The Effect of Menu Nutrition Labels on Consumers' Dietary Decision Making

Diane M. Lowe
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THE EFFECT OF MENU NUTRITION LABELS ON CONSUMERS’ DIETARY DECISION MAKING

A Thesis Presented

by

DIANE MARIE LOWE

Submitted to the Graduate School of the University of Massachusetts Amherst in partial fulfillment of the requirements for the degree of

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Hospitality & Tourism Management
THE EFFECT OF MENU NUTRITION LABELS ON CONSUMERS’ DIETARY DECISION MAKING

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ABSTRACT

THE EFFECT OF MENU NUTRITION LABELS ON CONSUMERS’ DIETARY DECISION MAKING

FEBRUARY 2012

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To help combat the growing obesity problem in the United States, the Menu Labeling Act was passed in 2010 as part of the Patient Protection and Affordable Care Act. However, little research has been conducted to determine the optimal format and content of the imminent label. A between-subjects experiment was conducted with a non-probability sample that was provided with three nutrition label treatments and surveyed to determine the labels’ effect on accuracy in dietary judgments and nutrition evaluations, level of certainty and confusion while completing those tasks, and perceived label comprehension and utility. The presence of a label had a positive relationship with all the dependent measures, while the addition of percent daily values to the label had a nonsignificant increase in accuracy but a negative effect on confusion and comprehension.
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CHAPTER 1
INTRODUCTION

The overweight and obese population continues to expand in the United States despite being classified as an epidemic by the Surgeon General in 2001 (U.S. Department of Health and Human Services [HHS], 2001). To help combat this growing national problem, the Menu Labeling Act was passed in 2010 as part of the Patient Protection and Affordable Care Act (Mantel, 2010). In recent years, a number of studies have been conducted on the impact of menu labeling on away-from-home food purchases, but not specifically on what the most effective label format is for consumers. Since nationwide menu labeling is imminent, this field project sought to explore the effect of nutrition labels’ format on consumers’ accuracy in dietary judgments and nutrition evaluations, their level of certainty and confusion while doing so, and their perceived label comprehension and utility. Also, how consumers’ individual characteristics play an important role in the awareness and use of disclosed nutritional information.

Background

In 2001, Surgeon General David Satcher declared “overweight and obesity may not be infectious diseases, but they have reached epidemic proportions in the United States” (HHS, 2001, p. XIII). Despite sounding this alarm, the overweight and obese population has continued to grow each year.

From 1987 to 2007, the fraction of adults who were overweight or obese increased from 44 percent to 63 percent; almost two-thirds of the adult population now falls into one of those categories. The share of obese adults rose particularly rapidly, more than doubling from 13 percent to 28 percent (Congressional Budget Office, 2010, p. 1).

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Overweight is defined as having a BMI in the range of 25 to 29.9 and a BMI over 30 is considered obese. BMI is calculated as weight in pounds divided by the square of the height in inches, multiplied by 703 (HHS, 2001).
Euromonitor International (2011) forecasts the populations of overweight and obese adults 15 years and older will reach 47 percent and 44 percent respectively by 2015. Therefore, 91 percent of the United States population will be overweight or obese in the near future, and the average lifespan will shorten for the first time in history (Olshansky et al., 2005).

Obesity causes or exacerbates over thirty diseases such as heart disease, type 2 diabetes, hypertension, stroke, and some cancers (Greenblatt, 2003). It rivals smoking as the leading cause of preventable deaths for adults with over 400,000 annual deaths reported (Mokdad, Marks, Stroup, & Gerberding, 2004). In 2001, healthcare cost for obesity and its related diseases was $117 billion for direct and indirect expenses (HHS, 2001). The costs were projected to have almost doubled within a decade to $200 billion in 2009 (Engelhard, Garson, & Dorn, 2009). Due to these facts, it is understandable that the Surgeon General asserted obesity in America has become an epidemic.

Since this significant declaration, there has been an increased focus on the growing obesity epidemic in the United States and its causes. An individual’s body weight is a result of genetic, metabolic, behavioral, environmental, cultural, and socioeconomic factors (HHS, 2001). While some experts believe one’s diet is a matter of personal responsibility, many blame society’s shift to a sedentary lifestyle, increase in dining-out, and the food service industry’s affinity for supersized portions at low prices. Much like the tobacco industry in the 1960’s, which was accused of putting profit ahead of consumer health, the food service industry has come under fire in recent years for aggressively marketing nutrient-sparse, super-sized foods (Brownell & Horgen, 2003; Engelhard, Garson, & Dorn, 2009; Parloff, 2003).

Food service industry sales between the nearly one million restaurants in the United States are projected to reach $604 billion in 2011, a 3.6 percent increase over 2010 (National Restaurant Associate [NRA], 2011). Consumers spend 49 percent of their food dollars on meals
made outside of the home and eat out on average 4.2 times a week (or 20 percent of meals based on 21 meals a week) (Ebbin, 2000). This almost doubles the food service industry’s share of the food dollar, which was 25 percent in 1955 (NRA, 2011).

Although there is a lack of empirical evidence directly linking dining-out to obesity, research universally indicates the consumption of away-from-home foods can be a factor in determining calorie intake and body weight (Binkley, Eales, & Jekanoski, 2000; Bowman & Vinyard, 2004; Clemens, Slawson, & Klesges, 1999; Jeffery & French, 1998; Lin, Gurthrie & Frazao, 1999; Ma et al., 2003; McCrory et al., 1999; Nestle, 2002; Paeratakul, Ferdinand, Champagne, Ryan, & Bray, 2003; Pereira et al., 2005). Thus the food service industry remains the focus of the public health, public policy, and medical sectors because of societal changes, large portion sizes, nutritional makeup of restaurant meals, and consumers’ drastic underestimation of nutritional content.

**Societal Changes**

Traditionally, people within households went out to eat occasionally to celebrate an event—birthday, anniversary, work promotion—and valued the occasion as a time for indulgence. In contrast, today’s consumers are eating away-from-home foods more frequently because of convenience, affordability, and accessibility. The concern is that people may still view dining-out as a reason for overindulgence even though they are dining-out a few times a week rather than once a month (Guthrie, Lin, & Frazão, 2002; Keystone, 2006; Krisberg, 2003). This mentality along with growing portion sizes has combined to prove detrimental to the health of consumers.

**Portion Sizes**

Since the 1970’s, portion sizes of away-from-home foods have increased, and large portions became commonplace in the 1980’s and 1990’s with “super sizing” and “value marketing” used as competitive and marketing advantages (Nielson & Popkin, 2003; Quilliam,
2006; Seiders & Petty, 2004; Young & Nestle, 2002). Young and Nestle (2002) concluded that “virtually all foods and beverages prepared for immediate consumption have increased [in portion size] and now appear typical” (p. 247). Today’s consumers don’t perceive they are receiving a value unless the portion size is large, despite the fact the oversized portion contains more negative nutrients, and the portion size encourages consumers to eat more, although they report having the same level of fullness (Diliberti, Bordi, Conklin, Roe, & Rolls, 2004; The National Alliance for Nutrition and Activity, 2002; Nestle, 2003; Quilliam, 2006; Rolls, Morris, & Roe, 2002). While portion size is part of the problem, another issue is that consumers are also consuming more calories per meal, especially in away-from-home foods.

**Nutritional Makeup**

Food prepared outside the home tends to be higher in negative nutrients than foods prepared at home because restaurants use nutrient sparse, lower-quality ingredients to keep costs down and portion sizes up (Guthrie et al., 2002; Jacobson & Hurley, 2002; Lin, Guthrie, & Frazão, 1999; Obesity Working Group, 2004; Ward & Martens, 2000). For consumers maintaining healthy diets, eating out limits what can be ordered off the menu or consumed for the other meals that day. For example, McDonald’s popular Big Mac meal consisting of a hamburger, a medium 4.1 ounce serving of fries, and a 21 ounce soda contains 1,130 calories, 48 grams of fat, and 1,425 milligrams of sodium (McDonalds, 2010). When an individual eats this single meal, he or she has already consumed more than 50 percent of the recommended allowance for the day for calories, fat and sodium.

According to the United States Department of Agriculture (USDA) *Dietary Guidelines for Americans 2010* an average diet should consist of 2,000 calories, 65 grams of fat (20 of which can be saturated fat), and less than 2,300 milligrams of sodium per day. The daily recommended allowances can be either increased or decreased based on gender, age, and
physical activity. A diet based on 2,000 calories is the most frequently used the baseline for nutrition labels on manufactured food as part of Nutrition Labeling and Education Act.

Even entrees labeled healthy on a menu are not when compared against the USDA’s daily recommended allowance for negative nutrients. From the Olive Garden’s Garden Fare menu the Mixed Grill dinner entrée contains 730 calories, 23 grams of fat, and 1,840 milligrams of sodium (Olive Garden, 2010). All the dishes on Applebee’s Unbelievably Great Tasting and Under 550 Calories™ menu have a sodium content ranging from 1,520 to 3,170 milligrams, which is 66 to 138 percent of the daily recommended allowance (Applebees, 2010).

Some menu items are presented as a single serving or are typically consumed by one person, but their reported nutrient content is based several servings (Saslow, 2010). For instance, all entrees on the Pizzeria Uno menu are listed as containing two servings including the hamburgers (Pizzeria Uno, 2011). In addition to consumers not being able to trust what a restaurant designates as a healthy choice or presents as a single serving, they are challenged to approximate the nutritional content of menu items.

Nutritional Content Underestimation

Registered dietitians and consumers significantly underestimate calories, fat, and sodium content in menu items from national, mid-priced restaurants because of the ingredients used and the portion sizes (Backstrand, Wootan, Young, & Hurley, 1997; Bates, Burton, Howlett, & Huggins, 2009; Burton, Cho, Howlett, Tangari, & Thyroff, 2010; Burton, Howlett, & Tangari, 2009; Chandon & Wansink, 2007). For example, a Reuben from four different restaurants ranged in calories from 480 to 1,730 because of the portion size and ingredients, which makes nutrition content estimation difficult (Pulos & Leng, 2010). For some menu items, the difference between the estimate and the actual value was greater than or equal to the daily recommended value based on a 2,000 calorie diet, and the deficit increased as the entrée’s level of healthiness
decreased (Burton, Creyer, Kees, & Huggins, 2006; Wansink & Chandon, 2006). A daily increase of 370 calories, which could easily occur with underestimation of the nutrient content of menu items, can result in a thirty-five pound weight gain over twenty-eight years; that can be the difference between a healthy weight and obesity (Katan & Ludwig, 2010).

**Government Involvement**

As a result of these dynamics, the government has decided it is time to step in. To combat the obesity epidemic, in the past five years several bills have been proposed regarding food content and marketing applications (e.g., sin tax, high fructose corn syrup ban, salt ban, kid’s meal toy ban) and some have passed (e.g., trans fat ban). Nevertheless, the most prominent bill regarding food consumption is the Nutrition Labeling and Education Act (NLEA) passed in 1990. This law requires packaged food and beverages to include a nutritional label on its package so that consumers can make healthier meals at home. It exempted food for immediate consumption, including restaurants and vending machines (Pomeranz & Brownell, 2008). While the NLEA has proven to be successful with packaged items, it excludes the source where Americans now consume an estimated one-third of their total calories: dining-out at restaurants and food service venues (Backstrand et al., 1997; Guthrie et al., 2002; Mantel, 2010).

**Statement of the Problem**

Even though several chain restaurants have voluntarily provided nutrition information for menu items, the time cost to diners who want to base their meal choice on calorie and nutrient content is high. Currently, nutrition information is offered on company websites, in brochures, on posters, or on packaging, but rarely at the point of purchase (Roberto, Agnew, & Brownell, 2009; Wootan & Osborn, 2006). Diners must seek out the nutrition information, and if it is only available on the website, they must look at the site before heading to the restaurant
and either recall the information or write it down and bring it with them. Not having the nutritional information readily available at the time of purchase (i.e., on the menu) makes it difficult for consumers to utilize that information when making meal selections.

Several states and municipalities have been considering and a few have enacted a Menu Labeling policy resulting in labeling inconsistencies across the nation. For example, King County, Washington, which includes Seattle, requires chain food establishments with 15 or more locations to display calorie, carbohydrate, saturated fat, and sodium information on menus, while in New York City chain restaurants only have to display calorie content (Rutkow, Vernick, Hodge, & Teret, 2008). To create national uniformity, the Federal Government included a menu labeling provision in the Patient Protection and Affordable Care Act of 2010; a mandate that supersedes state and local laws requiring restaurants with 20 or more locations to post the calorie content of their menu items (“Food Labeling Nutrition”, 2011). Whether it will help reduce obesity is less clear, but many experts deem this an important element of the solution (See Mantel, 2010).

Within the past five years menu labeling has been thoroughly debated by the restaurant industry, consumer interest groups, public health groups, and the government; and several studies have been conducted on whether or not menu labeling is effective in changing consumer food purchases. Since there has not been a national policy on menu labeling, the labeling format and nutrients included in each study has varied and may be a reason for the mixed findings. Now that a law has been passed that preempts any state and municipality law, the research question isn’t whether menu labeling is effective, but rather how can the nutrition label be most effective.

There has been minimal research on how menu labeling format affects consumer understanding and use of the nutritional information, yet “research suggests that the utilization
of product information by consumers in their purchase decisions depends both on the availability of information and the processability (simplicity/complexity) and usefulness of the information to the consumer” (Scammon, 1977, p148). Without research on the most effective format for menu labeling, policy makers may develop a format that is difficult for consumers to understand and use, thus not impacting their food purchases or aiding in ending the obesity epidemic.

**Objective of the Study**

Providing nutrition information at the point of purchase in a format that is simple for consumers to understand is an important factor that can contribute to informed food purchase decisions. However, to date there is little research on menu labeling formats. Note that while a uniform format for nutrition information is important, its format should be relevant to the type of food service establishment. For example, a quick-service restaurant with menu boards may not have the room to include calories, fat, saturated fat, and sodium that a menu in a full-service restaurant does. Therefore, this study focused on nutrition label format for menus in full-service restaurants. The objectives of this study were to:

1. Determine the effect different nutrition label formats, on a full-service restaurant menu, have on consumers’ accuracy in dietary judgments and nutrition evaluations and their level of certainty and confusion while doing so.
2. Determine the effect different nutrition label formats have on consumers’ perceived label comprehension and utility of the nutrition label.
3. Determine how consumers’ motivation to process nutrition information and their knowledge of negative nutrients moderates the effect of the nutrition labels.
Research Questions and Hypotheses

Based on the objectives stated above, this study sought to answer the research questions and validate the hypotheses below:

R1: Will providing a nutrition label on a menu increase consumers’ accuracy in evaluating the nutritiousness of the entrees?

H1a: The presence of a nutrition label increases consumer accuracy in making dietary judgments and nutrition evaluations.

H1b: The addition of the percent daily value to the nutrition label increases consumer accuracy in making dietary judgments and nutrition evaluations.

R2: Will providing a nutrition label on a menu increase consumers’ level of certainty and decrease confusion while making dietary judgments and nutrition evaluations?

H2a: The presence of a nutrition label increases consumers’ decision certainty and decreases confusion when making dietary judgments and nutrition evaluations than when there is no label.

H2b: The addition of the percentage of daily recommended value to the nutrition label increases consumers’ decision certainty and decreases confusion when making dietary judgments and nutrition evaluations than when reference values are not provided on the label.

R3: Will the content of a menu’s nutrition label increase consumers’ confidence in completing judgment tasks, their comprehension of the label, and perceived utility of the label?

H3a: The absolute number nutrition label format will result in a) higher confidence, b) higher comprehension, and c) higher perceived utility than when there is no label.
H3b: The percentage of daily recommended value nutrition label format will result in a) higher confidence, b) higher comprehension, and c) higher perceived utility than the absolute number nutrition label format.

R4: Do consumers that are very motivated to process nutrition information or have high nutrition knowledge have a greater moderating effect on the nutrition label?

H4b: Health motivation will positively moderate the effect that the presence of a nutrition label has on dietary judgment and nutrition evaluation accuracy, decision certainty and confusion, and perceived label comprehension and utility, such that individuals with higher levels of health motivation will be more affected by label information.

H4a: Nutrition knowledge will positively moderate the effect that the presence of a nutrition label has on dietary judgment and nutrition evaluation accuracy, decision certainty and confusion, and perceived label comprehension and utility, such that individuals with higher levels of nutrition knowledge will be more affected by label information.

**Significance of the Study**

Menu labeling has been the subject of heated debates between the restaurant industry, consumer interest groups, public health groups, and the government. With the passing of the Menu Labeling Act, the question shifts from whether or not menu labeling is effective to what format will make menu labeling most effective. While previous studies have evaluated the impact of menu labeling on consumers’ food purchases, none have evaluated what format will aid consumers the most in making nutrition evaluations and thus more informed purchasing decisions. Therefore, this present research study intended to investigate which menu labeling format produced the highest accuracy, certainty, and comprehension. Though limited in scope, the information gathered is timely and can be used by the relevant stakeholders to help
determine how to best persuade healthier away-from-home food choices through menu nutrition labeling to reduce the obese and overweight populations in the United States.

Terms and Definitions

The following terms are defined for use in this study:

Away-from-home food is food that is prepared outside of the home. The food can be purchased at a grocery store, convenience store, cafeteria, restaurant or vending machine, and can be consumed at any location including the home. For this study, away-from-home food will be food purchased at a full-service restaurant.

Full-service restaurant is a food service establishment that provides table service. Food is ordered at the table and is paid for at the end of the meal (Mintel, 2011a).

Motivation is the desire to perform healthy behaviors including nutrition label information acquisition life-balancing behaviors, positive diet addition, negative diet restriction, alcohol moderation, and tobacco nonuse. For this study, motivation is the willingness to process provided nutritional information with the goal of healthy eating behavior in a restaurant setting (Moorman & Matulich, 1993).

Negative nutrients are nutrients that the USDA recommends people limit their consumption of, such as fat, sodium, and sugar. While calories are a measure of energy and are not a nutrient, for this study negative nutrients include calories, total fat, saturated fat, and sodium (Russo, Staelin, Nolan, Russell, & Metcalf, 1986).

Nutrition knowledge is the know-how to be able to comprehend and utilize the nutrition information accurately (Moorman & Matulich, 1993).

Percent daily value is a reference value that indicates how much of the daily recommended amount of a nutrient or vitamin is being consumed. It is based on the USDA’s recommended average diet of 2,000 calories.
Positive nutrients are nutrients that the USDA recommends people consume more of because they are necessary for good health and include vitamins and minerals (Russo et al., 1986).

Quick-service restaurant is a food service establishment that provides inexpensive food and quick service. Food is ordered and paid for at the counter or drive-thru window at the time of ordering, prior to eating, and is either eaten on the premises or taken out (Mintel, 2011c).
CHAPTER 2
LITERATURE REVIEW

In order to achieve the research hypotheses proposed in Chapter 1, prior studies relating to food labeling, restaurant menu labeling, motivation to process nutrition information, and nutrition knowledge have been reviewed. There is a gap in the current research on menu labeling; specifically exploring the impact of the label’s format and content on consumer accuracy, confidence, comprehension, and perceived utility. The following sections review prior research, identify the research gap, and explain the reasoning for the methodology of this study in this order: Food Labeling, Menu Labeling Studies, Menu Label Format, Menu Label Content, Motivation and Nutrition Knowledge.

Food Labeling

A label is a disclosure of facts on a product that reduces information costs and promotes fair dealings, better-informed decision making, and more efficient commercial markets (Pomeranz & Brownell, 2008; Roe, Levy, & Derby, 1999). The government has the authority to require labels and routinely does so in the commercial marketplace. Within the food industry alone there are several labels including but not limited to organic, locally grown, USDA certified, and health claims such as zero trans fat and low sodium.

The most federally regulated and well-known food label is a product of the NLEA, which requires most packaged food and beverages to include a nutrition label on its package so that consumers can make healthier meals at home. The nutrition facts label provides the serving size, which is a mandated standardized portion size in a common household measurement, and the same measurement is used within similar food categories. The label also includes the amount of calories, calories from fat, total fat, saturated fat, cholesterol, sodium, total carbohydrates, dietary fiber, sugars, and protein in a serving. Also listed is the percentage of the
daily intake of each nutrient based on a healthy 2,000-calorie-a-day diet, commonly referred to as the percent daily value (%DV), and is designed to help consumers understand how the food fits into a healthy daily diet. The percentages of vitamins and minerals are also included. Lastly, a list of ingredients is provided in descending order of highest quantity to lowest (Burros, 2004; “Food Labeling Regulation”, 1993; Neuhouser, Kristal, & Patterson, 1999).

Researchers have found that 85 percent of the U.S. population is referencing the NLEA label when food shopping, and those that do tend to have a diet lower in fat (Burros, 2004; Finke, 2000; Sung-Yong, Nayga, & Capps, 2000; Kreuter, Brennan, Scharff, & Lukwago, 1997; Kristal, Levy, Patterson, Li, & White, 1998; Levy & Derby, 1996; Mathios, 2000; Neuhouser et al., 1999; Sung-Yong, Nayga, & Capps, 2000). Due to the increase in away-from-home food consumption and its plausible link to obesity, the justification for not requiring nutrition information for restaurant products is no longer reasonable. In addition, nutritional information provided for menu items has been shown to have stronger effects on consumer food purchases than nutritional information presented on packaged food products (Kozup, Creyer, & Burton, 2003). Inspired by the success of the NLEA and menu labeling studies, regulators have included a menu labeling provision in the Patient Protection and Affordable Care Act of 2010 that requires restaurants with 20 or more locations operating under the same name to post calorie content.

Empirical evidence indicates that at least two-thirds of Americans want menu labeling (i.e., nutrition information) in restaurants, and 50 percent said they would use the information (Fitch et al, 2009; Keystone, 2006; Kolodinsky, Reynolds, Cannella, Timmons, & Bromberg, 2009; Krukowski, Harvey-Berino, Kolodinsky, Narsana, & DeSisto, 2006). However, Roberto et al. (2009) found only 0.1 percent of consumers actually utilize nutrition information provided either on a poster, a brochure, or a computer before making food purchase decisions. This finding was
consistent with those of the Jacoby, Chestnut, and Silberman (1977) study that concluded consumers do not seek out nutrition information. Pulos and Leng (2010) surveyed 206 consumers that dined at six of the restaurants in their menu labeling study. Seventy-one percent saw the nutrition label and of that group 59 percent utilized the information, which is only 32 percent of the total sample. From a larger sample, 32 percent of Subway patrons saw the nutrition label and of that group 37 percent utilized the information, which is only 11 percent of the total sample of 1,805 patrons (Bassett et al., 2008). Both studies were self-reported behaviors in response to survey questions. This raised the question: why would the majority of the population say they want menu labeling, yet the minority actually uses it?

According to Pulos and Leng (2010), “how best to present nutrition information—what information to present, and where and how to display it—is likely to play an important role in whether information is noticed, understood, and used” (p. 1038). According to Almanza and Hsieh’s survey, patrons of an on-campus restaurant want an attractive menu with a clear presentation of information that is easy to use (1995). A review of menu labeling studies uncovered a gap in prior research: The studies do not explore how the format and content of the label impact consumers’ nutrition judgment (i.e., accuracy), confidence in decision-making, and comprehension of the label and its perceived utility.

