

University of Mississippi

eGrove

---

Electronic Theses and Dissertations

Graduate School

---

2016

## A Study Of The Effectiveness Of Front-Of-Package Nutrition Labels In The US

Emily Lauren Irvin  
*University of Mississippi*

Follow this and additional works at: <https://egrove.olemiss.edu/etd>



Part of the [Nutrition Commons](#)

---

### Recommended Citation

Irvin, Emily Lauren, "A Study Of The Effectiveness Of Front-Of-Package Nutrition Labels In The US" (2016). *Electronic Theses and Dissertations*. 1006.  
<https://egrove.olemiss.edu/etd/1006>

This Thesis is brought to you for free and open access by the Graduate School at eGrove. It has been accepted for inclusion in Electronic Theses and Dissertations by an authorized administrator of eGrove. For more information, please contact [egrove@olemiss.edu](mailto:egrove@olemiss.edu).

A STUDY OF THE EFFECTIVENESS OF FRONT-OF-PACKAGE NUTRITION LABELS IN  
THE US

A Thesis  
presented in partial fulfillment of requirements  
for the degree of Master of Sciences  
in the Department of Nutrition and Hospitality Management  
The University of Mississippi

by

EMILY L. IRVIN

May 14, 2015

Copyright Emily L. Irvin 2016  
ALL RIGHTS RESERVED

## ABSTRACT

American weight trends have steadily increased over the past years. In efforts to better inform consumers of their food consumption, increasingly front-of-package (FOP) food labels are displayed on packaged food items. FOP nutrition labels have become more prevalent in the US to help consumers identify healthier options at the point-of-purchase. This study aimed to evaluate the effectiveness of two current FOP labels, the Facts Up Front and the Facts Up Front Extended labels. In addition, a generic binary label was created to represent a non-brand associated symbol, which does not currently exist in the US. Participants were randomized to one of three of the label conditions or the no-label Control group. A total of 161 adults, who are primary grocery shoppers in the US, ages 18-69 participated in this study. All participants were recruited through an online database, Qualtrics, in January 2016, and participated in the study. The main outcome measures were the healthiness assessment of two product variants for three common food categories, along with label liking, familiarity, ease of comprehension, purchase intention, and perceived label credibility. Additionally, participants' nutrition attitude, self-reported nutrition knowledge, and label behaviors were examined. The results indicated minor differences between the Facts Up Front and Facts Up Front Extended FOPs, but both were significantly more liked, familiar, easier to comprehend, and perceived as more credible than the generic binary label, the Health Check ( $p < .05$ ). Overall, those in the Facts Up Front label conditions performed better than those in the Health Check and no label conditions, indicating the presence of FOP labels successfully assists in assessing product healthiness.

## DEDICATION

This thesis is dedicated to my family and friends who have helped me, supported me, and encouraged me throughout the process.

## LIST OF ABBREVIATIONS

CDC Centers for Disease Control and Prevention

BMI Body Mass Index

FOP Front of Package

FDA Food and Drug Administration

AHA American Heart Association

USDA U.S. Department of Agriculture

IFIC International Food Information Council Foundation

GDA Guideline Daily Amounts

US United States

UK United Kingdom

## ACKNOWLEDGMENTS

I express my deepest appreciation to my advisor, Dr. Mary Roseman and my committee members, Dr. Robert Magee, and Dr. David Joung. I greatly appreciate the countless hours of meetings, edits, and encouragement throughout the entire process. I also am very thankful for my wonderful parents, Wade and Judy Irvin. I could not have financed my research without the assistantship and encouragement provided by them. A special thanks to my sister, Ashley Irvin for her wonderful graphic design work.

## TABLE OF CONTENTS

ABSTRACT.....	ii
DEDICATION.....	iii
LIST OF ABBREVIATIONS .....	iv
ACKNOLWEDGMENTS.....	v
LIST OF TABLES.....	vii
CHAPTER 1: INDRODUCTION.....	1
CHAPTER 2: LITERATURE REVIEW.....	4
CHAPTER 3: METHODS.....	28
CHAPTER 4: RESULTS.....	36
CHAPTER 5: DISCUSSION.....	55
BIBLIOGRAPHY.....	70
LIST OF APPENDICES.....	79
VITA.....	89



## LIST OF TABLES

1. Descriptive Statistics and Chi-Square of Study Participants by Demographics and Label Conditions (N=161).....	37
2. Multiple Regression Predicting Label Use by Respondent Demographics.....	40
3. Crosstabulation of FOP Label Format and Healthiness Assessment.....	43
4. FOP Effectiveness Variables by Label Condition.....	47
5. t-test Comparison of Reductive and Evaluative FOP Label Format Conditions.....	49
6. Multiple Regression Predicting FOP Label Use.....	52
7. Summary of Logistic Regression Analysis for Healthiness Assessment and Perceived Healthiness of Food Products.....	54

## CHAPTER 1: INTRODUCTION

Over the last 20 years, overall health in the United States has steadily declined. The prevalence of obesity and related diseases has been consistently increasing (Centers for Disease Control and Prevention [CDC], 2014). More than two-thirds, or 68.8%, of Americans 20 years or older are overweight with a body mass index (BMI) of 25 or more, and 35.7% of Americans are considered obese (CDC, 2014). Previous research strongly suggests that dietary intake directly relates to the progression and improvement of chronic diseases (Andrews, Chung-Tung Jordan, Levy, & Lo, 2014; CDC, 2014; Edge, Toner, Kapsak, & Geiger, 2014). Adverse health behaviors that can lead to increased risk for diseases and obesity also result in considerable health related costs, not only for individuals, but also for the nation as a whole (Boztuğ, Juhl, Elshiewy, & Jensen, 2015).

In an effort to combat declining health as well as health care costs, public health policy strategies have been implemented through nutrition labeling programs to help educate and increase consumer awareness of the nutrient content in products (Campos, Doxey, & Hammond, 2011; Grabenhorst, Schulte, Maderwald, & Brand, 2013; Lowe, de Souza-Monteiro, & Fraser, 2013). Front of package (FOP) labels display nutritional characteristics of food products that serve as a tool to empower consumers to purchase and consume healthier foods. FOP labeling is a quick guide to help consumers better understand nutrient information, and use it to compare within and across product categories (Kees, Royne, & Cho, 2014). Reliable and comprehensive nutrition information on food packages, if utilized appropriately, could potentially counteract the

prevalence of obesity and diet-related diseases (U.S. Food and Drug Administration [FDA], 2014).

However, there are multiple types of label systems present on food products throughout the US, which can be confusing to the consumer. Labels have been developed by non-profit organizations, manufacturers or retailers including: the American Heart Association's "Heart Check," the "Whole Grain Stamp" from the Whole Grains Council; PepsiCo's "Smart Spot," the "Guiding Stars" shelf tag from Hannaford Bros, Unilever's "Eat Smart" logo, Kraft's "Sensible Solution," General Mills' "Goodness Corner," the Keystone Group and Nutrition Roundtable's "Smart Choices" icon, Wal-Mart's "Great for You" label, the NuVal numeric shelf tag label, and additional nutrient claims, health claims, and dietary guidance statements (Hersey, Wohlgenant, Arsenault, Kosa, & Muth, 2013; McGuire, 2012; Newman, Howlett, & Burton, 2014; U.S. Department of Health and Human Services, Food and Drug Administration, 2010). Each of the previously listed FOP labels provides different nutrition information in diverse formats. Some labels are simplistic symbols that depict a healthy image, while others are more complex displaying specific nutrient content. A consistent, standardized label would more effectively influence the consumer to make more informed decisions and consume healthier food to reduce or prevent diet-related diseases (Kees, et al., 2014).

The Facts Up Front label, which follows the USDA's Dietary Guidelines for Americans, was introduced in 2011 and is increasing in popularity among food products (Facts Up Front, n.d.). Currently, the Facts Up Front label is on 80% of grocery products in the US (Watson, 2013). In order to provide an increase understanding of consumers' opinion, preference, and usage of FOP labels, this research will examine the effectiveness of the two formats of FOP labels. The Facts Up Front labels and a binary nutrition symbol label will be evaluated in order to

identify consumer-preferred characteristics of an effective FOP label. These characteristics will include consumer usage, liking, familiarity, comprehension, purchase intent, credibility, and ability to differentiate between products with healthier and less healthy variants. In addition, relationships regarding consumer attitude and nutrition knowledge to these characteristics will be examined.

## CHAPTER 2: LITERATURE REVIEW

### **US Health Status**

In the United States, the prevalence of obesity and related diseases has been consistently increasing. One out of every three adults in the US is obese (CDC, 2014). The current food environment has more recently been changing due to the long-term research supporting the positive correlation between diet and chronic diseases. The nutritional content of food products has been determined as an attribute to diet-related health issues (Drichoutis, Lazaridis, & Nayga, 2006). Saturated fat, trans fat, sodium, and added sugars are the nutrients of most concern by the US population (McGuire, 2012). In response to consumer interest in healthier lifestyles, the food and beverage industry has introduced 20,000 products with reduced calories, fat, sugar, and sodium (Facts Up Front, n.d.). However, there is still a multitude of accessible, inexpensive, and high calorie packaged foods that contribute to weight gain and diet related diseases (Thorndike, Riis, Sonnenberg, & Levy, 2014).

Furthermore, the complexity of food choices in grocery stores has increased over the years, and the need for proper nutritional knowledge and understanding is necessary to make healthful decisions (van der Merwe, Bosman, & Ellis, 2014). The Nielsen Global Survey of Food Labeling Trends stated that 59% of respondents around the world found it difficult to understand nutrition labels and more than half of those individuals were overweight (Nielsen, 2012).

The primary purpose of FOP labels is to summarize and reinforce, rather than replace, the Nutrition Facts label that may be overlooked due to its complexity. FOP labels have the ability to

promote more nutrition-related thoughts than packages without FOP disclosures, in which consumers are more likely to use labels to impact their purchase, consume healthier foods, and lead to better overall health outcomes (Kees, et al., 2014). The use of nutrition information on food labels is associated with lower consumption of fat, cholesterol, and sugar; as well as higher levels of intake of vitamin C, fiber, and iron (Graham, Heidrick, & Hodgins, 2015). Since FOP labels have the potential to influence food choices, labels have become more prominent on packaged food items within the last ten years (Miller, Cassady, Beckett, Applegate, Wilson, Gibson, & Ellwood, 2015). A FDA survey found that 67% of respondents reported using FOP labels often or occasionally when making purchasing decisions (U.S. Department of Health and Human Services, Food and Drug Administration, 2008). Motivation and sensory features of food typically dominate individuals' food choices (Grabenhorst et al., 2013). However, convenient nutrition information provided by FOP labeling could potentially help consumers decipher between healthy and less healthy options.

According to Kleef and Dagevos (2015), FOP labels should help the consumers understand nutrient quality of products. Consumers can more easily compare products with FOP labels than when using the Nutrition Facts label on the back of food packages. Although, FOP labels provide nutrition information, rather than nutrition advice (Temple & Fraser, 2014), most consumers have issues translating nutrition information for practical guidance. FOP labels also have the potential to encourage manufacturers to develop healthier products in order to attain favorable nutrition labels sought out by consumers (Brownell & Koplan, 2011; Julia, Kesse-Guyot, Ducrot, Péneau, Touvier, Méjean, & Hercberg, 2015; Temple & Fraser, 2014).

## **Front of Package Labels**

Over the years, retailers, manufacturers, governmental, or non-profit organizations have created voluntary FOP nutrition labels or shelf tags to assist consumers in selecting healthier options at the grocery store (Hersey et al., 2013). Nutrient claims, health claims, and dietary guidance statements or icons flood the marketplace products. These visual aids have been implemented in nutrition labeling systems as a cue for healthier products. Many nutrition labels or symbols are private initiatives that have distinct nutritional criteria those food products must meet in order to display the label, which are regulated by a national health organization or the government (Hersey et al., 2013). However, the various health and nutrition symbols compete for real estate on food packages, as well as shoppers' attention (Hawley, Roberto, Bragg, Liu, Schwartz, & Brownell, 2012; Newman et al., 2014). Different FOP label systems are not consistent throughout the grocery store, which could be a barrier and prevent consumers from using labels altogether (Kleef & Dagevos, 2015). The wide variety of non-standardized nutrition labeling systems with different formats that provide different nutrient information can be confusing and overwhelming to shoppers (Andrews et al., 2014; Hawley et al., 2012). In addition, manufacturers tend to use FOP labels to highlight healthy aspects of products that are overall unhealthy (Hawley et al., 2012). The consistency of FOP labeling is important and could help reduce consumer confusion (Feunekes, Gortemaker, Willems, Lion, van den Kommer, 2008). A potential way to clarify nutrition information on food packages throughout the grocery store is to implement a single, standardized FOP labeling system in the United States (Hawley et al., 2012; Hersey et al., 2013). By implementing a voluntary FOP label, the government can influence public health by regulating a single, voluntary nutrition label (Kleef & Dagevos, 2015)

## **FOP Labels in the US and European Countries**

Previous and current FOP labels in the US include non-profit organization produced labels such as the AHA “Heart Check,” the “Whole Grain Stamp” from the Whole Grains Council; manufacturer and retail labels such as PepsiCo’s “Smart Spot,” the “Guiding Stars” shelf tag from Hannaford Bros, Unilever’s “Eat Smart” logo, Kraft’s “Sensible Solution”, “General Mills’ “Goodness Corner,” the Keystone Group and Nutrition Roundtable’s “Smart Choices” icon, Wal-Mart’s “Great for You” label, the NuVal label, and other labels including Guideline Daily Amounts (GDA) format labels (Hersey et al., 2013; McGuire, 2012; Newman et al., 2014; U.S. Department of Health and Human Services, Food and Drug Administration, 2010). Additional label formats have been developed and researched in European countries. Similar to the United States, labels tend to vary in complexity and indicated nutrition information, and are produced by retailers, manufacturers, governmental, or non-governmental organizations. The most common and effective FOP labels in European countries are the Multiple Traffic Light labels, GDA, Wheel of Health, and Green Keyhole icon (Feunekes et al., 2008; Hodgkins, Raats, Fife-Schaw, Peacock, Gröppel-Klein, Koenigstorfer,... & Grunert, 2015; U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation, 2011). In addition, the UK has recently adopted a new format, which is a hybrid GDA label with traffic light color-coding. A study reported that the traffic-light label plus GDA label increased favorable consumer attitudes and product intentions (Andrews et al., 2011).

A European study suggested that all of the tested FOP label formats, (Healthier Choice Tick, five Stars rating, five Smileys rating, Multiple Traffic Light, and the Wheel of Health labels) excluding the overly simplistic Health Protection Factor label, were well understood, liked, viewed as credible, and assisted in differentiation of healthy and less healthy food products



(Feunekes et al., 2008). An additional study suggested that health and claim logo FOP label formats were described as not having enough information to determine if the claim is true, although consumers more frequently related the GDA and traffic-light labels to less healthy food products (Hodgkins et al., 2015). European studies support the implementation of the multiple traffic-light labels (Balcombe, Fraser, & Di Falco, 2010; Newman et al., 2014; Siegrist, Leins-Hess, & Keller, 2015; Sonnenberg, Gelsomin, Levy, Riis, Barraclough, & Thorndike, 2013; Kleef & Dagevos, 2015), however corresponding research suggests that GDA labels and traffic-light labels did not perform significantly different during the evaluation of food products (Feunekes et al., 2008; Siegrist et al., 2015). Despite the results of European FOP label studies and the various label formats, it is inconclusive as to which label format is the most effective.

