant menus and signage have gained popularity and momentum with the recognized need to motivate individuals to improve their eating habits outside the home. However, no known studies have assessed nutrition and menu labeling behavior among Latino consumers while taking into consideration factors such as gender and education. Higher levels of education may influence the utility of menu labeling as more educated individuals recognize the benefits of monitoring their eating; and in particular, the effects of education were expected to be strongest for Latino men. To address these issues, this thesis analyzed data collected from a convenience sample of Latino patrons (n=100) attending a community market in South Los Angeles that implemented menu labels. Pearson's chi-square tests and logistic regression was used to assess the relationship between gender, education, and

the influence of menu labels on meal choice among Latino consumers who ranged in age from 18 to 67. Being a woman, married, and insured were significant correlates of utilization of nutrition and menu labels. Level of education and the interaction between gender and education, however, was not significantly associated with menu label utilization across the models analyzed. These results suggest that, in addition to providing nutritional content information, labeling interventions should implement strategies to educate consumers about healthy eating at the point-of-purchase and more directly motivate consumers to use the labeling information. Results also suggest that as Latino women are more sensitized to these intervention ideas, their behaviors need to be reinforced, whereas more efforts need to be taken to engage Latino men.

The thesis of Aresha Maree Martinez-Cardoso is approved.

Deborah C Glik

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INTRODUCTION

With the dramatic rise in rates of obesity and overweight, cardiovascular disease, and diabetes, policy makers and health practitioners have been eager to develop innovative efforts to improve the dietary behaviors of individuals in the US, which is considered an important risk factor for these conditions. One strategy that has been proposed to meet this call is the implementation of nutritional content menu labels in restaurant and fast food locations (Albright, Flora, & Fortmann, 1990; Burton, Creyer, Kees, & Huggins, 2006). Providing health information through nutritional content labels serves as a population-based strategy to help consumers make healthier meal purchases. Several studies have highlighted that nutrition and menu labels influence consumers' eating behaviors and food choice differently based on one's knowledge of healthy eating and motivation to monitor their nutritional intake (Robert Wood Johnson Foundation, 2009). Specifically, women and individuals with higher levels of education engage in healthier eating behaviors and in turn are more likely to pay attention to nutritional content labels on packaged foods (Campos, Doxey, & Hammond, 2011). Given the relative novelty of menu labels however, it is unclear how gender and education effect the utilization of menu labels in restaurant and fast food settings. Moreover, few studies have assessed the influence of nutrition and menu labels on eating patterns among Latinos in the US (Elbel, Kersh, Brescoll, & Dixon, 2009). The goal of this thesis is to conduct a secondary data analysis to evaluate the independent and interaction relationship between gender, education, and reporting nutrition and menu labels influenced meal choice.

Unhealthy Eating in the US

Unhealthy eating behaviors have been widely documented in populations across the US.

An analysis of diets from a national sample of adults in the US found that individuals consumed an average of 2,199 calories per day (although this figure may be underreported) where grain based deserts, breads, chicken, soda/sports drinks, and alcoholic beverages where among the top 5 sources of calories (NCI, 2010). Similarly, Ervin used the Healthy Eating Index (HEI) to assess adult eating behaviors across the US and found that the mean HEI score was 57.2 out of 100, which indicated a low quality diet, particularly in the consumption of vegetables, whole grains, sodium, and calories from fat, alcohol, and sugar (2011). These trends have motivated researchers to understand how individual, social, environmental, and policy factors have led Americans to adopt unhealthy eating behaviors (Wyatt, Winters, & Dubbert, 2006); particular attention has been paid to eating habits outside the home and their contribution to unhealthy diets.

Over the last 20 years, the practice of consuming food and meals outside the home in restaurants and fast food locations has increased dramatically. The average adult in the United States consumes approximately three meals outside the home per week (Cohen & Bhatia, 2012) and these meals account for nearly 40 percent of family food budgets (CDC, 2012b). Eating out has become a popular social trend due to the "intensification of consumer culture and the commodification of services previously supplied by the state or household" (Warde & Martens, 2000). The convenience of purchasing meals meets the needs of families with multiple working parents, extended work hours, and hectic school, work, and life schedules (Patrick & Nicklas, 2005). In addition, the availability and affordability of restaurant and fast food meals appeals to consumers who face barriers eating at home regularly (Keystone Center, 2006). In addition, restaurants spend $4.4 billion annually on advertising in radio, print media, Internet, outdoor

spaces, and television which serves as a powerful tool to pique consumers' interest and motivation to consume meals outside the home (Keystone Center, 2006).

Meals in fast food and commercial restaurants, however, tend to be unhealthier when compared to meals prepared at home and contributes to the diminishing quality of Americans' diets (Guthrie, Lin, & Frazao, 2002; Todd, Mancino, & Lin, 2010). One study analyzed 28,433 menu items from 245 different restaurant and fast food chains and found that 96% of menu items analyzed in the study exceeded USDA recommendations for calories, sodium, and percent calories from fat (Wu & Sturm, 2012). In addition, restaurant and fast food meals often contain high industrially produced trans fat, which facilitates the delivery and storage of food but has been associated with a higher risk of weight gain and abdominal fat compared to other fat sources (Stender, Dyerberg, & Astrup, 2007).

Studies have also found that individuals tend to underestimate the nutritional content of most meals that they consume whether they be at home, in the workplace, or in restaurants (Berman & Lavizzo-Mourey, 2008; Wansink, 2004). When eating food in restaurants or fast food locations, however, people engage in particularly unhealthy eating patterns by consuming meals with higher calories, fat, carbohydrates and sodium (Guthrie et al., 2002) or larger portions (Diliberti, Bordi, Conklin, Roe, & Rolls, 2004a). For example, one study that analyzed lunch time fast food purchases among consumers in New York found that customers purchased meals with an average of 827 calories, which was well above dietary recommendations (Harris, Pomeranz, Lobstein, & Brownell, 2009). While many assume that individuals have the choice and ability to control how and what they eat, this is not always the case. For example, portion sizes of food and drinks in restaurants and fast food locations has increased dramatically since the 1970s; moreover, studies have found that individuals consume more when presented with

larger portions (Diliberti, Bordi, Conklin, Roe, & Rolls, 2004b; Young & Nestle, 2002). Therefore not only do Americans visit sit-down and fast food restaurants with increasing frequency, they tend to consume more calories and eat unhealthier when they visit these locations.

Unhealthy eating patterns have contributed to the rise in obesity, overweight, diabetes, cardiovascular disease, hypertension, and other health complications (Mokdad et al., 2003). Over the past 20 years, the prevalence of obesity and overweight has increased by alarming rates: 35.7 percent of adults and 16.9 percent of children and adolescents were considered obese in 2009-2010 (CDC, 2012a). Meanwhile, both cardiovascular disease and diabetes have been consistently ranked among the top causes of death in the US (CDC, 2012b). While meals outside the home are not the sole explanatory factor for these concerning health trends, researchers have drawn strong links between consuming meals in fast food and restaurant locations and risk for obesity, diabetes, cardiovascular disease, and hypertension (Chou, Grossman, & Saffer, 2004).