Menu Labeling Studies

There have been many studies conducted on menu labeling that have taken place in full-service restaurants (Pulos & Leng, 2010; Shipp, 1988), quick-service restaurants (Bassett et al., 2008; Bollinger, Leslie, & Sorensen, 2010), cafeterias (see Robert Wood, 2009, for comprehensive list), and in research settings where participants order from a menu or completed a survey regarding a menu (Burton et al., 2009; Hwang & Lorenzen, 2008; Jones, 2007; Roberto, Larsen, Agnew, Baik, & Brownell, 2010; Yoon, 2009). To date, these studies have
evaluated one thing: does including a nutrition label on the menu cause consumers to order healthier items, that is, items lower in calories, fat, or sodium. Overall, these studies have found that after a menu label was implemented, consumers order a marginal 15 calories less to a significant 300 calories less per purchase (Bollinger et al., 2010; Roberto et al., 2010). None of these studies have explored why some are more impactful than others.

Previously discussed scientific evidence indicates that a small group of consumers are using menu labels and that the label is having mixed results on changing food purchases. Researchers agree that consumers not only need to be aware of the label before they can intend to use it, but they must also understand it before their intention can have any real meaning (Jacoby et al. 1977; Pulos & Leng, 2010). The personal relevance of the information and how it is presented plays an important role in consumers’ acquisition, use, and understanding of that information (Jacoby et al., 1974; Moorman, 1990; Russo & Leclerc, 1991; Scammon, 1977). While this area of research has been extensively studied in the context of manufactured foods, pre and post NLEA, it has been minimally investigated in regards to food service establishments.

**Menu Label Format**

Since there is a limited amount of studies specifically on the impact of menu labeling formats, studies that examined the effects of various proposed formats for the NLEA label were reviewed since the two mandates have the same goal: Provide consumers with nutrition information that will encourage more healthy food choices.

**Health Icons and Health Claims**

One consideration for menu labeling is the use of health icons (e.g., American Heart Association heart) or health claims (e.g., “low in fat”) rather than nutrition facts to disclose the healthiness of menu items. Studies have found that health icons or health claims are not as effective in impacting consumers’ nutrition beliefs as nutrition information. The presence of a
health icon or claim without additional nutrition information can result in all-encompassing nutrition judgments that are not supported by the item’s actual nutritional makeup. When additional nutrition information is present, consumers rely on that information, and opinions of the nutritiousness of an item are independent of the health icon or claim (Ford, Hastak, Mitra, & Ringold, 1996; Mitra, Hastak, Ford, & Ringold, 1999; Roe et al., 1999).

Ford et al. (1996) examined whether consumers’ evaluations of product nutritiousness are affected by a health claim in a 2 (health claim on the front of the package: present or absent) x 2 (nutrition value on the back panel: favorable or unfavorable) x 2 (nutrition label format: unambiguous or ambiguous) between-subjects experiment consisting of undergraduate and graduate business students. The two control groups, which were only shown the front panel, gave the frozen dinner a better heart health rating when the health claim was present than when it was not. Participants that viewed the nutrition facts panel rated the heart belief more accurately than those who were only exposed to the health claim. However, participants gave the frozen dinner higher positive heart belief and nutrition belief ratings when exposed to the health claim despite accompanying unfavorable nutrition information than those just exposed to the unfavorable nutrition information. Results also indicated that a health claim by itself may create a halo effect (rating the product higher on other health attributes not mentioned in the claim) on the overall perceived healthiness of the item. Studies conducted by Andrews, Netemeyer, & Burton, (1998), Keller et al. (1997), and Mitra et al. (1999) resulted in similar findings amongst primary food shopper, adults, and educationally diverse populations, respectively.

Evidence suggests that when a health claim or icon is present, consumers will truncate their search and judge the healthiness of an item based on the health claim or icon rather than also consulting the nutrition facts panel. Consequently, “the extent that consumers ignore
detailed nutrition information on food labels and rely solely on health claims (asserted or implied), they may make overly broad judgments about product healthfulness that might not be supported completely by the product’s nutrition profile” (Mitra et al., 1999, p.114).

Roe et al. (1999) explored this premise by not requiring participants, primary food shoppers recruited in mall-intercept interviews, to look at both sources of nutrition information: health claim on the front panel and the nutrition facts on the back panel unlike the Ford et al. (1996), Keller et al. (1997), and Mitra et al. (1999) studies. Participants answered questions regarding three different products either with no claim, a health claim, or a nutrient claim. More importantly, the interviewers observed whether or not the participant truncated their information search to the front panel when there was a health claim or also consulted the nutrition fact panel. Results suggest that the presence of a claim on the front the product was associated significantly with a greater probability of a search limited to the front panel. Furthermore, the data showed that the presence of a claim, not search truncation, induced a halo effect and, for one of the three products tested, a magic-bullet effect (attributing inappropriate health benefits to the product). Szykman, Bloom, and Levy (1997) also found that a health claim of a diet-disease relationship had a negative effect on nutrition label use.

Later studies provide evidence that if consumers examine the nutrition information, they will make nutrition judgments independent of the health icon or claim. Burton and Creyer (2004) tested the effect of a health claim on a restaurant menu with results congruent to the previously discussed studies. The study was a 3 (nutrient levels of the target menu item: no information, unfavorable, or favorable) x 2 (nutritional frame created by the provision or absence of nutrition information for the three non-target menu items) x 3 (health claim for the target menu item: no claim, cancer claim, or heart healthy claim) between-subjects experiment. A survey packet was mailed to a consumer household research panel located in a southern
state. Pot roast was the target item because it is frequently served in restaurants and because of its ambiguity from a nutritional perspective. When the menu only included either one of the claims, participants rated the target item as having a lower disease risk than when there wasn’t a claim. The addition of nutrition information (fat, saturated fat, and sodium), especially in the unfavorable nutrition condition, resulted in participants questioning the validity of the health claim. Furthermore, participants were able to determine the level of healthiness of menu items with just nutritional information, making the addition of a healthy claim unnecessary. Garretson and Burton (2000) and Kozup et al., (2003) had similar findings.

Jones (2007) presented focus study participants with an eleven-item menu containing two health icons: a regional restaurant’s ‘Eat’n Smart’ icon for entrees under 600 calories and less than 20 grams of fat and the American Heart Association’s ‘Heart Smart’ icon for entrees with 3 grams or less of fat, 20 milligrams or less of cholesterol, and 40 milligrams or less of sodium. An explanation for each icon was at the bottom of the menu. Only the fruit salad qualified for the ‘Heart Smart’ icon and was also labeled with the ‘Eat’n Smart’ icon. Four other entrees were eligible for the ‘Eat’n Smart’ icon. Participants were shown a menu without any icons or nutrition information and were asked to pick their top three choices they would order off the menu. They were then shown a menu with the icons or a menu with nutrition information and asked to select their top three choices again. The presence of the health icons was not the primary reason participants chose an entrée the second time around, but with some, they changed the ranking of their top three choices placing healthier options at the top. While some participants liked the quick reference the health icons provided, others weren’t comfortable relying on someone else’s judgment as to what nutrient quantity is deemed healthy and preferred to see the specific nutrient values. One participant even found the icons to be
too distracting and cluttering the menu. Overall, Jones found that the menu with nutrition information had a greater influence on entrée choices than the health icon menu (2007).

Health icons and claims are a quick and easy indicator for consumers to use to identify healthier items. However, experimental evidence supporting consumers’ ability to draw appropriate nutritional inferences in the presence of health claims hinges on consumers’ consultation of nutritional information. Without nutrition information, the health icon or claim will be the basis of the nutrition evaluation which may result in a halo or magic bullet effect. When nutrition information is available, consumers rely on the nutrition information to a greater extent than they do on health icons or claims when making nutrition judgments. Thus, health icons or claims tend to be misleading or unnecessary. Furthermore, health icons can deter consumers from selecting healthier items because they equate healthy foods with poor taste (Horgen & Brownell, 2002; Jones, 2007; Keystone, 2006; Raghunathan, Naylor, & Hoyer, 2006; Stubenitsky, Aaron, Catt, & Mela, 2000; Working Group on Obesity, 2004). Therefore, health icons were ruled out as a format tested in this study.

**Absolute Numbers**

Health icon and claim studies provide empirical evidence that consumers deem nutrition information to be more relevant and credible when presented as absolute numbers. Subsequently discussed studies indicate that the absolute number format is deemed as simple and easy to read but not very helpful in assessing the nutritiousness of an item. Literature on the presence of nutrition information concludes that some information is better than no information (Jacoby et al., 1974) in identifying healthier fare. Thus the following hypotheses are identified:

**H1a:** The presence of a nutrition label increases consumer accuracy in making dietary judgments and nutrition evaluations than when there is no label.
H2a: The presence of a nutrition label increases consumers’ decision certainty and decreases confusion when making dietary judgments and nutrition evaluations than when there is no label.

Unambiguous Information

Many researchers have argued and presented evidence that absolute numbers are ambiguous, that is lack meaning (Barone, Rose, Manning, & Miniard, 1996; Ford et al., 1996; Jacoby et al., 1977; Scammon, 1977; Viswanathan, 1994). For example, what does nine grams of saturated fat actually mean? The absolute number gives no indication of whether nine grams is a high amount or low, and unless one is nutritionally knowledgeable, which research indicates the general public is not\(^2\), it is impossible to determine without a reference point (Levy, Fein, & Schuker, 1996). The rationale behind nutrition disclosure is it should aid consumers in gauging whether a product contains a favorable or unfavorable level of a nutrient and how that product fits into their daily diet (“Food Labeling Nutrition”, 2011). The function of reference points is that consumers can use them as an objective measure against which the nutritiousness of a product can be gauged.

Empirical studies have indicated consumers prefer information presented in a manner that minimizes their effort to convert it into a functional format and will spend more time reviewing such information (Bettman & Kakkar, 1977; Jacoby et al., 1977; Keller & Staelin, 1987; Russo et al., 1986; Russo & LeClerc, 1991; Viswanathan; 1994). Including a reference point converts the information into an evaluative format (i.e., unambiguous), which increases its

\(^2\) Researchers have uncovered that the majority of the population cannot define nutrients or report the daily recommended intake for positive and negative nutrients (Barone, 1996; Jacoby et al, 1977; Krukowski et al., 2006; Russo, 1986). Except for calories; in surveys conducted by Krukowski et al. (2006) and Roberto (2010) two thirds of the respondents accurately provided the daily recommended amount for calories.
usefulness for consumers. Two designs have consistently been used to represent an unambiguous format: adjective descriptors and percentages. A conclusion made by these researchers support the premise that increases in high-quality information improves decision-making confidence, up to some point (i.e., information overload). Therefore, label formats that contain more useful, unambiguous information should result in higher accuracy in determining and comparing the nutritious of items than formats with less quality information.

**Adjective Descriptors versus Percent Daily Value**

The adjective descriptors format (subsequently referred as the adjective format) places a quantity defining adjective (e.g., low, moderate, high) next to the absolute number indicating if the level of that nutrient is favorable or not in the context of the recommended daily intake of that nutrient. The percent daily value format (subsequently referred as the percentage format) indicates what percentage of the recommended daily amount of a nutrient is being consumed in one serving. The absolute value of the nutrient is also present but is typically not adjacent to the percent in the NLEA label.

The adjective format and the percentage format are both postulated to improve consumers’ accuracy in assessing the nutritiousness of items, increase confidence in their judgments, and improve their ability to use the label because they provide a reference point. Researchers have debated which of the two formats is better with inconclusive results.

Viswanathan is a proponent of the adjective format. In 1994, the researcher conducted a between-subjects study in which participants saw either an absolute number format of nutritional information or an adjective format (very low, low, high, and very high) that did not include absolute numbers. Participants were to rate the healthiness of four products: two healthy and two unhealthy. The differences between the mean healthiness ratings of the healthy items versus the unhealthy items were computed, and the mean difference of the
adjective format group was significantly higher than that of the absolute number group (3.08 vs. 1.58, p < .001). This means participants were more accurate in the assessment of the healthiness of the items with the adjective format. Furthermore participants were asked to assess their satisfaction with the amount of information and the ease of understanding it and their confidence in their judgments. While the adjective format group had a higher mean score for the satisfaction and confidence measures, the difference was nonsignificant. Viswanathan continued this research with a within-subjects study that resulted in the adjective format having better accuracy in judging overall healthiness and gauging the level of each nutrient as being high or low than the absolute number format (1996).

In a similar study, Ford et al. (1996) also hypothesized that participants exposed to an adjective format (low, medium, high) would be more accurate in interpreting the healthiness of a frozen dinner than those exposed to only the absolute values. Undergraduate and graduate business students were asked to rate the heart healthiness, overall nutritional value, fat content, and sodium content based on the nutrition facts panel of a frozen dinner that was manipulated to create a healthy and an unhealthy version. Participants shown the adjective format rated the healthy dinner more favorably and the unhealthy dinner less favorably across all four ratings than those shown the absolute values (p < .05). Ford concluded that having the descriptive adjectives made it easier for participants to understand and use the nutrition information.

The above research demonstrates that the adjective format improves accuracy in dietary judgments over the absolute format. Comparisons between the adjective and percentage formats have mixed results. In 1977, Scammon compared the effects of providing nutrition information in the adjective format (excellent, good, fair, none, and no absolute values) with that of the percentage format. The researcher deemed the adjective as the
unambiguous format, and in contrast to most literature, regarded the percentage format as ambiguous. Participants, representing diverse demographic and socio-economic traits, were shown two commercials, each for a different peanut butter, and were asked to identify the more nutritious brand. Analysis of the data indicated that participants shown the adjective format were more accurate in selecting the correct brand than those exposed to the percentage format ($p < .01$). The descriptive adjectives are evaluative by nature, thus it was easier for participants to process and understand the nutrition information provided. However, participants presented with the percentage format were more satisfied and in less need of additional information. Scammon postulated that this was because the percentage format was more familiar to respondents and it allowed participants to make their own evaluations rather than relying on someone else's judgment.

Inconclusive results were also found by Burton, Biswas, and Netemeyer (1994) in a between-subjects experiment of adult, primary grocery shoppers. Four labels were tested (absolute number [pre-NLEA & simplified-NLEA] adjective descriptors, percentage) that either had reference values (per day or per meal) or did not for two frozen dinners (healthy, unhealthy). Three dependent variables were measured: nutrition evaluation, dietary judgment (i.e., accuracy), and perceived label comprehension. The pretest resulted in the adjective (low, medium, high) and the percentage formats being rated as having a bit too much information compared to the absolute number formats (4.8 vs. 2.6 $p < .001$) on a seven-point scale. However, those two formats were deemed to have higher information quality than the absolute number formats (16.9 vs. 12.7, $p < .001$). Nonetheless, the perceived label comprehension for both formats was lower than for the absolute number format. There were nonsignificant differences between the adjective and percentage formats means for the variables measuring nutrition evaluation. The adjective format had a better accuracy score in dietary judgments
than the percentage and absolute number formats, which were the same (63.0 vs. 55.7). The presence of reference values increased (decreased) nutrition beliefs and attitude for the favorable (unfavorable) nutrition valued items. The inclusion of reference values resulted in lower label comprehension than without them (4.7 vs. 5.1, p < .01) on a seven-point scale.

Reference values presented as percents also had a positive impact in the Moorman (1990) study on the nutritional information process. The between-subjects experiment explored the effect of consequence information (low, medium, high), reference information (present, absent), and nutrient familiarity (familiar, unfamiliar) had on motivation and ability to process information, information acquisition and assessment, information comprehension, and decision quality. Consequence information stated the negative result due to overconsumption of a target nutrient that was either familiar (sodium) or unfamiliar (pyridoxine). Reference information was a treatment because it “allows consumers not only to judge whether an attribute level is high relative to others, but also to judge whether these levels are generally too high, too low, or inconsequential” (p. 364). When participants were asked to rate their perceived comprehension of the label on a seven-point scale a difference was not found between the presence or absence of the reference information even though in the pretest it was significant (5.00 vs. 3.16, p < .05). The researcher attributed it to subject fatigue. However, reference information maximized comprehension accuracy and ability to process the label information.

In 1996, Levy et al. expanded their study conducted in 1992 with the goal of recommending to the FDA the most effective label format for the NLEA. Various label formats were tested by having participants, recruited using the shopping mall intercept method, complete several tasks that ultimately measured how the format affected the participant’s accuracy in completing those tasks. The absolute number format (i.e., control) performed the
worst in dietary judgment tasks where participants had to identify if the quantity of nutrients were high or low, how many servings of the item would have to be eaten in the day to get the recommended amount of a specified nutrient, and if the item were eaten three times in a day what nutrients would need to be consumed or avoided in other foods eaten that day. There was no significant difference between the percentage format and the adjective format for the dietary tasks. Both the absolute number and percentage formats performed well on identifying the healthier product when shown two, and the adjective format statistically did not perform as well. Overall, the percentage format was a top performer or the best on all the tasks. However, participants rated the adjective format as most helpful (e.g., preferred) and rated the percentage format as least, even though the data showed that the percentage format had better results.

In a menu labeling study that examined the nutrition information’s effect on calories ordered the inclusion of a reference statement resulted in participants consuming the least amount of total calories (Roberto et al., 2010). Roberto and colleagues divided participants up into three groups: no label (control), absolute number format, and a reference point format. Only calories were disclosed in the label, and the reference point was a message that it is recommended to consume 2,000 calories in a day. Participants ordered dinner from their menu, and the amount of calories actually consumed was calculated. Participants returned the next day to recall what they ate, if anything, for an evening snack, and the researchers estimated the calories consumed. The control group consumed an average of 1,459 calories during the experiment meal and a total of 1,630 calories between the experiment meal and post meal snack. The absolute number format group consumed and average of 1,335 calories during the experiment meal and a total of 1,625 calories between the experiment meal and post meal snack. The reference point format group consumed an average of 1,256 calories during the
experiment meal and a total of 1,390 calories between the experiment meal and post meal snack; significantly lower than the control (p = .02) and absolute number format (p = .03). While the absolute number format group consumed fewer calories during the meal than the control group (p < .05), this group consumed the same amount of total calories as the control group (p > .10). While the experiment did not explore why the label plus information group consumed 250 fewer total calories, the researchers postulated, “Providing people with information about daily calorie intake at the point of purchase provided a context for the other calorie information on the menu that appeared to eliminate excess eating later” (p. 317).

The literature shows that although the percentage format improves accuracy in gauging the healthiness of an item it is the least preferred format among consumers. A reason for this may be that not all consumers understand what the percent daily value means. The Obesity Working Group referenced surveys were the respondents could not accurately define or use the percent daily value for fat (2004). Lando and Labiner-Wolfe (2007) conducted eight consumer focus groups (four all-male, four all-female) on nutrition label on packaged foods and on a quick-service menu board. When discussing the percent daily value participants shared that they either did not understand its meaning or consumed less or more than 2,000 calories (the basis for the daily values) and therefore did not find it useful. A few participants did state they found the percentages useful in maintaining a healthy diet.

Since there are many different dietary needs, it is better to put reference points in a numerical format so that individuals can decide if the nutrient level is appropriate for their specific diet. For example, senior citizens should consume less than 1,500 milligrams of sodium daily compared to 2,400 milligrams for adults. Considering reference points are based on the average 2,000 calorie diet for adults, 800 milligrams of sodium would be labeled “low” for a
healthy adult, but is slightly more than fifty percent of the recommended amount for older age group, a high amount.

It is important to note that the adjective format does not perform well when comparing two or more items (Levy et al., 1996). The researchers did not elaborate on this result but perhaps several of the attributes of the items being evaluated had the same descriptors (Viswanathan & Childers, 1996). The ability to compare items is important in regards to a menu since consumers probably consider and evaluate a few entrees choices before making a final selection. Furthermore, the value range for what is considered low, medium, or high quantity is unknown, and consumers may not like relying on someone else’s judgment just like consumers’ perception of health icons (Jones, 2007).

The stream of research on nutrition label formats has had varied results, and the best format has not been identified (cf. Cowburn & Stockley, 2005). The absolute number format was deemed the most clear and easy to read but was the least helpful due to the lesser amount of information. Formats that have reference information (e.g., adjective or percent) create better accuracy in dietary judgment tasks but had lower label comprehension and in some studies were the least preferred by consumers.

Most of the studies on nutritional label formats have been conducted in regards to the NLEA label. A menu is a completely different medium than a food package to communicate nutrition information. Therefore, based on the literature, the limitation of the adjective descriptors in comparing items, and the theory that the interpretation of percent daily value is independent of consumers’ degree of knowledge; hence enables more consumers to process the message (Moorman, 1990) the following hypotheses are identified:
H1b: The addition of the percent daily value to the nutrition label increases consumer accuracy in making dietary judgments and nutrition evaluations than when reference values are not provided on the label.

H2b: The addition of the percent daily value to the nutrition label increases consumers’ decision certainty and decreases confusion when making dietary judgments and nutrition evaluations than when reference values are not provided on the label.

**Per Serving versus per Whole**

Currently, the NLEA label provides nutrition information per serving and not for the contents of the whole package. This can be misleading, especially in the current supersized society. According to Young and Nestle (2002), most portions of every-day foods are significantly larger than the federal standards. The current size of a typical muffin exceeds federal recommendations by 333 percent; and although the Nutrition Facts Panel states the muffin is two servings, it is often consumed at one time by one person. Entrees in restaurants, often perceived as serving one person, are also much larger than the single serving recommended by the FDA (Young & Nestle, 2002). Restaurant nutrition information for menus is often listed a la carte instead of as a meal, and items listed typically contain multiple servings, but the nutrient quantities listed are per serving. Thus it is difficult for a consumer to calculate the total nutrient makeup of a meal. Alarmingly, researchers have found that consumers can have a difficult time calculating the total value for nutrients in an entire package when they are presented as per serving, increasing the difficulty in managing a healthy diet (Jacoby et al., 1977; Lando & Labiner-Wolfe, 2007; Rothman et al., 2006).
Per Meal versus per Day

The percent daily value can be presented as a per meal allowance or as a per day allowance. Lando & Labiner-Wolfe (2007) divided the daily recommended allowance into thirds based the assumption that three meals are consumed in a day:

Healthier Meals have 1/3 or less of a day’s calories in a 2000 calorie diet. Also 1/3 or less of the Daily Value for saturated fat and cholesterol, less than 1/2 of the Daily Value for sodium and 7 grams or less of saturated plus trans fat (p. 159).

In a study conducted by Fitch et al. (2009) participants were shown fast food menu boards with calorie content for each item. One menu included a footnote of the daily recommended caloric intake per day for men and women and the other included a footnote of the daily recommended caloric intake per meal for men and women. Almost two-thirds of participants preferred the calories per meal footnote because it was easier to use; however 61 percent found the calories per day useful or very useful while only 58 percent found the calories per meal useful or very useful. Opponents of the calorie per meal format judged it as deceiving or inaccurate because there are too many variables to consider; such as the number of meals eaten in a day and the size of the meal to determine a per meal reference.