With the intention to create a more beneficial FOP label in the US, Congress appointed the CDC and the Institute of Medicine (IOM) to evaluate current FOP schemes and provide recommendations for a potential standardized FOP label in the United States (McGuire, 2012). The study results suggested that the most critical nutrients included on an FOP label are calories, saturated fat, sodium, and added sugars (McGuire, 2012). The CDC, FDA, and the USDA Center for Nutrition Policy and Promotion collaborated to determine the benefits and effectiveness of a standardized FOP label that would be regulated by the FDA. The committee identified four key characteristics to most successful labeling schemes: simplicity, interpretive or easy to understand, ability to assist in the identification of products healthiness, and easy to remember. This evaluation serves as the groundwork and direction for current and future FOP labeling in the US. In order to implement a uniform FOP labeling system, the FDA guided the development of the emerging Facts Up Front label (McGuire, 2012).

## **Facts Up Front Label**

Facts Up Front is a voluntary labeling system developed by the Grocery Manufacturers Association and the Food Marketing Institute, to “help busy consumers make more informed decisions” (Brownell & Koplan, 2011; Facts Up Front, n.d.). The Facts Up Front, previously introduced as “Nutrition Keys” (Facts Up Front, 2014; FDA, 2011), is grounded in research and follows the USDA’s Dietary Guidelines for Americans. Food companies that participate in the FOP labeling program have products that display four “Basic Icons” that provide product calories, saturated fat, sodium, and sugar content per serving that should be limited for the general US population (Brownell & Koplan, 2011). Products have the option to display up to two additional icons, which provide information on dietary fiber, protein content, calcium, vitamins, and other nutrients beneficial for a healthy diet (Facts Up Front, n.d.). These are nutrients that Americans typically need more of and will only appear on the label if the product contains at least 10% or more of the nutrient per serving, meeting the FDA requirement of a “good source” (Facts Up Front, n.d.). The Food and Drug Administration, as well as the U.S. Department of Agriculture (USDA), set guidelines to the voluntary initiative for food manufacturers and retailers (U.S. Food and Drug Administration, 2014). The nutrition information on Facts Up Front labels are reliable and accurate in regards to calorie and nutrient content, as it is a reflection of the Nutrition Facts pane. The overall goal of FOP labeling programs is to inform consumers and assist in healthier food selections to overall decrease the risks of obesity and diet related chronic diseases by helping consumers adhere to the Dietary Guidelines for Americans (Andrews et al., 2014; Kees et al., 2014). A total of 80% of retail food and beverage products have adapted the Facts Up Front label (Facts Up Front, n.d.; Watson, 2013). In order to increase the level of impact, the Facts Up Front initiative seeks to increase consumer identification and

understanding of product nutrients and their effects on health (Department of Health and Human Services, 2012).

Research supports the positive effects of FOP labeling on a single food evaluation for a nutrient-specific icon on product healthfulness and purchase intentions (Andrews et al., 2014; Newman et al., 2014). Although, it is unclear which informative format is most effective. In addition, multiple studies have been completed in European countries regarding various FOP labeling schemes, but research examining the effectiveness of the Facts Up Front label in the US is limited.

### **Current FOP Label Use and Behaviors**

Multiple European countries have been studied mainly because of their prevalence of different labels. A European study evaluating the effectiveness of three different FOP labeling formats (GDA, traffic-light, and health logo systems) from four countries (UK, Poland, Turkey, and France) suggested that familiarity with a particular FOP label is a major determinant for label usage (Hodgkins et al., 2015). Label usage is defined by the consumer use of nutrition information in making food choices, rather than simply noticing or reading the label and ignoring the information (Barreiro-Hurlé et al., 2010; Drichoutis et al., 2006; Edge et al., 2014). In another study, 27% of UK shoppers looked for nutrition information (Grunert et al., 2010). One US study suggested that 86% of the participants self-reported the use of Nutrition Facts labels on a regular or occasional basis when purchasing a product for the first time, and 85% reported reading labels in effort to compare products (Edge et al., 2014). Furthermore, an additional US study found a significant difference in intake of calories, total fat, saturated fat, cholesterol, sodium, dietary fiber, and sugar at healthier levels for label users compared to non-label users (Ollberding, Wolf, & Contento, 2011). In addition, consumers who use nutrition labels in

grocery stores thought they would be able to make healthy menu selections on restaurant menus with nutrition labels (Roseman, Mathe-Soulek, & Higgins, 2013).

Label use, in general, is influenced by multiple factors including: nutritional knowledge, individual characteristics, economic conditions, health concerns and habits, convenience and time constraints, need for nutrition information, and lifestyle. Consumer goals and motivation, such as searching for specific foods for dietary needs or weight loss are also driving factors for label usage. Research indicates that demographics such as socioeconomic status, education level, gender, age, and health status influence nutritional knowledge and play a role in label use (Barreiro-Hurlé et al., 2010).

Consumers who are price-conscious have been found to be less likely to be interested in nutritional content. In a study of those who reported rarely or never reading nutrition labels to make purchasing decisions, 48% had an income of less than \$35,000 a year, and 38% had a high school degree or equivalent (Edge et al., 2014). Previous research suggests that females are more likely to be label users (Azman, & Sahak, 2014; Helfer & Shultz, 2014; Kleef, & Dagevos, 2015). Individuals who have more time to grocery shop or are concerned about nutrition are more likely to use labels (Barreiro-Hurlé et al., 2010; Drichoutis et al., 2006). A study found that respondents who used claim labels reported having more time limitations, a higher level of education, consider diet important for overall health, and are more willing to trade-off food characteristics for health (Barreiro-Hurlé et al., 2010). Also, younger individuals and those with higher socioeconomic status tend to have a higher level of label understanding (Grunert et al., 2010). However, research has found that selecting health products is not solely mediated by an understanding of FOP labels (van Herpen, Seiss, & van Trijp, 2012). Those who do not use labels are found to have a lack in interest or understanding (van der Merwe et al., 2014).

## **FOP Labels for Assessing Product Healthfulness**

Consumers evaluate food labels to provide them with the confidence to make a satisfying decision. Based on the psychological and behavioral economic theory on the influences of purchases, individuals will be able to make healthier food choices when detailed nutrition information is provided (Grabenhorst et al., 2013). According to the International Food Information Council Foundation (IFIC) 2012 Food and Health Survey, respondents reported that healthfulness impacts 61% of purchase decisions.

A US study reported that 87.5% of participants reported being able to identify the healthiest of three food products (Grunert et al., 2010). The nutritional quality assessment of food is more accurate when a FOP labeling system is present and comprises a sufficient amount of information that helps determine the overall product healthiness (Edge, et al., 2014).

Consumers can identify healthier options, especially when levels of healthiness are obvious. Most individuals have little to no difficulties assessing product healthiness (Grunert et al., 2010). A supporting study suggested that participants increased perceived healthiness of healthier products and decreased the perceived healthiness for products that were less healthy when FOP labels were present, compared to no FOP label (Feunekes et al., 2008).

Maubach et al. (2014) found that simple FOP labels such as the Stars label misled consumers resulting in less accurate health comparisons between products. In fact, single-level summary icons gave consumers less realistic healthiness perceptions between products (Andrews et al., 2011). However, studies have found that simple labels promote accurate judgments of health level differentiation, even when daily reference values were not displayed (Campos et al., 2011; Feunekes et al., 2008).

## **FOP Label Effectiveness**

The effectiveness of nutrition labels depends on many factors, including individual factors and the actual FOP format (Lowe et al., 2013). Apart from consumer factors, effective FOP labels allow quick product evaluations of nutrient content for similar products in a busy, grocery store setting (Brownell & Koplan, 2011). The goal for effective FOP labeling is to market to individuals who use nutrition labels, as well as those who are less likely to use labels, and impact long-term health outcomes among all shoppers (Kees et al., 2014). Research heavily supports the presence of FOP labels being more beneficial than no FOP labels (Aschemann-Witzel et al., 2013; Feunekes et al., 2008; Hersey et al., 2013; Hodgkins et al., 2015; Kees et al., 2014; Maubach, Hoek, & Mather, 2014; Newman et al., 2014; Roberto, Bragg, Schwartz, Seamans, Musicus, Novak, & Brownell, 2012). Although, the 2012 Food and Health Survey conducted by the IFIC found that 76% of consumers agree that the constant changes in nutrition information make it difficult to know what to believe. To fully understand if a FOP nutrition label improves diet quality of consumers, it is necessary to evaluate changes in health status, although the effects may not present themselves for decades (Kleef & Dagevos, 2015). However, understanding the impact of current FOP systems might help project future changes. Effective FOP labels assist in determining the healthiness between food products, provide more accurate, improve accuracy of perceived healthiness of products, and are consumer friendly: well liked, familiar, easy to comprehend, influence purchase intentions, are found credible (Feunekes et al., 2008).

## **FOP Label Liking and Preferences**

There is an increase in consumer interest for healthier food and lifestyles (Andrews et al., 2014; International Food Information Council [IFIC], 2012; Nielsen, 2012), so shoppers are

likely to value and use FOP labels to help make healthy decisions. Research suggests that consumers indicated health as a primary criterion when making food choices and value FOP labels to simplify healthy eating (Kleef & Dafevos, 2015). Furthermore, consumers like labels that are simple and easy to comprehend (Feunekes et al., 2008; Julia, et al., 2015; Kees et al., 2014). Literature suggests that simplistic styled FOP label formats are more effective than complex or detailed labels (Hawley et al., 2012). Food packages have an abundance of information on the package such as brand labels, nutritional information, attention attracting graphics, and other visuals that can distract from nutrition-related information (Bialkova et al., 2014). Simple labels decrease the cognitive effort and time it takes to process nutrition information compared to more detailed labels (Andrews et al., 2011; Azman, & Sahak, 2014). Research suggests that processing time was faster when summary icons were viewed, rather than the nutrient-specific labels in the US, Canada, and the Netherlands (Bialkova, & van Trijp, 2010; Feunekes et al., 2008; Helfer & Shultz, 2014). In addition, after completing eight focus groups across the US, the FDA found that consumers preferred and responded more positively to simpler FOP label formats (Hawley et al., 2012).

The preferred amount of detail on FOP labels by US consumers varies, some consumers like more detail, but frequent label users prefer less detail (Campos et al., 2011). Opposing research suggests that consumers perform better identifying and comprehending nutrition information when more information is provided (Edge et al., 2014). European consumers prefer simple or directive labels, however, US consumers prefer more nutrition information (Feunekes et al., 2008; Lin & Levy, 2010). A study by van Herpen and Trijp (2011) found that consumers are more positively impacted by detailed nutrition information when evaluating product healthiness. Individuals reported that directive or simple labels are the preferred FOP label style,

however individuals desire to make their own food decisions based on nutrient content relevant to specific needs through non-directive or more detailed labels (Hodgkins, et al., 2012).

Although, simplistic labels may be more preferred, complex labels with more detail are proposed as being effective for product comparison (Edge, et al., 2014). Many European studies suggest that the more complex traffic-light labels are the preferred labels among consumers (Balcombe et al., 2010; Borgmeier, & Westenhoefer, 2009; Hawley et al., 2012; Hersey et al., 2013).

FOP labeling systems provide key nutrition information for food and beverages to help consumers make more informed and healthy choices about the food that is purchased (Facts Up Front, n.d.; Grunert et al., 2010). The typical shopper only spends a few seconds before making a decision, so the FOP label should easily communicate the nutrient content and whether or not the overall product is healthy. Research supports calories, fiber, sugar, fat, and sodium content as sufficient nutrition information to make an informed decision when purchasing packaged foods (IFIC, 2012), in addition to beneficial nutrients (Edge et al., 2014; Grunert et al., 2010). Nutrition label use is connected to selecting foods that are high in beneficial nutrients and avoiding foods high in negative nutrients saturated fat, sodium and sugar (Helfer & Shultz, 2014). The ideal label would provide nutritional profiling information through an easy to understand, simple label, while providing enough information to benefit the consumer and attract consumer attention in a demanding environment (Kleef & Dagevos, 2015).

### **FOP Label Familiarity**

Environmental factors also play a role in label usage. When the environment does not support healthy food choices, it is expected healthy selections will decline. For FOP labels to impact food decisions in the grocery store, the label should be appealing as well as easy to recognize (Feunekes et al., 2008; van Herpen, & Trijp, 2011). Shoppers may be more interested



in labels and the nutrition information provided if it is efficiently marketed and visually appealing. It is suggested that FOP labels are only effective if consumers are previously exposed to them (Kleef & Dagevos, 2015). Familiarity with FOP labels can determine whether or not the label will be used. In addition, uncertainty associated with the application of FOP labels was reported as the lack of familiarity with FOP label schemes (Hodgkins et al., 2015). A recent study evaluating US consumer perceptions of the Facts Up Front FOP label found that more than half (64%) of respondents had previously seen the label while grocery shopping (Diekman, Levy, Murray, Stafford, & Kees, 2016). A study evaluating the Choices Logo found that 72% of the participants familiar with the label reported purchasing more food products with the FOP label (Hawley et al., 2012). Furthermore, 42% of Registered Dietitians reported that they educate their clients with FOP labels, which will result in more familiarity with FOP labels over time (Kleef & Dagevos, 2015).

### **Comprehension of FOP labels**

Comprehension is a requirement for the correct use of labels and is important for the decision making process (Kleef & Davegos, 2015). Further attention, processing, and perception can lead to an increased understanding that may guide the consumers and stimulate healthier purchases, which will lead to overall healthier consumption (Hersey et al., 2013). Additionally, frequent label use is associated with increased understanding (Campos et al., 2011). A European study found that individuals had higher understanding of FOP labels than label use (Grunert et al., 2010). Although, individuals who rated themselves as less knowledgeable about health and nutrition, or had never read labels found it more difficult to understand more complicated labels than the simpler labels (Feunekes et al., 2008).

A study conducted by Edge et al. (2014) suggested that the amount of information on FOP nutrition labels could improve comprehension and ease of understanding scores regardless of education levels. Nutrient-specific or reductive FOP labels have been found to help consumers perform better with higher comprehension (Andrews et al., 2014; Lin & Levy, 2010). In a US study, participants who were randomly assigned to the extended Facts Up Front label (nutrients to encourage) had significantly higher levels of understanding than those assigned to the other label conditions (Edge, et al., 2014). Additionally, the results of a US study found that the extended version of the Facts Up Front label had significantly higher levels of attention and reported ease of use (Kees et al., 2014). A more recent US study found that participants rated the Facts Up Front label very easy to understand, especially when compared to the Nutrition Facts Label (Diekman et al., 2016). Many European studies suggest that traffic-light format labels are the easiest to comprehend among European consumers (Balcombe et al., 2010; Borgmeier, & Westenhoefer, 2009; Hawley et al., 2012; Hersey et al., 2013).

However, research suggests numerical and technical information can be confusing or difficult to understand (Campos et al., 2011; van der Merwe et al., 2014). In a European study, simple “seal of approval” type labels are found easier to understand than more complex, numerical labels among European consumers (Feunekes et al., 2008). In addition, many European consumers have difficulty with complex labels such as GDA label formats, although the traffic-light color associations enhanced understanding (Kleef & Davegos, 2015; Malam, Clegg, Kirwan, McGinial, Raats, Shepherd, & Dean, 2009). However, most of the studies evaluating use and understanding of FOP labeling have been conducted in European countries, which make it difficult to generalize which label is easiest to comprehend (Kleef & Davegos, 2015).

## **Purchase Intentions of Healthier Selections Using FOP Labels**

Label usage has been found to positively affect purchasing behavior when consumers try to avoid or limit negative nutrients in food products (Aschemann-Witzel et al., 2013; Azman, & Sahak, 2014; Drichoutis et al., 2006). Individuals who are more interested in healthy eating are more likely to use nutrition information while grocery shopping (Grunert et al., 2010). By providing information at the point of decision-making, consumers are more likely to accept and use FOP labels because they do not restrict purchasing power. According to Aschemann-Witzel et al., 2013, FOP labels serve as an informational tool, but should also be treated as an educational tool by informing the consumer to develop nutritional competencies over time.