Nutrition and Menu Labels

Nutrition and menu labels have gained popularity and momentum with the recognized need for targeted efforts to improve food purchases for meals both inside and outside the home. Nutrition and menu labels may motivate individuals to make healthier meal purchases, monitor their eating later in the day, and can prompt businesses to modify the nutritional content of their food items (Roberto, Schwartz, & Brownell, 2009; Wu & Sturm, 2012). While a number of community and policy level initiatives have been introduced to promote healthier eating, interventions such as nutrition labels specifically target individual behavior change.

The 1990 Nutritional Labeling and Education Act (NLEA) first mandated standardized nutrition labels on packaged foods and drinks sold in stores and vending machines

(Balasubramanian & Cole, 2002). The Federal Drug Administration requires manufacturers to list the calorie, total fat, cholesterol, sodium, total carbohydrates, protein, and vitamin and mineral content of their products (US Food and Drug Administration, 2011). In addition, the law imposed stringent nutrition guidelines for products labeled as diet, low fat, light, reduced fat, and fat free to curb deceptive marketing practices that had misled consumers into purchasing less healthy food items. At the same time, several government and public health agencies launched media and educational campaigns to educate consumers about the Nutrition Facts labels and how to use nutritional information (Byrd-Bredbenner, Alfieri, & Kiefer, 2000). Longitudinal analysis of grocery store sales data pre and post NLEA showed that customers reduced purchases of items with negative nutrition attributes after nutrition labels were implemented (Balasubramanian & Cole, 2002; Moorman, 1996).

Menu labeling in restaurant and fast food locations have been implemented over the last 10 years as leaders recognized the important role of meals outside of the home in shaping unhealthy diets. In general, consumers are supportive of nutrition information; six separate nationwide studies reported that between 61-83% of respondents agreed that restaurants should provide nutritional content information (Bland-Campbell, 2007; Field Research Corporation, 2003; Keystone Center, 2006; Lake Snell Perry & Associates, 2003). In 2008, New York City required fast food restaurants with more than 15 franchises to post caloric content of their products on menu boards and provide detailed nutritional content available for customers (NYDHMH, 2007). By 2010, similar menu labeling legislation had passed in Philadelphia, Nashville, California, Massachusetts, Maine, and Oregon while 11 other states had introduced menu-labeling laws. Additionally, the Affordable Care Act passed in 2010 included a provision requiring food vendors with more than 20 locations to implement menu labeling; currently the

Federal Drug Administration is in the process of developing standardized guidelines for implementation in 2013 (FDA, 2012). Menu labels have been implemented in a variety of formats across locations. Some interventions display only nutrition information (calories, calories from fat, carbohydrates), others include educational material about healthy eating, and others provide symbols to indicate healthier menu items (such as a heart, red/green/yellow) (Robert Wood Johnson Foundation, 2009).

In general, researchers have found that menu and nutritional labels improve eating behaviors, although their impact varies across settings and populations (Harnack & French, 2008; Swartz, Braxton, & Viera, 2011). One study that examined point-of-purchase interventions in restaurants, worksites, and grocery stories found that the 7 out of 9 restaurant interventions improved the intended healthy eating targets (Seymour, Lazarus Yaroch, Serdula, Blanck, & Khan, 2004). Other studies have similarly documented the effectiveness of menu labels for reducing the amount of calories (Bassett et al., 2008; Chu, Frongillo, Jones, & Kaye, 2009; Dumanovsky et al., 2011; Milich, Anderson, & Mills, 1976; Roberto, Larsen, Agnew, Baik, & Brownell, 2010) and fat (Pulos & Leng, 2010) in meals purchased by intervention participants. One study found that menu labeling interventions that ranked-ordered menu items based on calories and posted color-coded calorie ranking were most effective for improving healthy eating (Liu, Roberto, Liu, & Brownell, 2012). In addition, menu labeling helped consumers monitor their nutritional intake and modify how much they ate throughout the day (Roberto et al., 2010).

However it is important to note that some studies have found limited effectiveness of menu labeling interventions among fast food settings (Swartz et al., 2011), low-income communities (Vadiveloo, Dixon, & Elbel, 2011), and adolescents (Yamamoto, Yamamoto,

Yamamoto, & Yamamoto, 2005). Accordingly, nutrition labeling interventions do not appear to effect the food consumption behaviors of all consumers equally (Brewer & Rimer, 2008). Both nutrition and menu labels have varying levels of efficacy depending on the characteristics of the consumer utilizing the labels, type of food being purchased, and context of the food purchasing location (Burton & Creyer, 2004; Guthrie, Fox, Cleveland, & Welsh, 1995). Specifically, an individual's motivation to process nutritional information and nutrition knowledge impact the influence of nutrition and menu labels (Balasubramanian & Cole, 2002). Moreover, both motivation and knowledge vary across sociodemographic groups.

The Role of Gender and Education

Previous studies have found that women are more conscientious of healthy eating and nutrition when compared to men (Parmenter, Waller, & Wardle, 2000). Gender norms may influence the type of weight loss/maintenance activities individuals engage in since men are more likely to participate in physical activity (Kruger, Galuska, Serdula, & Jones, 2004; Sherwood & Jeffery, 2000). Men may perceive physical activity and exercise as a *masculine* form of losing weight while women may be socialized to watch their diets and eat smaller portions (Courtenay, 2000; Souza & Ciclitira, 2005). Krukowski et al found that men were less likely to look for low-calorie meals and use menu labels when compared to women (2006). With respect to nutritional labels on packaged food, studies have consistently shown that women are more likely to assess these labels and modify their eating patterns accordingly (Grunert, Wills, & Fernández-Celemín, 2010; Guthrie et al., 1995; Misra, 2007; Variyam & Cawley, 2006). Similarly, women report utilizing menu labels in restaurant and fast food settings more often than men (Bates, Burton, Howlett, & Huggins, 2009; Gerend, 2009) . Importantly, one study

found that women utilized menu labels more often than men even after controlling for knowledge of healthy eating (Nayga, 2000).

Education is also positively associated with healthier eating, reception of health promotion interventions, and utilization of nutrition and menu labels (Guthrie et al., 1995; Noar, Benac, & Harris, 2007; Ross & Wu, 1995). The effectiveness of nutritional labels depends on consumers understanding both dietary guidelines and recognizing that monitoring nutritional intake is important. As suggested by Mirowsky and Ross (1998), those with higher levels of education have the capacity and control to develop healthier lifestyle and behaviors, such as monitoring their nutritional intake. Individuals with higher levels of education are also thought to possess cognitive and analytical skills that would aid them in considering nutritional content, their overall eating habits, price differences, and portion sizes when utilizing menu labels (Rothman et al., 2006). Studies have confirmed a positive relationship between education level and utilization of nutritional labels on packaged food (Cowburn & Stockley, 2007; Guthrie et al., 1995; Nayga, 1996) and suggest similar relationships may also be at play with respect to menu labels (Josiam & Foster, 2009).