Burton et al. hypothesized that the group presented with the per-meal reference values would have lower nutrition evaluation scores than the group presented with the per-day reference value. The hypothesis was based on the fact that the per-meal value would have a smaller denominator thus resulting in higher percentages of the recommended amount than the per-day references for negative nutrients. The data did not indicate a difference in ratings for nutrition beliefs, attitudes, and purchase likelihood when the reference values were provided on a per-meal or per-day basis (1994).
Other Formats

A summary score is a calculation of all the nutrients in an item and presented as a single value rating that represents the overall nutritiousness of the item. Russo et al. (1986) used stars for their summary score of frozen dinners, and this format was rejected when the data showed consumers didn’t want nutrition presented that way. More recently, the summary score is being used in grocery stores (e.g., Hannaford and Big Y) to help consumers quickly identify healthy items (Seiders & Berry, 2007). A similar format, the average reference point, provides the average value for each nutrient for all the items available in that category (Viswanathan, 1994; Barone et al., 1996). For example, the average fat content of all brands of chips would be included on the label so that the consumer could see if the bag of chips he or she was considering purchasing contained above, below, or the average amount of fat compared to other chips. While these formats are ideal in theory, the summary score would require a lot of education and promotion among consumers so that they would understand it, trust it, and use it. The average reference point is not applicable to a menu because entrees are so different (i.e., comparing apples to oranges).

Other formats evaluated have included highlighting negative nutrients (Levy et al., 1996), stop light (Baic & Heathcote, 2011), number minutes an average person would have to run to burn off the calories consumed (Fitch et al., 2009), an apple symbol or colored dots (Almanza & Hsieh, 1995), pie charts (Lewis & Yetley, 1992), and bar graphs (Levy, Fein, & Schucker, 1992; Lewis & Yetley, 1992). These formats were not effective in communicating the overall nutrition value of items for reasons similar to the heath icons and claim.
Menu Label Content

Information Load

Policy makers are interested in how “individuals face limitations on their ability to deal effectively with large amounts of information within a limited time period” such as ordering off a menu (Scammon, 1977, p.148). Empirical evidence points out that more information is better to a point and then the quantity of attributes for an item becomes an information overload (Jacoby, Speller, & Berning, 1974; Scammon, 1977; Wilkie, 1974).

In 1974, Jacoby et al. published a foundational study exploring the effect of marketer-controlled information load on consumers. The researchers varied the quantity of brand choices and the quantity of attributes per brand; each participant received one combination of 4, 8, or 12 brands and 2, 4, or 6 attributes per brand. Participants were asked to pick the best brand from his or her set and answer questions regarding satisfaction, certainty, confusion, and desire for more information. It was concluded that participants were more satisfied, certain, and less confused as the quantity of attributes per brand increased, but made poorer product selections as the quantity of brands increased.

Several researchers reviewed and critiqued the Jacoby et al. study. Wilkie (1974) recalculated the results to take into account the conditional probability of choosing the correct brand without any attribute information provided. It was found that as the quantity of brands and attributes per brand increased, the number of participants that chose the correct brand was significantly higher than the probability of choosing the correct brand by chance; a contrast to Jacoby et al. conclusion. A graph of the recalculated data yielded an inverted U-shaped curve that indicated more information is better to a point.

Scammon (1977) focused on one treatment of the Jacoby et al. study: Changing the number of attributes per brand since in a non-experiment setting the consumer would have
control over the number of brands being compared. Scammon had participants choose the nutritionally superior brand of peanut butter from a choice of two. The amount of nutrition attributes provided varied with none for the control group, four attributes plus calories, and eight attributes plus calories. There was significant difference between the control group and the two groups that received information in selecting the more nutritious peanut butter, but there was a nonsignificant difference between the groups receiving different amounts of information. However, the data revealed that the participants exposed to eight attributes plus calories felt less satisfied and certain with their brand choice than those exposed to less attributes.

Another, more recent study concurs that having eight nutrients causes an information overload. Hwang & Lorenzen (2008) evaluated participants’ attitude toward an entrée labeled with zero, one, six, seven, or eight nutrients (calories, cholesterol, sodium, protein, carbohydrates, fat, saturated fat, and fiber). The results revealed that as the number of nutrients provided increased, the easier it was for participants to determine the healthiness of the item and the more positive their attitude was toward the item. However, the addition of fiber as the eighth nutrient didn’t significantly increase participants’ perception of helpfulness or attitude than when there were seven nutrients. The researchers believe this is because including eight nutrients reached a point of information overload.

**Information Load on a Menu**

The NLEA label has been successful in having consumers compare nutrition content within a subcategory such as cola, but not between categories such as cola versus juice (Barone et al., 1996). Russo, Krieser, and Miyashita (1975) found that having a centralized unit price list for a category of products increased the purchase of economical products because it was easier for consumer to compare. A menu is a centralized list of a restaurant’s meal options, and “the
provision of nutrition information for a menu item generally has stronger effects than nutrition information presented on a packaged food product” (Kozup et al., 2003, p.25-26). One reason for this could be that the various nutrition labels tested on menus have considerably less information than the Nutrition Facts panel, which lists eleven macronutrients plus vitamins and minerals. For this reason the following hypothesis is proposed.

H3: The addition of percent daily value to the nutrition label will result in higher perceived label comprehension and perceived label utility than when reference values are not provided on the label.

**Nutrients**

Which nutrients to include in a nutrition label have been tested in several studies. Although nutrition is typically defined in terms of positive nutrients, studies have uncovered that consumers are more concerned with controlling their intake of negative nutrients, and therefore prefer to know the quantities of negative nutrients listed rather than positive nutrients (Burton et al., 2006; Heimbach, 1981; Jones, 2007; Putman & Weimer, 1981; Russo et al., 1986).

Russo et al., (1986) tested the impact of providing positive nutrient content on consumer purchases of frozen TV dinners. A poster was placed in the aisle listing the vitamins and minerals of all the frozen TV dinners sold. While the presence of the posters increased nutrition knowledge, it did not change consumer frozen TV dinner purchases. A survey of grocery shoppers during the study revealed that they were more interested in negative nutrients. To test this, Russo et al. conducted a second study by hanging posters in the cereal aisle listing the amount of added sugar for each cereal sold. The researchers found a shift in sales to cereals with lower amounts of added sugar. It was concluded that consumers are not interested in knowing the quantity of positive nutrients present in a food product because one could simply take a multivitamin to consume the daily recommended amount.
Additional studies demonstrate that consumers are more interested in negative nutrients than positive. Heimbach (1981) conducted a survey asking participants to rate the usefulness of knowing the quantity of 38 food components that currently are and may be added to the manufactured food nutrition label: 29 positive and 9 negative nutrients. All 9 negative nutrients (calories, fat, sugar, cholesterol, sodium, carbohydrates, starch, polyunsaturated fat, saturated fat) were ranked in the top 12 of “most useful” with protein, vitamin C, and iron being the 3 positive nutrients. Similarly, Yoon (2009) found that survey respondents were most interested in knowing the total calories, total fat, trans fat, calories from fat, saturated fat, and protein. Furthermore, 9 out of 10 reasons for changing one’s eating habits were to reduce consumption of negative nutrients (Putman & Weimer, 1981).

Researchers have found that consumers want to avoid or limit their consumption of calories, fats, sugars, and sodium to prevent health problems, manage health problems, or because of dietary intake recommendations based on age (Burros, 2004; Burton et al., 2009; Jones, 2007). Jones (2007) conducted focus groups with Moms and Senior Citizens to determine the impact of menu nutritional labeling on their food choices. It was revealed that the Moms focused on the amount of calories for weight control. Meanwhile, the Senior Citizens were focused on sodium content because of concern with high blood pressure and the USDA recommendation for this age group to consume less than 1,500 milligrams of sodium daily compared to 2,400 milligrams for adults (Jones, 2007; USDA, 2010).

As previously noted, the federal menu labeling law plans to require only caloric content to be posted despite the evidence that consumers are concerned with more than just calories. Providing additional negative nutrients for a menu item creates a more complete nutritional picture. Burton et al. (2006) mailed out three different menus (no nutrition information, calories only, and calories, fat, saturated/trans fat & sodium) listing four entrees (unhealthy:
hamburger with fries and chef salad; healthy: grilled chicken with baked potato and turkey sandwich). The researchers surveyed respondents on their perceived likelihood to gain weight and develop heart disease and their attitude towards and purchase intention for each item. The menu containing calories plus nutrients led to higher perceived likelihood of heart disease and weight gain than just the calories only menu and no nutrition information menu for the unhealthy items because including fat and sodium content was more informative.

Consumers are pragmatic and only want information that is personally relevant. In this context, they want the quantity of nutrients which overconsumption of has been proven to cause diet-related diseases (Cranage, Conklin, & Lambert; 2004; Heimbach, 1981). Cranage et al. (2004) placed nutrition information cards that were the same as the NLEA label panel next to each hot entree at a university café. A survey question asked after patrons made their food selections revealed that they only referred to total fat grams, calories, and calories from fat despite there being twelve nutrients listed.

As part of the menu labeling law, restaurants will have to provide additional nutrition information upon customer request. This is futile since the Roberto et al. (2009) study concluded that only 0.1% of consumers sought out nutrition information that was not on the menu. In addition, Basset et al. (2008) found that only 30 percent of Subway patrons noticed nutrition information on the deli case, meanwhile in Pulos and Leng’s study (2010) 70% of restaurant patrons noticed nutrition information on the menu. Therefore, additional negative nutrients besides just calories should be included in the menu label because the closer the nutrition information is to where customers look when ordering food, the more likely it will be seen and used.

Based on the above findings, this current study included calories along with fat, saturated fat, and sodium in the menu label, because according to the FDA’s definition of
healthy food, the amount of total fat, saturated fat, cholesterol, and sodium are important when determining if food is healthy or not (FDA, 1999). Cholesterol was not included in the label because calories was the first health index mentioned in the Dietary Guidelines for Americans 2010, and 25 percent of consumers find information on sodium most useful compared to only 15 percent who find cholesterol useful (Food Marketing Institute, 1996; USDA, 2010). The label was limited to four negative nutrients based on the information load studies, and the researcher’s concern that the addition of percent daily value in the third treatment would be perceived at eight points of information by the participants.

**Motivation and Nutrition Knowledge**

In addition to label format and content, individual characteristics play an important role in food purchase and consumption decisions. Among the many individual health characteristics, motivation to perform healthy behaviors (i.e., process nutrition information) and nutrition knowledge have consistently been measured in studies meant to identify the effects of nutritional information on food choices and assessments. The reason for this is motivation is needed to initially acquire the information and process it, while nutrition knowledge is needed to be able to comprehend and evaluate the information before it can be effectively integrated in purchase decision making (Jacoby et al., 1977, Moorman & Matulich, 1993). Previous research studies revealed the influence motivation to process nutrition information and nutrition knowledge has on healthy behaviors and food label usage (Andrews et al., 1998; Drichoutis, Lazaridis, & Nayga, 2005; Droms, 2006; Burton, Garretson, & Velliquette, 1999; Keller et al., 1997; Moorman, 1990; Moorman & Matulich, 1993).

According to Moorman (1990) “motivation to process is an internal readiness to process information, created by the personal relevance of the stimulus....[and it] facilitates greater information acquisition and elaboration,” (p. 363). Nutritional knowledge refers the ability to
comprehend and use nutrition information accurately (Moorman & Matulich, 1993). Literature shows motivation to process nutrition information has an intertwined relationship with nutrition knowledge.

Motivation to perform healthy behaviors, such as consulting a nutrition label, is one of the significant factors that influence healthy behaviors (Moorman & Matulich, 1993). In this study several individual characteristics (motivation to perform healthy behavior, health knowledge, health status, health locus of control, healthy behavior control, age, education and income) influence on healthy behaviors were measured. Healthy behaviors are actions performed to avoid diseases or unhealthy states, such as information acquisition and health maintenance activities. The researchers surveyed a diverse demographic and socio-economic group and identified an interaction where individual characteristics were significant predictors of positive and negative healthy behavior. Motivation to perform healthy behaviors, in particular, moderated the effects of the health characteristics on healthy behavior performance. It was also found that health knowledge had a positive effect on information acquisition from media sources, that is, as the degree of knowledge increased, the likelihood a consumer would use a nutrition label increased as well.

Szykman et al. (1997) used the FDA's Food Label Use and Education Survey, conducted in 1994, to test their conceptual model of the relationships between: frequency of label use, frequency of on-package claim use, the amount of relevant diet-disease knowledge, perception of how effective diet is in the fight against disease, health status, and the level of skepticism toward claims. The model proposed and the survey data supported a positive relationship between knowledge and person's perceived diet effectiveness in preventing diseases, which in turn increased the use of the nutrition label. The researchers suggested that more knowledgeable consumers are more likely to believe they can prevent the onset of a disease.
through their diet and thus seek the quantities of the nutrients (increased label use) that are linked to the diseases they are trying to prevent.

Drichoutis et al. (2005) employed an economic model of information search as well and also found that the relationship between nutrition knowledge and label and nutrient content use is positive and significant. Nutritional knowledge facilitates label use by increasing the perceived benefits of label use, by increasing efficiency, and by decreasing the cost of using them (Nayga, 2000).

In particular, there is evidence that nutritional knowledge can play an important role in food evaluations and effective label use. Andrews et al. (1998) conducted a between-subjects, unbalanced experiment with adult, primary food shoppers that examined the effects of nutritional claims in a print ad depending on nutritional knowledge, disclosure type (none, absolute, percentage, evaluative), and ad claim type (no claim, general claim, and specific claim). The disclosure provided information on the level of fat in the margarine being promoted. During the pretest the researcher created a questionnaire that effectively measured the nutritional knowledge of participant as either high or low. The different disclosure types had a significant effect on perceived fat level, disease risk perception, and general attitudinal measures, which were not moderated by nutrition knowledge. The researchers expected highly knowledgeable consumer to process, comprehend, and use more accurately the detailed disclosures (relative and evaluative) than those with lesser knowledge. However, highly knowledgeable consumers had improved accuracy in measuring fat content in the margarine (high = 3.93; low = 2.97; p < .06), and perceived cancer risk directionally, when shown the absolute disclosure than lesser knowledgeable consumers. This indicates that highly knowledgeable consumers are able to comprehend and use absolute information; therefore, they may not need reference information.
Barone et al. (1996) speculated highly knowledgeable consumers may not need reference information to effectively use nutrition labels, that is, the impact of percent daily value should be greater for those with lesser nutrition knowledge. A study conducted by Li, Miniard, and Barone (2000) provided opposing evidence. The researchers examined the moderating role knowledge has on participants use of percent daily value in rating the healthiness of the item and its nutrients, their overall attitude toward the item, and how likely they would try the item. Undergraduates were shown the nutrition label for crackers that was nutritionally skewed as strong or weak, and the label either had the percent daily value or it did not. Knowledge was a manipulated factor that was achieved by providing the high knowledge group with three pages of materials intended to educate them on the contents of the nutrition label and what is and how to use the percent daily value. As hypothesized, higher knowledge participants shown the percent daily value gave more favorable (unfavorable) ratings for the six dependent measure for the stronger (weaker) product (p < .001) However, such polarized results was far less evident in the high knowledge, no reference value group. The low knowledge group was unresponsive to the nutrition value manipulation regardless if the reference value was there or not. Furthermore, researchers tested to ensure that motivation did not inadvertently become a moderating factor. Results showed the degree motivation was consistent across all groups, thus confirming knowledge is a moderating factor in reference value use. Even without the treatment of reference information, higher knowledge was related to increased (decreased) nutrition beliefs and attitude for the favorable (unfavorable) nutrition valued items (Burton et al., 1994)

Motivation to process nutrition information also moderates the relationship between nutritional information and increased accuracy in consumers’ food evaluations. Keller et al. (1997) utilized a statewide household research panel to measure participant’s motivation to
process nutrition information along with the following dependent variables: nutrition attitude, overall food attitude, perceived credibility of the product marketer, and purchase intention. The product used was a frozen chicken dinner, which had three manipulated levels of nutritional values (poor, medium, and good). A significant interaction between motivation and nutrition value (indicated by information in Nutrition Facts label) was identified that had an effect on consumers’ evaluations. When the nutrition value was good, highly motivated consumers rated nutrition attitude, overall attitude toward the product, and purchase intention higher than those with lower motivation; but only significantly for nutrition attitude ($p < .01$). The relationship was reverse in the poor nutrition value condition ($p < .01$). Also, the higher motivated group was more sensitive to the difference in the cholesterol and sodium between the medium and good valued chicken dinners in their nutrition evaluation than the less motivated group. Therefore, as the degree of motivation increases, so does information acquisition and evaluation as reflected in the more accurate nutrition evaluations.

Similar results were found by Howlett, Burton, Bates, and Huggins (2009). The researchers found that when motivation was high, participants rated an unhealthy food more negatively after nutrition information was disclosed than pre-disclosure ratings. Conversely when only ingredients were disclosed, there is not a significant difference between pre and post rates no matter the degree of motivation. Thus the researchers concluded that consumers need to be motivated to access and use nutrition information to influence food evaluations.

Not only does motivation to process information have an effect on label use, but the number of nutrient attributes interacts with the degree of motivation. Yoon (2009) surveyed undergraduate and graduate students to determine the effect of varied nutrient quantity in a label had on consumers’ nutritional evaluation of a menu item, personal attitude toward a menu item, and their purchase intention. In addition, nutrition motivation and knowledge effect as
moderating variables was measured. Yoon found that motivation to process nutritional information had a significant moderating effect on participants’ perceived nutrition and overall attitude toward a menu item when nutritional information was present. More specifically, highly motivated consumers rated the nutritiousness of items more negatively when the highest number of nutrition attributes (i.e., six) was disclosed than the low and moderately motivated consumers. Conversely, when only calories were present, low and highly motivated consumers were more negative about the healthiness of the item than moderately motivated consumers. Motivation to process did not have an effect on the consumers’ purchase behavior. The effect of subjective nutrition knowledge was moderated by motivation: Changes in food evaluation and purchase intention only occurred when consumers had enough motivation to process nutritional information. Overall, the degree of nutritional knowledge did not significantly influence consumers’ food evaluation or purchase intention, but was significantly associated with how accurately they used nutritional information.

The above stream of literature universally concluded that highly motivated and knowledgeable consumers are more likely to acquire and process nutritional information, and have improved accuracy gauging the nutritiousness of food items. However, despite the significant role motivation and nutritional knowledge play in food decisions, only a few studies have measured these individual characteristics in regards to food choices and evaluations in food service establishments. Accordingly, it should be determined how nutritional knowledge and motivation to process nutritional information moderate the evaluations of menu items, depending on the presence and format of nutritional information. Hence the following hypotheses were proposed:

H4a: Health motivation will positively moderate the effect that the presence of a nutrition label has on dietary judgment and nutrition evaluation accuracy, decision certainty and
confusion, and perceived label comprehension and utility, such that individuals with higher
levels of health motivation will be more affected by label information.

H4b: Nutrition knowledge will positively moderate the effect that the presence of a
nutrition label has on dietary judgment and nutrition evaluation accuracy, decision certainty and
confusion, and perceived label comprehension and utility, such that individuals with higher
levels of nutrition knowledge will be more affected by label information.

Summary of Literature Review and Conceptual Model

Prior studies provide enough evidence that the value of perceived risk associated with
information on negative nutrients is greater than that of perceived gains associated with
information on positive nutrients, and that negative information is a more powerful persuader
than positive information (Mizerski 1982). Past literature that studied the effect of the amount
of information presented suggests that, at least up to some point, increases in relevant attribute
information can have a positive effect. Empirical evidence proposes that the percentage format,
which seems to increase both the amount of information and the quality of information, should
result in improved accuracy in rating nutritiousness, higher confidence, higher label
comprehension, and improved label utility.

Previous studies supply enough evidence that consumers’ healthy eating behavior in
restaurants could be influenced by external factors such as label format and content, as well as
by internal factors such as nutrition knowledge and motivation to process nutrition information.
Empirical evidence suggests that consumers high in motivation and knowledge tend to process
and use the provided information more effectively.

Based on the literature reviewed and the hypotheses proposed, the following
conceptual model of this study was developed and is show in Figure 1.
Figure 1: Conceptual Model of this Study
CHAPTER 3

METHODOLOGY

In the previous chapters, research questions and hypotheses were developed based on current societal trends and prior research studies regarding nutritional labeling. Hypotheses tested in this study consider the effects of (1) a nutrition label, (2) reference values, (3) nutrition knowledge, and (4) motivation to process nutrition information on the accuracy and certainty of evaluating the nutritiousness of entrees, utility of the label information and perceived label comprehension. To test the hypotheses an experimental design method was used. Specifically, a survey was created to obtain the data needed to answer the research questions. This chapter describes the development of the experimental design and the survey procedure used in this study.

**Experimental Design**

To empirically test the hypotheses, a between-subjects factorial design was created: 3 (no label, absolute number, percentage) x 2 (high motivation, low motivation) x 2 (high knowledge, low knowledge). To determine the effect of the nutritional label’s format on consumers’ ability to use the label and identify the level of nutritiousness of an entrée, five dependent variables were measured in this study: accuracy, certainty, confusion, comprehension, and utility.

**Menu Design**

**Entrée Choices**

One menu was created that received three treatments for a total of three menus, and thus three similar versions of the survey. Three levels of nutritional value for the entrees were established to follow the pattern instituted by Burton et al. (2006) when they tested how including nutrition information affected preferences. The menu contained nine entrees that
were selected from the menu of a national, casual, full-service restaurant chain so that there were three entrees for each level of nutritional value. The nutritional information for each entrée was pulled from the restaurant’s website. Some of the menu entrees’ nutrition information were manipulated, consistent with previous studies (Ford et al., 1996; Hwang & Lorenzen, 2008; Kozup, et al., 2003; Scammon, 1977; Yoon, 2009), so that the nutritional values of the healthy entrees were set at 40 percent or less of the daily recommended values, moderate entrees were set between 41 percent to 70 percent, and unhealthy entrees were set at 71 percent or greater for calories, total fat, and saturated fat. Sodium content in restaurant entrees tend to be high, therefore sodium values were not manipulated. The entrees and their nutrient content are summarized in the Table 1 below.

<table>
<thead>
<tr>
<th>Table 1: Menu Entrees and Their Manipulated Nutrition Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calories (％DV)</strong></td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Healthy Entrees</td>
</tr>
<tr>
<td>Chopped Salad</td>
</tr>
<tr>
<td>Top Sirloin Steak</td>
</tr>
<tr>
<td>Baked Haddock</td>
</tr>
<tr>
<td>Moderate Entrees</td>
</tr>
<tr>
<td>Chicken Caesar Salad</td>
</tr>
<tr>
<td>Chicken Parmesan</td>
</tr>
<tr>
<td>Shrimp Scampi</td>
</tr>
<tr>
<td>Unhealthy Entrees</td>
</tr>
<tr>
<td>Crunchy Chicken Wrap</td>
</tr>
<tr>
<td>Bacon Cheeseburger</td>
</tr>
<tr>
<td>Macaroni &amp; Cheese</td>
</tr>
</tbody>
</table>

**Menu Layout (Independent Variables)**

To validate the effect of a nutrition label on the menu and to find the extent that the label’s format has an effect on consumer dietary judgments and nutrition evaluations, three
different treatments of nutrition labels were provided: no nutrition label, which was the control group (CG) absolute numbers only (AN), and the percent daily values (DV).

**Control Group (CG)**

The first menu was designed to resemble a typical full-service restaurant menu. It included the name of the entrée with a description of the ingredients but no nutrition information; this served as the control group. Prices were not included because they were not relevant to this study and the researcher did not want to risk spuriousness.

**Absolute Number (AN)**

For the absolute number label, the same information was presented as the control group menu, but it also included the quantity of calories, total fat grams, saturated fat grams, and sodium milligrams for each entrée. The negative nutrients were chosen based on the definition of healthy food, current regulations, and previous studies. The nutrient values were placed below the entrée name and above the menu description and were separated by a solid dot. At the bottom of the menu was a key explaining the label (Burton et al., 2004; Fitch et al., 2009; Lando & Labiner-Wolfe, 2007; Roberto et al, 2010).