Grocery stores are considered the last line of defense against obesity, so nutrition marketing through FOP labeling could positively impact healthier selections by emphasizing healthy products as well as less healthy products, for more informed decision making (Bui, Kaltcheva, Patino, & Leventhal, 2013; Lowe et al., 2013). Research indicates that the presence of FOP labels is likely to increase purchase intentions of healthier foods (Andrews et al., 2011; Feunekes et al., 2008; Hamlin, McNeill, & Moore, 2014). Marketing messages conveyed through FOP labels provide maximum health benefits to consumers by emphasizing amounts of nutrients, as well as attract attention to nutrient content (Schermel, Emrich, Arcand, Wong, & L'abbé, 2013). However, even though a food product package displays a FOP label, it does not necessarily mean a product is healthy. A total of 10,487 Canadian packaged foods were recently evaluated, and found that products with FOP labels were not consistently lower in calories, saturated fat, sodium, or sugar when compared to similar products without FOP labels (Emrich, Qi, Cohen, Lou, & L'Abbe, 2015). Although as previously mentioned, FOP labels can impact food manufacturers by encouraging product reformulation to improve product nutrient quality

(Temple & Fraser, 2014). A study evaluating consumer purchase behavior found that respondents reported an increase in healthier food purchases from 36% to 54% over a four-year period when nutrition related FOP labels or shelf tags were present (Hersey et al., 2013). An additional study in a US grocery store found that purchases of frozen dinners and yogurts with the Guiding Stars labels increased and outsold products without the FOP label (Hersey et al., 2013). A study evaluating scanner data from a large UK retailer found that purchase behaviors of yogurt and frozen meals with a store-brand, monochrome GDA label increased the purchasing of healthier product variants regardless of the price difference (Boztuğ et al., 2015).

In a study comparing the effects of reductive and evaluative FOP label types, consumer purchase intentions were higher when the reductive label (Facts Up Front) was present, but not for the evaluative icon format (Newman et al., 2014). An additional study evaluating consumer-purchasing decisions found that the extended version of the Facts Up Front label (including nutrients to encourage) was the only label condition in the study to significantly outperform the no-label Control group by influencing purchase decisions (Kees et al., 2014). These articles conclude that FOP labels, especially nutrient-specific labels, have the potential to impact purchases; however it is still inconclusive which label is most effective.

### **Perceived Credibility of FOP labels**

Consumers perceive nutrition labels as a highly credible source of information (Campos et al., 2011). For a label to be credible, it should be transparent (Grunert et al., 2010). Furthermore, labels can be viewed more credible and reduce consumer skepticism of FOP labels when regulated by a government group or organization, such as the FDA (Kleef & Dagevos, 2015). Since credibility is reported as a common concern with consumers that may limit their label use, it is important to have official endorsement and regulation to insure reliability (van der

Merwe et al., 2014). In addition, manufacturers' nutrition and health claims were found to be trusted less by consumers, especially when claims contradict nutrition information on the Nutrition Facts label (Campos et al., 2011).

A Dutch study suggested that logo FOP labels are more likely to be attended to or viewed specifically when a certain health goal is present (van Herpen, & Trijp, 2011). However, consumers acknowledged that the detailed information was more trusted, but found more difficult to use in product comparison. A US study found that the nutrient-specific FOP labels (Nutrition Highlights, GDA, Nutrition Tips) were equally helpful and trustworthy (Lin & Levy, 2010). In addition, consumers' reported increased credibility when FOP labels were endorsed by trusted health or nutrition organizations (Feunekes et al., 2008).

### **FOP Label Formats**

FOP labeling systems are grouped into two categories, evaluative or reductive. Evaluative symbols are an objective FOP labeling approach, which provides a summary of product nutrient content, and is usually formatted as an icon that helps consumers quickly identify healthier products. These icons typically have predetermined nutritional criteria that a product must meet before displaying the label. This allows shoppers to spot healthier products more quickly. The American Heart Association's (AHA) Heart Check symbol is an example of an evaluative symbol that has very stringent nutritional criteria for a product to be certified and labeled (U.S. Department of Health and Human Services, Food and Drug Administration, 2010; Hersey et al., 2013; McGuire, 2012; Newman et al., 2014). In addition, the privately promoted label, Smart Choices, was found to have to lenient nutritional criteria and was removed from products in 2009 (Roberto, Bragg, Livingston, Harris, Thompson, Seamans, & Brownell, 2012). Reductive FOP labels have nutrient-specific information and provide a summary of the

traditional Nutrition Facts label (Andrews et al., 2014; Newman et al., 2014). Nutrient-specific labels are typically displayed through the percent guideline daily amounts (GDA or %GDA), providing a complete representation of the products nutrient composition. GDA labeling formats provide food characteristics that should be limited such as calories, sugar, saturated fat, and sodium in grams and each percentages per serving based on the average adult intake in the US (Hersey et al., 2013; Hodgkins, Barnett, Wasowicz-Kirylo, Stysko-Kunkowska, Gulcan, Kustepeli, & ... Raats, 2012). The Facts Up Front falls within the reductive category. Some critics state that GDA labeling systems may create the potential for misinterpretation of portion sizes and cause products to appear healthier than they may actually be (Hodgkins et al., 2012). However, the label is useful for product comparison as well as exhibiting necessary nutrition information.

Research suggests that evaluative or summary icons FOP labels influence perceived healthiness (Newman et al., 2014) and aids in faster processing (Bialkova, Grunert, Juhl, Wasowicz-Kirylo, Stysko-Kunkowska, & van Trijp, 2014; Feunekes et al., 2008; Helfer & Shultz, 2014). However, evaluative icons FOP labels provide a less realistic perception of product healthiness (Andrews, et al., 2014). Further research supports reductive or nutrient-specific FOP labels have been found to improve perceived healthiness (Andrews, Burton, & Kees, 2011; Aschemann-Witzel, Grunert, van Trijp, Bialkova, S., Raats, Hodgkins,... & Koenigstorfer, 2013; Borgmeier, & Westenhofer, 2009; Grunert, Wills, & Fernández-Celemín, 2010; Julia et al., 2015; Kees et al., 2014; Lin & Levy, 2010; Newman et al., 2014). Reductive FOP label formats also positively influence purchase intentions (Andrews, et al., 2014; Newman et al., 2014), and improve label comprehension (Andrews, et al., 2014; Lin & Levy, 2010). Additionally, when compared to evaluative formats, reductive format FOP labels were found

more credible among consumers (Lin & Levy, 2010). Symbols FOP label formats have been found to help consumers perform better when comparing products, but nutrient-specific FOP labels have been found to better inform consumers of product healthiness in non-comparative situations (Newman et al., 2014). However, it is uncertain whether evaluative or reductive icons are equally effective, because comparative and non-comparative processing impact consumer purchases, attitudes, and behavior differently while evaluating food products (Newman et al., 2014).

### **Nutrition Attitudes, Knowledge, and Behaviors**

Research supports nutrition knowledge, attitudes, and beliefs as major factors and potential barriers regarding label use (Cannoosamy, Pugo-Gunsam, & Jeewon, 2014; Grunert et al., 2010). Nutrition knowledge impacts label usage because it facilitates nutrition understanding (Cannoosamy et al., 2014). Individuals with beliefs and behaviors related to health are more likely to use labels. Greater nutrition label usage is associated with positive health beliefs, diet-specific self-efficacy, and placing a higher priority on health and nutrition (Graham et al., 2015). Also, individuals with greater self-reported nutrition knowledge and individuals actively seeking to lose weight tend to use labels (Graham et al., 2015).

A total of 42.4% of respondents reported using nutrition labels when purchasing a product for first time or when comparing two products, but only 22.2% of respondents reported frequent label use (Cannoosamy et al., 2014). In the same study, the determinants of greater nutritional knowledge were individuals who were female, between 19 to 29 years old, and individuals with higher levels of education. Additionally, individuals with higher levels of self-reported nutrition knowledge reported significantly greater nutrition label use (Cannoosamy et al., 2014). Additionally, Barreiro-Hurlé, Gracia, and de-Magistris (2010) found that education

and income were both positively related to nutrition knowledge and healthy lifestyles. A European study found that a majority of the respondents were able to answer nutrient recommendations correctly, but many had difficulty understanding substantive FOP label nutrition information and putting them to use to select the healthier products. However, when assessed for conceptual understanding (general level label information), 87.5% of the participants displayed the ability to select the healthiest product from a set of three (Grunert et al., 2010). In this study, the level of FOP label understanding was much higher than the reported use of labels. FOPs clearly aid in product comparison, but label presence does not guarantee its use (Grunert et al., 2010). Additionally, research suggests that those who reported having a lower perceived nutritional knowledge and less experience reading nutrition labels found it more difficult to understand more detailed labels (Feunekes et al., 2008).

### **Perceived Healthiness**

Research suggests that both nutrient-specific (reductive) and summary (evaluative) FOP label formats increase perceived healthiness of the products (Newman et al., 2014). However, research indicates that nutrient-specific labels with more detail such as traffic-light labels, the Facts Up Front label or other GDA formats, which provide more nutrition information and better assist consumers in determining levels of health between products (Andrews et al., 2014; Aschemann-Witzel et al., 2013; Edge et al., 2014; Borgmeier, & Westenhoefer, 2009; Bui et al., 2013; Grunert et al., 2010; Julia et al., 2015; Kees et al., 2014; Lin & Levy, 2010; Maubach et al., 2014; Roberto, Bragg, Schwartz et al., 2012; Siegrist et al., 2015). In addition, a US study that evaluated varying amounts of information displayed on the Facts Up Front label found that participants in the original Facts Up Front label (only calories and nutrients to limit) were less likely to find information about nutrients to encourage by utilizing the Nutrition Facts label



(Edge et al., 2014). When healthful nutrient content is not readily available, consumers are less likely to look for the positive aspects of food such as fiber, vitamins and minerals, which contribute to a healthy diet and contribute to perceived healthiness of food products.

## **Conclusion**

Research supports the presence of FOP labels being more beneficial to consumers than no FOP label present (Aschemann-Witzel et al., 2013; Feunekes et al., 2008; Hersey et al., 2013; Hodgkins et al., 2015; Kees et al., 2014; Maubach et al., 2014; Newman et al., 2014; Roberto, Bragg, Livingston, et al., 2012). Although it is unclear which label format, evaluative or reductive, most effectively influences consumer purchases. Effective label characteristics are considered to be well liked, familiar, easy to comprehend, influence purchases, found credible, and assist in determining the healthiness of food products (Feunekes et al., 2008). Research has determined the need for a singular, uniform FOP label throughout product categories (Hawley et al., 2012; Kleef & Dagevos, 2015). When a message is seen frequently, the likelihood of understanding increases. In the case of FOP labeling, if consumers see the same format, comprehension and usage may increase, further improving overall diet and health.

FOP label research is limited in the US (Andrews, et al., 2014; Bui et al., 2013; Drichoutis et al., 2006; Edge, et al., 2014; Graham et al., 2015; Hawley et al., 2012; Hersey et al., 2013; Kees et al., 2014; Lin & Levy, 2010; McGuire, 2012; Miller, et al., 2015; Newman et al., 2014; Ollberding et al., 2011; Roberto, Bragg, Schwartz et al., 2012; Sonnenberg et al., 2013; Thorndike et al., 2014). Additionally, only four of the US studies have previously evaluated the Facts Up Front label (Edge, et al., 2014; Kees et al., 2014; Newman et al., 2014; Roberto, Bragg, Schwartz et al., 2012). None of which evaluated the relationships between FOP label behaviors and FOP label liking, familiarity, purchase intentions, price-consciousness, and time.

Furthermore, it is unclear what type of FOP labeling system, the reductive format, Facts Up Front label or an evaluative format symbol, would best fit consumers in the United States,

Most FOP label research has been completed in European countries (Aschemann-Witzel et al., 2013; Azman, & Sahak, 2014; Balcombe et al., 2010; Bialkova et al., 2014; Bialkova, & van Trijp, 2010; Borgmeier, & Westenhoefer, 2009; Boztuğ et al., 2015; Brownell & Koplan, 2011; Feunekes et al., 2008; Grunert et al., 2010; Hamlin et al., 2014; Hodgkins et al., 2012; Hodgkins et al., 2015; Julia, et al., 2015; Kleef & Dagevos, 2015; Malam et al, 2009; Newman et al., 2014; Siegrist et al., 2015; van Herpen & Trijp, 2011; van Herpen et al., 2012), New Zealand (Hamlin et al., 2014; Maubach et al., 2014), Canada (Helfer & Shultz, 2014), Korea (Kim & Kim, 2009), and South Africa (van der Merwe et al., 2014), which makes it difficult to generalize for US consumers. As seen in the US, Europe, and other countries, most FOP label initiatives are voluntary and created by private, non-governmental groups such as health organizations or food manufacturers. Due to the limited amount of research in the US on the effectiveness of the FOP labels, specifically the Facts Up Front label and a non-industry driven binary symbol (Edge, et al., 2014; Kees et al., 2014; Newman et al., 2014; Roberto, Bragg, Schwartz et al., 2012), further examination of the Facts Up Front label is necessary based on its increasing popularity (Watson, 2013), and a non-brand produced binary symbol to determine if reductive or evaluative formats are more helpful. Therefore, additional investigation is necessary to determine if the US implemented Facts Up Front and a binary nutrition symbol label are equally effective.

### **Purpose of Study**

The overall objective of this study was to explore three different types of FOP labeling schemes currently used in the US and their effectiveness. Effectiveness of the three labels was

evaluated based on ability to assist in the health assessment of food products, perceived healthiness of food products with labels, and consumer liking, familiarity, ease of comprehension, purchase intention, and perceived label credibility. This study specifically explored the following research questions:

1. Is there a relationship between FOP label use and (a) age, (b) gender, (c) ethnicity, (d) education level, (e) income status, (f) marital status, (g) household composition, and (h) BMI?
2. Of the three FOP labels (Facts Up Front, Facts Up Front extended, and Health Check symbol), which FOP label best assists in the health assessment of food products?
3. Of the three FOP labels (Facts Up Front, Facts Up Front extended, and Health Check symbol), which FOP label is (a) most liked, (b) most familiar, (c) found easiest to comprehend, (d) positively influence purchase intentions, and (e) most credible by consumers?
4. Which FOP label format, evaluative (summative: simple Health Check) or reductive (nutrient-specific: Facts Up Front & Facts Up Front Extended) is (a) most liked, (b) most familiar, (c) found easiest to comprehend, (d) positively influence purchase decisions, and (e) most credible by consumers?
5. Is there a relationship between FOP label use and consumer attitude towards nutrition, self-reported diet assessment, self-reported nutrition knowledge, and other label behaviors (selecting food for healthful reasons, using restaurant nutrition labels on menus, having enough time to grocery shop, and paying attention to food prices while grocery shopping)?

6. Of the three FOP labels (Facts Up Front, Facts Up Front extended, and the Health Check symbol), which FOP label is most effective at influencing perceived healthiness?

## CHAPTER 3: METHODS

### **Overview**

This study explored three different types of FOP labeling schemes currently used in the US. Effectiveness of the labels was evaluated based on ability to assist in the health assessment of food products, perceived healthiness of food products with labels, and consumer liking, familiarity, ease of comprehension, purchase intention, and perceived credibility of the label. The survey was adapted from a previous study conducted Europe (Feunekes et al., 2008).

### **Participants**

Participants in this study were recruited from the online survey company, Qualtrics. Approximately 161 adults listed in Qualtrics' database as primary household grocery shoppers residing in the United States were randomly contacted in order to comprise a representative sample of participants for this study. Qualtrics recruited a sample whose age and income is distributed comparable to current US Census data (U.S. Census Bureau, 2011; U.S. Census Bureau, 2015).