Healthy eating motivation and behavior, however, is a dynamic process that is simultaneously influenced by many factors. The interaction between gender and education may have an effect on practices that in turn affect the influence of nutrition and menu labels. The gender gap seems to vary by education: at higher levels of education men recognize and actively engage in healthier lifestyles and eating patterns similar to women. Increased levels of education may provide men with a greater sense of locus of control and perception that there are more returns to their health by monitoring their eating behavior (Cobb-Clark, Kassenboehmer, Schurer, & Melbourne Institute of Applied Economic and Social Research, 2012). Meanwhile,

women's utilization of nutrition labels is similar across levels of education due to societal pressures and expectations experienced by all women to eat healthy and watch their diets (Bates et al., 2009). Numerous studies have explored the independent effects of gender and education on other health behaviors, finding that women and the more educated are less likely to smoke, drink alcohol excessively, use illegal substances and generally report less chronic disease prevalence (Brunello, Fort, Schneeweis, & Winter-Ebmer, 2011; Deeks, Lombard, Michelmore, & Teede, 2009; Felton, Parsons, & Bartoces, 1997; Koning, Webbink, & Martin, 2010) . Interaction effects of gender and education show a less consistent pattern across health behaviors and outcomes; in some cases researchers have found that education has no differential effect across gender, while education has a bigger impact for women with respect to obesity and depression and a bigger impact on men for heavy drinking and overall mortality (Cutler & Lleras-Muney, 2006).

Similarly, current studies that have explored the interactive effects of gender and education on eating and labeling behavior have arrived at inconclusive results. For example, one study confirmed that more educated individuals engage in calorie counting behavior however differences by gender were not found (FDA, 2008). Another study that only sampled female consumers found that women with high school educations were less able to locate and analyze quantitative information on nutrition labels when compared to women with college educations (Byrd-Bredbenner et al., 2000). Meanwhile, Kruger et al. determined that while women reported trying to lose weight more often than men, when individuals were disaggregated by education levels these differences in gender were minimized (Kruger et al., 2004). The authors suggested that at higher levels of education men recognize and actively engage in healthier lifestyles and eating patterns similar to women. On the other hand, associations between education and

healthier food consumption was found to be stronger for men than for women (Roos, Lahelma, Virtanen, Prättälä, & Pietinen, 1998).

Latino Consumers

Nutritional and menu labeling interventions could particularly benefit Latinos and potentially improve healthy eating and health outcomes among this community. Latinos face considerable challenges accessing healthy meal options outside the home and suffer from rates of diabetes and overweight that are nearly 2 times greater than rates for non-Hispanic Whites (Woodward-Lopez & Flores, 2008). According to data from the CDC, 71% of Latinos were considered overweight or obese compared to 59% of non-Hispanic whites and 70% of non-Hispanic Blacks (2012c). In addition, 13.2% of Hispanic/Latinos have been diagnosed with diabetes and are 1.7 times greater to be diagnosed than non-Hispanic Whites (OMH, 2012).

Research on Latinos is needed because their dietary patterns appear to differ from other groups. Data from NHANES suggest that Latinos eat meals outside the home with less frequency than other racial/ethnic groups (Kant & Graubard, 2004). Latinas reported eating 1.7 meals outside the home per week compared to 2.5 and 2.0 meals for White and African American women respectively. Meanwhile, the average reported number of meals outside the home per week was significantly lower for Latino (2.5) and African American men (2.2) than for White men (3.6). As a result, Latinos may be less inclined to watch their eating habits and pay attention to menu labels since they are "treating themselves" when eating outside the home (Swartz et al., 2011). Importantly, though, these data do not assess the quality of meals outside the home, so although Latinos may be eating out with less frequently, they could be consuming unhealthier meals overall.

Additionally, few studies have assessed nutrition and menu labeling behavior among Latinos while taking into consideration factors such as gender and education. Studies that compared use nutrition labels across racial groups reported that Latinos were significantly less likely to use labels when compared to African American and White respondents (Gans, Burkholder, Risica, & Lasater, 2003; Hyman, Simons-Morton, Ho, Dunn, & Rubovits, 1993). Another study that surveyed African American and Latino New Yorkers found that respondents reported noticing menu labels in fast food restaurants but there was no evidence that they reduced the amount of calories purchased when compared to a control group (Elbel et al., 2009).

However, it is unclear how or if gender and level of education shapes Latinos' eating behaviors and use of nutrition and menu labels. The existing literature suggests that Latinas may have healthier eating habits and in turn are more likely to use nutrition and menu labels when compared to Latinos. For example, Latina women display healthier eating patterns and have greater nutrition knowledge when compared to Latino men (Sharma, Gernand, & Day, 2008). Moreover, one study that surveyed Mexicans citizens at Mexican grocery stores found that women versus men were more likely to read and understand nutritional labels (De la Cruz-Góngora et al., 2012). In their study among Latinas, Fitzgerald et al reported that age, education, nutrition knowledge, and diabetes status was significantly associated with utilization of nutritional labels (Fitzgerald, Damio, Segura-Pérez, & Pérez-Escamilla, 2008).

In addition, the Latino population consists of a large proportion of immigrant, low education, and/or non-English speaking individuals (Motel & Patton, 2012). Therefore, education may influence health behaviors differently because quality of education and educational levels vary based on nativity, language, and years in the US. Previous studies have suggested a positive association between education and noticing and using nutrition labels

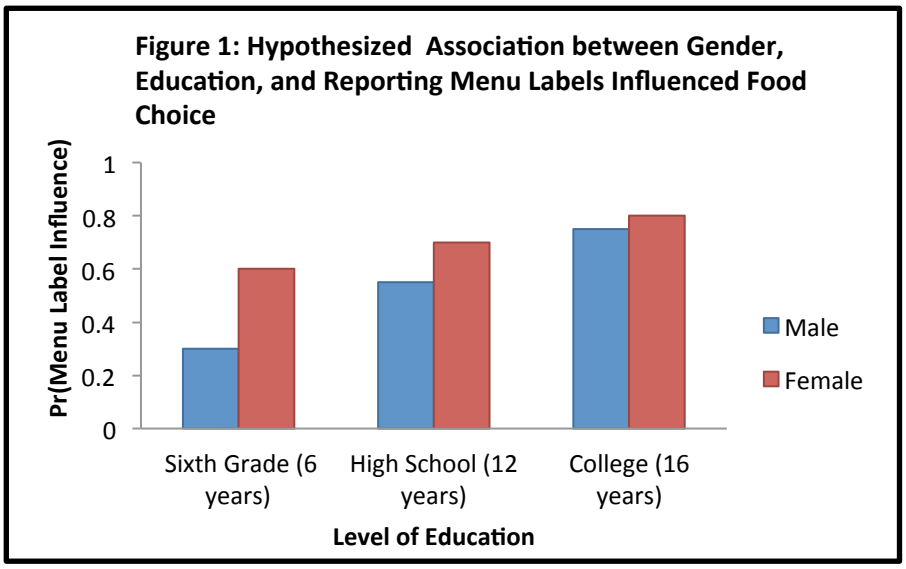
among Latinos (Neuhouser, Kristal, & Patterson, 1999; Satia, Galanko, & Neuhouser, 2005). Furthermore, one study of Latinas found that level of education was positively correlated with use of nutrition labels but the relationships was mediated by nutrition knowledge (Fitzgerald et al., 2008). Finally, no known studies have explored the relationships between education and use of menu labels among Latinos consumers. Several articles on nutritional labeling have underscored the need to engage in research to understand how specific audiences utilize nutrition and menu labels with a particular need to focus on populations at high risk of diet-related health complications. Meeting this call, this thesis focuses on assessing the effects of gender and education on nutrition and menu label usage among Latinos which may assist with developing future interventions.