**Percent Daily Value (DV)**

The percent daily value label presented the same information as the absolute number label menu, but also included the percent daily value for each of the negative nutrients. The percentages were in parenthesis appended to the absolute number. A sentence was added to the key explaining the reference values. The menus are in Appendix A: Researcher Letter, Menu, and Survey for Each Experimental Condition.

**Survey**

The three surveys were created in Qualtrics, a web based survey program. The surveys are in Appendix A: Researcher Letter, Menu, and Survey for Each Experimental Condition.
Measures of Dependent Variables

To determine the effectiveness of the two menu label conditions being tested, five dependent variables were measured in this study: accuracy, certainty, confusion, comprehension, and utility. The measures of these five variables were pulled from previous studies, but were altered for this study. The majority of responses were measured using a five-point Likert-scale.

Accuracy

The accuracy dependent variable measures the participant’s ability to make accurate dietary judgments and nutrition evaluations regarding the menu entrees. This variable is relevant to the primary objective of menu labeling as it tests how well consumers can use the information to gauge the nutritiousness of an entrée, and hopefully make informed choices.

The ability to identify the nutritiousness of an entrée should differ across the label formats. A participant’s accuracy in dietary judgments was measured by three tasks from prior studies.

The first two tasks asked participants to identify the two most and the two least healthy entrees from the menu. For survey participants to accurately identify the most and least healthy entrees, they must notice the nutrition information, find and read the key explaining what that numbers represent, understand the key, and then make their selection (Pulos & Leng, 2010). Participants were asked to identify the two healthiest and the two least healthy entrees on the menu to measure the affect the label treatments had on their accuracy. Furthermore, participants were asked if they noticed the nutrition label and whether or not they looked at the key to see what the numbers on the labels meant (Chandon & Wansink, 2007; Pulos & Leng, 2010).

The third dietary judgment task measured participants’ accuracy in processing the nutrition label information to successfully answer the question. Participants were asked, “If you
were to eat three servings of the Grilled Shrimp and Sirloin in one day, what nutrient(s) would you consume more than the daily recommended amount of: calories, total fat, saturated fat, or sodium?” The question was chosen based on prior research and indicates how well the participant can use the label to determine the nutrient level in regards to the daily allowance (Andrews et al., 1998; Burton et al., 1994; Burton et al., 1999; Burton et al., 2009; Ford et al., 1996; Keller et al., 1997; Lando & Labiner-Wolfe, 2007; Moorman, 1990; Viswanathan; 1996).

The nutrition evaluation variables measured participants’ nutrition beliefs regarding the quantity of each nutrient in the entrée and its overall healthiness (Scammon, 1977; Viswanathan, 1996). Participants’ nutrition beliefs was measured by asking, “How do you rate the calorie, total fat, saturated fat, and sodium levels for the Grilled Shrimp and Sirloin?” rated by a five-point Likert scale defined as 1=very low to 5=very high. In addition, “How healthy do you consider the Grilled Shrimp and Sirloin?” was measured with a five-point Likert scale defined as 1=very unhealthy to 5=very healthy. These questions were included based on previous research (Burton et al., 1994; Burton et al., 2004; Ford et al, 1996; Garretson & Burton, 2000; Hwang & Lorenzen, 2008; Keller et al., 1997; Yoon, 2009)

Certainty and Confusion

The accuracy items were followed up with questions measuring how certain and confused the participant felt while completing the dietary judgment tasks. These questions were based on similar questions in the Jacoby et al. (1974) study. The specific questions were: “How certain are you that you selected the most and least healthy entrees?” measured by a five-point Likert scale defined as 1=very uncertain to 5=very certain, and “How confusing did you find selecting the most and least healthy entrees to be?” measured by a five-point Likert scale defined as 1=very confusing to 5=very clear.
**Comprehension**

The label’s format effect on perceived label comprehension was also assessed. This measurement was important in prior studies because it exposes the effectiveness of the label (Burton et al., 1994; Burton et al., 1999; Viswanathan, 1994) and therefore it was measured in this study as well. Using a five-point Likert scale defined as 1=strongly disagree to 5=strongly agree the following three statements were made: “The nutrition information provided on the label is hard to understand,” “The nutrition information provided on the label is very clear,” and “The nutrition information provided on the label is very confusing.” The “very clear” statement was reversed coded, thus a lower comprehension score reflected greater comprehension.

**Utility**

Although the nutrition label content and format was designed based on previous studies, it was important to know what the participants thought about this study’s label design. Using questions from past studies, participants were asked about the content and quantity of information on the label (Bollinger et al., 2010; Burton et al., 1994; Hwang & Lorenzen, 2008; Jacoby et al., 1974; Lando & Labiner-Wolfe, 2007; Viswanathan, 1996; Yoon, 2009).

Participants were asked to, “Rate the helpfulness of calories, total fat, saturate fat, sodium, percent daily value, and entrée description in influencing your most and least healthy entrée selections” using a five-point Likert scale defined as 1=very unhelpful to 5=very helpful. Participants were then asked which of the factors influenced their decision the most and the least.

The effects of Information load have been researched extensively and influenced the quantity of nutrients included in this study’s label. To measure if the amount of information on the label was effective or not, the following questions were asked: “What do you think about the number of nutrients included the nutrition label?” measured with a three-point Likert scale.
defined as 1=too few nutrients to 3=too many nutrients with the option of “not sure.” To delve deeper into the content of the label, participants were asked what, if any, nutrition information they would like added to or removed from the label. Lastly, the two label conditions that did not have the percent daily value was asked, “how helpful it would have been to have the percent daily value on the menu?” measured with a five-point Likert scale defined as 1=very unhelpful to 5=very helpful.

Moderating Variables

Motivation to Process Nutrition Information

Motivation to process nutrition information was measured using six items that were based on previous studies (Ford et al., 1996; Kolodinsky et al., 2009; Krukowski et al., 2006; Moorman, 1990; Stubenitsky et al., 2000; Yoon, 2009).

Three questions were asked concerning the participant’s attitude towards eating healthy. The specific questions were: “For you personally, eating healthy is:” measured by a five-point Likert scale defined as 1=very unimportant to 5=very important; “How careful are you when selecting what you eat to achieve a balanced, healthy diet?” measured by a three-point Likert scale defined as 1=not very careful to 3=very careful; and “When eating out, how likely is it that you would choose a healthy option for a meal over an unhealthy option?” measured by a five-point Likert scale defined as 1=very unlikely to 5=very likely.

Participants were asked how frequently they “use nutrition information when shopping for prepackaged food in a grocery store, convenience store or department store,” “look up nutritional information from on-line sources before dining at a restaurant to help make a meal selection,” and “use nutritional information if it is provided on the menu when making a meal selection” measured by a five-point Likert scale defined as 1=never to 5=always.
**Nutritional Knowledge**

Nutritional knowledge is the ability to use dietary and health information accurately (Moorman, 1993). To measure nutritional knowledge, both objective and subjective knowledge related questions were asked.

Subjective nutritional knowledge was measured by how participants rated their ability to use nutrition information. The following two statements were presented, based on questions in the Moorman (1990) study. Participants were asked to rate their level of accord with each statement using a five-point Likert scale defined as 1=strongly disagree to 5=strongly agree: “Using the nutrition information provided, I can determine if an entree is healthy or not” and “Using the nutrition information provided, I understand how an entree fits into my daily diet.”

Li et al. (2000) suggested that the knowledge variable should reflect the type of knowledge participants need to accurately perform what is being measured. Therefore, only three measures were used to determine objective knowledge regarding the nutrients included in this study.

The following three statements were presented, and participants were asked to rate their level of accord with each statement using a five-point Likert scale defined as 1=strongly disagree to 5=strongly agree: “Calories measure the amount of energy contained in a food item,” “It is better to consume more saturated fat than unsaturated fat” and “Consuming too much sodium can lead to high blood pressure.”

**Other Survey Questions**

At the end of the survey, general questions about restaurant visits, health status, and the opportunity to provide additional comments on nutrition labeling in restaurants were incorporated. The survey concluded with demographic questions categorizing respondents by their age, gender, education, income, and ethnicity.
Institutional Review Board (IRB) Approval

The cover letter from the researcher, the menus, and the surveys were submitted to an institutional review board for approval prior to launching the surveys. Approval was granted on August 01, 2011.

Pretest

A pretest was conducted with four respondents for each condition for a total of twelve. Their feedback on grammar, readability, and format were included in the final survey.

Study Procedure

From August 05 through August 22, 2011, adult consumers (eighteen years or older) were e-mailed a link to the web-based survey. Participants were randomly assigned to one of the surveys. The link was also posted on social media websites during the same time period.

Upon selecting the link, participants were presented with a cover letter from the researcher that explained the study and provided instructions. Participants were then shown the menu and asked questions regarding the listed entrees while still being able to see the menu. Next, participants were asked to answer questions about their nutritional perception of a specific menu item and their overall attitude towards the nutrition label. Health-related questions, measures of motivation to process nutritional information questions, and demographic questions followed in that order.

Analytical Procedure

The data were analyzed using SPSS version 17.0 for Windows. Cronbach’s alpha was calculated for dependent measures to assess its reliability. To test the hypotheses, analysis of variance (ANOVA) was executed with follow up Bonferroni tests, where applicable. Furthermore, to measure some of the dietary judgment tasks, cross-tabulations and chi-square difference tests were employed.
A total of 283 individuals participated in this study and are included in the analysis. The participants were randomly assigned to one of the three experimental conditions. The control condition had 97 respondents, the absolute number condition had 98 respondents, and the percentage condition had 88 respondents.

The majority of respondents were female (63%), Caucasian (91%), between 26 and 35 years old (41%), with a bachelor’s degree (37%) earning between $25,000 and $49,000 annually (39%) before taxes. Table 2 summarizes the demographic information of respondents in this study.
<table>
<thead>
<tr>
<th>Table 2: Demographic Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GENDER</strong></td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Missing</td>
</tr>
<tr>
<td><strong>AGE</strong></td>
</tr>
<tr>
<td>18-25</td>
</tr>
<tr>
<td>26-35</td>
</tr>
<tr>
<td>36-45</td>
</tr>
<tr>
<td>46-55</td>
</tr>
<tr>
<td>56-65</td>
</tr>
<tr>
<td>66-75</td>
</tr>
<tr>
<td>76 or older</td>
</tr>
<tr>
<td>Missing</td>
</tr>
<tr>
<td><strong>EDUCATION</strong></td>
</tr>
<tr>
<td>Some high school or less</td>
</tr>
<tr>
<td>High school diploma or equivalent</td>
</tr>
<tr>
<td>Associate degree or Technical school</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
</tr>
<tr>
<td>Graduate degree or Doctoral degree</td>
</tr>
<tr>
<td>Missing</td>
</tr>
<tr>
<td><strong>PRE-TAX INCOME</strong></td>
</tr>
<tr>
<td>Less than $25,000</td>
</tr>
<tr>
<td>$25,000 - $49,000</td>
</tr>
<tr>
<td>$50,000 - $74,999</td>
</tr>
<tr>
<td>$75,000 - $99,999</td>
</tr>
<tr>
<td>$100,000 or more</td>
</tr>
<tr>
<td>Missing</td>
</tr>
<tr>
<td><strong>ETHNICITY</strong></td>
</tr>
<tr>
<td>African American</td>
</tr>
<tr>
<td>Asian</td>
</tr>
<tr>
<td>Caucasian</td>
</tr>
<tr>
<td>Hispanic/Latino/Spanish</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Missing</td>
</tr>
</tbody>
</table>
Lifestyle

In addition to demographic questions, a few lifestyle questions were asked to determine how frequently participants dined at restaurants and how they felt about their weight and overall health. Most respondents reported they ate a meal from a restaurant two or three times a week (41%) for breakfast, lunch, or dinner. While participants considered themselves either slightly overweight or overweight (45%), the majority of the group deemed themselves somewhat or very healthy (78%). Table 3 summarizes the lifestyle information of respondents in this study.

Table 3: Lifestyle Information

<table>
<thead>
<tr>
<th>WEIGHT</th>
<th>Frequency</th>
<th>Percent</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>1</td>
<td>.4%</td>
<td>3.66</td>
<td>.788</td>
</tr>
<tr>
<td>Slightly Underweight</td>
<td>9</td>
<td>3.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy Weight</td>
<td>118</td>
<td>41.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slightly Overweight</td>
<td>111</td>
<td>39.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>44</td>
<td>15.5%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HEALTHINESS</th>
<th>Frequency</th>
<th>Percent</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Unhealthy</td>
<td>3</td>
<td>1.1%</td>
<td>3.96</td>
<td>.970</td>
</tr>
<tr>
<td>Somewhat Unhealthy</td>
<td>31</td>
<td>11.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neither Healthy nor Unhealthy</td>
<td>26</td>
<td>9.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Somewhat Healthy</td>
<td>140</td>
<td>49.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very Healthy</td>
<td>81</td>
<td>28.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not sure</td>
<td>2</td>
<td>.7%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EAT RESTAURANT MEAL</th>
<th>Frequency</th>
<th>Percent</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than once a week</td>
<td>43</td>
<td>15.2%</td>
<td>2.79</td>
<td>1.080</td>
</tr>
<tr>
<td>Once a week</td>
<td>56</td>
<td>19.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 – 3 times a week</td>
<td>116</td>
<td>41.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 – 6 times a week</td>
<td>53</td>
<td>18.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily</td>
<td>15</td>
<td>5.3%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reliability Measure

Cronbach’s alpha was calculated to test the internal consistency of the comprehension dependent variable. Comprehension was assessed by using a three-item measure adopted from Burton et al. (1994), Burton et al. (1999) and Viswanathan (1994). Using a five-point Likert scale
defined as 1=strongly disagree to 5=strongly agree the following three questions were asked:

“The nutrition information provided on the label is hard to understand;” “The nutrition information provided on the label is very clear;” and “The nutrition information provided on the label is very confusing.” The “very clear” statement was reversed coded, thus a lower comprehension score reflected greater comprehension. The Cronbach’s alpha for comprehension was .90; an acceptable level of reliability occurs when α=0.70. Therefore, the comprehension measure is deemed internally consistent and reliable in measuring the dependant variable comprehension.

Hypotheses Tests

Effect of Nutrition Label Conditions on Dependent Variables

Accuracy

H1a and H1b involve the effect of nutrition label conditions on accuracy in dietary judgments and nutrition evaluations. Participants were given a number of different dietary judgment tasks. First, participants were asked to identify the two healthiest entrees on the menu. Next, participants were asked to identify the two least healthy entrees on the menu. The participants could refer to the menu while answering these two questions. Respondents received one point for each correct item selected. The two questions were analyzed separately, so for the healthiest choice question participants could have zero, one, or two points. The same applied for the least healthy entrée question.

Another dietary judgment task involved participants identifying what nutrients they would consume more than the recommended daily amount if they eat the Grilled Shrimp and Sirloin entrée three times in a day. Three of the four nutrients would be over the recommended daily amount if the entrée was consumed three times: total fat, saturated fat, and sodium. The maximum accuracy score was three points. A point was deducted if a respondent selected
calories or did not select one of three nutrients. Participants that selected “cannot determine from the information provided” were given a score of zero.

A cross-tabulation was performed between the three menu treatments and the number of participants that made one hundred percent accurate choices in each judgment task. As shown in Table 4, 51 percent, 70 percent, and 61 percent of respondents correctly chose the two healthiest entrees in the control, absolute number, and percentage conditions, respectively ($\chi^2=9.443; p=.05$). The pattern of findings were similar for the two unhealthiest entrees, with 64 percent, 80 percent, and 78 percent accurately choosing the entrees in the control, absolute number, and percentage conditions, respectively ($\chi^2=11.094; p<.05$). A significant difference was found among the control, absolute number, and percentage conditions accuracy score for identifying the over consumed nutrients with zero percent, 59 percent, and 65 percent choosing the correct nutrients, respectively ($\chi^2=115.696; p<.01$).

Follow-up cross-tabulations were conducted to directly compare each condition with one another to obtain a more precise picture on how the label conditions affected the dependent measures. The results are shown in the bottom portion of Table 4. For all three measures, there was a significant difference between the number of participants with complete accuracy in the control condition and absolute number condition. There was only a significant difference between the control condition and the percentage condition for the least healthy and the over consumed nutrients measures. Although there was no significant difference between the control condition and percentage condition in selecting the healthiest entrees, the percentage condition had a higher percent of participants that accurately identified the two healthiest entrees, which reflects the hypothesized relationship. Thus, H1a as it relates to the effect of label presence on accuracy in dietary judgments was supported.
There is no significant difference between the number of participants with complete accuracy in the absolute number and the percentage conditions across all three measures nor are the frequency values in the hypothesized direction. Therefore, H1b as it relates to the effect of percent daily value presence on accuracy in dietary judgments was not supported.

Table 4: Chi-Square Test for Differences across Experimental Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>N</th>
<th>Freq.</th>
<th>( \chi^2 )</th>
<th>P</th>
<th>Freq.</th>
<th>( \chi^2 )</th>
<th>P</th>
<th>Freq.</th>
<th>( \chi^2 )</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG</td>
<td>97</td>
<td>50 (51.5%)</td>
<td>9.443</td>
<td>.05</td>
<td>62</td>
<td>(63.9%)</td>
<td>11.094</td>
<td>&lt;.05</td>
<td>0</td>
<td>(0.0%)</td>
</tr>
<tr>
<td>AN</td>
<td>98</td>
<td>69 (70.4%)</td>
<td>78 (79.6%)</td>
<td>58</td>
<td>(59.2%)</td>
<td>69 (78.4%)</td>
<td>57</td>
<td>(64.8%)</td>
<td>92.204</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>DV</td>
<td>88</td>
<td>54 (61.4%)</td>
<td>9.111</td>
<td>.01</td>
<td>9.277</td>
<td>.01</td>
<td>93.619</td>
<td>&lt;.01</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: CG: Control Group; AN: Absolute Number; DV: Percentage

The hypothesized relationships were further tested with univariate analyses of variance (ANOVAs) conducted on the four nutrient quantity beliefs and overall healthiness rating of the Grilled Shrimp and Sirloin entrée. Cell means and ANOVA results are shown in Table 5. The label conditions had significant main effects on all five dependent measures (p < .01).

Follow-up Bonferroni contrasts indicate that consumers in the control condition inaccurately rated the dependent measures (except for sodium) when compared to the two label formats. Specifically, participants rated the calorie content of the Grilled Shrimp and Sirloin entrée more negatively in the absence of a nutrition label than either of the two label groups (M = 3.73 for control, 2.37 for absolute number, and 2.90 for percentage; p < .01), yet the calorie content was the most favorable of the four negative nutrients. Participants rated the total fat content more positively in the absence of a nutrition label than either of the two label groups (M = 3.75 for control, 4.13 for absolute number, and 4.30 for percentage; p < .01). A similar pattern of findings occurred for the sodium content (M = 3.54 for control, 4.75 for...
absolute number, and 4.84 for percentage; p < .01) and overall healthiness (M = 3.44 for control, 2.60 for absolute number, and 2.51 for percentage; p < .01). Note that for each nutrient a higher value indicates a more unfavorable nutrient level but for overall healthiness a higher number indicates a healthier rating (See Table 5).

The results for saturated fat were inconsistent with the above findings. The absolute number condition rated the saturated fat content more positively than the control condition (M = 3.33 for absolute number and 3.64 for control; p < .10) and the percentage condition (M = 3.33 for absolute number and 3.86 for percentage; p<.01). The more favorable rating for sodium in the absolute number condition is contrary to the hypothesized relationship. There is no significant difference between the control condition and the percentage condition, but the difference was in the hypothesized direction. The findings for all five measures support H1a as it relates to the effect of label presence on accuracy in nutrition evaluations, except for the sodium measure in the absolute number condition.
Table 5: Differences of Nutrient Ratings and Overall Health Rating by Experimental Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>DEPENDENT MEASURES</th>
<th>CALORIES&lt;sup&gt;a&lt;/sup&gt;</th>
<th>TOTAL FAT&lt;sup&gt;a&lt;/sup&gt;</th>
<th>SATURATED FAT&lt;sup&gt;a&lt;/sup&gt;</th>
<th>SODIUM&lt;sup&gt;a&lt;/sup&gt;</th>
<th>HEALTHINESS&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M</td>
<td>SD</td>
<td>F</td>
<td>P</td>
<td>T</td>
</tr>
<tr>
<td>CG</td>
<td>96</td>
<td>3.73</td>
<td>801</td>
<td>30.27</td>
<td>&lt;.01</td>
<td>93</td>
</tr>
<tr>
<td>AN</td>
<td>96</td>
<td>2.73</td>
<td>1.061</td>
<td>30.27</td>
<td>&lt;.01</td>
<td>92</td>
</tr>
<tr>
<td>DV</td>
<td>88</td>
<td>2.90</td>
<td>971</td>
<td>30.27</td>
<td>&lt;.01</td>
<td>83</td>
</tr>
<tr>
<td>CG vs AN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;.01</td>
<td>3.30</td>
</tr>
<tr>
<td>CG vs DV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;.01</td>
<td>4.66</td>
</tr>
<tr>
<td>AN vs DV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;.10</td>
<td>1.44</td>
</tr>
</tbody>
</table>

Note: CG: Control Group; AN: Absolute Number; DV: Percentage
<sup>a</sup>Items are measured on a 5-point scale (1=very low to 5=very high)
<sup>b</sup>Item is measured on a 5-point scale (1=very unhealthy to 5=very healthy)
The differences in means between the percentage condition and absolute number condition were in the postulated direction, but the differences were only significant for saturated fat. For that reason H1b as it relates to the effect of percent daily value presence on accuracy of nutrition evaluations was partially supported.

The interaction plot in Figure 2 shows the absolute and the percentage conditions’ ratings of the nutrient contents negatively increased in comparison with the actual nutrient content in the Grilled Shrimp and Sirloin entrée. Calories had lowest quantity at 32 percent of to recommended daily allowance, followed by saturated fat, total fat, and sodium with quantities of 42 percent, 65 percent, and 90 percent, respectively. In contrast, the control condition rated sodium as having the lowest level out of the four nutrients when in actuality it was the highest, and cell means were consistent across all variables despite the varying levels of the nutrients. This provides further support for hypothesis 1a.

Figure 2: Effect of Label Conditions on Nutrient Ratings and Overall Health Rating
**Certainty and Confusion**

Hypothesis 2a predicted that the addition of a nutrition label on the menu will increase consumers’ decision certainty and decrease confusion when making dietary judgments and nutrition evaluations compared to when there is no label. Hypothesis 2b suggests the inclusion of the percent daily value will produce elevated consumers’ decision certainty and decrease confusion when making dietary judgments and nutrition evaluations compared to when there is no reference information.

Analysis of variance results in Table 6 shows the label conditions did not have a significant main effect on consumers’ certainty with their choices for the most and least healthy entrees. As shown in hypothesis 2b is not supported, this unexpected finding has important implications that will be discussed later in the paper.

Figure 3, the difference in means between the control condition and the two label groups are in the hypothesized direction but the differences are not significantly different. Therefore, these findings do not lend support to the predicted effect of nutrient labeling on certainty of decision making.