Participants in the Qualtrics database were recruited in numerous ways: website intercept recruitment, member referral, targeted email lists, gaming sites, customer loyalty web portals, permission-based networks, and through social media (Qualtrics, 2014). Qualtrics uses specialized recruitment campaigns to include hard-to-reach individuals so they are equally represented in the database. Qualtrics randomly selected qualifying participants for the study. Each sample from a panel base was proportioned to the general population and randomized

without prioritization to avoid bias caused by invitation wording, survey topic, or incentive before the survey is implemented. In addition, the strategic panel used de-duplication technology to retain the most reliable results and survey data (Qualtrics, 2014).

## **Research Design**

Using a between-subjects experimental design, participants were randomly assigned to one of four label conditions. The label groups included the Facts Up Front label, Facts Up Front Extended label (with two additional “nutrients to encourage”), a binary symbol, and no-label Control.

1. The Facts Up Front label displayed calories, saturated fat, sodium, and sugar in percent Daily Value (%DV) (Facts Up Front, n.d.).
2. The Facts Up Front Extended label displayed calories, saturated fat, sodium, and sugar as well as two “nutrients to encourage,” such as potassium, fiber, protein, vitamins, or minerals (Facts Up Front, n.d.).
3. A binary symbol label, created due to the absence of evaluative FOP label format in the US that was not associated with a brand (Helfer & Shultz, 2014; Newman et al., 2014). The binary label was created specifically for this experiment to provide a non-bias comparison of evaluative and reductive FOP label formats. Food brands and manufacturers implement most nutrition symbol FOP labels in the US. The ideal FOP symbol to be used in comparison to the Facts Up Front FOP label formats would be the Smart Choices label because it is not associated or promoted by a specific food company, but it was taken off of products in 2009 due to its inconsistent labeling criteria (Roberto, Bragg, Livingston, et al., 2012). In addition, the American Heart Association Heart

Check criterion was much too stringent for this study (American Heart Association, 2015).

#### 4. No-label Control

### **Procedures**

The experiment was conducted online. Participants were randomized to one of four label conditions representing three product categories. In beginning of the survey, participants randomly viewed three common consumer food product categories: breakfast cereal, dairy products, and processed snacks. Each product category consisted of two products, a healthy and less healthy variant, which was displayed pictorially at the same time for participants to compare and select the healthiest variety. The order of presentation of the health variant products on the left or right side was be randomized over participants. Participants were exposed to a total of three product pairs with one of the three FOP labeling formats or the no label Control. Questions addressing participants' attitudes towards health and diet, self-reported nutrition knowledge, and label behaviors were asked. Participants then viewed for a second time the six products individually, to report perceived healthiness of each product. While the assigned FOP label was displayed, participants answered questions regarding their liking, familiarity, and comprehension of the label, purchase intentions with the present label, and perceived credibility of the label. Finally the participants were asked to answer questions about their demographics.

### **Materials**

Prior to conducting the survey, products were predetermined healthy or less healthy by using FDA's definitions of "high," "a good source," or "low" guidelines (U.S. Department of Health and Human Services, Food and Drug Administration, 2015). The main nutrient percentages observed for the overall product healthiness were determined by saturated fat,

sodium, and sugar content. Since sugar does not have a recommended daily value, it was calculated based on the American Heart Association's recommendation of 32 grams per day based on a 2,000-calorie diet (Johnson, Appel, Brands, Howard, Lefevre, Lustig,... & Wylie-Rosett, 2009). The healthier food products had at least two nutrient values 5% or below daily value based on a 2,000-calorie diet for saturated fat, sodium, or sugar content, and were also lower in calories than the less healthy option. In addition, the healthier products had at least one nutrient with 20% or higher of nutrients to encourage such as fiber, vitamins or minerals. Less healthy food products had at least two nutrient values 10% to 20% (FDA's "Good Source"), or above (FDA's "High in") the daily value based on a 2,000-calorie diet of saturated fat, sodium, or sugar content, and contained more calories than the healthier option. The food products in each product category had the same brand and number of grams per serving to control outlying variables. Accurate labels were generated and added to the product picture. Additionally distracting or helpful information such protein, fiber, or whole grain content on cereal product packages were covered up so that participants would use the labels to judge each food product.

### **Survey Instrument**

As mentioned, this study used a survey adapted from a previous study (Feunekes et al., 2008) for the label effectiveness variables. The measures adapted from the study were attitudinal, nutrition knowledge, and label use questions, perceived healthiness of food products, label friendliness variables: liking, comprehension, purchase intention, and perceived credibility. The healthiness assessment and measures for restaurant menu label use, time, and price-consciousness were variables added to the present study. At the end of the experiment, participants were asked to complete the demographic questions.



## **Assessment of Healthiness of Food Products**

The product comparison portion of the survey required participants to select the healthier option of the product pairs displayed (1 = first product is the healthier, 2 = second product is the healthier).

## **Attitude, Self-Reported Knowledge, and Behaviors Section**

This section of the survey included questions on attitudes toward health and diet, self-reported nutrition knowledge, and behaviors, including FOP label usage and restaurant menu label usage. Personal attitude towards overall healthy eating was assessed by participant's choice of one of five statements (1 = "I eat a healthy diet because it helps keep me fit and well," 2 = "I occasionally eat a healthy diet, but consider the taste first before health," 3 = "I feel neutral about eating a healthy diet," 4 = "I try to eat a healthy diet, but I find it hard to stick to," or 5 = "I eat what I like and do not worry about how healthy it is"). Overall diet was self-reported measured using a 5-point Likert scale with the question "How would you best describe your overall diet" (1 = poor, 5 = excellent). A self-assessment of nutrition and health knowledge was assessed using the statement, "I am knowledgeable about health and nutrition issues" (1 = strongly disagree, 5 = strongly agree).

## **Measures**

The healthiest food product assessment was measured with a dichotomous nominal scale. All subsequent questions were measured with a 5-point Likert-type rating scale including the attitude, self-reported knowledge, and label behaviors section, as well as six dependent variables: perceived healthiness, liking, familiarity, comprehension, purchase intentions, and perceived credibility of the label.

The behavior questions assessed current FOP label use (1 = never, 5 = always). Frequency of participants selecting food for healthful reasons was assessed using the question “How often do you select food for healthful reasons” (1 = never, 5 = always). In addition, fast food restaurant menu label use was assessed with the question, “when you eat at fast food restaurants, do you use the nutrition information (e.g. calories) on the menu board to make a decision” (1 = never, 5 = always). Additional questions assessing consumer time and price-consciousness in the grocery store were measured. The variable of time was assessed by asking participants if they have enough time while grocery shopping (1 = never, 5 = always). Price-consciousness was assessed with the question, “while grocery shopping, do you pay attention to food prices?” (1 = never, 5 = always).

### **Dependent Variables**

Following the pictorial viewing of the six food product labels, participant, excluding the no label Control group, were asked label effectiveness questions. The label effectiveness addressed the following variables concerning products with FOP labels and the assigned FOP label condition itself:

#### **1. Perceived Healthiness of Products**

Participants viewed each of the six food products individually to rate their perceived healthiness with the question, “How healthy is this product for you?” (1 = Not healthy at all, 2 = somewhat unhealthy, 3 = Neutral, 4 = somewhat healthy, 5 = very healthy).

A correlation between perceived healthiness and label use, attitude, and nutrition knowledge was assessed. The mean difference in perceived healthiness between the healthy and less healthy variants of the same product category for each label condition was calculated. The

size of the difference indicates the extent that the FOP label format helped participants differentiate between healthier and less healthy product variants.

## **2. Liking of Assigned FOP Label**

Participants were asked to rank their liking of the displayed label (1 = do not like at all, 5 = extremely like).

## **3. Familiarity of Assigned FOP Label**

Familiarity of assigned FOP label was determined by asking if participants have ever seen the label (1 = “Not at all familiar,” 2 = “Slightly familiar,” 3 = “Somewhat familiar,” 4 = “Moderately familiar,” 5 = “Extremely familiar”).

## **4. Comprehension of Assigned FOP Label**

Comprehension was measured by the question “How difficult or easy is it for you to understand this label,” (1 = very difficult to understand, 5 = very easy to understand).

## **5. Purchase Intention of Assigned FOP Label**

Likelihood of purchasing products with FOP labels will be assessed (1 = not at all, 5 = completely).

## **6. Perceived Credibility of Assigned FOP Label**

Perceived credibility of the assigned FOP label was determined using a 5-point Likert-type rating scale (1 = not at all credible, 5 = extremely credible).

## **Analysis**

In addition to the previously mentioned variables, demographic variables for age, gender, ethnicity, education level, marital status, income level, household composition level, and self-reported weight and height were analyzed. Descriptive statistics were performed on all variables using SPSS statistical software version 22. Data analysis included frequency test, independent

sample *t*-tests, one-way Analysis of Variances (ANOVA), multiple regression and logistic regression models. Significant outcomes were assessed with an alpha level set to 0.05.

Body Mass Index (BMI) scores were calculated based on the self-reported height (*H*) and weight (*W*). Height was first converted from feet and inches to inches. BMI was calculated as follows:  $BMI = (W \div H^2) \times 703$ . The BMI scores were then categorized by under weight (<18.5), healthy (18.5-24.8), over weight (25-29.9), or obese (>40). Mean differences of the dependent variables (perceived healthiness, liking, familiarity, comprehension, purchase intentions, perceived credibility) were compared between the label formats (Facts Up Front, Facts Up Front Extended, the binary symbol label, and no-label Control) using an ANOVA to compare means. The mean difference in perceived healthiness between the healthier and less healthy products for each FOP label format were calculated and used as the dependent measure. A logistic regression was performed to determine the relationship between perceived healthiness and the healthiest product assessment outcomes. ANOVAs were run to compare all variables with a 5-point scale to determine if there were any significant relationships.

## CHAPTER 4: RESULTS

### **Sample Profile**

In total, 161 primary grocery shoppers ages 18-69 in the US took part in survey. Demographic data of the participant and FOP label condition profile are displayed in Table 1. The highest percentage of participants who reported using FOP labels were female (62.1%), ages 35-64 (65.2%), Caucasian (72.0%), had some college or a bachelor's degree (68.9%). The highest percentage of participants' (23.0%) household income was \$50,000-\$99,999 (42.8%), which is around the average US income (Census Bureau, 2015). Additionally, the majority of participants were married or in a domestic partnership (57.1%), and many reported a household composition of three individuals (25.5%), which is close of the national average (2.58) (U.S. Census Bureau, 2010). Descriptive statistics and Chi-square analysis were done to determine if there were any differences between the four label conditions. As determined by the Chi-square, there were no significant differences found among the label conditions and demographic measures.

Table 1

*Descriptive Statistics and Chi-Square of Study Participants by Demographics and Label Conditions (N=161)*

Characteristics and Categories	Total		Control (n=40)		Facts Up Front (n=39)		Facts Up Front Extended (n=41)		Health Check (n=41)		$\chi^2$
	N	%	N	%	N	%	N	%	N	%	
<i>Age</i>											8.94
34 & Younger	51	31.7	19	49.5	9	23.1	14	34.1	9	22	
35-49	55	24.4	11	27.5	14	35.9	12	29.3	18	43.9	
50 & Older	55	34.2	10	25.0	16	41	15	36.5	14	34.1	
<i>Gender</i>											0.77
Male	61	37.9	14	35.0	16	41.0	14	34.1	17	41.5	
Female	100	62.1	26	65.0	23	58.9	27	65.9	24	58.5	
<i>Ethnicity/Race</i>											2.11
Caucasian	116	72.0	31	77.5	30	76.9	28	68.3	27	65.8	
All Others	45	27.9	9	22.5	9	23.1	13	31.5	14	34	
<i>Level of Education</i>											0.96
High School or Less	17	21.8	8	20	9	23.1	9	21.9	9	21.9	
Some College or Associate Degree	62	38.5	15	37.5	14	35.9	15	36.5	18	43.9	
Bachelor's Degree or Higher	64	39.7	17	42.5	16	41	17	41.3	14	34.1	
<i>Income Level</i>											0.78
\$49,999 & Under	73	45.4	17	42.5	20	51.2	21	51.2	15	18.6	
\$50,000 & Above	88	54.7	23	57.5	19	48.7	20	48.7	26	63.4	

Table 1 (Continued)

Characteristics and Categories	Total		Control (n=40)		Facts Up Front (n=39)		Facts Up Front Extended (n=41)		Health Check (n=41)		$\chi^2$
	N	%	N	%	N	%	N	%	N	%	
<i>Marital Status</i>											0.02
Single, never married or separated/divorced	67	41.6	19	47.5	19	48.7	15	36.6	14	34.1	
Married or domestic partnership	94	58.3	21	52.5	20	51.3	26	63.3	27	65.8	
<i>Household Comp</i>											7.50
One Person	34	21.1	9	22.5	12	30.7	8	19.5	5	12.2	
Two People	39	24.2	6	15	9	23.1	11	26.8	13	31.7	
Three People	41	25.5	11	27.5	10	25.6	10	24.4	10	24.3	
Four or More	47	29.2	14	35.0	8	20.5	12	29.2	13	31.6	
<i>BMI</i>											7.99
Underweight	12	7.5	3	7.5	6	15.4	3	7.3	1	2.4	
Healthy	58	36.0	14	30.0	15	38.5	13	31.7	16	39.0	
Overweight	45	27.9	14	30.0	7	17.9	12	29.3	9	21.9	
Obese	44	27.3	9	22.5	11	28.2	13	31.7	13	31.7	

BMI was calculated by:  $BMI = (W \div H^2) \times 703$ .

BMI scores: under weight (<18.5), healthy (18.5-24.8), over weight (25-29.9), & obese (>40)

Demographic measures for age, gender, ethnicity, education, marital status, household income, household composition, and height and weight calculated to BMI were compared to FOP label usage. A multiple regression was conducted to see if the demographic variables predicted use of FOP labels. The regression data can be found in Table 2. A significant regression equation was found ( $F(7,158) = 3.84, p < .001$ ), with an  $R^2$  of 0.15. Of the seven independent variables, two showed a statistically positive significance to predicting the use of FOP labels: gender and education. Being female ( $\beta = -.30, t(158) = -1.99, p < .05$ ), and having a Bachelor's degree or higher ( $\beta = 0.28, t(158) = 3.57, p < .001$ ) were found as predictors of FOP label use. The coefficients of age, ethnicity, income level, marital status, household composition, and BMI score did not significantly predict use of FOP label.



Table 2

*Multiple Regression Predicting Label Use by Respondent Demographics*

Variables	<i>B</i>	<i>SE<sub>b</sub></i>	<i>β</i>	<i>t</i> -value
Constant	1.89	0.61		3.08**
<i>Age</i>				
18-34	0.11	0.10	0.09	1.09
35-49	0.24	0.35	0.12	1.84
50-69				
<i>Gender</i>				
Female	-0.30	0.15	-0.15	-1.99*
Male				
<i>Ethnicity/Race</i>				
Caucasian	0.28	0.17	0.13	1.64
All Others				
<i>Education</i>				
High School or Less Associate Degree or some college	0.23	0.12	0.15	1.89
Bachelor's Degree or Higher	0.51	0.14	0.28	3.67***
<i>Income Level</i>				
\$49,999 & Below				
\$50,000 & Above	0.09	0.24	0.03	0.40
<i>Marital Status</i>				
Single, never married or separated/divorced	0.38	0.23	0.14	1.65
Married or domestic partnership				
<i>Household Composition</i>				
One Person				
Two People	-0.03	0.23	-0.01	-0.11
Three People	-0.26	0.22	-0.11	-1.19
Four or More	-0.36	0.21	-0.16	-1.73
<i>BMI</i>				
Overweight or Obese	-0.06	0.08	-0.06	-0.80
Healthy				

BMI was calculated by:  $BMI = (W \div H^2) \times 703$ .