RESEARCH QUESTIONS

This thesis aims to address the following hypotheses using data collected from a community market in South Los Angeles that implemented menu labels for Latino consumers:

> **Hypothesis 1**: When compared to men, women will have an *increased* likelihood of nutrition labels influencing their food choices when exposed to menu labels in restaurants.
>
> **Hypothesis 2:** When compared to individuals with less education, individuals with more education will have an *increased* likelihood of nutrition labels influencing their food choices when exposed to menu labels in restaurants.
>
> **Hypothesis 3**: Gender interacts with education. At low levels of education, gender will have a significant effect on the likelihood of nutrition menu labels influencing food choice; women with low levels of education will have a higher likelihood of menu labels influencing their food choice when compared to men with low levels of education. At

high levels of education, the effect of gender on the likelihood of nutrition menu labels influencing food choice will be insignificant; that is, highly educated women and men will not display significant differences in the likelihood of menu labels influencing their food choice. The hypothesized relationship is illustrated in Figure 1.



METHODS

The section below first describes the study setting and development of the menu labeling intervention at a community market in South Los Angeles. Subsequently research design, survey instrument measures and data collection procedures are presented. Finally, the analytical plan that was used to address the research questions is summarized.

Study Setting:

In 2010 the study survey was administered to patrons at Mercado La Paloma, a community market in South Los Angeles that implemented a menu labeling intervention to promote healthier eating behaviors. The menu labeling intervention development, implementation, and evaluation has been described in detail elsewhere (Nevarez, 2011; Flores et

al, 2011). Briefly, in 2009 non-profits and public health agencies in Los Angeles launched the "La Salud Tiene Sabor" project to develop and test a community based menu-labeling intervention for Latinos. Mercado La Paloma, a vibrant marketplace and Latino cultural center, was selected as the intervention site.

La Salud Tiene Sabor partners worked with the food stall owners to develop and post nutritional information on their menus and signage. A registered dietician analyzed the nutritional content of the restaurant recipes and provided suggestions for improving the quality of menu items. Six out of the seven food stalls modified some of their recipes and food preparation based on these recommendations. In addition, calorie counts were posted on the menu boards for each stall and detailed nutritional information for menu items were provided in a brochure for patrons.

To be clear, this is not a formal evaluation of the menu labeling intervention with a pre-post test comparative design. Instead, this study can be considered as an "intercept survey" in which a paper-pencil survey was administered to patrons during the market's business hours (Bush & Hair, 1985). The intent of the survey was to assess respondents' health and nutrition behaviors, history of health disease and symptoms, and utilization of nutrition labels on packaged foods and menu labels on the restaurant signage.

Survey Instrument:

The survey used items adapted from measures in the California Health Interview Survey (UCLA Center for Health Policy Research, 2010). The instrument was translated from English to Spanish and pre-tested among native Spanish speakers. Prior to the data collection, the study team met to assess the accuracy of the translations, the clarity of the items in the survey, and to make necessary modifications of the instrument.

Survey Administration & Participants:

Survey administration took place on both weekends and weekdays during Mercado La Paloma's normal business hours in Spring 2010 (8am-5pm). Three trained bilingual graduate students were responsible for recruiting the participants and administering the survey. The target population for the survey was adult men and women over the ages of 18 who identified as Latino. In order to participate in the study, participants also had to have purchased a meal at any of the seven food stalls in the market on the day of data collection. Adult patrons were randomly approached among food-court eaters in the market and screened for participation in the survey; specifically they were asked if they were over the age of 18, identified as Latino, and had purchased a meal in the market. No additional factors such as gender or age were considered when selecting potential participants. Approximately 95% of the individuals met the inclusion criteria and were invited to complete the survey. The response rate was approximately 25% (n=100) and a total of 100 participants were recruited for the study. The survey was administered either in English or Spanish based on the participants' preference and it took participants approximately 10 minutes to complete the survey. The study procedures were approved by the IRB at UCLA.

STUDY VARIABLES:

Dependent Variables:

Noticed Menu Labels: Participants were asked if they noticed the menu labels posted on the restaurant signage when making their meal purchase; participants had the option of responding yes, no, or don't know.

Menu Label Influences Food Choice: Participants who responded that they had noticed the menu labels on the restaurant signage were subsequently asked if the labels made an influence on the

their food choice; participants had the option of responding yes, no, or don't know. The survey administrators checked "no" for participants who didn't notice the labels in the first place

Nutrition Labels Influences Food Choice: Respondents were also asked whether nutritional content labels on packaged food in supermarkets, stores, and vending machines (which are distinct from restaurant and fast food menu labels) influenced their food purchases, with the option of responding yes, no, or don't know. This variable was used as a measure of whether nutrition labels influence food choice.

Independent Variables:

Gender: Gender was measured as a dichotomous variable.

Education: Education was measured using one item that asked participants how many years of education they had completed in the US or abroad.

Covariates:

Given the small sample size of the dataset, only a small set of covariates are controlled for within the analysis.

Age: Respondents' age was compute from date of birth information. Previous studies have found that as adults become older they are more likely to monitor their caloric intake when consuming food outside the home or change their eating patterns due to menu labels (Pulos & Leng, 2010).

Income: Respondents provided their annual income before taxes from the previous year. Since healthy foods tend to expensive, income has been shown to be positively associated with purchasing healthy foods and making nutritious food choices (Roos et al., 1998).

Married: Respondents were asked to report if they were currently married, divorced, or single. Individuals who are married report better eating behaviors (Christensen, 2004; Roos et al., 1998).

Trying to lose weight: Respondents were asked whether they were currently trying to lose weight; they had the option of responding, yes, no, or don't know. Individuals who are conscientious of their weight are more likely to be influenced by menu labels (Girz, Polivy, Herman, & Lee, 2012).

Keeps track of calories: Respondents were asked whether they kept track of the calories they consumed every day and had the option of responding, yes, no, or don't know (Satia et al., 2005).

ANALYTICAL PLAN:

The analysis plan below describes the procedures used to assess the relationship between the independent variables and the dependent variable, menu label influence; the same procedures were repeated using the other dependent variables, noticed menu labels and nutrition label influence. Analysis was performed using STATA version 12.1 (Stata Corp. College Station, TX).

Descriptive Statistics:

Descriptive statistics and frequencies of the study variables were generated to assess the quality of the data, proportion of missing cases, and characteristics of the sample population (Table 1). Annual income was log transformed because the distribution was heavily skewed. Responses of "Don't Know" were recoded as missing. For the variables used in the analysis, only one variable, annual income, had any missing cases (n=7).

Bivariate Analysis:

Pearson's chi-square and Students t tests were used to explore the relationship between the independent variables (gender and years of education) and the dependent outcome variable (menu label influence). In addition, chi-square tests were also performed for categorical control variables while t-tests were performed for ordinal control variables. The Pearson's chi-square

and t-test statistics and respective p-value were used to determine significant associations among the variables of interest.