**Table 6: Differences in Certainty and Confusion of Dietary Judgments by Experimental Conditions**

<table>
<thead>
<tr>
<th>Condition</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>F</th>
<th>P</th>
<th>T</th>
<th>M</th>
<th>SD</th>
<th>F</th>
<th>P</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG</td>
<td>97</td>
<td>3.68</td>
<td>.884</td>
<td>.884</td>
<td>&gt;.10</td>
<td></td>
<td>3.52</td>
<td>1.052</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AN</td>
<td>98</td>
<td>3.86</td>
<td>1.131</td>
<td></td>
<td></td>
<td></td>
<td>3.86</td>
<td>1.131</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DV</td>
<td>88*</td>
<td>3.82</td>
<td>.865</td>
<td></td>
<td></td>
<td></td>
<td>3.45</td>
<td>1.118</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CG vs AN: >.10 1.29 <.10 2.15
CG vs DV: >.10 0.98 >.10 0.43
AN vs DV: >.10 0.28 <.05 2.53

Note: CG: Control Group; AN: Absolute Number; DV: Percentage

*a* Item is measured on a 5-point scale (1=very uncertain to 5=very certain)

*b* Item is measured on a 5-point scale (1=very confusing to 5=very clear)

*Note: only 87 respondents in the DV group answered the confusion question*
The label condition did have a main effect on participants’ level of confusion when completing the dietary judgment tasks and nutrition evaluations. Differences between conditions were assessed by conducting individual t-tests (See lower part of Table 6). The results indicated that participants in the absolute number condition had significantly less confusion than those in the control condition ($p < .10$), but there is no significant difference in confusion between the control and percentage conditions. The last portion of hypothesis H2a postulates less confusion when there is a nutrition label, which is supported in the absolute number condition but not in the percentage condition. The mean difference between the absolute number condition and the percentage condition is significant ($M = 3.86$ vs $M = 3.45$; $p < .05$) but opposite of the hypothesized direction (see Figure 3). While hypothesis 2b is not supported, this unexpected finding has important implications that will be discussed later in the paper.

Figure 3: Effects of Experimental Conditions on Certainty and Confusion
Participants assigned to the control condition were asked how helpful it would have been to have a nutrition label when making nutrition evaluations (1=very unhelpful to 5=very helpful). Results suggested that participants would find a nutrition label very helpful in making nutrition evaluation (M=4.34; σ=1.145).

**Comprehension and Utility**

Perceived nutrition label comprehension and utility were only measured in the absolute number and the percentage conditions because the control condition did not have a nutrition label. The ANOVA revealed a main effect for the two label formats, but not in the hypothesized direction. The cell means in Table 7 revealed an improved perceived label comprehension for the absolute number condition. Recall that a lower comprehension score indicates higher comprehension. Despite the results being marginally significant, they are not in the postulated direction; hence, the first half of hypothesis 3 is not supported.

**Table 7: Differences in Comprehension of Label by Experimental Conditions**

<table>
<thead>
<tr>
<th>Condition</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN</td>
<td>94</td>
<td>2.23</td>
<td>.944</td>
<td>2.918</td>
<td>&lt;.10</td>
</tr>
<tr>
<td>DV</td>
<td>85</td>
<td>2.46</td>
<td>.867</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: AN: Absolute Number; DV: Percentage

Item is measured on a 5-point scale (1=strongly disagree to 5=strongly agree)

Perceived label utility was assessed using two items. Analysis of variance (ANOVA) was utilized to test the effect the two label formats had on participants’ perception of the quantity of label attributes. This variable was measured on a three-point scale with 1=too few nutrients and 3=too many nutrients. The option of “not sure” was also available, which 19 percent of the participants in these two conditions selected, but the cells were excluded from the ANOVA. The outcomes in Table 8 are almost identical and show there is no significant difference between the
two label conditions even though the percentage format had double the attributes (four vs. eight).

Table 8: Differences in Rating of the Label’s Quantity of Attributes by Experimental Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN</td>
<td>74</td>
<td>1.69</td>
<td>.572</td>
<td>.045</td>
<td>&gt;.10</td>
</tr>
<tr>
<td>DV</td>
<td>57</td>
<td>1.67</td>
<td>.636</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: AN: Absolute Number; DV: Percentage

The helpfulness of percent daily value was measured in the three label conditions. The two label conditions that did not have the reference value were asked how helpful it would have been to have percent daily value when completing the dietary judgment tasks (1=very unhelpful, 5=very helpful). The percentage condition was asked how helpful it was to have the percent daily value present (1=very unhelpful, 5=very helpful). Cell means and ANOVA results are in Table 9. There is no significant difference between the two conditions that had no reference values. In general however, the mean values for helpfulness increased as the amount of nutrition information on the label conditions decreased. There is no main effect from the label conditions on perceived utility; consequently, hypothesis 3 is not supported.

Table 9: Differences in Helpfulness of Percent Daily Value by Experimental Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG</td>
<td>93</td>
<td>4.04</td>
<td>.988</td>
<td>.343</td>
<td>&gt;.10</td>
</tr>
<tr>
<td>AN</td>
<td>96</td>
<td>3.95</td>
<td>1.226</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DV</td>
<td>87</td>
<td>3.86</td>
<td>1.202</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: CG: Control Group; AN: Absolute Number; DV: Percentage
Item measured on a 5-point scale (1=very unhelpful to 5=very helpful)
The Effect of Health Motivation

Motivation to process nutrition information was a measured variable rather than a manipulated factor. Five items were used to assess motivation to process nutrition information. Three of the items measured the frequency of nutrition information use: in the grocery store, from online sources, and on a restaurant menu. The other two items measured healthy eating habits. Similar to Bates et al. (2009), Howlett et al. (2009), and Keller et al. (1997), the five items were averaged to create a single motivation measure. A median split was performed, and the measure was recoded to reflect a low level of motivation (coded as zero) or a high level of motivation (coded as one).

Accuracy

It was postulated that a higher level of motivation to process nutrition information would be associated with greater accuracy in completing the three dietary judgment tasks detailed above. A cross-tabulation was performed between the two motivation groups and the number of participants that made one hundred percent accurate choices. As shown in Table 10, there was not a main effect for the degree of motivation on the accuracy in the dietary judgment tasks.

<table>
<thead>
<tr>
<th>Table 10: Chi-Square Test for Differences across Motivation Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DEPENDENT MEASURES</strong></td>
</tr>
<tr>
<td>Condition</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Low Motivation</td>
</tr>
<tr>
<td>High Motivation</td>
</tr>
</tbody>
</table>

The hypothesized relationships were further tested with a two-way analyses of variance (condition x motivation) conducted on the four nutrient quantity beliefs and over all healthiness of the Grilled Shrimp and Sirloin entrée. Cell means and ANOVA results are shown in Table 11.
The motivation groups had a significant main effect on the calories, total fat, and saturated fat dependent measures. This two-way analysis also reiterated that the label condition has a main effect on the evaluation of all the nutrients and overall healthiness (p < .01). However, the interaction between the label conditions and motivation groups has a moderately significant effect only for the evaluation of saturated fat (p = .10).

Motivation had the greatest effect on evaluating the level of total fat in the Grilled Shrimp and Sirloin entrée (p < .01). Within each label condition, the high motivation groups rated total fat more unfavorable than the low motivation groups (See Table 11). The same pattern occurred for saturated fat (p < .05), sodium (p >.10), and calories (p < .05). However, calories should have a more favorable rating (lower mean) since it provides only 32 percent of the recommended daily amount. For the overall healthiness rating, the higher motivation groups rated the entrée more unfavorable in the control and the absolute number conditions but not in the percent condition, although the difference between the two motivation groups was not significant.
### Table 11: Differences of Nutrient Ratings and Overall Health Rating by Motivation Groups

<table>
<thead>
<tr>
<th>Condition</th>
<th>Moderating Variable</th>
<th>N</th>
<th>M (SD)</th>
<th>N</th>
<th>M (SD)</th>
<th>N</th>
<th>M (SD)</th>
<th>N</th>
<th>M (SD)</th>
<th>N</th>
<th>M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG</td>
<td>Low Motivation</td>
<td>42</td>
<td>3.60 (.828)</td>
<td>40</td>
<td>3.60 (.900)</td>
<td>39</td>
<td>3.31 (.977)</td>
<td>40</td>
<td>3.37 (1.005)</td>
<td>41</td>
<td>3.66 (.855)</td>
</tr>
<tr>
<td></td>
<td>High Motivation</td>
<td>52</td>
<td>3.83 (.785)</td>
<td>51</td>
<td>3.86 (.749)</td>
<td>49</td>
<td>3.90 (.895)</td>
<td>49</td>
<td>3.65 (.969)</td>
<td>53</td>
<td>3.26 (.964)</td>
</tr>
<tr>
<td>AN</td>
<td>Low Motivation</td>
<td>51</td>
<td>2.53 (.880)</td>
<td>48</td>
<td>3.92 (.986)</td>
<td>47</td>
<td>3.32 (.958)</td>
<td>48</td>
<td>4.73 (.707)</td>
<td>51</td>
<td>2.61 (1.115)</td>
</tr>
<tr>
<td></td>
<td>High Motivation</td>
<td>44</td>
<td>3.00 (1.181)</td>
<td>43</td>
<td>4.35 (.720)</td>
<td>42</td>
<td>3.33 (1.119)</td>
<td>43</td>
<td>4.77 (.611)</td>
<td>45</td>
<td>2.58 (1.055)</td>
</tr>
<tr>
<td>DV</td>
<td>Low Motivation</td>
<td>49</td>
<td>2.86 (1.000)</td>
<td>47</td>
<td>4.26 (.607)</td>
<td>46</td>
<td>3.78 (.786)</td>
<td>45</td>
<td>4.78 (.636)</td>
<td>49</td>
<td>2.49 (.845)</td>
</tr>
<tr>
<td></td>
<td>High Motivation</td>
<td>38</td>
<td>2.92 (.941)</td>
<td>35</td>
<td>4.34 (.482)</td>
<td>34</td>
<td>3.94 (.776)</td>
<td>34</td>
<td>4.91 (.379)</td>
<td>38</td>
<td>2.55 (1.005)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>Low Motivation</td>
<td>142</td>
<td>2.96 (1.003)</td>
<td>135</td>
<td>3.94 (.879)</td>
<td>132</td>
<td>3.48 (.928)</td>
<td>133</td>
<td>4.34 (1.007)</td>
<td>141</td>
<td>2.87 (1.075)</td>
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<td></td>
<td>High Motivation</td>
<td>134</td>
<td>3.30 (1.055)</td>
<td>129</td>
<td>4.16 (.712)</td>
<td>125</td>
<td>3.72 (.980)</td>
<td>126</td>
<td>4.37 (.927)</td>
<td>136</td>
<td>2.84 (1.056)</td>
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<table>
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<td>4.62</td>
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<td>&lt;.01</td>
<td>12.48</td>
<td>&lt;.01</td>
<td>6.95</td>
<td>&lt;.01</td>
<td>82.16</td>
<td>&lt;.01</td>
<td>26.07</td>
<td>&lt;.01</td>
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<td>&lt;.05</td>
<td>7.50</td>
<td>&lt;.01</td>
<td>4.75</td>
<td>&lt;.05</td>
<td>2.49</td>
<td>&gt;.10</td>
<td>1.03</td>
<td>&gt;.10</td>
</tr>
<tr>
<td>Condition* MotivationValue</td>
<td>1.07</td>
<td>&gt;.10</td>
<td>1.07</td>
<td>&gt;.10</td>
<td>2.27</td>
<td>&gt;.10</td>
<td>2.76</td>
<td>&gt;.10</td>
<td>1.38</td>
<td>&gt;.10</td>
</tr>
</tbody>
</table>

Note: CG: Control Group; AN: Absolute Number; DV: Percentage

a Items are measured on a 5-point scale (1=very low to 5=very high)

b Item is measured on a 5-point scale (1=very unhealthy to 5=very healthy)

Interaction plots are show in Figure 4. The label condition has a greater main effect on the dependent measures’ ratings than motivation. The greatest effect size occurs between the two motivation groups in the absence of a nutrition label. In the absolute number condition, there is miniscule difference between the two groups for saturated fat, sodium, and overall healthiness. The same occurred in the percent condition for calories, total fat, and overall healthiness. Motivation moderated the label conditions’ effect on saturated fat content beliefs at marginal level of significance (p = .10). Consequently, hypothesis 4a is not supported in regards to dietary judgments and nutrition evaluations.
Figure 4: Effect of Motivation on Nutrient Ratings and Overall Health Rating
Certainty, Confusion, and Comprehension

The interaction between the label conditions and motivation on the dependent variables certainty and confusion was assessed by conducting a series of ANOVAs (see Table 12). Motivation does not have a main effect on either dependent variable. The two-way interaction is not significant, and the label conditions only have a main effect on the confusion variable reconfirming the results from above.

Table 12: Differences in Certainty, Confusion, and Comprehension by Motivation Groups

<table>
<thead>
<tr>
<th>Condition</th>
<th>Moderating Variable</th>
<th>N</th>
<th>M (SD)</th>
<th>M (SD)</th>
<th>N</th>
<th>M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>CERTAINTY</td>
<td>CONFUSION</td>
<td></td>
<td>COMPREHENSION</td>
</tr>
<tr>
<td>CG</td>
<td>Low Motivation</td>
<td>42</td>
<td>3.55 (.968)</td>
<td>3.38 (1.147)</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>High Motivation</td>
<td>53</td>
<td>3.77 (.800)</td>
<td>3.60 (.968)</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>AN</td>
<td>Low Motivation</td>
<td>52</td>
<td>3.94 (.958)</td>
<td>3.85 (1.109)</td>
<td>49</td>
<td>2.32 (.957)</td>
</tr>
<tr>
<td></td>
<td>High Motivation</td>
<td>45</td>
<td>3.80 (1.290)</td>
<td>3.91 (1.145)</td>
<td>44</td>
<td>2.07 (.830)</td>
</tr>
<tr>
<td>DV</td>
<td>Low Motivation</td>
<td>49</td>
<td>3.76 (.804)</td>
<td>3.37 (1.093)</td>
<td>48</td>
<td>2.46 (.914)</td>
</tr>
<tr>
<td></td>
<td>High Motivation</td>
<td>38*</td>
<td>3.89 (.953)</td>
<td>3.57 (1.168)</td>
<td>36</td>
<td>2.44 (.800)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>Low Motivation</td>
<td>143</td>
<td>3.76 (.919)</td>
<td>3.55 (1.130)</td>
<td>97</td>
<td>2.39 (.934)</td>
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<tr>
<td></td>
<td>High Motivation</td>
<td>136</td>
<td>3.82 (1.020)</td>
<td>3.70 (1.088)</td>
<td>80</td>
<td>2.23 (.833)</td>
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</table>

TEST OF BETWEEN SUBJECTS

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<th>P</th>
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<tbody>
<tr>
<td>Corrected Model</td>
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<td>2.00</td>
<td>&lt;.10</td>
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<td>&gt;.10</td>
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<tr>
<td>Condition</td>
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<td>&gt;.10</td>
<td>4.10</td>
<td>&lt;.05</td>
<td>3.56</td>
<td>&lt;.10</td>
</tr>
<tr>
<td>MotivationValue</td>
<td>.41</td>
<td>&gt;.10</td>
<td>1.49</td>
<td>&gt;.10</td>
<td>1.05</td>
<td>&gt;.10</td>
</tr>
<tr>
<td>Condition* MotivationValue</td>
<td>.94</td>
<td>&gt;.10</td>
<td>.14</td>
<td>&gt;.10</td>
<td>.73</td>
<td>&gt;.10</td>
</tr>
</tbody>
</table>

Note: CG: Control Group; AN: Absolute Number; DV: Percentage

*Item is measured on a 5-point scale (1=very uncertain to 5=very certain)

*Item is measured on a 5-point scale (1=very confusing to 5=very clear)

*Item is measured on a 5-point scale (1=strongly disagree to 5=strongly agree)

*Note: only 37 respondents in the DV-high motivation group answered the confusion question.

As shown in Figure 5, certainty increases in the high motivation group as the amount of nutrition information increases across label conditions; on the other hand, certainty is the highest for the low motivation group in the absolute number condition. Both high and low
motivation groups have less confusion in the absolute condition, and rate their level of confusion the same for the control and percentage conditions. Overall, the high motivation group gives more positive rating for confusion than the low motivation group.

Figure 5: Effect of Motivation on Certainty and Confusion across Experimental Conditions

Perceived label comprehension was only measured in the absolute number and the percentage conditions since there was no nutrition label in the control condition. Univariate results in Table 12 indicated motivation does not affect perceived label comprehension, nor is there a significant two-way interaction between the motivation groups and label conditions. Overall, there is less label comprehension for both motivation groups in the percentage condition than in the absolute number condition. Motivation did not moderate the effect of the label conditions; therefore hypothesis 4a is not supported in regards to certainty, confusion, and comprehension.

Utility

Analysis of variance (ANOVA) was utilized to examine the two-way interaction between motivation and the absolute and the percentage conditions and its effect on participants’ perception of the quantity of label attributes. The outcomes in Table 13 showed there was no
moderating effect, nor did motivation or the label conditions affect participants’ ratings.

Overall, hypothesis 4a is not supported for any of the dependent measures.

Table 13: Differences in Rating of the Label’s Quantity of Attributes by Motivation Groups

<table>
<thead>
<tr>
<th>Condition</th>
<th>Moderating Variable</th>
<th>N</th>
<th>M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN</td>
<td>Low Motivation</td>
<td>42</td>
<td>1.74 (.587)</td>
</tr>
<tr>
<td></td>
<td>High Motivation</td>
<td>32</td>
<td>1.62 (.554)</td>
</tr>
<tr>
<td>DV</td>
<td>Low Motivation</td>
<td>27</td>
<td>1.59 (.636)</td>
</tr>
<tr>
<td></td>
<td>High Motivation</td>
<td>30</td>
<td>1.73 (.640)</td>
</tr>
<tr>
<td>Total</td>
<td>Low Motivation</td>
<td>69</td>
<td>1.68 (.606)</td>
</tr>
<tr>
<td></td>
<td>High Motivation</td>
<td>63</td>
<td>1.68 (.594)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test of Between Subjects</th>
<th>F</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>.49</td>
<td>&gt;.10</td>
</tr>
<tr>
<td>Condition</td>
<td>.03</td>
<td>&gt;.10</td>
</tr>
<tr>
<td>MotivationValue</td>
<td>.02</td>
<td>&gt;.10</td>
</tr>
<tr>
<td>Condition* MotivationValue</td>
<td>1.42</td>
<td>&gt;.10</td>
</tr>
</tbody>
</table>

Note: AN: Absolute Number; DV: Percentage

The Effect of Nutrition Knowledge

Objective nutrition knowledge was measured using three five-point scale items.

Statements regarding nutrients (i.e., sodium causes high blood pressure) were made and participants rated their level of agreement on a scale with endpoints of “strongly disagree” and “strongly agree.” The three measures were averaged to create a composite knowledge score. Similar to Andrew et al. (1998) a median split of the average was performed, and the measure was recoded to reflect a low level of knowledge (value of zero) or a high level of knowledge (value of one).
Accuracy

It was proposed that a higher level of nutrition knowledge would be associated with greater accuracy in completing the three dietary judgment tasks. A cross-tabulation was performed between the two knowledge groups and the number of participants that made one hundred percent accurate choices. As shown in Table 14, the degree of knowledge had a significant main effect on selecting the over consumed nutrients, a moderately significant effect on selecting the two least healthy entrees, and no significant effect on selecting the two healthiest entrees. However, the high knowledge group had a higher percentage of participants accurately select the healthier entrees supporting the hypothesized direction.

Table 14: Chi-Square Test for Differences across Knowledge Groups

<table>
<thead>
<tr>
<th>Condition</th>
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<th>Healthiest Choice Correct</th>
<th></th>
<th></th>
<th>Least Healthy Choice Correct</th>
<th></th>
<th></th>
<th>Over Consumed Correct</th>
<th></th>
<th></th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Freq.</td>
<td>χ²</td>
<td>P</td>
<td>Freq.</td>
<td>χ²</td>
<td>P</td>
<td>Freq.</td>
<td>χ²</td>
<td>P</td>
</tr>
<tr>
<td>Low Knowledge</td>
<td>149</td>
<td>83</td>
<td>4.274</td>
<td>&gt;.10</td>
<td>104</td>
<td>4.603</td>
<td>=.10</td>
<td>46</td>
<td>13.250</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>High Knowledge</td>
<td>134</td>
<td>90</td>
<td>(67.2%)</td>
<td></td>
<td>105</td>
<td>(78.4%)</td>
<td></td>
<td>69</td>
<td>(50.4%)</td>
<td></td>
</tr>
</tbody>
</table>

The hypothesized relationship was further tested with univariate analyses conducted on the four nutrient quantity beliefs and over all healthiness of the Grilled Shrimp and Sirloin entrée. Cell means and ANOVA results are shown in Table 15. The knowledge groups had a significant main effect on the sodium and the overall healthiness dependent measures. This two-way analysis also reiterated that the label condition has a main effect on the evaluation of all the nutrients and overall healthiness (p < .01). Although the means were in the predicted direction for the relationship between degree of knowledge and label conditions, results were not statistically significant for the five dependent measures.

The high knowledge consumers were more able to use the nutrition information and have greater accuracy in rating the level of sodium and the overall healthiness of the Grilled
Shrimp and Sirloin entrée (p < .05). The same pattern occurred for total fat and saturated fat, but not at a significant level. In contrast, the high knowledge consumers rated the level of calories more negatively than the low knowledge consumers in the control condition, but more favorably in the absolute and the percentage conditions.