BMI scores: under weight (<18.5), healthy (18.5-24.8), over weight (25-29.9), & obese (>40)

Note: \*  $p < .05$ , \*\*\*  $p < .001$ ;  $R^2 = .15$ ;  $F = 3.84$ ,  $p = .001$

## **FOP Label Format**

Participants were asked about the most effective FOP label among three different formats (Facts Up Front, Facts Up Front Extended, and a Health Check) by asking the participants their perception of the healthiness of each individual food product previously viewed during the healthiness comparison. Additionally, participants were asked to report their liking, familiarity, comprehension, purchase intentions, and perceived credibility for one of the three assigned FOP label formats or no label for the Control.

## **Healthiness Assessment**

Participants were asked to choose the healthier option of two varieties of three categories (cereal, cheese, and snacks) between a healthier and less healthy variant, with photos of each displaying the assigned format. The percentages of healthier and less healthy product selection by label condition are displayed in Table 3. Overall, most participants in each label condition were able to identify the healthier variety for the cereal ( $M = 4.40$ ,  $SD = 0.68$ ) and dairy ( $M = 3.53$ ,  $SD = 1.13$ ) categories, regardless of the type of label displayed, but not the snack category ( $M = 1.97$ ,  $SD = 1.14$ ). A chi-square was conducted to determine if there was a relationship between the FOP label formats (Facts Up Front, Facts Up Front Extended, Health Check, and no label Control) and the selection of healthy options in each of the three food categories. There were no statistically significant differences between the FOP label format and the healthiness assessment of the cereal and dairy categories. This means that individuals were able to correctly identify the healthier product between a comparison of two similar products of cereal and dairy with healthier and less healthy variants. However, there was a statistically significant association between the label conditions and the selection of the healthier option for the snack category,  $\chi^2_{(1)} = 100.58$ ,  $p < .001$ . Individuals in the no label Control group found it more difficult to select the

healthier option in the snack category with only 12.0% of participants selecting the healthier snack variety.

Table 3

*Crosstabulation of FOP Label Format and Healthiness Assessment*

<b>Healthiness Assessment</b>	<b>Label Condition</b>				<b>Chi-square (<math>\chi^2</math>)</b>
	<b>Facts Up Front (N = 39)</b>	<b>Facts Up Front Extended (N = 41)</b>	<b>Health Check (N = 41)</b>	<b>No Label (N = 40)</b>	
<b><i>Cereals</i></b>					
<b>Correct</b>	89.7%	92.7%	95.1%	95.0%	1.19
<b>Incorrect</b>	10.3%	7.3%	4.9%	5.0%	
<b><i>Dairy</i></b>					
<b>Correct</b>	66.7%	65.9%	56.1%	62.5%	1.20
<b>Incorrect</b>	33.3%	34.1%	30.0%	37.5%	
<b><i>Snacks</i></b>					
<b>Correct</b>	92.3%	92.7%	95.1%	12.5%	100.58***
<b>Incorrect</b>	7.7%	7.3%	4.9%	87.5%	

Correct = participants identified the healthier option.

Incorrect = participants failed to identify the healthier option

Note: \*\*\*  $p < .001$

## **FOP Label Effectiveness**

FOP label effectiveness was measured by the variables of liking, familiarity, comprehension, purchase intentions, and perceived credibility of the three assigned FOP labels but was not applicable for the Control. Data for FOP label effectiveness variables can be found in Table 4.

### *FOP Label Liking*

Frequency tests were run to determine the average FOP label liked among the three tested label conditions. Data to determine if one of the FOP label conditions was liked the most. On average, participants reasonably liked the three FOP label formats, with means ranging from 3.44 to 3.87 on a 5-point scale. Participants in the Facts Up Front Extended group had the highest liking average ( $M = 3.93$ ,  $SD = 0.73$ ), followed by the Facts Up Front group ( $M = 3.87$ ,  $SD = 0.73$ ), and the Health Check ( $M = 3.44$ ,  $SD = 0.74$ ). There was a significant difference between FOP label conditions and liking as determined by a one-way ANOVA ( $F(2,118) = 5.43$ ,  $p < .05$ ) with liking higher in the Facts Up Front group and the Facts Up Front Extended group than the Health Check symbol. According to the Tukey HSD post-hoc test, there was statistically significant difference between participant liking of the Facts Up Front and Facts Up Front Extended FOP labels and the Health Check FOP label ( $p < .05$ ).

### *FOP Label Familiarity*

A frequency test was run to determine the average FOP label familiarity among all survey participants. Participants were more familiar with the Facts Up Front ( $M = 3.52$ ,  $SD = 0.89$ ), and the Facts Up Front Extended ( $M = 3.39$ ,  $SD = 0.89$ ), and less familiar with the Health Check FOP label ( $M = 2.63$ ,  $SD = 1.16$ ). There was no significant difference between the Facts Up Front and the Facts Up Front Extended FOP label versions. However, there was a significant

difference between FOP label conditions and familiarity as determined by a one-way ANOVA ( $F(2, 118) = 8.79, p < .001$ ). According to Tukey's HSD post-hoc test, both the Facts Up Front and Facts Up Front Extended FOP labels were significantly more familiar to participants more than the Health Check FOP label format ( $p < .001$ , both).

#### *FOP Label Comprehension*

A frequency test was run to determine how difficult or easy it was for participants to understand the assigned FOP label measuring comprehension. On average, participants found that the FOP labeling formats were easy to understand, with means ranging from 3.37 to 4.17 on a 5-point scale ( $M = 4.17, SD = 0.63$ ). The results suggested that the Facts Up Front ( $M = 3.89, SD = 0.97$ ) and the Facts Up Front Extended ( $M = 4.17, SD = 0.63$ ) FOP label versions were easier to comprehend than the Health Check label ( $M = 3.37, SD = 1.16$ ). Comprehension was significantly different for Facts Up Front and the Facts Up Front Extended FOP label formats than the Health Check label as determined by a one-way ANOVA,  $F(2, 118) = 10.53, p < .001$ . According to Tukey's HSD post-hoc test, both the Facts Up Front and Facts Up Front Extended FOP labels were significantly easier to comprehend than the Health Check FOP label format ( $p < .001$ , both).

#### *FOP Label Purchase Intentions*

A frequency test was run to determine if the assigned FOP label would influence participants purchase intentions. Individuals in the Facts Up Front Extended group ( $M = 3.44, SD = 1.09$ ), and the Facts Up Front group ( $M = 3.36, SD = 1.22$ ) were on average, more likely to use the FOP label when making food-purchasing decisions than the Health Check FOP label ( $M = 2.61, SD = 1.26$ ). Purchase intentions were higher for participants in the Facts Up Front and the Facts Up Front Extended than the Health Check FOP label format. The two Facts Up Front

FOP label formats were statistically significantly different for participant purchase intentions as determined by the one-way ANOVA,  $F(2, 118) = 5.96, p < .01$ . According to Tukey's HSD post-hoc test, both the Facts Up Front and Facts Up Front Extended FOP labels conditions would significantly influence purchase intentions more than the created Health Check FOP label format ( $p < .01$ , both).

#### *FOP Label Perceived Credibility*

A frequency test was run to determine if the participants perceived the FOP label formats as credible. On average, participants found the formats reasonably credible, with means ranging from 2.78 to 3.82 on a 5-point scale. The Facts Up Front ( $M = 3.82, SD = 0.94$ ) and the Facts Up Front Extended ( $M = 3.78, SD = 0.90$ ) label formats did not significantly differ from each other. Both Facts Up Front labels were perceived as more credible than the created Health Check ( $M = 2.78, SD = 1.26$ ) label format as determined by the one-way ANOVA,  $F(2,118) = 12.82, p < .001$ . According to Tukey's HSD post-hoc test, the Facts Up Front and Facts Up Front FOP labels were found as significantly more credible than the Health Check ( $p < .001$ ).

Table 4

*FOP Effectiveness Variables by Label Condition*

Variables	FOP Label Format			F-value
	Facts Up Front	Facts Up Front Extended	Health Check	
<b>Liking</b>	3.87 <sup>a</sup>	3.93 <sup>a</sup>	3.74 <sup>b</sup>	5.43 <sup>*</sup>
<b>Familiarity</b>	3.51 <sup>a</sup>	3.39 <sup>a</sup>	3.63 <sup>b</sup>	8.79 <sup>***</sup>
<b>Comprehension</b>	4.15 <sup>a</sup>	4.17 <sup>a</sup>	3.37 <sup>b</sup>	10.53 <sup>***</sup>
<b>Purchase Intentions</b>	3.36 <sup>a</sup>	3.34 <sup>a</sup>	2.61 <sup>b</sup>	5.96 <sup>**</sup>
<b>Perceived Credibility</b>	3.82 <sup>a</sup>	3.78 <sup>a</sup>	3.78 <sup>b</sup>	12.82 <sup>***</sup>

Note: <sup>\*</sup>  $p < .05$ , <sup>\*\*</sup>  $p < .01$ , <sup>\*\*\*</sup>  $p < .001$

<sup>a,b</sup>Tukey HSD post-hoc test



## Evaluative vs Reductive FOP Label Formats

The effectiveness of FOP labels between evaluative and reductive formats was examined. The effectiveness was measured using the variables of liking, familiarity, comprehension, purchase intentions, and perceived credibility, but the label formats were grouped by either reductive or evaluative category. In order to determine whether the reductive (Facts Up Front and Facts Up Front Extended) or evaluative (Health Check) FOP label formats were more effective than the other, an independent-samples *t*-test was conducted to compare FOP liking, familiarity, ease of comprehension, purchase intentions, and perceived credibility between both reductive label conditions and the evaluative label condition. The Facts Up Front and Facts Up Front Extended label groups were combined and compared to the Health Check label outcomes. According to the *t*-test, there was a statistically significant difference between reductive and evaluative FOP label formats for liking ( $t(119) = 3.90, p < .001$ ), familiarity ( $t(119) = 4.17, p < .001$ ), comprehension ( $t(119) = 4.60, p < .001$ ), purchase intentions ( $t(119) = 3.45, p < .001$ ), and credibility ( $t(119) = 5.08, p < .001$ ). Data can be found in Table 5.

Table 5

*t*-test Comparison of Reductive and Evaluative FOP Label Format Conditions

Variable	N	Mean	<i>t</i> -value
<i>Liking</i>			3.29***
Reductive	80	3.90	
Evaluative	41	3.44	
<i>Familiarity</i>			4.17***
Reductive	80	3.45	
Evaluative	41	2.63	
<i>Comprehension</i>			4.60***
Reductive	80	4.16	
Evaluative	41	3.37	
<i>Purchase Intentions</i>			3.45***
Reductive	80	3.40	
Evaluative	41	2.61	
<i>Credibility</i>			5.08***
Reductive	80	3.80	
Evaluative	41	2.78	

Note: Reductive = Facts Up Front and Facts Up Front Extended; Evaluative = Health Check;  
 Two-tailed significance: \*\*\*  $p < .001$

## **Predictor Variables of FOP Label Use**

Respondents' personal attitude towards nutrition and health, personal diet assessments, self-reported nutrition knowledge, and label behavior, were analyzed for relationships with respondents' indication of FOP label usage. A significant regression equation was found ( $F(7, 153) = 23.27, p < .001, R^2 = .52$ ). The multiple regression data between the predictor variables and FOP label use can be found in Table 6.

### *Personal Healthiness Attitude*

Personal attitude towards overall healthy eating was assessed by participants selection of one of five statements that most accurately represented their personal attitude towards healthy eating (1 = I eat a healthy diet because it keeps me fit and well, 2 = I eat a healthy diet because it helps keep me fit and well, 3 = I occasionally eat a healthy diet, but consider the taste first before health, 4 = I try to eat a healthy diet, but I find it hard to stick to, or 5 = I eat what I like and do not worry about how healthy it is). The analysis shows that personal attitude towards healthiness did not significantly predict the use of FOP labels ( $\beta = -.03, t(160) = -.53, p = .59$ ).

### *Self-Reported Diet Assessment*

On average, the majority (69.8%) of participants ranked their diet as good to excellent on a 5-point Likert scale. Thirty-five percent of participants who reported a healthy attitude ("I eat a healthy diet to be fit and well") also reported reading labels either "most of the time" or "always" ( $n=33$ ). The multiple regression analysis shows that the self-reported diet assessment did not significantly predict the use of FOP labels ( $\beta = -.03, t(160) = -.34, p = .73$ ).

### *Self-Reported Nutrition Knowledge*

Subjective nutrition knowledge was evaluated by the question "I am knowledgeable about health and nutrition issues" using a 5-point scale. A multiple regression was conducted to

determine if subjective nutrition knowledge predicted the use of FOP labels. Self-reported nutrition knowledge was found to predict FOP label use ( $\beta = .39, t(160) = 4.49, p < .001$ ).

### *Label Behaviors*

Label behaviors were measured with questions assessing label reading frequency, frequency of selecting food for healthful reasons, restaurant nutrition label usage, time to grocery shop, and frequency of attention to food prices while grocery shopping. A multiple regression was conducted to determine if participants who reported selecting food for healthful reasons predicted the use of FOP labels ( $\beta = .44, t(160) = 4.42, p < .001$ ). Additionally, the analysis found that the frequency of restaurant menu label use ( $\beta = .23, t(160) = 1.08, p = .28$ ), having enough time to grocery shop ( $\beta = .23, t(160) = .02, p = .98$ ), and paying attention to food prices ( $\beta = .23, t(160) = .07, p = .95$ ) did not significantly predict FOP label use.

Table 6

*Multiple Regression Predicting FOP Label Use*

Variables	<i>B</i>	<i>SE<sub>b</sub></i>	<i>β</i>	<i>t</i> -value
Constant	.47	.49		.96
Healthiness Attitude	-.03	.05	-.04	-.53
Self-Reported Diet Assessment	-.03	.08	-.03	-.35
Self-Reported Nutrition Knowledge	.39	.09	.32	4.49***
Frequency of Selecting Food for Healthful Reasons	.44	.09	.41	4.42***
Frequency of Restaurant Menu Label Use	.07	.07	.09	1.08
Time to Grocery Shop	.00	.06	.00	.02
Attention to Food Prices	.00	.07	.00	.07

Note: \*\*\*  $p < .001$ ;  $R^2 = .52$ ;  $F = 23.27$ ,  $p < .001$

## Perceived Healthiness

Participants in each of the four label condition (including no label) were asked to rate their perception of healthiness of each individual food product on a 5-point scale with one being ‘not healthy at all’ and 5 being ‘very healthy.’ A logistic regression was completed for the healthy and less healthy variety of cereal, dairy, and snack foods for each label condition and perceived healthiness ratings. The independent variable was perceived healthiness means and the dependent variable was the healthiness selection score. Of the six food products, all of the products were statistically significant with perceived healthiness: the healthier cereal product ( $B = 2.27, p < .01$ ), the less healthy cereal product ( $B = -2.57, p < .001$ ), the healthier dairy product ( $B = -1.17, p < .001$ ), the less healthy dairy product ( $B = 0.94, p < .001$ ), the healthier snack product ( $B = 3.22, p < .001$ ), and the less healthy snack product ( $B = -2.71, p < .01$ ). The beta value for perceived healthiness of the healthier cereal product was positive and the less healthy product beta value was negative, which denotes that participants were able to identify the healthier cereal product and the perceived healthiness scores predicted these values. However, the perceived healthiness of the healthier dairy product beta value was negative and the perceived healthiness of the less healthy dairy product beta value was positive, showing participants had a more difficult time determining the healthier option, in which the perceived healthiness did not predict. Data can be found in Table 7.