Logistic Regression:

Logistic regression was used to further explain the relationship between education, gender, and reporting menu label influence. Logistic regression is an appropriate analytical approach because the outcome variables are binary and theoretically significant covariates could be controlled for in the model.

Post-estimation tests and diagnostics were performed to assess the fit of the model. Specifically, standardized residuals were examined to determine observations that were poorly estimated by the model. In addition, AIC and BIC statistics were generated and used to aid in determining which variables to include in the final model. AIC and BIC statistics provide measures to estimate the "fit" of a model to the data; in general a smaller information criterion measure indicates a better fit. The model that produces a small information criterion and includes statistically significant variables and theoretically meaningful covariates was used for the final model.

For the final model unstandardized beta coefficients, standard errors, z-statistic, p-values, and odds ratios are presented.

The logistic regression equation for the analysis of hypotheses 1 and 2 is:

Equation 1:

$$logit\ (Reporting\ Menu\ Label\ Influence) = b_0 + b_1(gender) + b_2\ (level\ of\ education) + b_k\ (controls)$$

To test for a potential interaction between gender and education on the influence of menu labels, an interaction term will be added to the model. The logistic regression equation to test hypothesis 3 is:

Equation 2:

$$logit\ (Reporting\ Menu\ Label\ Influence) = b_0 + b_1(gender) + b_2\ (level\ of\ education) + b_3\ (gender*level\ of\ education) + b_k\ (controls)$$

The p-value of the interaction term was used to test the significance of the interaction between gender and education and AIC/BIC statistics was used to compare the full model to the nested model without the interaction (Long, 1997). In addition, predicted probabilities from the logistic regression model were computed for both men and women at different years of education and other variables in the model held at their means; the graphs associated with these predicted probabilities are presented in the results.

RESULTS:

Sample Characteristics

The characteristics of the survey participants are presented in Table 1. More women (60%) than men completed the survey and approximately half (46%) of the respondents were married. The average age of the participants was 42 years old (SD=13.15) and the mean number of years of school completed was approximately 11 years (SD=0.38). About half (48%) of participants reported currently having health care insurance.

With respect to health behaviors, the majority of respondents reported that they were trying to lose weight (72%) however few reported regularly tracking their caloric intake (16%). Finally, 63% of respondents reported that they utilized nutrition labels when purchasing packaged food in stores and vending machines. Approximately half (56%) noticed the menu labels in the food court, while only 38% reported that the menu labels in the market influence their meal choice.

Table 1. Characteristics of Survey Participants, La Paloma Menu Labeling Study, Los Angeles, 2010 (n=100)			
Sociodemographic	**%**	**Mean**	**SD**
Female	60		
Married	46		
Age	---	42.37	13.15
Years of Education	---	11.77	.38
Annual Income	---	20,049	16,083
Health Behaviors			
Keeps track of calories	16		
Trying to Lose Weight	72		
Nutritional and Menu Labels			
Nutrition Labels Influence food choice	63		
Noticed Menu Labels at Market	56		
Menu Labels Influenced food choices	38		
Health Status			
Insured	48		

Bivariate Analysis

Results from the chi-square and t-tests[1] comparing individuals who reported noticing the menu labels in the food court are presented in Table 2. Being a woman (X^2=4.931, p=0.026) and insured (X^2=4.262, p=.039) was significantly associated with noticing the menu labels. Years of education did not have a significant association with noticing menu labels (t=0.672, p=0.532) while being married was marginally significant (X^2=2.937, p=0.087).

Table 3 presents the results from the chi-square and t-tests comparing individuals who reported menu labels influenced their meal purchases to those who reported no influence. Being a woman (X^2=14.969, p=0.001), married (X^2=5.207, p=0.023), and insured (X^2=5.642, p=0.018), was significantly associated with menu label influence. In addition, those who reported using nutrition labels were also more likely to be influenced by menu labels (X^2=9.076, p=0.003).

[1] Age, Annual Income, and Level of Education were not normally distributed which may alter the findings of the t-test; therefore Mann-Whitney U tests which do not require normality of the variables were performed and the results replicated the findings of the t-tests.

Again, years of education did not have a significant association with menu label influence (t=0.7552, p=0.452).

Finally, chi-square and t-tests comparing those who reported nutrition label influence to those who reported no influence are provided in Table 4. Similar to menu label influence, gender (X^2=9.266, p=0.002) and health insurance status (X^2=7.858, p=0.005) were associated with reporting nutrition label influence. However being married (X^2=0.677, p=0.411) and years of education (t=1.202, p=0.232) were not significantly associated with nutrition label influence.

Logistic Regression

The results from the logistic regression models are presented in Tables 5-7 for each dependent variable. Independent variables and control variables were entered into the first model; subsequently the gender and education interaction variable was introduced into the second model.

Neither gender nor years of education were significant correlates of noticing menu labels after controlling for the covariates (Table 5; Model 1). Of the covariates, individuals with health care insurance were significantly more likely to report noticing menu labels compared to uninsured respondents. (B=1.376, p=0.007). Further, contrary to the hypothesis, the interaction term between gender and education was non-significant (Table 5; Model 2).

Figure 2 displays the predicted probabilities of noticing menu labels by gender and years of education using parameters from Table 5; Model 2. Women consistently had a higher predicted probability of noticing menu labels across the educational levels compared to men; however these differences were not significant. In addition, there was no significant difference in noticing menu labels across years of education.

Table 6 presents the results from the analysis of factors associated with respondents' reporting that menu labels influenced their food choice. The logistic regression found that respondents who were women (B=1.651, p=0.004), married (B=1.409, p=0.018), and insured (B=1.499, p=0.008) were more likely to report being influenced by menu labels when making their meal purchase. Years of education, however, was not a significant correlate of menu label influence (B=-0.064, p=0.339). In the second model, health insurance and being married remained a significant correlates of menu label influence but the gender-education interaction was only marginally significant (p=0.08).

Figure 3 displays the predicted probabilities of reporting menu labels influenced meal choice by gender and years of education using parameters from Table 6, Model 2. At a 6th grade level of education, men have a higher probability of reporting being influenced by menu labels although this difference is not significantly different from women. However at a high school and college level of education, the pattern swaps where women have a significantly higher probability of being influenced by menu labels. The figure also displays the gender-education interaction. For both men and women, as years of education increase the predicted probability of menu labels influencing food choice decreases, but this trend is more dramatic for men.

Finally, Table 7 provides the analysis of factors associated with reporting nutritional labels on packaged foods influenced food choice. After controlling for the other correlates, both gender (B=1.219, p=0.017) and health insurance status (B=1.499, p=0.026) were significantly associated with nutrition labels influencing respondents' food selection. Again, years of education was not a significant correlate of nutrition label influence (B=0.028, p=0.676). When the gender-education interaction term was entered into the second model, the gender-education interaction term was not significant.

Figure 4 presents the predicted probabilities of reporting nutrition labels influenced food choice by gender and years of education using parameters from Table 7, Model 2. Across all levels of education, women had higher predicted probabilities of nutrition labels influencing their food choice when compared to men. However, the predicted probability of nutrition labels influencing food choice did not change significantly across levels of education.