**Table 15: Differences of Nutrient Ratings and Overall Health Rating by Knowledge Groups**

<table>
<thead>
<tr>
<th>Condition</th>
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<th>N</th>
<th>M (SD)</th>
<th>N</th>
<th>M (SD)</th>
<th>N</th>
<th>M (SD)</th>
<th>N</th>
<th>M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG</td>
<td>Low Knowledge</td>
<td>60</td>
<td>3.63 (.802)</td>
<td>58</td>
<td>3.69 (.777)</td>
<td>55</td>
<td>3.58 (1.013)</td>
<td>56</td>
<td>3.46 (1.026)</td>
<td>60</td>
<td>3.62 (.904)</td>
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<tr>
<td></td>
<td>High Knowledge</td>
<td>36</td>
<td>3.89 (.785)</td>
<td>35</td>
<td>3.86 (.912)</td>
<td>35</td>
<td>3.74 (.919)</td>
<td>35</td>
<td>3.66 (.938)</td>
<td>36</td>
<td>3.14 (.899)</td>
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<td>AN</td>
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<td>42</td>
<td>2.81 (1.194)</td>
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<td>4.07 (.971)</td>
<td>38</td>
<td>3.26 (1.083)</td>
<td>40</td>
<td>4.60 (.900)</td>
<td>44</td>
<td>2.82 (1.105)</td>
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<td></td>
<td>High Knowledge</td>
<td>54</td>
<td>2.67 (.952)</td>
<td>52</td>
<td>4.17 (.834)</td>
<td>52</td>
<td>3.38 (.993)</td>
<td>52</td>
<td>4.87 (.345)</td>
<td>53</td>
<td>2.42 (1.027)</td>
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<td>DV</td>
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<td>3.02 (.988)</td>
<td>41</td>
<td>4.22 (.571)</td>
<td>40</td>
<td>3.80 (.853)</td>
<td>40</td>
<td>4.75 (.670)</td>
<td>45</td>
<td>2.49 (.895)</td>
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<td>43</td>
<td>2.77 (.947)</td>
<td>42</td>
<td>4.38 (.539)</td>
<td>41</td>
<td>3.93 (.721)</td>
<td>40</td>
<td>4.93 (.350)</td>
<td>43</td>
<td>2.53 (.935)</td>
</tr>
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<td>TOTAL</td>
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<td>147</td>
<td>3.21 (1.042)</td>
<td>139</td>
<td>3.96 (.815)</td>
<td>133</td>
<td>3.56 (1.003)</td>
<td>136</td>
<td>4.18 (1.074)</td>
<td>149</td>
<td>3.04 (1.077)</td>
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<td>High Knowledge</td>
<td>133</td>
<td>3.03 (1.044)</td>
<td>129</td>
<td>4.16 (.795)</td>
<td>128</td>
<td>3.66 (.917)</td>
<td>127</td>
<td>4.55 (.794)</td>
<td>132</td>
<td>2.65 (1.004)</td>
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</table>

**Test of Between Subjects**

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<th>P</th>
<th>F</th>
<th>P</th>
<th>F</th>
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<th>F</th>
<th>P</th>
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<td>&lt;.01</td>
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<td>&lt;.01</td>
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<td>&lt;.01</td>
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<td>&lt;.01</td>
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<td>&gt;.10</td>
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<td>&gt;.10</td>
<td>4.96</td>
<td>&lt;.05</td>
<td>5.70</td>
<td>&lt;.05</td>
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<td>.09</td>
<td>&gt;.10</td>
<td>1.92</td>
<td>&gt;.10</td>
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</tbody>
</table>

Note: CG: Control Group; AN: Absolute Number; DV: Percentage

*Items are measured on a 5-point scale (1=very low to 5=very high)
**Item is measured on a 5-point scale (1=very unhealthy to 5=very healthy)

Interaction plots are show in Figure 6. The label conditions have a greater main effect on the dependent measures’ ratings than the knowledge groups. The label condition’s effect on the two knowledge groups is the same for total fat, saturated fat, and sodium; although the high knowledge consumers rated the content of the three negative nutrients more unfavorably than
the low knowledge consumers. The high knowledge group rated the overall healthiness of the Grilled Shrimp and Sirloin entrée more unfavorably than the low knowledge group except for those in the percentage condition where there is no difference between the groups. Since knowledge does not moderate the effect of the label condition, hypothesis 4b is not supported pertaining to dietary judgments and nutrition evaluations.
Figure 6: The Effect of Knowledge on Nutrient Ratings and Overall Health Rating
Certainty and Confusion

The interaction between the label conditions and nutrition knowledge on the dependent variables certainty and confusion was assessed by conducting a series of ANOVAs; results are in Table 16. The degree of nutrition knowledge does not have a main effect on either dependent variable. The two-way interaction is also not significant. As shown in Figure 7, for the high knowledge group certainty increased with the presence of a nutrition label, but there is no difference in certainty between the absolute number and the percentage conditions. The low knowledge group is less certain than the high knowledge group, and the participants rated their certainty parallel across all three conditions.

Both high and low knowledge groups have less confusion in the absolute condition, and rate their level of confusion the same for the control and the percentage conditions (See Table 16). Figure 7 confirmed that the high knowledge group gives a more positive rating for confusion than the low knowledge group, but the difference is not significant. Label conditions have a significant effect, but it is not moderated by knowledge. Consequently, hypothesis 4b is not supported relating to certainty and confusion.

Figure 7: Effect of Knowledge on Certainty and Confusion across Experimental Conditions
Table 16: Differences in Certainty and Confusion by Knowledge Groups

<table>
<thead>
<tr>
<th>Condition</th>
<th>DEPENDENT MEASURES</th>
<th>CERTAINTY&lt;sup&gt;a&lt;/sup&gt;</th>
<th>CONFUSION&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Moderating Variable</td>
<td>N</td>
<td>M (SD)</td>
</tr>
<tr>
<td>CG</td>
<td>Low Knowledge</td>
<td>60</td>
<td>3.67 (.896)</td>
</tr>
<tr>
<td></td>
<td>High Knowledge</td>
<td>37</td>
<td>3.70 (.878)</td>
</tr>
<tr>
<td>AN</td>
<td>Low Knowledge</td>
<td>44</td>
<td>3.73 (1.188)</td>
</tr>
<tr>
<td></td>
<td>High Knowledge</td>
<td>54</td>
<td>3.96 (1.081)</td>
</tr>
<tr>
<td>DV</td>
<td>Low Knowledge</td>
<td>45</td>
<td>3.69 (.925)</td>
</tr>
<tr>
<td></td>
<td>High Knowledge</td>
<td>43*</td>
<td>3.95 (.785)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>Low Knowledge</td>
<td>149</td>
<td>3.69 (.993)</td>
</tr>
<tr>
<td></td>
<td>High Knowledge</td>
<td>134</td>
<td>3.89 (.939)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OF BETWEEN SUBJECTS</th>
<th>F</th>
<th>P</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>.97</td>
<td>&gt;.10</td>
<td>2.01</td>
<td>&lt;.10</td>
</tr>
<tr>
<td>Condition</td>
<td>.74</td>
<td>&gt;.10</td>
<td>3.43</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Knowledge Value</td>
<td>2.34</td>
<td>&gt;.10</td>
<td>2.05</td>
<td>&gt;.10</td>
</tr>
<tr>
<td>Condition* Knowledge Value</td>
<td>.37</td>
<td>&gt;.10</td>
<td>.27</td>
<td>&gt;.10</td>
</tr>
</tbody>
</table>

Note: CG: Control Group; AN: Absolute Number; DV: Percentage
<sup>a</sup>Item is measured on a 5-point scale (1=very uncertain to 5=very certain)
<sup>b</sup>Item is measured on a 5-point scale (1=very confusing to 5=very clear)
*Note: only 42 participants in the DV- High Knowledge group answered the confusion question

Comprehension and Utility

Perceived nutrition label comprehension and utility were only measured in the absolute number and the percentage conditions because the control condition did not have a nutrition label. Analysis of variance results in Table 17 indicate knowledge does have a main effect on perceived label comprehension (p < .01); however, it does not moderate the effect of the label conditions. The high knowledge group finds the nutrition label in both the absolute number and percentage conditions significantly more comprehensible than the low knowledge group (See Figure 8). Recall that a lower mean value means greater comprehension.
### Table 17: Differences in Comprehension of Label and Rating of the Label’s Quantity of Attributes by Knowledge Groups

<table>
<thead>
<tr>
<th>Condition</th>
<th>Moderating Variable</th>
<th>Dependent Measure</th>
<th>Comprehension&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Number of Nutrients&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>M (SD)</td>
<td>N</td>
</tr>
<tr>
<td>AN</td>
<td>Low Knowledge</td>
<td>42</td>
<td>2.48  (.980)</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>High Knowledge</td>
<td>52</td>
<td>2.03  (.870)</td>
<td>45</td>
</tr>
<tr>
<td>DV</td>
<td>Low Knowledge</td>
<td>43</td>
<td>2.72  (.900)</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>High Knowledge</td>
<td>42</td>
<td>2.19  (.748)</td>
<td>34</td>
</tr>
<tr>
<td>TOTAL</td>
<td>Low Knowledge</td>
<td>85</td>
<td>2.61  (.943)</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>High Knowledge</td>
<td>94</td>
<td>2.10  (.818)</td>
<td>79</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test of Between Subjects</th>
<th>F</th>
<th>P</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>5.81</td>
<td>&lt;.01</td>
<td>1.36</td>
<td>&gt;.10</td>
</tr>
<tr>
<td>Condition</td>
<td>2.41</td>
<td>&gt;.10</td>
<td>.07</td>
<td>&gt;.10</td>
</tr>
<tr>
<td>Knowledge Value</td>
<td>14.29</td>
<td>&lt;.01</td>
<td>3.87</td>
<td>=.05</td>
</tr>
<tr>
<td>Condition* Knowledge Value</td>
<td>.09</td>
<td>&gt;.10</td>
<td>.02</td>
<td>&gt;.10</td>
</tr>
</tbody>
</table>

Note: AN: Absolute Number; DV: Percentage  
<sup>a</sup> Item is measured on a 5-point scale (1=strongly disagree to 5=strongly agree)  
<sup>b</sup> Item is measured on a 3-point scale (1=too few nutrients to 3=too many nutrients)

The degree of knowledge also had a main effect on participants’ perception of the quantity of label attributes. The univariate results in Table 17 show that the high knowledge groups rated the nutrition label, on average, as having too fewer nutrients than the low knowledge group, which is not the hypothesize direction. Nevertheless, the degree of knowledge does not moderate the effect of the label condition (See Figure 8). Overall, hypothesis 4b is not supported for any of the dependent measures.
Additional Analysis

Of the participants exposed to the two label formats, 94 percent saw the nutrition label (See Table 18). Of that group, 61 percent looked at the key at the bottom of the menu while 39 percent did not. Only eleven participants did not see the nutrition label on the menus. There was no significant difference between the two label conditions and the number of participants that saw the label or looked at the key.

Table 18: Number of Respondents Who Saw the Label and Looked at the Key

<table>
<thead>
<tr>
<th>Saw the Label</th>
<th>Looked at the Key</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
<td>107 (57%)</td>
<td>68 (37%)</td>
</tr>
<tr>
<td>No</td>
<td>2 (1%)</td>
<td>9 (5%)</td>
</tr>
<tr>
<td>Total</td>
<td>109 (59%)</td>
<td>77 (41%)</td>
</tr>
</tbody>
</table>

Note: Only those respondents assigned to the absolute number and percentage conditions responded to these questions

ANOVA results of the label conditions’ effect on the helpfulness rating of the entrée description and each label attribute are presented in Table 19. The label condition has a main effect on the helpfulness rating of the entrée description only, with the absolute number
condition finding the entrée description less helpful than the control and the percentage
conditions (M = 3.99 for control, 3.57 for absolute number, and 3.95 for percentage; p < .05).

The participants in the absolute number and the percentage conditions were asked
between the label attributes and entrée description which was the most and the least influential
on their dietary judgments. Participants that reported they did not see the nutrition label and
those that picked the same response for the most and least influential were excluded from the
results. The responses, shown in Figure 9, indicated that calories was most influential closely
followed by entrée description. Entrée description was also elected least influential with
sodium after that. Of the participants only in the percentage condition two percent found the
reference values most influential while 36 percent found it least influential.
Table 19: Helpfulness of Label Items by Experimental Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>ENTRÉE DESCRIPTION</th>
<th>CALORIES(^a)</th>
<th>TOTAL FAT(^a)</th>
<th>SATURATED FAT(^a)</th>
<th>SODIUM(^a)</th>
<th>%D.V.(^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M</td>
<td>SD</td>
<td>F</td>
<td>P</td>
<td>N</td>
</tr>
<tr>
<td>CG</td>
<td>97</td>
<td>3.99</td>
<td>1.123</td>
<td>&lt;.05</td>
<td>97</td>
<td>4.02</td>
</tr>
<tr>
<td>AN</td>
<td>96</td>
<td>3.57</td>
<td>1.296</td>
<td>3.564</td>
<td>96</td>
<td>3.91</td>
</tr>
<tr>
<td>DV</td>
<td>87</td>
<td>3.95</td>
<td>1.150</td>
<td>3.564</td>
<td>87</td>
<td>4.05</td>
</tr>
</tbody>
</table>

Note: CG: Control Group; AN: Absolute Number; DV: Daily Value

Items are measured on a 5-point scale (1=very unhelpful to 5=very helpful)

\(^a\)Only the absolute number group and percentage group were asked this question regarding the label

\(^b\)Only the percentage group was asked this question regarding the label

**Figure 9: Participants’ Election of the Most and Least Influential Factor in Making Dietary Judgments**

- **Most Influential**
  - Calories: 28%
  - Total Fat: 14%
  - Saturated Fat: 19%
  - Sodium: 13%
  - Entrée Description: 27%

- **Least Influential**
  - Calories: 11%
  - Total Fat: 8%
  - Saturated Fat: 4%
  - Sodium: 33%
  - Entrée Description: 43%
Participants in the control label condition were asked what nutrients they would want on a nutrition label. The frequency results are exhibited in Figure 10, and they indicate the most desired nutrients are the four used in this study’s label: calories, total fat, saturated fat, and sodium (> 70%). Protein, carbohydrates, cholesterol, and fiber are desired by 50 to 60 percent of the participants in this group. Vitamins, deemed a positive nutrient, were selected by only 31 percent of the group. Furthermore, only three percent of the group did not want a label.

Participants in the absolute number and the percentage conditions were asked what nutrients they would like added to the nutrition label and what, if any, nutrients they would like removed from the label. Less than fifteen percent of these two groups wanted a nutrient removed. Similar to the control condition, about 60 percent of the participants would like protein and carbohydrates added to the label, while only 40 percent would like cholesterol and fiber. Again, vitamins were selected by the fewest people to be added to the label (see Figure 10).
A univariate analysis was done between the two moderating variables, motivation and knowledge, and two lifestyle variables, weight and overall health. The results suggested that motivation only had a main effect on consumers’ healthiness (M= 3.67 low motivation, 4.26 for high motivation p < .01). Motivation did not have a significant effect on weight nor did knowledge have a significant effect on weight or healthiness.
The results of the hypotheses test are summarized in Table 20.

**Table 20: Results of Hypotheses Testing**

<table>
<thead>
<tr>
<th>HYPOTHESES</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a: The presence of a nutrition label increases consumer accuracy in making dietary judgments and nutrition evaluations.</td>
<td>Supported</td>
</tr>
<tr>
<td>H1b: The addition of the percent daily value to the nutrition label increases consumer accuracy in making dietary judgments and nutrition evaluations.</td>
<td>Dietary Judgments: Not Supported Nutrition Evaluations: Partially Supported</td>
</tr>
<tr>
<td>H2a: The presence of a nutrition label increases consumers’ decision certainty and decreases confusion when making dietary judgments and nutrition evaluations than when there is no label.</td>
<td>Certainty: Not Supported Confusion: Partially Supported</td>
</tr>
<tr>
<td>H2b: The addition of the percent daily value to the nutrition label increases consumers’ decision certainty and decreases confusion when making dietary judgments and nutrition evaluations than when reference values are not provided on the label.</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H3: The addition of percent daily value to the nutrition label will result in higher perceived label comprehension and perceived label utility than when reference values are not provided on the label.</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H4a: Health motivation will positively moderate the effect that the presence of a nutrition label has on dietary judgment and nutrition evaluation accuracy, decision certainty and confusion, and perceived label comprehension and utility, such that individuals with higher levels of health motivation will be more affected by label information.</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H4b: Nutrition knowledge will positively moderate the effect that the presence of a nutrition label has on dietary judgment and nutrition evaluation accuracy, decision certainty and confusion, and perceived label comprehension and utility, such that individuals with higher levels of nutrition knowledge will be more affected by label information.</td>
<td>Not Supported</td>
</tr>
</tbody>
</table>
CHAPTER 5

CONCLUSIONS

Summary of Results and Discussion

The purpose of this study was to address the gap in research on menu labeling formats. Specifically, to evaluate the label format’s effect on consumers’ accuracy and certainty in making dietary judgments and nutrition evaluations and consumers’ perceived label comprehension and utility. Three different label treatments were tested and analyzed. Additionally, moderating factors in the nutrition information process were also explored. By means of an experiment, data was collected from a non-probability sample and evaluated using chi-square tests and analysis of variance. The results of this study are summarized in this chapter along with implications for stakeholders, study limitation and recommendations for future research.

Effect of Providing Nutrition Information

The primary focus of this study was on the differences in effect between no nutrition label and the presence of a nutrition label on a menu and whether or not the inclusion of reference values increases that effect. It was hypothesized that the addition of a nutrition label would increase consumers’ accuracy in dietary judgments and nutrition evaluations and that the improvement would be greater when reference values were incorporated into the label.

For the dietary tasks, consumers were asked to identify the two healthiest items on the menu, the two least healthy items on the menu, and the nutrients that would be over consumed if the specified entrée was eaten three times in one day. A chi-squared test revealed the presence of a nutrition label did indeed increase the consumers’ accuracy in all three judgment tasks. The size effect was greatest in the over consumed nutrient task. No one in the control group, who had no nutrition information present on the menu, accurately identified only the
three nutrients that would be over consumed, while in the absolute condition and the
percentage condition, 60 percent and 65 percent, respectively, were able to. The difference
between the control group and the two label formats is not as substantial for selecting the most
and least healthy entrees.

One reason for this could be the entrees that were included on the menu. The average
consumer has enough common sense to know that a bacon cheeseburger is not as healthy as a
grilled chicken salad. More than likely, if the items’ nutritional makeup was not familiar (Burton
et al., 2004), the size effect would increase for the two entrée selection tasks. Nevertheless, the
empirical data supports the hypothesis that the presence of nutrition label increase consumer
accuracy in dietary judgments.

The proposed relationship between the reference values and consumer accuracy was
not supported by the chi-square test findings. Only for the over consumed nutrient task was
there a higher percentage of participants in the daily value treatment than the absolute number
format, although the difference was not significant. And the differences between the two label
formats for the other two dietary judgment tasks were not significant as well. Given the greater
effect the label condition had in the over consumed task, the researcher speculates that if the
tasks were repeated using a menu with similar entrees (e.g. a burger menu), there may be a
greater size effect in the dietary judgment tasks, and the percent condition may improve in
accuracy over the absolute number condition.

Participants’ ratings of the level of nutrients in a specified entrée and its overall
healthiness were compared by a univariate analysis. Similar to the findings above, the presence
of a nutrition label resulted in the high (low) level of negative nutrients to be rated more
unfavorably (favorably) than when a nutrition label was absent, supporting the hypothesized
relationship. Although there was no significant difference between the absolute and percentage
conditions, the percentage condition ratings were more unfavorable (favorable) than the absolute number format. This supplements the findings in previous research (Burton et al., 1994; Levy et al., 1996).

The pattern of cell means was different for saturated fat. The participants exposed to the absolute number format rated the level of saturated fat more favorably than the control condition (p < .10) or the percentage condition (p < .01). A reason for this could be that of the four nutrients, participants are least knowledgeable of the recommended amount of saturated fat that should be consumed in a day, which is twenty grams. For consumers who are unaware of this, eight grams of saturated fat may not seem so high in the context of acceptable levels of other negative nutrients, when in actuality it is 42 percent of the recommended amount. Barone et al. (1996) had similar findings in their study when participants rated a high percentage of sodium as favorable.

The researcher was not just interested in how label formats affected consumer accuracy, but also its effect on consumer certainty and confusion felt when completing the task. A univariate analysis with follow-up t-tests revealed that the label conditions did not have a main effect on consumers’ level of certainty. Certainty was higher for the two label formats than when a nutrition label was not present in the control condition, but certainty slightly decreased with the addition of reference values. The flanking cell means could be a result of consumers being able to accurately identify the most and least healthy options without nutrition information. This measure was taken before the over consumed nutrient task was assigned, so consumers’ feeling of certainty while completing this task, which showed the greatest label effect, was not incorporated in this measure. The decrease in certainty with the inclusion of reference values could be due to too much information.
Several studies on information overload were reviewed by the researcher. The general consensus is that more information is beneficial, up to a point, then it becomes too much and hinders accurate decision making (Jacoby et al., 1974; Scammon, 1977; Wilkie, 1974). The label conditions had a main effect on consumer confusion while completing the dietary judgment tasks. The absolute number condition had the lowest level of confusion at a marginally significant difference from the control group ($p < .10$) and significant difference from the percentage group ($p < .05$). In fact, the percentage condition had the highest level of confusion. The conclusion that could be drawn from these findings based on past research is that there was too much information in the percentage condition. However, there was no significant difference between the absolute number condition ($M=1.69$) and the percentage condition ($M=1.67$) in the rating of the number of attributes included in the label.

The decrease in certainty and increase in confusion in the percentage condition may be due to the lack of knowledge consumers have of what percent daily values are and how to utilize them rather than the quantity of attributes in the label. The results of the dietary judgments and nutrition evaluations point to an increase in accuracy with the presence of the percent of daily value. Furthermore, participants in the percentage condition rated percent daily values as helpful in completing the tasks and evaluations, and those in the control and absolute number conditions reported that having the percent daily value would have been helpful. Consumer knowledge of the percent daily value was not measured in this study but should be included in future studies that utilize reference values in the nutrition label.

**Effect of Health Motivation**

Motivation to process nutrition information was calculated using five items that were based on previous studies. Unlike prior research, the different degrees of motivation did not affect any of the dependent measures except for three of the five nutrition evaluation
measures. It also did not moderate the effect the label conditions had on any of the dependent variables.

The degree of motivation did not have an effect on the dietary judgment tasks. Unlike the label conditions and knowledge groups, the size effect was minute for the over consumed nutrient task, and more low motivated consumers were accurate in this task. Highly motivated consumers were better at identifying the most and least healthy entrees, but the difference was nonsignificant. This finding indicates the high motivation group was not any more driven to use the nutrition information than low motivation group in completing the dietary judgment tasks.

Motivation had some bearing on the nutrition beliefs for calories (p < 0.05), total fat (p < .01), and saturated fat (p < .05) in the Grilled Shrimp and Sirloin entrée. Interestingly, the high motivation group rated the level of calories more unfavorably than the low motivation group in all three label conditions, although the difference was the smallest in the percentage condition. Note that calories provided the least percent of the recommended amount. For all five nutrition evaluations, there was not a difference between the low and high motivation groups in the percentage condition, indicating that the reference values aided low motivation consumers to process and use the nutrition information accurately. The same occurred for the absolute number condition for the saturated fat, sodium, and healthiness ratings. There was a difference between the two groups in the control condition for all five measures, so it can be concluded that the presence of a nutrition label reduces the difference between low and high motivated consumers in evaluating the nutritiveness of an item, potentially because the provision of information makes it easier.

The high motivation group reported a consistent level of certainty across all label conditions; meanwhile the low motivation group was affected by the label conditions. The low motivation group felt less certain in the presence of reference values than the absolute number
format, which is surprising considering the low motivation group was most accurate when the reference values were present. Both groups felt more confused in the percentage condition than the absolute number condition and slightly more confused than the control condition. Although the consumers had greater accuracy in the percentage condition, they did not feel certain or clear using that format.

The lack of effect motivation had on the dependent measures was not consistent with previous findings that indicated that as the degree of motivation increases, so does information acquisition and evaluation as reflected in the more accurate nutrition evaluations (Howlett et al. 2009; Keller et al., 1997; Yoon, 2009).

Effect of Nutrition Knowledge

Objective knowledge was calculated by measures designed by the researcher. According to Li et al. (2000) different types of knowledge may vary in their usefulness when performing a particular task. It is important to know the participants' level of knowledge as it pertains to the different components of the nutrition label used in this study rather than a measure of overall nutrition knowledge. Knowing what items belong in what food groups will not aid in interpreting the nutrition label utilized in this study.

Overall, knowledge had a main effect on more dependent variables than the motivation measure. However, it did not moderate the effect the label conditions had on any of the dependent variables. The researcher postulates whether an improvement in the knowledge items would result in knowledge having a main effect on all dependent variables and moderate the effect the label conditions have as well. This should be explored further.