Table 7

*Summary of Logistic Regression Analysis for Healthiness Assessment and Perceived Healthiness of Food Products*

<b>Variables</b>	<b>B</b>	<b>SE<sub>b</sub></b>	<b>Wald Test</b>
Healthier Cereal Product Perceived Healthiness	2.27	0.72	9.81**
Less Healthy Cereal Product Perceived Healthiness	-2.57	0.39	10.99***
Healthier Dairy Product Perceived Healthiness	-1.17	0.24	23.54***
Less Healthy Dairy Product Perceived Healthiness	0.94	0.22	10.70***
Healthier Snack Product Perceived Healthiness	3.22	0.96	11.25***
Less Healthy Snack Product Perceived Healthiness	-2.71	0.89	9.10**

Note: \*\*  $p < .01$ , \*\*\*  $p < .001$

## CHAPTER 5: DISCUSSION

The purpose of this study was to assess the effectiveness of three different FOP labels, the US implemented Facts Up Front label and Facts Up Front Extended label (U.S. Department of Health and Human Services, Food and Drug Administration, 2011), and the Health Check binary symbol on three different product categories (cereal, dairy, and snack). In addition, a no label Control group was used as the reference point. The study evaluated the two Facts Up Front labels and the Health Check label for liking, familiarity, ease of comprehension, purchase intentions, and perceived credibility, along with the perceived healthiness of the food products. An assessment of the respondent's nutrition attitude and self-reported nutrition knowledge, and label behaviors was included in the study to determine their impact on FOP labeling.

Most FOP label research has been completed in European countries (Aschemann-Witzel et al., 2013; Azman, & Sahak, 2014; Balcombe et al., 2010; Bialkova et al., 2014; Bialkova, & van Trijp, 2010; Borgmeier, & Westenhoefer, 2009; Boztuğ et al., 2015; Brownell & Koplan, 2011; Feunekes et al., 2008; Grunert et al., 2010; Hamlin et al., 2014; Hodgkins et al., 2012; Hodgkins et al., 2015; Julia, et al., 2015; Kleef & Dagevos, 2015; Malam et al, 2009; Newman et al., 2014; Siegrist et al., 2015; van Herpen & Trijp, 2011; van Herpen et al., 2012), with a few studies conducted in non European countries other than the US (Helfer & Shultz, 2014; Kim & Kim, 2009; van der Merwe et al., 2014). However, research regarding the effectiveness of the Facts Up Front labeling system used in the US is limited (Edge, et al., 2014; Diekman et al., 2016; Helfer & Shultz, 2014; Kees, Royne, & Cho, 2014; Lin & Levy, 2010; Newman, Howlett,



& Burton, 2014; Roberto, et al., 2012). Additionally, prior to this study, no research has measured the effectiveness of the Facts Up Front label systems by liking, familiarity, ease of comprehension, purchase intentions, and perceived credibility in the US. Overall, the affects of having enough time to grocery shop and price consciousness on FOP label use are lacking in the research among US consumers.

This study is important to the literature because FOP nutrition labels have the potential to influence consumers to purchase healthier food products by informing them of relevant nutrition values and assisting consumers in quickly comparing products when grocery shopping (Edge et al., 2014 & Miller et al., 2015). Research suggests that the Nutrition Facts label on the back of the package has been unsuccessful and more difficult to understand which affects the use of FOP labels by the general population (Campos et al., 2011; Diekman et al., 2016). In addition, research suggests that consumers are more concerned about levels of saturated fat, trans fat, sodium, and added sugars (McGuire, 2012), which were the nutrients displayed on both the Facts Up Front FOP label versions. The Facts Up Front FOP label provides the nutrients of concern at the point of purchase, influencing the purchases of healthier food products, which was originally the goal of the Nutrition Facts label. Furthermore, the Facts Up Front FOP label has overcome the issues of the Nutrition Facts label by providing reliable and relevant nutrition information while being to be easier to understand and use by consumers (Edge et al., 2014).

In this study, participants who reported using labels were primarily female, Caucasian, had higher levels of education and income, and had at least three individuals in the household. These findings are supported by the similar demographic profiles of previous research (Azman, & Sahak, 2014; Cannoosamy et al., 2014; Helfer & Shultz, 2014; Kleef, & Dagevos, 2015). Additionally, BMI was not found as a predictor of FOP label use in this study. The majority of

participants in this study had a BMI that was considered overweight or obese. These outcomes are reflective of the US population with 68.7% of Americans considered overweight and 35.7% considered obese (CDC, 2014). While not studied in this research, adults with BMI scores greater than 30, classified as obese, have been reported as being most likely to pay attention to serving sizes “often” or “sometimes,” and believed serving sizes indicated the amount of food people should eat (Zhang, Kantor, & Juan 2016). One study’s results could be due to the motivation of weight loss, which can either increase or decrease FOP label use (Grabenhorst et al., 2013).

Overall, the study’s findings suggest that the Facts Up Front and the Facts Up Front Extended FOP labels, are generally well liked, recognized as familiar, easy to understand, have the ability to influence purchases, and are seen as a credible source of nutrition information. Previous findings support these results, which suggest that the presence FOP labels provide more accurate health assessments of food products (Aschemann-Witzel et al., 2013; Feunekes et al., 2008; Hersey et al., 2013; Hodgkins et al., 2015; Kees et al., 2014; Maubach, Hoek, & Mather, 2014; Newman et al., 2014; Roberto, Bragg, Schwartz, Seamans, Musicus, Novak, & Brownell, 2012). Based on the findings of this study, food manufacturers and retailers should consider the use of the Facts Up Front label. Additionally, a standardized FOP label would be more affective since multiple different FOP labels have been found to confuse consumers and deter the use of FOP labels (Andrews et al., 2014; Hawley et al., 2012; Kees, et al., 2014)

### **Healthiness Assessment**

FOP labels have been found to be effective in helping consumers make healthier choices (Feunekes et al., 2008; Kleef & Dagevos, 2015). All of the FOP labels researched were able to assist participants in differentiating between healthier and less healthy variants of commonly

consumed food product categories. Research supports the presence of a FOP label in promoting correct answers when given a choice between a healthier and less healthy product (Aschemann-Witzel et al., 2013; Feunekes et al., 2008; Hersey et al., 2013; Hodgkins et al., 2015; Kees et al., 2014; Maubach et al., 2014; Newman et al., 2014; Roberto, Bragg, Livingston, et al., 2012). In the same way, it can be said that the absence of FOP labels could decrease the amount of correct product healthiness assessments. Although a majority of the control group, which did not display a FOP label, was able to correctly determine the healthier option of the cereal and dairy products, the control group as a whole was unsuccessful at differentiating the health levels between the two snack category products. This could be due to packaged snack food items being desired mostly for their taste; being associated with palatability rather than healthiness (Vasiljevic, Pechey, & Marteau, 2015). Additionally, snack food products, particularly cookie snacks are not thought to have healthy varieties. So, when two cookie snacks were compared with no label, participants had more difficulty determining which product was healthier in terms of being lower in calories, saturated fat, and sugar. These findings suggest that participants need the prompting of a FOP label to determine the healthier product. Previous research findings supporting this study's results suggesting that FOP label versions that provide more nutrition information increased consumer's comprehension of the nutrient content of food (Edge et al., 2014). The findings in the present study suggest that the presence of an FOP label is more helpful in assessing product healthiness; without a nutrition label or indicator, participants were unsuccessful at determining the healthier product. This is similar to another study where participants accurately selected the healthier of two products when the Facts Up Front FOP labeling system was presented (Roberto, Bragg, Livingston, et al., 2012).

In all of the FOP label conditions, when asked to determine perceived healthiness between the two products in a product category, the participants in this study had no difficulty making accurate inferences about product healthiness. These results align with research from the UK, in which respondents were enabled to make correct product comparisons regarding the healthiness of products (Grunert, Wills, & Fernández-Celemín, 2010). However, Campos et al. (2011) found that consumers were willing to use label information, although the perceptions of healthiness may have been influenced by consumer's beliefs rather than influenced by the label.

### **FOP Label Effectiveness**

In this study, FOP label effectiveness was measured by assessing participants liking, familiarity, comprehension, purchase intentions, and perceived credibility of their assigned FOP label, based on a previous European study (Feunekes et al., 2008). Liking was significantly higher for the Facts Up Front FOP label variants compared to the Health Check symbol, which is somewhat contrary to research suggesting consumers like simple and easy to understand FOP labels (Feunekes et al., 2008; Hawley et al., 2012; Julia, et al., 2015; Kees et al., 2014). Although the preferred amount of detail varies, US studies have found that consumers like more detailed information that provides a snap shot of the nutrition quality of a food product (Campos et al., 2011; Edge, et al., 2014; Lin & Levy, 2010), differing from international studies showing consumers preferred simpler FOP formats (Feunekes et al., 2008; Hodgkins, et al., 2012; van Herpen, and Trijp, 2011).

Research suggests that familiarity with FOP nutrition labels is a determinant for the use of FOP labels (Hodgkins et al., 2015). Participants were found to be significantly more familiar with the two Facts Up Front FOP labels than the Health Check symbol, which was created specifically for this study. However, a handful of respondents reported being familiar with the

Health Check symbol, which could mean that these individuals were familiar with the idea of a green check mark on healthier food products, which has been found in previous research (Helfer & Shultz, 2014). Previous research supports these results and suggests that labels are more effective when consumers are previously exposed to them (Kleef & Dagevos, 2015). Additionally, uncertainty with the application of FOP labels has been found to be due to the lack of familiarity with FOP label schemes (Hawley et al., 2012; Hodgkins et al., 2015).

Comprehension is essential to be able to correctly use FOP nutrition labels (Kleef & Davegos, 2015). Understanding nutrition information on FOP labels can stimulate healthier purchases and lead to an overall healthy diet (Hersey et al., 2013). The current study found that participants could easily comprehend and understand how to use all three FOP label conditions. However, the two Facts Up Front labels were more easily comprehended than the Health Check label. A supporting study by Edge, et al., concluded that Facts Up Front Extended label format had significantly higher levels of understanding than other tested conditions (2014). Another study found that the Facts Up Front Extended label provided significantly higher attention levels and was found easier to use than abbreviated FOP versions with less information (Kees, Royne, & Cho, 2014). Therefore, the more nutrition information provided, the easier it is to comprehend despite education level (Edge et al., 2014; Kees et al., 2014). Nutrient-specific or reductive FOP formats such as the Facts Up Front label formats have been found to help consumers select healthier products because of the higher level of participant comprehension (Andrews et al., 2014; Lin & Levy, 2010).

FOP labels are at the point of decision-making in grocery store aisles and can impact healthy choices by emphasizing healthy products as well as less healthy products, for more informed decision making (Bui, Kaltcheva, Patino, & Leventhal, 2013; Lowe et al., 2013). The

current study found that consumers were more likely to purchase foods with FOP labels, especially the two Facts Up Front labels, over no FOP label present. Previous research supports the presence of FOP labels increasing consumer purchase intentions of healthier foods (Andrews et al., 2011; Feunekes et al., 2008; Hamlin, McNeill, & Moore, 2014). Furthermore, reductive FOP label formats were found to positively influence purchase intentions (Andrews, et al., 2014; Newman et al., 2014) with the Facts Up Front Extended label being the only label condition found to positively influence purchase decisions (Kees et al., 2014).

In this study, the two Facts Up Front label formats were found more credible than the Health Check label. Evidence supporting the results of this study suggests that consumers view FOP nutrition labels as highly credible sources of information (Campos et al., 2011). However, research suggests that consumers are less trusting of FOP labels that are created and promoted by manufacturers, reducing the label credibility (Campos et al., 2011). This is due to the consumer perception of manufacturers motivation to make a profit rather than promote healthiness (Newman et al., 2014). Additionally, more detailed FOP labels have been found to be more credible by consumers (Lin & Levy, 2010). FOP label credibility can be increased if they are endorsed by trusted health or nutrition organizations (Feunekes et al., 2008). This supports the use of a consistent FOP label regulated or implemented by the FDA or a health organization to insure reliability (van der Merwe et al., 2014) due to the lack of trust consumers have in manufacturers' nutrition and health claims (Campos et al., 2011).

### **Facts Up Front FOP Label Format**

There were small, insignificant differences found between the two reductive FOP formats: the Facts Up Front and the Facts Up Front Extended. However, both the Facts Up Front and the Facts Up Front Extended FOP labels were significantly more liked, familiar, easy to

understand, more likely to influence purchase intentions, and perceived as more credible than the evaluative Health Check FOP label. However, the Facts up Front and the Facts Up Front Extended FOP labels were not significantly different from each other. In addition, the findings suggest that reductive formats were more favorable than the evaluative label. These results could be due to the increasing awareness and popularity of the Facts Up Front label in the US (Diekman et al, 2016). Additionally, these results could have been caused by the unfamiliar evaluative FOP label format that was created for the purposes of this study, rather than using a non-brand label, which does not currently exist in the US.

Furthermore, recent research suggests that two-sided messages, which includes positive and negative attributes about a product are more likely to benefit consumers overall health and may offer a better labeling solution (Pham, Mandel, & Morales, 2016). The positive attributes in a product include beneficial nutrients, such as vitamins and minerals, and the negative attributes refer to nutrients to limit in the diet such as fat, sugar, and sodium. The Facts Up Front Extended format displays the negative associated nutrients, as well as two “nutrients to encourage” from protein, vitamins, minerals, and fiber, satisfying the two-sided message of the previously mentioned study. Additionally, individuals who diet and use nutrition labels, interpret two-sided messages about unhealthy foods providing them with the ability to choose food products, in contrast to only one-sided, positive messages (Pham, Mandel, & Morales, 2016). These findings support the effectiveness of the Facts Up Front labels and their potential to impact food purchases and further promote making healthier choices. Additionally the reductive, Facts Up Front label was found to influence purchase intentions and perceived healthiness (Newman et al., 2014).

The Health Check label, which is an evaluative FOP symbol created for the purposes of this study, was found to be the least effective FOP format. It was found to be moderately liked and fairly easy to understand, but less familiar and credible. However, it was found to be helpful in differentiating between healthier and less healthy product variants when the healthy option displays the Health Check and a similar but less healthy product does not display the Health Check. An additional study created a binary nutrition FOP symbol with the justification of not being able to obtain the precise certification criteria and permission of binary schemes, therefore stimulating a generic heart icon (Helfer & Shultz, 2014). The results suggest that evaluative symbols could be effective when consumer's time is limited (Helfer & Shultz, 2014). A study by Newman et al. (2014) also created evaluative symbol, the "Healthy Selection Seal," for their study and found that the label did not influence purchase intentions and results were non-significant. While evaluative symbols may not be as successful as a reductive or detailed FOP label formats, simple labels decrease the amount of thinking and processing time used to evaluate reductive labels such as the Facts Up Front FOP label formats (Andrews et al., 2011; Azman, & Sahak, 2014; Bialkova, & van Trijp, 2010; Feunekes et al., 2008; Helfer & Shultz, 2014). It is important to note that most of the studies supporting the effectiveness of simple, evaluative symbol FOP formats were conducted in European countries.

### **Predictor Variables of FOP Label Use**

Personal attitude towards nutrition and health, personal diet assessment, self-reported nutrition knowledge, and label behaviors were used in this study as predictor variables for FOP label use. Respondents rated themselves mostly good to excellent on self-reported nutrition attitudes. Although the data is subjective, a recent study found that the death-related anti-smoking warning labels increased consumer attitudes toward smoking (Pham, Mandel, &



Morales, 2016). In the same way, FOP labels providing an accurate reflection of product healthiness could further influence consumer attitude toward nutrition and healthy eating. However, an individual must possess positive attitudes towards nutrition in order to make healthier choices (Roseman, Mathe-Soulek, & Higgins, 2013). A recent study found that health consciousness and nutrition self-efficacy have direct effects on attitudes toward nutrition labels, which can positively influence label use (Sun, Huang, & Chu, 2015). The results from the present study suggest that attitudes toward healthiness are not a predictor of FOP label use. Possibly, individuals who do not use FOP labels are not actively seeking healthier food selections. Additionally, self-reported diet assessment was not found to be a predictor of FOP label use. This may indicate that individuals who have healthy attitudes and healthier self-reported diet consumption do not believe they need to read labels due to their existing knowledge of health and nutrition, which may include believing they know which products are healthier than others. Furthermore, general attitudes toward nutrition may have been affected by the social desirability bias where individuals report desirable responses rather than responding based on their true feelings (Grimm, 2010).