Table 2. Bivariate Analysis of Factors Associated with Noticing Menu Labels, La Paloma Menu Labeling Study, Los Angeles 2010 (n=100)

	Noticed Labels (n=56)	Did Not Notice Labels (n=44)		
	%	%	X^2	p-value
Sociodemographic				
% Male	**3**	**52**	**4.931**	**0.026**
Mean Age			0.600	0.549
Mean Years of Education			0.627	0.532
% Married	54	36	2.937	0.087
Mean Annual Income			1.032	0.305
Health Behaviors				
% Keeps track of calories	20	11	1.257	0.262
% Trying to Lose Weight	75	68	0.568	0.451
Nutritional and Menu Labels				
% Reported Nutrition Labels Influence	**78**	**45**	**10.377**	**0.001**
% With Health Insurance	**57**	**36**	**4.262**	**0.039**

Table 3. Bivariate Analysis of Factors Associated with Menu Labels Influencing Food Choice, La Paloma Menu Labeling Study, Los Angeles 2010 (n=100)

	Labels Influenced Food Choice (n=38)	Labels Did Not Influence Food Choice (n=62)		
	%	%	X^2	p-value
Sociodemographic				
% Male	**16**	**54**	**14.969**	**<.001**
Mean Age			.327	.745
Mean Years of Education			0.7552	.452
% Married	61	37	**5.207**	**.023**
Mean Annual Income			.525	.601
Health Behaviors				
% Keeps track of calories	21	13	1.164	.281
% Trying to Lose Weight	76	69	.566	.452
Nutritional and Menu Labels				
% Looks at Nutrition Labels	**82**	**52**	**9.076**	**.003**
% With Health Insurance	**63**	**38**	**5.642**	**.018**

Table 4. Bivariate Analysis of Factors Associated with Nutrition Labels Influencing Food Choice, La Paloma Menu Labeling Study, Los Angeles 2010 (n=100)

	Labels Influenced Food Choice (n=63)	Labels Did Not Influence Food Choice (n=37)		
	%	%	X^2	p-value
Sociodemographic				
% Male	29	59	**9.266**	**.002**
Mean Age			1.125	0.263
Mean Years of Education			1.202	0.232
% Married	43	51	0.677	0.411
Mean Annual Income			1.229	0.222
Health Behaviors				
% Keeps track of calories	21	8	2.713	0.099
% Trying to Lose Weight	71	73	0.027	0.868
Nutritional and Menu Labels				
% Menu Labels Influence	**49**	**19**	**9.076**	**0.003**
% With Health Insurance	**59**	**30**	**7.854**	**0.005**

Table 5. Logistic Regression Analysis of Factors Associated with Noticing Menu Label, La Paloma Menu Labeling Study, Los Angeles, 2010

	Model 1 (n=93)			Model 2 (n=93)		
Measures	B	s.e	p	B	s.e	p
Gender	0.537	0.479	---	1.997	1.628	---
Years of Education	-0.064	0.065	---	0.020	0.226	---
Age	-0.155	0.020	---	-0.016	0.020	---
Married	0.807	0.536	---	0.931	0.554	---
Annual Income	0.021	0.061	---	0.027	0.062	---
Tracks Calories	0.170	0.674	---	0.218	0.675	---
Trying to Lose Weight	0.221	0.523	---	0.173	0.528	---
Health Insurance	1.376	0.511	**0.007**	1.360	0.515	**0.008**
Constant	-0.418	1.480	---	-2.947	3.063	
Gender*Education				-0.121	0.129	---
Model Fit						
Log-likelihood	-55.82			-55.4		
AIC	129.6			130.7		
BIC	152.4			156.1		

Table 6. Logistic Regression Analysis of Factors Associated with Reporting Menu Label Influenced Food Choice, La Paloma Menu Labeling Study, Los Angeles, 2010

	Model 1 (n=93)			Model 2 (n=93)		
Measures	B	s.e	p	B	s.e	p
Gender	1.651	0.575	**0.004**	-2.764	2.459	---
Years of Education	-0.068	0.072	---	-0.432	0.447	**0.054**
Age	-0.033	0.024	---	-0.045	0.027	---
Married	1.409	0.596	**0.018**	1.347	0.631	**0.033**
Annual Income	0.080	0.076	---	0.069	0.078	---
Tracks Calories	-0.089	0.709	---	-0.222	0.735	---
Trying to Lose Weight	0.311	0.606	---	0.579	0.640	---
Health Insurance	1.499	0.564	**0.008**	1.790	0.619	**0.004**
Constant	-3.30	1.711	---	5.362	5.028	--
Gender*Education				0.404	0.229	0.077
Model Fit						
Log-likelihood	-47.22			-45.42		
AIC	112.4			110.8		
BIC	135.2			136.2		

Table 7. Logistic Regression Analysis of Factors Associated with Reporting Nutrition Label Influenced Food Choice, La Paloma Menu Labeling Study, Los Angeles, 2010

	Model 1 (n=93)			Model 2 (n=93)		
Measures	B	s.e	p	B	s.e	p
Gender	1.219	0.509	**0.017**	1.212	1.647	---
Years of Education	0.028	0.067	---	0.027	0.232	---
Age	-0.018	0.022	---	-0.018	0.022	---
Married	0.040	0.549	---	0.040	0.569	---
Annual Income	-0.035	0.063	---	-0.035	0.064	---
Tracks Calories	0.840	0.765	---	0.841	0.765	---
Trying to Lose Weight	-0.581	0.582	---	-0.582	0.583	---
Health Insurance	1.158	0.521	**0.026**	1.158	0.522	**0.026**
Constant	-0.824	1.528	---	-0.811	3.111	---
Gender*Education				0.0006	0.133	---
Model Fit						
Log-likelihood	-53.04			-53.04		
AIC	124.1			126.1		
BIC	146.9			151.4		

Figure 2: Conditional Probability of Noticing Menu Labels by Gender and Education, La Paloma Menu Labeling Study, Los Angeles 2010