Nutrition knowledge had the strongest relationship with perceived label comprehension (M=2.61 for low and 2.10 for high; p < .01). Recall, a lower number means higher label comprehension. This implies those high in knowledge were better able to understand the
nutrition information disclosed. Comprehension was greater in the absolute number format than the percentage format for both degrees of knowledge. These findings supplement the results in the Andrews et al. (1998) study and contradict the conclusions drawn by Li et al. (2000).

It is interesting to note that despite the high knowledge consumers having more label comprehension than the low knowledge consumers, they rated the nutrition label, on average, as having too fewer nutrients than the low knowledge group (M=1.81 for low and 1.59 for high; p = .05). Perhaps the ease in which the high knowledge group could comprehend the nutrition information encouraged them to want information on additional nutrients. However, the difference in opinion was not reflected in the reported feeling of certainty and confusion.

Knowledge did not have a main consumers’ certainty or confusion while completing the dietary tasks, even though the high knowledge group had greater perceived label comprehension. The high knowledge group is more certain and less confused than the low knowledge group, but the differences are negligible. The high knowledge group felt more certain when either label format was present, probably because they were better able to use the nutrition information.

In reviewing the results for the dietary judgment task and nutrition evaluations the chi-square tests and univariate analysis indicates that the degree of knowledge did affect the accuracy for some of the measures. There is a greater percent of high knowledge consumer that correctly selected the two healthiest entrees (p > .10), the two least healthy entrees (p = .10) and selecting the over consumed nutrients (p < .01). Similar to the results of the label conditions’ effect on dietary judgments, the size effect is greatest for over consumed nutrients measure. This could be due to the weak manipulation of the menu entrees. Knowledge only moderated the nutrition beliefs for sodium (p < .05) and over healthiness (p < .05) of the Grilled
Shrimp and Sirloin entrée. Nutrition evaluations for the other three measures were nonsignificant. In general, the high knowledge consumers rated the high (low) levels of negative nutrients more unfavorable (favorable) than the low knowledge consumers. These results are consistent with previous studies, which indicated that nutritional knowledge had a significant effect on nutrition label comprehension and accuracy in using the nutritional information (Drichoutis, et al., 2005; Droms, 2006; Moorman, 1993).

**Additional Findings**

There are other findings that should be noted that were not affected by the label condition or the moderating variables. What nutrients to include in the nutrition label is a debated topic. This study included four nutrients based on empirical evidence as being important to consumers and their link to diet related diseases: calories, total fat, saturated fat, and sodium. These four nutrients were selected by the highest percentage of consumers in the control condition as the nutrients they would want on a label, confirming the chosen negative nutrients were the most relevant to consumers. Additionally, 60 percent of all the participants would like information on protein and carbohydrates, followed by cholesterol and fiber being desired by 40 percent. Vitamins, the only positive nutrient listed, were selected by the least number of participants, consistent with findings from other research (Heimbach, 1981; Putman & Weimer, 1981; Russo et al., 1986).

Participants were also asked how helpful each nutrient, the reference value and entrée description were in selecting the most and least healthy entrée. All cell means were on the helpful side of the five-point scale, with calories (M=4.06) being most helpful and the reference values being the least (M=3.60).
Conclusion

As hypothesized, results indicate that accuracy in dietary judgments and nutrition evaluations differs across label conditions. Also as postulated, the inclusion of reference values augmented the effect of the nutrition disclosure. However, while a nutrition label did increase the certainty and decreased confusion while completing the judgments and evaluations, the addition of reference values had a negative effect. Neither motivation nor knowledge had a moderating effect on the nutrition labels, but the different levels of knowledge did have a main effect on several dependent measures. The findings from this study potentially has important implications for a number of different stakeholders, including public policy makers, marketing managers, and consumers.

Implication for Public Policy

The Menu Labeling Act was passed in 2010 as part of the Patient Protection and Affordable Care Act. When the FDA passed the NLEA in 1990, several studies were conducted to determine the optimal label format for packaged food that would be the most effective in conveying the nutrition information and aiding consumers with their dietary judgments. Conversely, there have been very few studies conducted on placing a nutrition label on a menu, and so far they have only measured the impact on consumers’ food choices with mixed findings.

Since the Menu Labeling Act is an expansion of the NLEA, similar studies should be conducted regarding the menu’s nutrition label format. This is the first study, to the researcher’s knowledge, that examined the effect of the menu label’s format on dietary judgments, confidence in making those judgments, and perceived label comprehension and utility; thus it provides valuable information for policy makers.

The most important decision that needs to be made in regards to the nutrition label is what nutrients to include on the label. Prior studies conclude that consumers want information
on negative nutrients more than positive. Currently, most state and municipal labeling regulation only require the disclosure of calories, and it seems that will be the same for the menu labeling act. However, findings in this study indicate that consumers want information on more than just calories, which supports similar findings from previous studies (Hwang & Lorenzen 2008; Yoon, 2009). Over 70 percent of the participants that did not have a nutrition label would like to see calories, total fat, saturated fat, and sodium in the menu label, and conversely, less than 15 percent of the consumers that were exposed to a nutrition label wanted one of these nutrients removed. It has been acknowledged that it is possible for an individual to maintain a caloric balanced diet, yet consume an overall unhealthy diet (Keystone, 2006). Furthermore, negative nutrients besides calories have been linked to diet related diseases, and thus individuals are concerned with different nutrients (Jones, 2007). In addition, full-service menus have the flexibility that menu boards in quick service restaurants do not, to provide more than just calorie information. Public Policy makers should consider making separate nutrition label guidelines for quick-service and full-service restaurants.

The inclusion of reference values on the label has been of interest to policy makers because of their ability to increase comprehension independent of consumers’ degree of knowledge; hence, they enable more consumers to process the information (Moorman, 1990). As predicted in this study, the inclusion of reference values resulted in more accurate choices in the dietary judgment tasks and more favorable (unfavorable) ratings for low (high) levels of negative nutrients than the two label conditions without them. They also increased the accuracy for both motivation and knowledge groups. From a public policy perspective, the percent of daily value can aid consumers in assessing product nutritiousness which is a primary goal of the menu labeling act. Policy makers should take the findings on negative nutrients and reference values into consideration when finalizing the guidelines.
On the other hand, results pertaining to the main effect of the percentage condition were nonsignificant. Also, the inclusion of reference values on the label had a negative effect on confusion and label comprehension, consistent with findings from previous studies. It is possible that these results are due to consumers’ lack of knowledge of percent daily value rather than the label format. Li et al. (2000) manipulated knowledge by providing those in the high knowledge group an information packet explaining negative nutrients, the nutrition label and percent daily values. The responses of those in the high knowledge group who had percent daily values on the nutrition label were more polarized than the high knowledge, no reference value group. Therefore, the relationship between nutrition knowledge and references values should be explored further.

Regardless of whether or not reference values are a part of the nutrition label, an education program should be considered with the implementation of the menu labeling law. Research points to a lack of nutrition information in the general public, so without the appropriate educational efforts, the objectives of the menu labeling may not be fully achieved. Efforts should be directed at informing consumers about the meaning of the attributes included on the nutrition label, how they can be used to both evaluate and compare entrees, and their usefulness in maintaining a healthy diet.

Implications for Marketers

In the past five years, consumers have increasingly demanded healthier options, smaller portions, and fresh produce. According to the NRA (2010), these items were all listed in the top twenty food trends for 2010, in the United States (cf. Mintel, 2011b; Sloan, 2008). Furthermore, 39 percent of consumers reported cutting back on dining out because of the lack of healthy options (Technomic, 2008). However, consumer food purchases are affected by other important factors such as taste, price, menu variety, convenience, and ambience (Kuchler,
Taste is the most influential component of consumers’ food selection, and many still equate healthy food with poor taste (Colby, Elder, & Peterson, 1987; Droms, 2006; Howlett et al., 2009; Lee & Cranage, 2007; Raghunathan et al., 2006; Wansink & Park, 2000). Apart from that, there is a significant opportunity for businesses to capitalize on the growing health trend.

In the study conducted by Bollinger et al. (2010), it was found that the disclosure of nutrition information actually increased Starbucks’s sales. Revenues for Starbucks located within one hundred meters of a Dunkin Donuts experienced a more positive effect than those Starbucks not located next to the donut shop. The researchers speculated that Starbucks offered healthier fare, and that consumers may not only substitute items within a restaurant, but also substitute across restaurants. With the right balance of food offerings, businesses may see an increase in sales as a result of nutrition disclosure.

With menu labeling imminent, marketers need to find a way to keep their offerings desirable and the menu design appealing. Kincaid and Corsun (2003) summed up research that identified the menu as the most important marketing tool a restaurant has. The researcher found no difference in how consumers perceived the amount of attributes in the label despite one format having twice as many. Also, twenty-seven percent of the participants identified entrée description as the most influential factor in identifying the most and least healthy entrée, one percentage point behind calories. Creative marketers will have to find a way to arrange the entrée descriptions, required nutrition information, and possibly pictures so that consumers have a favorable reaction to the label.

One important consideration marketers should make is the arrangement of entrees. Since taste is the number factor in food choice and studies have provided empirical evidence
that sales of items identified as healthy decreased, designating a section of the menu for healthy items could have a negative effect (Horgen & Brownell, 2002; Stubenitsky et al., 2000).

However, Yoon (2009) found that the context of the menu influenced consumer food decision making, their attitude toward the target item, and moderated the effect of nutritional information disclosure. Intermixing healthy items with unhealthy items affects consumers’ attitude to the entrée. These inconsistent findings should be explored in future research.

The menu labeling act may have a significant effect on a restaurant’s image and the food industry as a whole. There could be a positive reaction from consumers when they learn that an item is healthier than they believed: They may increase the frequency of purchasing that item (Bollinger et al., 2010). Brand image could be enhanced by providing consumers the flexibility to make substitutions, change cooking methods (e.g., grilled instead of fried), or order half portions.

On the contrary, there could be a negative backlash from consumers if they see that items once promoted as “less than 550 calories” have an unfavorable level of other negative nutrients when the nutrition information is disclosed. Empirical evidence suggests that consumers find nutrition information and its source less credible when there is contradictory information (Keller et al., 1997; Kozup et al., 2003). Marketers should evaluate how attitudes toward menu items and the brand may change with the disclosure of nutrition information.

**Implications for Consumers**

For consumers, a key benefit of menu nutrition labeling is product reformulations. It has been found that restaurants modify products, swap ingredients for healthier ones, or reduce portion sizes upon nutrition disclosure so that items have a more favorable nutrition make up (Severson, 2008; Shipp, 1988). Furthermore, some entrees were removed from the menu and replaced with nutritionally superior entrees (Pulos & Leng, 2010). This has a significant public
health benefit because all consumers will purchase a nutritionally improved meal regardless if they see or utilize the nutrition information.

Another benefit for consumers is based on the empirical evidence that they are more likely to change their eating behavior if the nutrition information is readily available. Reviewed literature indicated that very few consumers seek out nutrition information whether in the restaurant or online (Roberto et al., 2009). The participants in the focus groups conducted by Jones (2007) reiterated this finding by stating that they don’t use separate nutrition information in restaurants and would find nutrition information on the menu very useful. Nutrition disclosure provides consumers the opportunity to make informed, healthier choices by switching their typical entrée choice or selecting side dishes that are healthier.

There is a learning effect caused by nutrition labeling. Bollinger et al. (2010) found that consumers that made a purchase at a Starbucks in New York City where calories must be posted subsequently purchased lower caloric items at Starbucks where there was not a labeling regulation. Since the Menu Labeling policy will only affect restaurants with twenty or more locations, it may still have a positive impact on consumers when they dine at restaurants that do not have to have nutrition disclosures.

A potential downfall of menu labeling is a decrease in the enjoyment of dining out. For some consumers dining out is still considered a treat, a time for indulgence (Droms, 2006). Consumers may have feelings of guilt when they see that their favorite dish provides a day’s worth of calories. For other consumers, they perceive nutrition labeling as a means for the restaurant (or government) to control them (Jones, 2007). Lastly, another concern is that consumers, even if they choose a healthier item while dining out, may increase their caloric intake somewhere else (Keystone, 2006).
Education will be an important factor in the effectiveness of menu labeling. While this study’s findings indicate knowledge does have an effect on nutrition label use, it is not known whether or not a lack of knowledge of percent daily value minimized their impact on the dependent measures.

**Limitations and Future Research**

While the collective study results imply that a nutrition label on a menu aids consumers in nutrition evaluation of food choices, there are several factors to consider that restrict the generalizability of this study’s findings. Subjects were presented with a mock menu and asked questions regarding the menu outside of a restaurant setting. Thus, subjects were not exposed to the variety of situational factors that influence food judgments and behavior. Therefore, results do not necessarily extend beyond the specific label treatments, the specific dependent variables, and the measures used in this study.

The findings do not necessarily extend beyond the specific label treatments employed in this study. Slight changes to how the nutrition information is presented, such as using a back slash instead of a dot to separate the nutrients or excluding the percent symbol or parenthesis when disclosing the percent of recommended daily value, may alter the degree of impact the label has on dietary judgments and label comprehension. The nutrition label was placed beneath the entrée name and above the entrée description. Prior studies have not examined the best location to place the nutrition label nor was the placement’s effect measured here. A future study could measure the effect of different label placement such as below the entrée name and description or in a column to the right similar to how prices are displayed.

A key was placed at the bottom of the two menus that had a nutrition label explaining the format of the label and included that the USDA’s recommended allowance for the nutrients based on a 2,000 calorie diet. Whether or not consumers found the key helpful or credible was
not measured. A future study should analyze how a label key and its perceived credibility could aid or hinder label comprehension and use.

The literature indicates that consumers are more interested in negative nutrients than positive; four negative nutrients were included in this study. This study’s findings confirmed the relevance of the four nutrients, while sixty percent of the sample would also like protein and carbohydrates added to the label. A concern is whether or not the addition of two nutrients, especially when accompanied by reference values, would cause information overload. This study did not have a difference in ratings of the amount of attributes between the two label formats; however, an increase to six nutrients may have an effect. To the researcher’s knowledge, only two studies tested the information overload theory in the context of a menu, and even then, the stimulus was not a full menu (Hwang & Lorenzen 2008; Yoon, 2009). It is important to mimic a real restaurant situation as closely as possible, so research focused on the effect of information overload on a full menu would be beneficial.

Previous FDA research concluded that label format preference does not necessarily coincide with its effectiveness (Levy et al., 1996). The label formats examined in this study may not present the optimal mix of design, nutrients, or reference value. There are several other formats, some of which were reviewed but not tested in this study that could be used for the menu nutrition label. Future research may identify and test other formats that may be equally or more effective at conveying nutrition information on a menu.

Since this study employed snowball sampling method to acquire participants, the sample group may not be representative of the U.S. population. While previous studies have shown that age (Burton & Andrews, 1996; Moorman & Matulich, 1993; Pulos & Leng, 2010), gender (Bates, 2009; Nayga, 2000), education (Moorman, 1990; Mitra et al., 1999; Saegert & Young, 1983), and income (Bollinger et. al, 2010; Ebel, Kersh, Brescoll, & Dixon, 2009; Moorman
Matulich, 1993) can affect how people process and use nutrition information, a series of covariate tests were conducted and indicated that none of the demographic characteristics affected the dependent variables in the current study. It may therefore be helpful to conduct the same experiment with a national probability sample and reevaluate the effect of demographic characteristics.

Both knowledge and motivation were not moderating factors in this study. The motivation measure was based on items from past studies; however the knowledge measure was not. There has been limited research on the effect motivation and knowledge has on the use of nutrition information on a menu. It is possible that the measures in this study were weak or that these individual characteristics do not have as a significant role on away-from-home food. Further research on motivation and knowledge effect on menu label use would be valuable.

In conclusion, the study of menu labeling as well as the study of nutrition information formats provide promising avenues for improving consumer use and decision making when purchasing and consuming away-from-home foods.
APPENDIX
APPENDIX

RESEARCHER LETTER, MENU, AND SURVEY FOR EACH EXPERIMENTAL CONDITION

Control Group (CG)

Dear Participant,

I am a graduate student at the University of Massachusetts, and I am conducting this survey as part of my thesis. I would appreciate your participation. On average, this survey takes 8 minutes to complete. Your participation is entirely voluntary.

I am interested in your reactions to a situation that you might encounter concerning meal selection in a restaurant. Please respond to the questions in a natural manner. There are no right or wrong answers; I want your honest opinions.

Please carefully read all information presented on the menu. Later I will ask you to provide your reaction to the information.

This information is used only in an aggregate format with other respondents. Individuals are not identified by anyone including the researchers. Your responses will be confidential.

If you have any additional questions concerning this research or your participation in it, please feel free to contact me or my advisor at any time.

Sincerely,

Diane

Diane Lowe
Graduate Student
Department of Hospitality & Tourism
University of Massachusetts – Amherst
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Faculty Advisor: Linda Shea
Professor of Marketing
Department of Hospitality & Tourism
University of Massachusetts – Amherst
LjShea@ht.umass.edu
Please review the menu below. The first set of questions will be about this menu.

**SALADS**

**CHICKEN CAESAR SALAD**
Grilled chicken over romaine lettuce tossed in a creamy Caesar dressing. Topped with imported parmesan cheese and croutons.

**CHOPPED SALAD**
Grilled chicken breast, baby spinach, plum tomatoes, carrots, feta, red grapes, goji berries, raisins, soy nuts, almonds, pepitas, and sweetened dried cranberries tossed in a balsamic vinaigrette.

**PASTA**

**SHRIMP SCAMPI**
Sautéed shrimp with plum tomatoes and basil on vermicelli pasta tossed in a white wine sauce. Sprinkled with freshly grated parmesan cheese.

**DEEP DISH MACARONI AND 3-CHEESE**
Penne with aged cheddar, parmesan and Romano cheeses. Sprinkled with a buttery crumb topping and baked in a deep dish pan.

**ROMANO CRUSTED CHICKEN PARMESAN**
Chicken breasts coated with Romano cheese, basil, panko bread crumbs and Italian spices. Baked with melted mozzarella. Served over penne with an all-natural marinara sauce over penne.

**LAND & SEA**

**CRUNCHY CHICKEN WRAP**
A whole wheat and flaxseed tortilla filled with fried chicken, cheddar cheese, lettuce, dried cranberries, and tarragon mayo. Served with a side of fries.

**BACON CHEESEBURGER**
Our handmade Angus-beef burger topped with cheddar cheese and crispy bacon. Served with lettuce, tomato and a side of fries.

**TOP SIRLOIN STEAK**
An 8 oz. Certified Angus top sirloin cooked to your preference served with steamed broccoli and rice pilaf sweetened with dried cranberries.

**BAKED HADDOCK**
An 8 oz. haddock fillet baked with cracker crumbs. Served with roasted seasonal vegetables and whole-grain salad with diced tomatoes, cucumbers and balsamic vinaigrette.
Q01 In your opinion, which two entrees on this menu are the healthiest?
- Chicken Caesar Salad
- Chopped Salad
- Shrimp Scampi
- Deep Dish Macaroni & Cheese
- Chicken Parmesan
- Crunchy Chicken Wrap
- Bacon Cheeseburger
- Top Sirloin Steak
- Baked Haddock

Q02 In your opinion, which two entrees on this menu are the unhealthiest?
- Chicken Caesar Salad
- Chopped Salad
- Shrimp Scampi
- Deep Dish Macaroni & Cheese
- Chicken Parmesan
- Crunchy Chicken Wrap
- Bacon Cheeseburger
- Top Sirloin Steak
- Baked Haddock

NOTE: For each page, please ensure you have answered all the questions before selecting the next button. You will not be able to go back and fill in answers.

Q03 How certain are you that you selected the most and least healthy entrees?
- Very Uncertain
- Somewhat Uncertain
- Neither Certain nor Uncertain
- Somewhat Certain
- Very Certain

Q04 How confusing did you find selecting the most and least healthy entrees to be?
- Very Confusing
- Somewhat Confusing
- Neither Clear nor Confusing
- Somewhat Clear
- Very Clear

Q05 Rate the helpfulness the entrée description influencing your most and least healthy entrée selections.
- Very Unhelpful
- Somewhat Unhelpful
- Neither Helpful or Unhelpful
- Somewhat Helpful
- Very Helpful
Q06 Do you agree or disagree with the following statements?

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories measure the amount of energy contained in a food item.</td>
<td>○</td>
<td>○</td>
<td>○</td>
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</tr>
<tr>
<td>It is better to consume more saturated fats than unsaturated fats.</td>
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<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Consuming too much sodium can lead to high blood pressure.</td>
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<td>○</td>
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</tr>
</tbody>
</table>

Refer to the entrée below when answering the next set of questions.

**GRILLED SHRIMP & SIRLOIN**
A 6 oz. Certified Angus top sirloin and five skewered shrimp basted in a basil and garlic arinade. Served with steamed broccoli and a whole-grain salad.

Q07 If you were to eat three servings of the Grilled Shrimp and Sirloin in one day, which nutrient(s) do you think you would consume more than the daily recommended amount? Select all that apply.
- Calories
- Total Fat
- Saturated Fat
- Sodium
- Cannot determine from the information provided

Q08 What do you estimate the calorie and nutrient levels for the Grilled Shrimp & Sirloin to be?

<table>
<thead>
<tr>
<th></th>
<th>Very Low</th>
<th>Somewhat Low</th>
<th>Neither High nor Low</th>
<th>Somewhat High</th>
<th>Very High</th>
<th>Cannot Determine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Fat</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Saturated Fat</td>
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<td></td>
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<tr>
<td>Sodium</td>
<td></td>
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</tbody>
</table>

Q09 Based on the entrée's description, how healthy do you consider the Grilled Shrimp & Sirloin?
- Very Unhealthy
- Somewhat Unhealthy
- Neither Healthy nor Unhealthy
- Somewhat Healthy
- Very Healthy
- Cannot Determine

Q10 When answering the above three questions, how helpful would it have been to have a nutrition label for the entrée?
- Very Unhelpful
- Somewhat Unhelpful
- Neither Helpful nor Unhelpful
- Somewhat Helpful
- Very Helpful
Q11 What nutrition information, if any, would you like provided in the nutrition label? Select all that apply.

- Calories
- Total Fat
- Saturated Fat
- Sodium
- Protein
- Carbohydrates
- Cholesterol
- Fiber
- Vitamins
- Other. Please specify ____________________
- None of the above

Q12 When making your entrée selection, how helpful would it be to have the percentage of daily recommended value on the menu?

- Very Unhelpful
- Somewhat Unhelpful
- Neither Helpful nor Unhelpful
- Somewhat Helpful
- Very Helpful

Lifestyle Questions

Please respond to the following questions that relate to your own characteristics.

Q13 Please select the option that best describes your current weight.

- Underweight
- Slightly Underweight
- Healthy Weight
- Slightly Overweight
- Overweight

Q14 How would you assess your current level of health?

- Very Unhealthy
- Somewhat Unhealthy
- Neither Healthy nor Unhealthy
- Somewhat Healthy
- Very Healthy
- Not sure

Q15 On average, how many times per week do you eat meals that were prepared in a restaurant for breakfast, lunch or dinner? Please include eat-in restaurants, carry-out restaurants, and restaurants that deliver food to your house.