The present study did however find that self-reported nutrition knowledge could be a predictor of FOP label use. Another study found significant relationships between label use and objective nutrition knowledge (Cannoosamy, Pugo-Gunsam, & Jeewon, 2014), while there appears to be no other studies that have examined subjective knowledge. Additionally, individuals who use labels less often have been found to have less objective nutritional knowledge, suggesting that higher nutritional knowledge may lead to greater use and understanding of the nutrition label information (Cannoosamy, Pugo-Gunsam, & Jeewon, 2014). This study found a relatively high amount of participants reported using labels sometimes and

having moderate subjective nutrition knowledge. However, this measurement could have been affected by the social desirability bias as well. Additional research supports the use of nutrition labels on groceries suggesting that the use of the label itself will create more knowledgeable and health motivated individuals (Gurnert, Wills, Fernández-Celemín, 2010).

Label behaviors in this study were measured as selecting food for healthful reasons, using restaurant nutrition labels on menus, having enough time to grocery shop, and paying attention to food prices while grocery shopping. These specific measures provide a better picture of individuals label behaviors and are less likely to be affected by the social desirability bias (Grimm, 2010). Research suggests that individuals who frequently use FOP labels consume a significantly less amount of calories, total and saturated fat, sodium, and sugar (Helfer & Shultz, 2014; Ollberding, Wolf, & Contento, 2011). Furthermore, research suggests that nutrition label use is correlated to selecting foods higher in beneficial nutrients (Helfer & Shultz, 2014). The frequency of selecting food for healthful reasons was found to be a predictor of FOP label use. This may imply that individuals who actively try to make healthier choices at the grocery store are more likely to use FOP labels. Previous research supports this thought, suggesting that consumers are more likely to use FOP labels when purchasing a product for the first time or comparing similar products (Cannoosamy et al., 2014).

In the present study, shopping time and prices of food were assessed, which had not been studied as frequently in FOP label research. The variable of time was not a predictor of FOP label use. However, previous research suggests that individuals who have more time to grocery shop are more likely to use FOP labels (Barreiro-Hurlé et al., 2010; Drichoutis et al., 2006). Attention to food prices was also not a predictor of FOP label use. These results may indicate that consumers consider these two factors of higher value than FOP labeling or irrelevant to

nutrition information decisions. The cost of food is a common barrier and price-conscious individuals have been found to be less interested in nutritional content before price (Edge, et al., 2014). However, a conflicting study found that a detailed FOP label increased the likelihood of purchasing the healthier product variant despite its cost (Boztuğ et al., 2015).

### **Perceived Healthiness**

The present study suggests that all the FOP label formats are more likely to increase the perceived healthiness of the healthier products than to decrease the perceived healthiness of the less healthy products, especially when participants are unsure of the level of healthiness of the product. Implying that when a healthy product has a FOP label, participants perceive the product as healthier, but when a less healthy product has a FOP label, it is not perceived as a healthy product because the label reveals its less healthy characteristics. These label factors may include higher percentages of fat, calories, sodium, or sugar per serving. In addition, positive nutrients (protein, fiber, vitamins, or minerals), which can be found on the Facts Up Front Extended label, can make food products appear to be healthier (Facts Up Front, n.d.). Furthermore, perceived healthiness can be influenced by other factors such as food package design and marketing (Chandon, 2013).

The healthiness selection between the cereal, dairy, and snack products corresponded to the perceived healthiness of the individual products of these food categories. Meaning that participants collectively selected the healthier option for the food categories for the healthiness assessment portion of the survey, and participants also rated the healthier options as higher (more healthy) on the perceived healthiness portion of the survey. Potentially, consumers could differentiate the healthier and less healthy option between two like products using a FOP label if the products vary in healthiness. However, the level of perceived healthiness was found more

difficult to determine on its own. The results of the perceived healthiness ratings suggest that participants needed and could benefit from additional nutrition information as provided by the FOP label to individually rate product healthiness on a 5-point Likert scale. This research further supports the use of the Facts Up Front FOP label formats because they both display the negative associated nutrients (calories, saturated fat, sodium, and sugar), which may provide lower values of these nutrients for some products endorsing the healthier product. Additionally, when the positive values of the Facts Up Front Extended FOP format is displayed and the perceived healthiness of a product could increase. However, when compared to similar products, the labels could reveal less healthy qualities such as higher sugar or fat (Vasiljevic, Pechey, & Marteau, 2015).

### **Limitations**

Like most research, this study has its limitations. One possible limitation could be the healthiness varieties of the food products selected. However, this was prevented as much as possible by using the FDA's definitions of "high," "a good source," or "low" guidelines (U.S. Department of Health and Human Services, Food and Drug Administration, 2015) and equal gram serving sizes to equally compare product nutrient content, to determine which food products to use for the study. Also, the food products were analyzed by gram weight to ensure an equivalent comparison. An additional limitation is the self-reported data for height and weight that was used to calculate BMI. Evidence suggests that individuals underestimate weight and overestimate their height, so reports may not be sufficiently accurate (Ikeda, 2016); however, self-reported data has been found effective for data modeling (Masood, Ahmed, Choi, & Gutierrez-Osuna, 2012). Furthermore, evidence on the impact of nutrition labels is also self-reported data, which may have resulted in over-reported label use (Campos et al., 2011; Diekman

et al., 2016). Additionally, nutrition knowledge was assessed with one subjective question rather than an objective test of knowledge, which was not feasible for the scope of this study. However, research suggests that self-reports can provide useful alternative for data collection especially when other objective measurements are difficult (Masood et al., 2012).

Lastly, it is possible that recently published articles were not available for this review due to the rapidly evolving research on FOP labeling. An additional limitation is that the methods did not include real-world grocery shopping comparison. There are multiple brands and varieties of products in grocery stores, which can make healthier food selections more varied and realistic than was possible in this research study. However, it would be an interesting area for evolving FOP label research with future research focusing on practical and actual application of FOP label use.

## **Conclusion**

FOP nutrition labeling has the potential to influence food choices at the point of food purchase in the retail environment, leading to healthier consumed food items and an overall healthier population, when the FOP label results in healthier product selection. This study is among the first to examine the effectiveness of US FOP label formats, Facts Up Front and Facts Up Front Extended, which are both monitored by the FDA (U.S. Department of Health and Human Services, Food and Drug Administration, 2011), with the addition of a created evaluative label (Healthy Check) to determine if there are differences in evaluative and reductive FOP label formats. As seen in this study, FOP labels can be effective for healthiness assessment, liking, familiarity, ease of comprehension, purchase intentions, and perceived credibility of a product, although there are other factors that affect selection of healthy choices in the grocery store. There are a variety of FOP label formats created and promoted by food retailers, manufacturers,

governmental, and non-profit organizations. However, multiple FOP labeling formats can confuse consumers and decrease the effectiveness of FOP labeling.

In conclusion, the results of this study indicate that the FOP labeling formats can help consumers make healthier choices between healthier and less healthy options. Additionally, both of the reductive, Facts Up Front FOP label formats are well liked, familiar, easy to comprehend, positively influence purchase intentions, and are perceived as credible. While studies outside the US show that consumers are interested in an evaluative label, this finding has not been found in research of US consumers. If a non-manufacturer develops an evaluative FOP label in the US, further research will be needed to determine which format is the most effective in the US. In addition, further implications of this study may be to include evaluations of the current use of the Nutrition Facts label and the manipulation of methodology to reflect grocery-shopping scenarios. This study may be the groundwork for a new and prevalent area of focus and aid in bridging current research gaps, and promote a single, standardized FOP label format in the US, which would further benefit consumers' overall health and wellness.

## BIBLIOGRAPHY

- American Heart Association. (2015). Heart-check food certification program nutrition requirements. Retrieved from [http://heart.org/HEARTORG/GettingHealthy/NutritionCenter/Heart-CheckMarkCertification/Heart-Check-Food-Certification-Program-Nutrition-Requirements\\_UCM\\_300914\\_Article.jsp#.VicAvxPBwXA](http://heart.org/HEARTORG/GettingHealthy/NutritionCenter/Heart-CheckMarkCertification/Heart-Check-Food-Certification-Program-Nutrition-Requirements_UCM_300914_Article.jsp#.VicAvxPBwXA)
- Andrews, J. C., Burton, S., & Kees, J. (2011). Is simpler always better? Consumer evaluations of front-of-package nutrition symbols. *Journal of Public Policy & Marketing*, 30(2), 175-190.
- Andrews, J. C., Chung-Tung, J. L., Levy, A. S., & Lo, S. (2014). Consumer research needs from the food and drug administration on front-of-package nutritional labeling. *Journal of Public Policy & Marketing*, 33(1), 10-16. Retrieved from <http://0-search.ebscohost.com.umiss.lib.olemiss.edu/login.aspx?direct=true&AuthType=ip,url,uid&db=bth&AN=96867049&site=eds-live&scope=site>
- Aschemann-Witzel, J., Grunert, K. G., van Trijp, H. C., Bialkova, S., Raats, M. M., Hodgkins, C., ... & Koenigstorfer, J. (2013). Effects of nutrition label format and product assortment on the healthfulness of food choice. *Appetite*, 71, 63-74.
- Azman, N., & Sahak, S. Z. (2014). Nutritional Label and Consumer Buying Decision: A Preliminary Review. *Procedia - Social And Behavioral Sciences*, 130(4th International Conference on Marketing and Retailing 2013, INCOMaR 2013), 490-498. doi:10.1016/j.sbspro.2014.04.057
- Balcombe, K., Fraser, I., & Di Falco, S. (2010). Traffic lights and food choice: A choice experiment examining the relationship between nutritional food labels and price. *Food Policy*, 35(3), 211-220.
- Barreiro-Hurlé, J., Gracia, A., & de-Magistris, T. (2010). Does nutrition information on food products lead to healthier food choices? *Food Policy*, 35, 221-229. doi:10.1016/j.foodpol.2009.12.006
- Bialkova, S., Grunert, K. G., Juhl, H. J., Wasowicz-Kirylo, G., Stysko-Kunkowska, M., & van Trijp, H. C. (2014). Attention mediates the effect of nutrition label information on consumers' choice. Evidence from a choice experiment involving eye-tracking. *Appetite*, 76, 66-75.
- Bialkova, S., & van Trijp, H. (2010). What determines consumer attention to nutrition labels?. *Food Quality And Preference*, 21(Eighth Pangborn Sensory Science Symposium), 1042-1051. doi:10.1016/j.foodqual.2010.07.001
- Borgmeier, I., & Westenhoefer, J. (2009). Impact of different food label formats on healthiness evaluation and food choice of consumers: a randomized-controlled study. *BMC public health*, 9(1), 184.



- Boztuğ, Y., Juhl, H. J., Elshiewy, O., & Jensen, M. B. (2015). Consumer response to monochrome Guideline Daily Amount nutrition labels. *Food Policy*, 531-8. doi:10.1016/j.foodpol.2015.03.002
- Brownell, K. D., & Koplan, J. P. (2011). Front-of-package nutrition labeling—an abuse of trust by the food industry?. *New England Journal of Medicine*, 364(25), 2373-2375.
- Bui, M., Kaltcheva, V. D., Patino, A., & Leventhal, R. C. (2013). *Front-of-package product labels: Influences of varying nutritional food labels on parental decisions* Retrieved from <http://0-search.ebscohost.com.umiss.lib.olemiss.edu/login.aspx?direct=true&AuthType=ip,url,uid&db=edb&AN=93511015&site=eds-live&scope=site>
- Campos, S., Doxey, J., & Hammond, D. (2011). Nutrition labels on pre-packaged foods: a systematic review. *Public health nutrition*, 14(08), 1496-1506.
- Cannoosamy, K., Pugo-Gunsam, P., & Jeewon, R. (2014). Consumer knowledge and attitudes toward nutritional labels. *Journal of nutrition education and behavior*, 46(5), 334-340.
- Cherry, J. C., Bruce, J. M., Lusk, J. L., Crespi, J. M., Lim, S., & Bruce, A. S. (2015). Neurofunctional Correlates of Ethical, Food-Related Decision-Making. *Plos ONE*, 10(4), 1-16. doi:10.1371/journal.pone.0120541
- Chandon, P. (2013). How package design and packaged-based marketing claims lead to overeating. *Applied Economic Perspectives and Policy*, 35(1), 7-31.
- Centers for Disease Control and Prevention. (2013). National health and nutrition examination survey: 2009–2010 data documentation, codebook, and frequencies, consumer behavior phone follow-up module—adults (CBQBFA\_F). Retrieved from [http://www.cdc.gov/nchs/nhanes/nhanes2009-2010/CBQPFA\\_F.htm](http://www.cdc.gov/nchs/nhanes/nhanes2009-2010/CBQPFA_F.htm)
- Center for Science in the Public Interest. (2010). Food labeling chaos. Retrieved from [http://cspinet.org/new/pdf/food\\_labeling\\_chaos\\_report.pdf](http://cspinet.org/new/pdf/food_labeling_chaos_report.pdf)
- Diekmann, C., Levy, M., Murray, R., Stafford, M., & Kees, J. (2016). A Preliminary Examination of Facts Up Front: Survey Results from Primary Shoppers and At-Risk Segments. *Journal of the Academy of Nutrition and Dietetics*. doi: 10.1016/j.jand.2016.01.007.
- Drichoutis, Lazaridis, & Nayga. (2006). Consumers' use of nutritional labels: A review of research studies and issues. *Academy of Marketing Science Review*, 9(9), 1-22.
- Edge, M. S., Toner, C., Kapsak, W. R., & Geiger, C. J. (2014). The impact of variations in a fact-based front-of-package nutrition labeling system on consumer comprehension. *Journal Of The Academy Of Nutrition And Dietetics*, 114(6), 843-854.e8. doi:10.1016/j.jand.2014.01.018