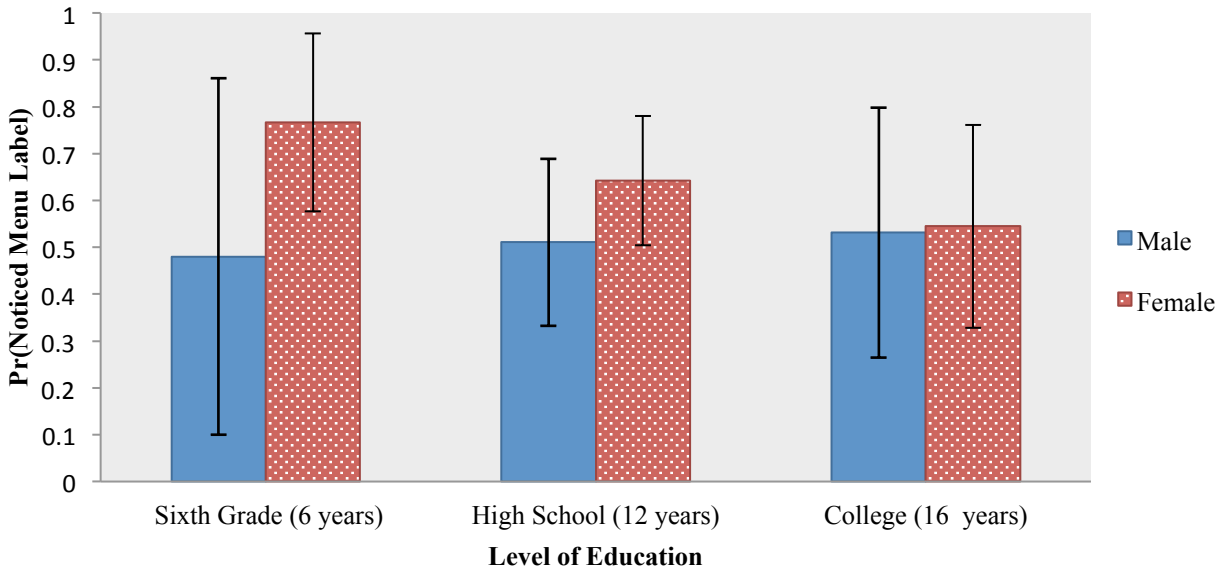


Figure 3: Conditional Probability of Reporting Menu Labels Influenced Food Choice by Gender and Education, La Paloma Menu Labeling Study, Los Angeles 2010

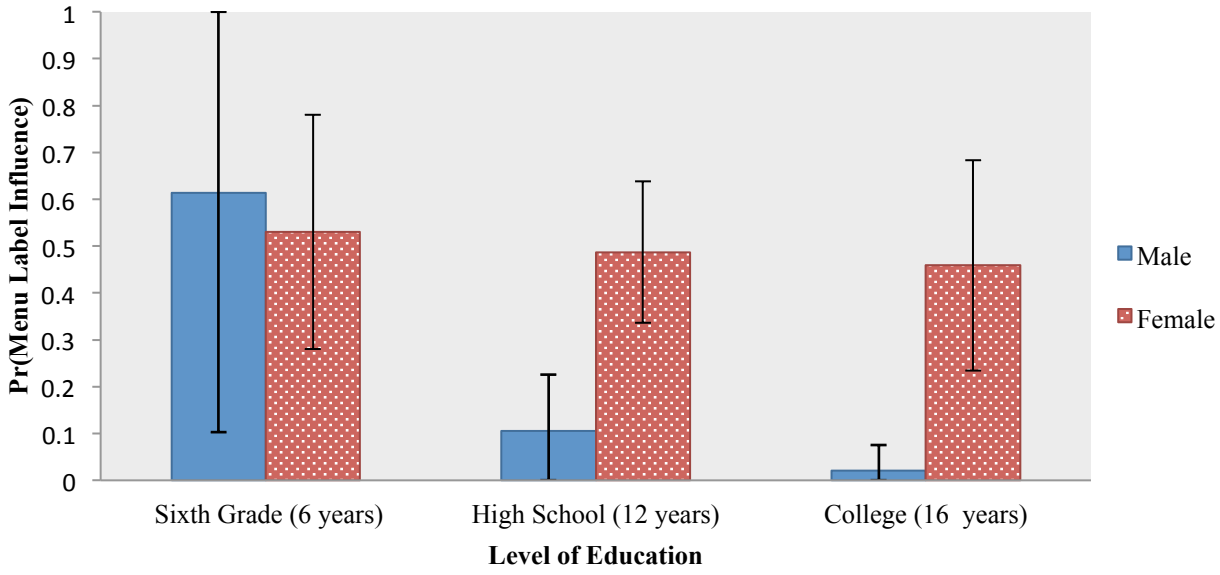
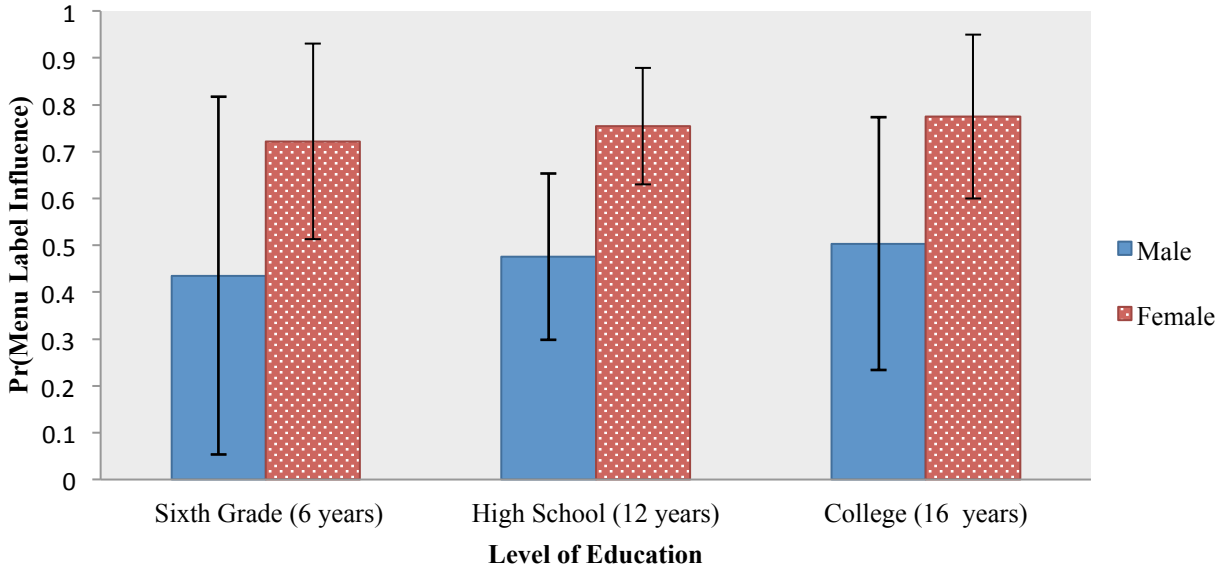


Figure 4: Conditional Probability of Reporting Nutrition Labels Influenced Food Choice by Gender and Education, La Paloma Menu Labeling Study, Los Angeles 2010



DISCUSSION

Understanding the relationship between consumer characteristics and nutrition labeling behavior and influence is a critical step for improving the efficacy of labeling interventions (Blumenthal & Volpp, 2010). This analysis contributes to the growing literature on menu and nutrition labels by exploring the relationship between nutrition and menu label usage, gender, and education among Latino consumers.