- Less than once a week
- Once a week
- 2 – 3 times a week
- 4 – 6 times a week
- Daily
Q16 For you personally, eating healthy is
- Very Unimportant
- Somewhat Unimportant
- Neither Important nor Unimportant
- Somewhat Important
- Very Important

Q17 How careful are you when selecting what you eat to achieve a balanced, healthy diet?
- Not Very Careful
- Somewhat Careful
- Very Careful

Q18 When eating out, how likely is it that you would choose a healthy option for a meal over an unhealthy option?
- Very Unlikely
- Somewhat Unlikely
- Undecided
- Somewhat Likely
- Very Likely

Q19 How often do you:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Never</th>
<th>Hardly Ever</th>
<th>About Half the Time</th>
<th>Most Times</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>use nutrition information when shopping for prepackaged food in a grocery store, convenience store or department store?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>look up nutritional information from online sources before dining at a restaurant to help you make a meal selection?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>use nutritional information if it is provided on the menu when making a meal selection?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Q20 Do you have any additional comments about your use of nutritional labels in restaurants?
Demographic Questions
This information is confidential and responses are used only in the aggregate. Individuals are not identified by anyone including the researchers.

Q21 Please select your gender.
- Male
- Female

Q22 Please select your age range.
- 18-25
- 26-35
- 36-45
- 46-55
- 56-65
- 66-75
- 76 or older

Q23 Please select your highest level of education completed.
- Some high school or less
- High school diploma or equivalent
- Associate degree or Technical school
- Bachelor degree
- Graduate degree or Doctoral degree

Q24 Please select your individual pre-tax income range.
- Less than $25,000
- $25,000 - $49,999
- $50,000 - $74,999
- $75,000 - $99,999
- $100,000 or more

Q25 Please select your ethnicity.
- African American
- Asian
- Caucasian
- Hispanic/Latino/Spanish
- Other
Dear Participant,

I am a graduate student at the University of Massachusetts, and I am conducting this survey as part of my thesis. I would appreciate your participation. On average, this survey takes 8 minutes to complete. Your participation is entirely voluntary.

I am interested in your reactions to a situation that you might encounter concerning meal selection in a restaurant. Please respond to the questions in a natural manner. There are no right or wrong answers; I want your honest opinions.

Please carefully read all information presented on the menu. Later I will ask you to provide your reaction to the information.

This information is used only in an aggregate format with other respondents. Individuals are not identified by anyone including the researchers. Your responses will be confidential.

If you have any additional questions concerning this research or your participation in it, please feel free to contact me or my advisor at any time.

Sincerely,

Diane

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Professor of Marketing
Department of Hospitality & Tourism
University of Massachusetts – Amherst
LjShea@ht.umass.edu
Please review the menu below. The first set of questions will be about this menu.

**SALADS**

**CHICKEN CAESAR SALAD**  
850 • 45 • 13 • 1880  
Grilled chicken over romaine lettuce tossed in a creamy Caesar dressing. Topped with imported parmesan cheese and croutons.

**CHOPPED SALAD**  
540 • 14 • 3 • 1220  
Grilled chicken breast, baby spinach, plum tomatoes, carrots, feta, red grapes, goji berries, raisins, soy nuts, almonds, pepitas, and sweetened dried cranberries tossed in a balsamic vinaigrette.

**PASTA**

**SHRIMP SCAMPI**  
1160 • 42 • 12 • 1940  
Sautéed shrimp with plum tomatoes and basil on vermicelli pasta tossed in a white wine sauce. Sprinkled with freshly grated parmesan cheese.

**DEEP DISH MACARONI AND 3-CHEESE**  
2000 • 134 • 64 • 3100  
Penne with aged cheddar, parmesan and Romano cheeses. Sprinkled with a buttery crumb topping and baked in a deep dish pan.

**ROMANO CRUSTED CHICKEN PARMESAN**  
1120 • 38 • 9 • 2040  
Chicken breasts coated with Romano cheese, basil, panko bread crumbs and Italian spices. Baked with melted mozzarella. Served over penne with an all-natural marinara sauce over penne.

**LAND & SEA**

**CRUNCHY CHICKEN WRAP**  
1410 • 87 • 16.5 • 3290  
A whole wheat and flaxseed tortilla filled with fried chicken, cheddar cheese, lettuce, dried cranberries, and tarragon mayo. Served with a side of fries.

**BACON CHEESEBURGER**  
1490 • 109 • 34.5 • 3490  
Our handmade Angus-beef burger topped with cheddar cheese and crispy bacon. Served with lettuce, tomato and a side of fries.

**TOP SIRLOIN STEAK**  
650 • 22 • 6.5 • 1780  
An 8 oz. Certified Angus top sirloin cooked to your preference served with steamed broccoli and rice pilaf sweetened with dried cranberries.

**BAKED HADDOCK**  
750 • 18 • 6 • 1010  
An 8 oz. haddock fillet baked with cracker crumbs. Served with roasted seasonal vegetables and whole-grain salad with diced tomatoes, cucumbers and balsamic vinaigrette.

Nutrition information is included on this menu in the following format: calories • total fat • saturated fat • sodium. The USDA recommends an average daily diet of 2,000 calories, 65 grams of fat, 20 of which can be saturated fat, and 2,400 milligrams of sodium.
Q01 In your opinion, which two entrees on this menu are the healthiest?
- Chicken Caesar Salad
- Chopped Salad
- Shrimp Scampi
- Deep Dish Macaroni & Cheese
- Chicken Parmesan
- Crunchy Chicken Wrap
- Bacon Cheeseburger
- Top Sirloin Steak
- Baked Haddock

Q02 In your opinion, which two entrees on this menu are the unhealthiest?
- Chicken Caesar Salad
- Chopped Salad
- Shrimp Scampi
- Deep Dish Macaroni & Cheese
- Chicken Parmesan
- Crunchy Chicken Wrap
- Bacon Cheeseburger
- Top Sirloin Steak
- Baked Haddock

NOTE: For each page, please ensure you have answered all the questions before selecting the next button. You will not be able to go back and fill in answers.

Q03 How certain are you that you selected the most and least healthy entrees?
- Very Uncertain
- Somewhat Uncertain
- Neither Certain nor Uncertain
- Somewhat Certain
- Very Certain

Q04 How confusing did you find selecting the most and least healthy entrees to be?
- Very Confusing
- Somewhat Confusing
- Neither Clear nor Confusing
- Somewhat Clear
- Very Clear

Q05 On your menu there were numbers such as 770 • 24 • 18 • 550 for each entree. Did you notice these numbers?
- Yes
- No

Q06 Did you look at the key that explains what these numbers mean?
- Yes
- No
Q07 Rate the helpfulness of these five factors in influencing your most and least healthy entrée selections.

<table>
<thead>
<tr>
<th></th>
<th>Very Unhelpful</th>
<th>Somewhat Unhelpful</th>
<th>Neither Helpful nor Unhelpful</th>
<th>Somewhat Helpful</th>
<th>Very Helpful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
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<tr>
<td>Saturated Fat</td>
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<td>Sodium</td>
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<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Entrée Description</td>
<td>○</td>
<td>○</td>
<td>○</td>
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</tbody>
</table>

Q08 Which of the five factors influenced your decisions the most?
- Calories
- Total Fat
- Saturated Fat
- Sodium
- Entrée Description

Q09 Which of the five factors influenced your decisions the least?
- Calories
- Total Fat
- Saturated Fat
- Sodium
- Entrée Description

Q10 Do you agree or disagree with the following statements?

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
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<td>Calories measure the amount of energy contained in a food item.</td>
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<td>It is better to consume more saturated fats than unsaturated fats.</td>
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<tr>
<td>Using the nutrition information provided, I can determine if an entree is healthy or not.</td>
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<td>○</td>
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<td>○</td>
</tr>
<tr>
<td>Using the nutrition information provided, I understand how an entree fits into my daily diet.</td>
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<td>○</td>
<td>○</td>
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<td>○</td>
</tr>
</tbody>
</table>
Refer to the entrée below when answering the next set of questions.

**GRILLED SHRIMP & SIRLOIN**

640 • 42 • 8 • 2170

A 6 oz. Certified Angus top sirloin and five skewered shrimp basted in a basil and garlic marinade. Served with steamed broccoli and a whole-grain salad.

Nutrition information is included on this menu in the following format: calories *total fat* *saturated fat* sodium. The USDA recommends an average daily diet of 2,000 calories, 65 grams of fat, 20 of which can be saturated fat, and 2,400 milligrams of sodium.

Q11 If you were to eat three servings of the Grilled Shrimp and Sirloin in one day, which nutrient(s) would you consume more than the daily recommended amount? Select all that apply.

- [ ] Calories
- [ ] Total Fat
- [ ] Saturated Fat
- [ ] Sodium
- [ ] Cannot determine from the information provided

Q12 How do you rate the calorie and nutrient levels for the Grilled Shrimp and Sirloin?

<table>
<thead>
<tr>
<th></th>
<th>Very Low</th>
<th>Somewhat Low</th>
<th>Neither High nor Low</th>
<th>Somewhat High</th>
<th>Very High</th>
<th>Cannot Determine</th>
</tr>
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<tr>
<td>Calories</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Total Fat</td>
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<td></td>
</tr>
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</table>

Q13 Based on the specific nutrition information shown for the entrée, how healthy do you consider the Grilled Shrimp and Sirloin?

- [ ] Very Unhealthy
- [ ] Somewhat Unhealthy
- [ ] Neither Healthy nor Unhealthy
- [ ] Somewhat Healthy
- [ ] Very Healthy

Q14 The nutrition information provided on the label is:

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
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Q15 What do you think about the number of nutrients included the nutrition label?
- Too Few Nutrients
- Right Amount of Nutrients
- Too Many Nutrients
- Not Sure

Q16 What additional nutrition information, if any, would you like provided for the entrée? Select all that apply.
- Protein
- Carbohydrates
- Cholesterol
- Fiber
- Vitamins
- Other. Please specify ____________________
- None of the above

Q17 What nutrition information, if any, do you think does not need to be provided for the entrée? Select all that apply.
- Calories
- Total Fat
- Saturated Fat
- Sodium
- None of the above

Q18 When making your entrée selection, how helpful would it be to have the percentage of daily recommended value on the menu?
- Very Unhelpful
- Somewhat Unhelpful
- Neither Helpful nor Unhelpful
- Somewhat Helpful
- Very Helpful
Lifestyle Questions
Please respond to the following questions that relate to your characteristics.

Q19 Please select the option that best describes your current weight.
- Underweight
- Slightly Underweight
- Healthy Weight
- Slightly Overweight
- Overweight

Q20 How would you assess your current level of health?
- Very Unhealthy
- Somewhat Unhealthy
- Neither Healthy nor Unhealthy
- Somewhat Healthy
- Very Healthy
- Not sure

Q21 On average, how many times per week do you eat meals that were prepared in a restaurant for breakfast, lunch or dinner? Please include eat-in restaurants, carry-out restaurants, and restaurants that deliver food to your house.
- Less than once a week
- Once a week
- 2 – 3 times a week
- 4 – 6 times a week
- Daily

Q22 For you personally, eating healthy is
- Very Unimportant
- Somewhat Unimportant
- Neither Important nor Unimportant
- Somewhat Important
- Very Important

Q23 How careful are you when selecting what you eat to achieve a balanced, healthy diet?
- Not Very Careful
- Somewhat Careful
- Very Careful
Q24 When eating out, how likely is it that you would choose a healthy option for a meal over an unhealthy option?
- Very Unlikely
- Somewhat Unlikely
- Undecided
- Somewhat Likely
- Very Likely

Q25 How often do you:

<table>
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<tr>
<th>Use Nutrition Information</th>
<th>Never</th>
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<th>About Half the Time</th>
<th>Most Times</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use nutrition information when shopping for prepackaged food in a grocery store, convenience store or department store?</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>Look up nutritional information from online sources before dining at a restaurant to help you make a meal selection?</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>Use nutritional information if it is provided on the menu when making a meal selection?</td>
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Q26 Do you have any additional comments about your use of nutritional labels in restaurants?
Demographic Questions
This information is confidential and responses are used only in the aggregate. Individuals are not identified by anyone including the researchers.

Q27 Please select your gender.
- Male
- Female

Q28 Please select your age range.
- 18-25
- 26-35
- 36-45
- 46-55
- 56-65
- 66-75
- 76 or older

Q29 Please select your highest level of education completed.
- Some high school or less
- High school diploma or equivalent
- Associate degree or Technical school
- Bachelor degree
- Graduate degree or Doctoral degree

Q30 Please select your individual pre-tax income range.
- Less than $25,000
- $25,000 - $49,999
- $50,000 - $74,999
- $75,000 - $99,999
- $100,000 or more

Q31 Please select your ethnicity.
- African American
- Asian
- Caucasian
- Hispanic/Latino/Spanish
- Other
Dear Participant,

I am a graduate student at the University of Massachusetts, and I am conducting this survey as part of my thesis. I would appreciate your participation. On average, this survey takes 8 minutes to complete. Your participation is entirely voluntary.

I am interested in your reactions to a situation that you might encounter concerning meal selection in a restaurant. Please respond to the questions in a natural manner. There are no right or wrong answers; I want your honest opinions.

Please carefully read all information presented on the menu. Later I will ask you to provide your reaction to the information.

This information is used only in an aggregate format with other respondents. Individuals are not identified by anyone including the researchers. Your responses will be confidential.

If you have any additional questions concerning this research or your participation in it, please feel free to contact me or my advisor at any time.

Sincerely,

Diane

Diane Lowe
Graduate Student
Department of Hospitality & Tourism
University of Massachusetts – Amherst
DLowe@som.umass.edu

Faculty Advisor: Linda Shea
Professor of Marketing
Department of Hospitality & Tourism
University of Massachusetts – Amherst
LjShea@ht.umass.edu
Please review the menu below. The first set of questions will be about this menu.

**SALADS**

**CHICKEN CAESAR SALAD**
850(43%) • 45(69%) • 13(65%) • 1880(82%)
Grilled chicken over romaine lettuce tossed in a creamy Caesar dressing. Topped with imported parmesan cheese and croutons.

**CHOPPED SALAD**
540(27%) • 14(22%) • 3(15%) • 1220(53%)
Grilled chicken breast, baby spinach, plum tomatoes, carrots, feta, red grapes, goji berries, raisins, soy nuts, almonds, pepitas, and sweetened dried cranberries tossed in a balsamic vinaigrette.

**PASTA**

**SHRIMP SCAMPI**
1160(58%) • 42(65%) • 12(60%) • 1940(84%)
Sautéed shrimp with plum tomatoes and basil on vermicelli pasta tossed in a white wine sauce. Sprinkled with freshly grated parmesan cheese.

**DEEP DISH MACARONI AND 3-CHEESE**
2000(100%) • 134(206%) • 64(320%) • 3100(135%)
Penne with aged cheddar, parmesan and Romano cheeses. Sprinkled with a buttery crumb topping and baked in a deep dish pan.

**ROMANO CRUSTED CHICKEN PARMESAN**
1120(56%) • 38(58%) • 9(45%) • 2040(89%)
Chicken breasts coated with Romano cheese, basil, panko bread crumbs and Italian spices. Baked with melted mozzarella. Served over penne with an all-natural marinara sauce over penne.

**LAND & SEA**

**CRUNCHY CHICKEN WRAP**
1410(71%) • 87(134%) • 16.5(87%) • 3290(137%)
A whole wheat and flaxseed tortilla filled with fried chicken, cheddar cheese, lettuce, dried cranberries, and tarragon mayo. Served with a side of fries.

**BACON CHEESEBURGER**
1490(75%) • 109(168%) • 34.5(173%) • 3490(152%)
Our handmade Angus-beef burger topped with cheddar cheese and crispy bacon. Served with lettuce, tomato and a side of fries.

**TOP SIRLOIN STEAK**
650(33%) • 22(43%) • 6.5(33%) • 1780(77%)
An 8 oz. Certified Angus top sirloin cooked to your preference served with steamed broccoli and rice pilaf sweetened with dried cranberries.

**BAKED HADDOCK**
750(38%) • 18(28%) • 6(30%) • 1010(44%)
An 8 oz. haddock fillet baked with cracker crumbs. Served with roasted seasonal vegetables and whole-grain salad with diced tomatoes, cucumbers and balsamic vinaigrette.

Nutrition information is included on this menu in the following format: calories • total fat • saturated fat • sodium. The percentages of daily recommended values are in parentheses. The USDA recommends an average daily diet of 2,000 calories, 65 grams of fat, 20 of which can be saturated fat, and 2,400 milligrams of sodium.
Q01 In your opinion, which two entrees on this menu are the healthiest?
☐ Chicken Caesar Salad
☐ Chopped Salad
☐ Shrimp Scampi
☐ Deep Dish Macaroni & Cheese
☐ Chicken Parmesan
☐ Crunchy Chicken Wrap
☐ Bacon Cheeseburger
☐ Top Sirloin Steak
☐ Baked Haddock

Q02 In your opinion, which two entrees on this menu are the unhealthiest?
☐ Chicken Caesar Salad
☐ Chopped Salad
☐ Shrimp Scampi
☐ Deep Dish Macaroni & Cheese
☐ Chicken Parmesan
☐ Crunchy Chicken Wrap
☐ Bacon Cheeseburger
☐ Top Sirloin Steak
☐ Baked Haddock

NOTE: For each page, please ensure you have answered all the questions before selecting the next button. You will not be able to go back and fill in answers.

Q03 How certain are you that you selected the most and least healthy entrees?
☐ Very Uncertain
☐ Somewhat Uncertain
☐ Neither Certain nor Uncertain
☐ Somewhat Certain
☐ Very Certain

Q04 How confusing did you find selecting the most and least healthy entrees to be?
☐ Very Confusing
☐ Somewhat Confusing
☐ Neither Clear nor Confusing
☐ Somewhat Clear
☐ Very Clear

Q05 On your menu there were numbers such as 770(39%) • 24(37%) • 18(90%) • 550(24%) for each entree. Did you notice these numbers?
☐ Yes
☐ No

Q06 Did you look at the key that explains what these numbers mean?
☐ Yes
☐ No
Q07 Rate the helpfulness of these six factors in influencing your most and least healthy entrée selections.

<table>
<thead>
<tr>
<th></th>
<th>Very Unhelpful</th>
<th>Somewhat Unhelpful</th>
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<th>Very Helpful</th>
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</tr>
<tr>
<td>% Daily Recommended Value</td>
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<td>Entrée Description</td>
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</tbody>
</table>

Q08 Which of the six factors influenced your decisions the most?
- Calories
- Total Fat
- Saturated Fat
- Sodium
- % Daily Recommended Value
- Entrée Description

Q09 Which of the six factors influenced your decisions the least?
- Calories
- Total Fat
- Saturated Fat
- Sodium
- % Daily Recommended Value
- Entrée Description

Q10 Do you agree or disagree with the following statements?

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
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Refer to the entrée below when answering the next set of questions.

**GRILLED SHRIMP & SIRLOIN**
**640(32%) • 42(65%) • 8(42%) • 2170(90%)**
A 6 oz. Certified Angus top sirloin and five skewered shrimp basted in a basil and garlic marinade. Served with steamed broccoli and a whole-grain salad.

Q11 If you were to eat three servings of the Grilled Shrimp & Sirloin in one day, which nutrient(s) would you consume more than the daily recommended amount? Select all that apply.
- Calories
- Total Fat
- Saturated Fat
- Sodium
- Cannot determine from the information provided

Q12 How do you rate the calorie and nutrient levels for the Grilled Shrimp & Sirloin?

<table>
<thead>
<tr>
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<th>Very Low</th>
<th>Somewhat Low</th>
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<th>Somewhat High</th>
<th>Very High</th>
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</tr>
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Q13 Based on the specific nutrition information shown for the entrée, how healthy do you consider the Grilled Shrimp & Sirloin?
- Very Unhealthy
- Somewhat Unhealthy
- Neither Healthy nor Unhealthy
- Somewhat Healthy
- Very Healthy

Q14 The nutrition information provided on the label is:

<table>
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</table>
Q15 What do you think about the number of nutrients included the nutrition label?
○ Too Few Nutrients
○ Right Amount of Nutrients
○ Too Many Nutrients
○ Not Sure

Q16 What additional nutrition information, if any, would you like provided for the entrée?
Select all that apply.
☐ Protein
☐ Carbohydrates
☐ Cholesterol
☐ Fiber
☐ Vitamins
☐ Other. Please specify _________________
☐ No additional nutrition information is needed

Q17 What nutrition information, if any, do you think does not need to be provided for the entrée? Select all that apply.
☐ Calories
☐ Total Fat
☐ Saturated Fat
☐ Sodium
☐ None of the above

Q18 When making your entrée selection, how helpful is it to have the percentage of daily recommended value on the menu?
○ Very Unhelpful
○ Somewhat Unhelpful
○ Neither Helpful nor Unhelpful
○ Somewhat Helpful
○ Very Helpful

Lifestyle Questions
Please respond to the following questions that relate to your characteristics.

Q19 Please select the option that best describes your current weight.
○ Underweight
○ Slightly Underweight
○ Healthy Weight
○ Slightly Overweight
○ Overweight

Q20 How would you assess your current level of health?
○ Very Unhealthy
○ Somewhat Unhealthy
○ Neither Healthy nor Unhealthy
○ Somewhat Healthy
○ Very Healthy
○ Not sure
Q21 On average, how many times per week do you eat meals that were prepared in a restaurant for breakfast, lunch or dinner? Please include eat-in restaurants, carry-out restaurants, and restaurants that deliver food to your house.
- Less than once a week
- Once a week
- 2 – 3 times a week
- 4 – 6 times a week
- Daily

Q22 For you personally, eating healthy is
- Very Unimportant
- Somewhat Unimportant
- Neither Important nor Unimportant
- Somewhat Important
- Very Important

Q23 How careful are you when selecting what you eat to achieve a balanced, healthy diet?
- Not Very Careful
- Somewhat Careful
- Very Careful

Q24 When eating out, how likely is it that you would choose a healthy option for a meal over an unhealthy option?
- Very Unlikely
- Somewhat Unlikely
- Undecided
- Somewhat Likely
- Very Likely

Q25 How often do you:

<table>
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<tr>
<th>Use nutrition information when shopping for prepackaged food in a grocery store, convenience store or department store?</th>
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Q26 Do you have any additional comments about your use of nutritional labels in restaurants?
**Demographic Questions**
This information is confidential and responses are used only in the aggregate. Individuals are not identified by anyone including the researchers.

Q27 Please select your gender.
- Male
- Female

Q28 Please select your age range.
- 18-25
- 26-35
- 36-45
- 46-55
- 56-65
- 66-75
- 76 or older

Q29 Please select your highest level of education completed.
- Some high school or less
- High school diploma or equivalent
- Associate degree or Technical school
- Bachelor degree
- Graduate degree or Doctoral degree

Q30 Please select your individual pre-tax income range into which you fall.
- Less than $25,000
- $25,000 - $49,999
- $50,000 - $74,999
- $75,000 - $99,999
- $100,000 or more

Q31 Please select your ethnicity.
- African American
- Asian
- Caucasian
- Hispanic/Latino/Spanish
- Other
REFERENCES


Food labeling; nutrition labeling of standard menu items in restaurants and similar retail food establishments. (2011). *Federal Register, 76*(66), 19191-19236.


Mintel (2011a, August). *Casual dining*. Mintel Group Ltd. Retrieved from http://academic.mintel.com/sinatra/oxygen_academic/search_results/show&\&type=RCltem\&sort=relevant\&access=accessible\&archive=hide\&source=non_snapshot\&list=search_results\display/id=543317\display/id=589037#hit1


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