Before addressing the study findings, there are some significant limitations of this analysis that should be acknowledged. In order to participate in the study, individuals had to have purchased an item in the food market; this inclusion criteria excludes individuals who may have read the menu labels and decided not to purchase a meal due to the nutritional content. The convenience sampling used to collect the data may have introduced sampling bias; therefore we cannot generalize the study findings outside of this study sample. Similarly the outcome

variables, influence of menu labeling and influence of nutrition labels, were measured through self-report. Therefore we are relying on the respondent's personal perceptions of whether they felt nutrition labels influenced their meal purchases. While this self-report strategy is commonly used in other studies, this approach measures influence indirectly and could be inaccurate. Instead, other studies of menu labels have used quasi-experimental techniques and pre/post tests to more directly assess the influence of nutritional labels on food choice. The robustness of the tests and strength of the statistical analysis is limited due to the small sample size of the data. Recognizing this limitation, the logistic regression models included a small number of covariates to help ensure accurate estimations. Also, using cross-sectional data allows us to assess relationships among independent variables and the outcome of interest; however we cannot assume causality between these variables. Finally, this data was collected from a menu labeling intervention although the survey was not intended to evaluate the intervention per se. Therefore study findings may be biased by the quality and effectiveness of the labeling intervention, rather than actual relationships among the study variables.

This preliminary analysis, however, provides novel information on the use of menu and nutrition labels among Latino consumers. The majority of respondents in the sample reported utilizing nutritional labels on packaged food and being influenced by these labels when making meal purchases. Yet, fewer individuals reported noticing the menu labels in the food court and even less reported being influenced by the labels when making their meal purchase. Previous studies have also documented this pattern where individuals noticed labels but were not always influenced to modify their food choices as a result (Roberto et al, 2009). Researchers suggest that in addition to providing caloric information, menu-labeling interventions also need to provide health education materials so consumers understand the labels as well as tactics to motivate

consumers to actual implement the information when making purchases (Viswanathan, Hastak, & Gau, 2009). Similarly, Gordon and Hayes conducted qualitative interviews among Latinos in New York and reported that participants were supportive of menu labeling but wanted more information on daily caloric intake, fat, sugar, and sodium content; in addition, participants underscored the importance of balancing the health of a meal with price, taste, and convenience (Gordon & Hayes, 2012).

This analysis also revealed important relationships between gender, education, and influence of nutritional labeling among the sample of Latino respondents. Across the models, gender was a significant correlate of respondents noticing menu labels, being influenced by menu labels, and being influenced by nutrition labels. In general, women were more likely to notice labels and modify their food choice accordingly. This pattern replicates findings from previous studies that also found women utilized nutrition and menu labels more often than men (Campos et al., 2011). Latina women often make the food purchasing decisions and meal preparation in Latino households; it is important that Latinas continue to monitor nutrition labels and public health practitioners provide these women with the tools to make healthy food purchases (Kilanowski, 2010). However, diet-related health conditions also impact Latino men, who were significantly less likely to utilize both nutrition and menu labels. This relationship between gender and healthy eating and usage of labels has been documented across other racial/ethnic groups in the US, highlighting the need for scholars and policy makers to focus on the eating habits of men (Souza & Ciclitira, 2005). Women may be more likely utilize nutritional labels partly because they experience societal pressures to be thin and monitor their eating behavior (Bates et al., 2009).

Previous studies also have suggested that education is positively associated with knowledge about labels, positive attitudes toward them, and use of labels (Cowburn & Stockley, 2007; Marietta, Welshimer, & Long Anderson, 1999). However, in this present analysis, years of education did not show significant associations with noticing menu labels or the influence of nutrition labels. The sample for this study consisted of foreign and native born Latinos with different experiences of years in the US and familiarity with English language. Researchers have used measures of education as a proxy for knowledge about healthy eating, analytical capacity, and perceived ability to control one's health behavior. However in our current sample, factors such as nativity status, years in the US, and English language could have confounded the links between education and healthy eating behavior. Sample size limitations limited the ability to control for these factors in the analysis so future studies should further probe relationships between education and labeling behavior.

Moreover, the gender-education interaction hypothesis was not statistically significant across the models. It is important to note that the gender-interaction was marginally significant with respect to the menu label influence outcome; this relationship should be further explored with better data since the present analysis was limited by sample size. In contrary to the study hypothesis, years of education was negatively associated with reporting the influence of menu labels and this relationship was strongest for Latino men. Perhaps more educated Latinos perceive that monitoring their food intake with menu labels is less beneficial for their health or are less trustful of the information on the menu labels. This explanation and finding, however, runs contrary to the literature as well as this study's findings with respect to the nutritional label influence outcome. In addition, the relationship between education and reporting menu label influence among women in the sample is significantly less drastic. Instead, the small sample size

and low proportion of highly educated men in the sample most likely led to unstable model estimates; therefore we must interpret these finding with caution. It would be useful to explore these relationships with both qualitative and quantitative data to better understand the underlying mechanisms that motivate individuals to use menu labels. Future studies should replicate this analysis with a larger racially diverse sample while controlling for generational status and years in the US to confirm these findings.

Finally, both health insurance and marital status were also consistently related to labeling behavior and influence. Individuals who are married or have families may monitor nutritional labels because the food they purchase also impacts the health of their significant other, children, or family members. In addition, those with family may be more willing to monitor their health and care for themselves by using menu labels because they have significant others who depend on them for support. It is less clear why insured individuals are more likely to utilize both nutrition and menu labels. These individuals may have more access to a regular physician who advises them to watch their health, diet, and nutrition. Alternatively, this variable may capture labor occupation of an individual where insured individuals are more likely to hold professional and white-collar professions (Kaiser Commission on Medicaid and the Uninsured, 2008). The uninsured may be those who engage in blue collar, manual, or hard labor and may perceive that they do not need to monitor their nutrition and diet because they engage in everyday exercise in their work (Drichoutis, Lazaridis, & Nayga, 2006).

This study contributes to an important gap in the literature exploring nutrition and menu labeling behavior among Latinos. This growing racial/ethnic group currently represents 11% of the US population and faces considerably high rates of diet-related health condition. In addition, most current menu labeling efforts are implemented in large chain franchises and restaurants that

have the resources and capacity to analyze their menu items and provide nutritional content to their consumers (Robert Wood Johnson Foundation, 2009). Smaller independent and family owned food restaurants and vendors with less than 10-20 locations are often not mandated to provide menu labels (Banker, 2010). Researchers have underscored the importance of extending menu labeling to smaller vendors however, to date, few studies have evaluated menu labeling interventions in small neighborhood restaurants and independently owned fast food establishments (Britt, Frandsen, Leng, Evans, & Pulos, 2011).

CONCLUSION

Nutrition and menu labels provide a unique low-cost opportunity to arm individuals with the tools and resources to combat unhealthy eating in grocery and convenience stores and fast food and sit-down restaurants. Several researchers and policy makers have highlighted, however, that the effectiveness of these interventions depends on making nutritional information readily accessible and easy to implement for consumers (Blumenthal & Volpp, 2010). In addition, knowledge alone will not cause consumers to make healthier meal purchases and interventions should also focus on the eating beliefs, attitudes, and motivation of consumers (Gordon & Hayes, 2012). The results from this analysis suggest that labeling interventions should explore strategies to be more effective for unmarried, uninsured, and male consumers. In addition, future studies should continue to explore how education influences eating patterns and labeling usage among Latinos. Finally, it is important to note that nutrition and menu-labeling information alone will not solve the alarming obesity, overweight, and cardiovascular disease epidemics facing the US, however consumers should be armed with the tools to combat obesogenic environments in their lives. Nutrition and menu labels, when targeted effectively to consumers, can provide one tool at the individual level of the socio ecological model to promote healthier eating.

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