- Emrich, T. E., Qi, Y., Cohen, J. E., Lou, W. Y., & L'Abbe, M. L. (2015). Front-of-pack symbols are not a reliable indicator of products with healthier nutrient profiles. *Appetite*, *84*, 148-153.
- Facts Up Front. (n.d.). Retrieved from <http://factsupfront.org>
- Facts Up Front. (n.d.). *Facts about facts up front* [PowerPoint slides]. Retrieved from <http://enadmin.factsupfront.org/FileUploads/Files/276b18a7-a955-433b-b288-1b25b41231dd.pdf>
- Feunekes, G. I., Gortemaker, I. A., Willems, A. A., Lion, R., & Van den Kommer, M. (2008). Front-of-pack nutrition labelling: testing effectiveness of different nutrition labelling formats front-of-pack in four European countries. *Appetite*, *50*(1), 57-70.
- Grabenhorst, F., Schulte, F. P., Maderwald, S., & Brand, M. (2013). Food labels promote healthy choices by a decision bias in the amygdala. *Neuroimage*, *74*, 152-163. doi:10.1016/j.neuroimage.2013.02.012
- Graham, D. J., Heidrick, C., & Hodgins, K. (2015). Nutrition Label Viewing during a Food-Selection Task: Front-of-Package Labels vs Nutrition Facts Labels. *Journal Of The Academy Of Nutrition And Dietetics*, doi:10.1016/j.jand.2015.02.019
- Grimm, P. (2010). Social desirability bias. *Wiley International Encyclopedia of Marketing*.
- Grunert, K. G., Wills, J. M., & Fernández-Celemín, L. (2010). Nutrition knowledge, and use and understanding of nutrition information on food labels among consumers in the UK. *Appetite*, *55*(2), 177-189.
- Hamlin, R. P., McNeill, L. S., & Moore, V. (2014). The impact of front-of-pack nutrition labels on consumer product evaluation and choice: an experimental study. *Public health nutrition*, 1-9.
- Hawley, K. L., Roberto, C. A., Bragg, M. A., Liu, P. J., Schwartz, M. B., & Brownell, K. D. (2012). The science on front-of-package food labels. *Public health nutrition*, *16*(03), 430-439.
- Helfer, P., & Shultz, T. R. (2014). The effects of nutrition labeling on consumer food choice: a psychological experiment and computational model. *Annals of the New York Academy of Sciences*, *1331*(1), 174-185.
- Hersey, J. C., Wohlgenant, K. C., Arsenault, J. E., Kosa, K. M., & Muth, M. K. (2013). Effects of front-of-package and shelf nutrition labeling systems on consumers. *Nutrition Reviews*, *71*(1), 1-14. Retrieved from <http://0-search.ebscohost.com.umiss.lib.olemiss.edu/login.aspx?direct=true&AuthType=ip,url,uid&db=s3h&AN=84578447&site=eds-live&scope=site>

- Hodgkins, C., Barnett, J., Wasowicz-Kirylo, G., Stysko-Kunkowska, M., Gulcan, Y., Kustepeli, Y., & ... Raats, M. (2012). Research report: Understanding how consumers categorise nutritional labels: A consumer derived typology for front-of-pack nutrition labelling. *Appetite*, 59806-817. doi:10.1016/j.appet.2012.08.014
- Hodgkins, C. E., Raats, M. M., Fife-Schaw, C., Peacock, M., Gröppel-Klein, A., Koenigstorfer, J., ... & Grunert, K. G. (2015). Guiding healthier food choice: systematic comparison of four front-of-pack labelling systems and their effect on judgements of product healthiness. *British Journal of Nutrition*, 113(10), 1652-1663.
- IBM Corp. Released 2013. IBM SPSS Statistics for Macintosh, Version 22.0. Armonk, NY: IBM Corp.
- Ikeda, N. (2016). Validity of Self-Reports of Height and Weight among the General Adult Population in Japan: Findings from National Household Surveys, 1986. *PloS one*, 11(2), e0148297.
- International Food Information Council. (2012). 2012 Food & health survey: Consumer attitudes toward food safety, nutrition, and health [PowerPoint slides]. Retrieved from [http://www.foodinsight.org/Content/3840/2012%20IFIC%20Food%20and%20Health%20Survey%20Report%20of%20Findings%20\(for%20website\).pdf](http://www.foodinsight.org/Content/3840/2012%20IFIC%20Food%20and%20Health%20Survey%20Report%20of%20Findings%20(for%20website).pdf)
- Johnson, R. K., Appel, L. J., Brands, M., Howard, B. V., Lefevre, M., Lustig, R. H., ... & Wylie-Rosett, J. (2009). Dietary sugars intake and cardiovascular health a scientific statement from the american heart association. *Circulation*, 120(11), 1011-1020.
- Julia, C., Kesse-Guyot, E., Ducrot, P., Péneau, S., Touvier, M., Méjean, C., & Hercberg, S. (2015). Performance of a five category front-of-pack labelling system—the 5-colour nutrition label—to differentiate nutritional quality of breakfast cereals in France. *BMC public health*, 15(1), 179.
- Kees, J., Royne, M. B., & Cho, Y. (2014). Regulating front-of-package nutrition information disclosures: A test of industry self-regulation vs. other popular options. *Journal of Consumer Affairs*, 48(1), 147-174. doi:10.1111/joca.12033
- Kim, W. K., & Kim, J. (2009). A study on the consumer's perception of front-of-pack nutrition labeling. *Nutrition research and practice*, 3(4), 300-306.
- Kleef, E. V., & Dagevos, H. (2015). The growing role of front-of-pack nutrition profile labeling: A consumer perspective on key issues and controversies. *Critical reviews in food science and nutrition*, 55(3), 291-303.

- Legault, L., Brandt, M. B., McCabe, N., Adler, C., Brown, A., & Brecher, S. (2004). Research: perspectives in practice: 2000–2001 food label and package survey: an update on prevalence of nutrition labeling and claims on processed, packaged foods. *Journal Of The American Dietetic Association*, 104952-958. doi:10.1016/j.jada.2004.03.024
- Lin, C. T. J., & Levy, A. (2010). Food and Drug Administration's front-of-pack consumer research. In *Workshop on Consumer Behavior Research and Front-of-Package Nutrition Rating Systems and Symbols: What Do Consumers Know, Understand, and Use*.
- Lowe, B., de Souza-Monteiro, D. M., & Fraser, I. (2013). Nutritional labelling information: Utilisation of new technologies. *Journal of Marketing Management*, 29(11), 1337-1366. doi:10.1080/0267257X.2013.798673
- Masood, K., Ahmed, B., Choi, J., & Gutierrez-Osuna, R. (2012). Consistency and Validity of Self-reporting Scores in Stress Measurement Surveys. In *Engineering in Medicine and Biology Society (EMBC), 2012 Annual International Conference of the IEEE* (pp. 4895-4898). IEEE.
- Malam, S., Clegg, S., Kirwan, S., McGinival, S., Raats, M., Shepherd, R., ... & Dean, M. (2009). Comprehension and use of UK nutrition signpost labelling schemes. *London: Food Standards Agency*.
- Maubach, N., Hoek, J., & Mather, D. (2014). Research report: Interpretive front-of-pack nutrition labels. Comparing competing recommendations. *Appetite*, 8267-77. doi:10.1016/j.appet.2014.07.006
- McGuire, S. (2012). Institute of Medicine. 2012. Front-of-Package Nutrition Rating Systems and Symbols: Promoting Healthier Choices. Washington, DC: *The National Academies Press. Advances In Nutrition (Bethesda, Md.)*, 3(3), 332-333. doi:10.3945/an.112.001933
- Miller, L. S., Cassady, D. L., Beckett, L. A., Applegate, E. A., Wilson, M. D., Gibson, T. N., & Ellwood, K. (2015). Misunderstanding of Front-Of-Package Nutrition Information on US Food Products. *Plos ONE*, 10(4), 1-11. doi:10.1371/journal.pone.0125306
- Nielsen. (2012). Reports: Healthy eating trends around the world. Retrieved from <http://www.nielsen.com/us/en/insights/reports/2012/healthy-eating-trends-around-the-world.html>
- Newman, C. L., Howlett, E., & Burton, S. (2014). Shopper response to front-of-package nutrition labeling programs: Potential consumer and retail store benefits. *Journal of Retailing*, 90, 13-26. doi:10.1016/j.jretai.2013.11.001

- Nutrition Labeling and Education Act of 1990, H.R. 3562, 101th Cong. (1990).
- Ollberding, N. J., Wolf, R. L., & Contento, I. (2011). Food label use and its relation to dietary intake among US adults. *Journal of the American Dietetic Association*, 111(5), S47-S51.
- Qualtrics. (2014). ESOMAR 28: 28 questions to help research buyers of online samples. Retrieved from [https://drive.google.com/file/d/0B4yta3apdw\\_mdk9ySlZLbzUyams/view?usp=sharing](https://drive.google.com/file/d/0B4yta3apdw_mdk9ySlZLbzUyams/view?usp=sharing)
- Pham, N., Mandel, N., & Morales, A. C. (2016). Messages from the Food Police: How Food-Related Warnings Backfire among Dieters. *Journal of the Association for Consumer Research*.
- Roberto, C. A., Bragg, M. A., Livingston, K. A., Harris, J. L., Thompson, J. M., Seamans, M. J., & Brownell, K. D. (2012). Choosing front-of-package food labelling nutritional criteria: how smart were 'Smart Choices'?. *Public Health Nutrition*, 15(02), 262-267.
- Roberto, C. A., Bragg, M. A., Schwartz, M. B., Seamans, M. J., Musicus, A., Novak, N., & Brownell, K. D. (2012). Facts up front versus traffic light food labels a randomized controlled trial. *American Journal Of Preventive Medicine*, 43(2), 134-141.
- Roseman, M. G., Mathe-Soulek, K., & Higgins, J. A. (2013). Relationships among grocery nutrition label users and consumers' attitudes and behavior toward restaurant menu labeling. *Appetite*, 71, 274-278.
- Schermel, A., Emrich, T. E., Arcand, J., Wong, C. L., & L'abbé, M. R. (2013). Nutrition marketing on processed food packages in canada: 2010 food label information program. *Applied Physiology, Nutrition & Metabolism*, 38(6), 666-672. Retrieved from <http://0-search.ebscohost.com.umiss.lib.olemiss.edu/login.aspx?direct=true&AuthType=ip,url,id&db=s3h&AN=87915672&site=eds-live&scope=site>
- Schuldt, J. P. (2013). Does green mean healthy? Nutrition label color affects perceptions of healthfulness. *Health communication*, 28(8), 814-821.
- Siegrist, M., Leins-Hess, R., & Keller, C. (2015). Which front-of-pack nutrition label is the most efficient one? The results of an eye-tracker study. *Food Quality And Preference*, 39183-190. doi:10.1016/j.foodqual.2014.07.010

- Sonnenberg, L., Gelsomin, E., Levy, D. E., Riis, J., Barraclough, S., & Thorndike, A. N. (2013). A traffic light food labeling intervention increases consumer awareness of health and healthy choices at the point-of-purchase. *Preventive medicine*, 57(4), 253-257.
- Sun, P. C., Huang, H. L., & Chu, F. Y. (2015). Factors instead of demographic characteristics related to nutrition label use. *British Food Journal*, 117(12), 3024-3038.
- Thorndike, A. N., Riis, J., Sonnenberg, L. M., & Levy, D. E. (2014). Research article: Traffic-light labels and choice architecture. promoting healthy food choices. *American Journal of Preventive Medicine*, 46, 143-149. doi:10.1016/j.amepre.2013.10.002
- U.S. Census Bureau. (2011). Age and sex composition: 2010.  
<http://www.census.gov/prod/cen2010/briefs/c2010br-03.pdf>
- U.S. Census Bureau. (2015). Income and poverty in the United States: 2014.  
<http://www.census.gov/content/dam/Census/library/publications/2015/demo/p60-252.pdf>
- U.S. Census Bureau. (2010). Households and families: 2010.  
<https://www.census.gov/prod/cen2010/briefs/c2010br-14.pdf>
- U.S. Department of Health and Human Services, Food and Drug Administration. (2008). Health and diet survey: Topline frequency report. Retrieved from  
<http://www.fda.gov/Food/FoodScienceResearch/ConsumerBehaviorResearch/ucm193895.htm>
- U.S. Department of Health & Human Services, Food & Drug Administration: Federal Register (2010), Front-of-Pack and shelf tag nutrition symbols; Establishment of docket: Request for comments and information, 75 (82) , 22602–22606.
- U.S. Department of Health and Human Services, Food and Drug Administration. (2011). Letter of enforcement discretion to GMA/FMI re "Facts Up Front". Retrieved from  
<http://www.fda.gov/Food/IngredientsPackagingLabeling/LabelingNutrition/ucm302720.htm>

- U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation (2011). Policy research for front of package nutrition labeling: Environmental scan and literature review. Retrieved from <http://aspe.hhs.gov/basic-report/policy-research-front-package-nutrition-labeling>
- U.S. Department of Health and Human Services, Food and Drug Administration. (2015). How to understand and use the nutrition facts label. Retrieved from [http://www.fda.gov/oc/ohrt/ingredientspackaginglabeling/labelingnutrition/ucm274593.htm#percent\\_daily\\_value](http://www.fda.gov/oc/ohrt/ingredientspackaginglabeling/labelingnutrition/ucm274593.htm#percent_daily_value)
- van der Merwe, D., Bosman, M., & Ellis, S. (2014). Consumers' opinions and use of food labels: Results from an urban-rural hybrid area in South Africa. *Food Research International*, 63(Part A), 100-107. doi:10.1016/j.foodres.2014.03.032
- van Herpen, E., Seiss, E., & van Trijp, H. C. (2012). The role of familiarity in front-of-pack label evaluation and use: A comparison between the United Kingdom and The Netherlands. *Food Quality & Preference*, 26(1), 22-34. doi:10.1016/j.foodqual.2012.03.003
- van Herpen, E., & Trijp, H. v. (2011). Research report: Front-of-pack nutrition labels. Their effect on attention and choices when consumers have varying goals and time constraints. *Appetite*, 57, 148-160. doi:10.1016/j.appet.2011.04.011
- Vasiljevic, M., Pechey, R., & Marteau, T. M. (2015). Making food labels social: The impact of colour of nutritional labels and injunctive norms on perceptions and choice of snack foods. *Appetite*, 91, 56-63.
- Watson. (2013). Facts up front labels now on 90% of foods in some categories, says GMA as it launches new educational website. *Food Navigator-USA*. Retrieved from <http://www.foodnavigator-usa.com/Markets/Facts-up-Front-labels-now-on-90-of-foods-in-some-categories-says-GMA-as-it-launches-new-educational-website>
- Zhang, Y., Kantor, M. A., & Juan, W. (2016). Usage and Understanding of Serving Size Information on Food Labels in the United States. *American Journal of Health Promotion*, 30(3), 181-187.

## **LIST OF APPENDICES**



## **APPENDIX A: FOP SURVEY OUTLINE**

1. Assessment of Healthiness

“Imagine you are in a supermarket and looking at products on the shelf.

In this test you will see two products at a time, and answer questions about them.”

*(Show healthier and unhealthier variant together on one screen: left and right random)*

[Collage #1]

a. Which product is the healthier option? [Product A (1); Product B (2)]

b. [Collage #2]

Which product is the healthier option? [Product A (1); Product B (2)]

c. [Collage #3]

Which product is the healthier option? [Product A (1); Product B (2)]

*Attitude:*

2. Which one of the following four statements do you think best describes your own personal attitude towards healthy eating?

1. “I eat a healthy diet because it helps keep me fit and well”

2. “I consider the taste or other food qualities before health”

3. “I am neutral about eating a healthy diet”

4. “I try to eat a healthy diet, but I find it hard to stick to”

5. “I eat what I like and do not worry about how healthy it is”

3. How would you best describe your overall diet [Poor (1) to Excellent (5)]

*Self-Reported Knowledge:*

4. How would you answer this statement: I am knowledgeable about health and nutrition issues [Strongly Disagree (1) to Strongly Agree (5)]

*Behavior:*

5. How often do you read labels on food packages [Never (1) to Always (5)]

6. How often do you select food for healthful reasons [Never (1) to Always (5)]

7. When you eat at restaurants, do you use the nutrition information (e.g. calories) on the menu board to make a decision? [Never (1) to Always (5)]

8. While grocery shopping, do you feel as though you have enough time to grocery shop? [Never (1) to All of the Time (5)]

9. While grocery shopping, do you pay attention to food prices? [Never (1), to Always (5)]

[Show each food product picture]

*Perceived Healthiness {10-22}*

10. How healthy is this product for you? [Not healthy at all (1), Somewhat unhealthy (2), Neutral (3), Somewhat healthy (4) Very healthy (5)]

[Show Assigned Label – *omit no label control*]

*Liking*

11. How much do you like the label on this product [Dislike Extremely (1) to Like Extremely (5)]

*Familiarity*

12. Have you seen this type of label on food products in the grocery store? [Never (1) to Always (5)]

*Comprehension*

13. How difficult or easy is it for you to understand this label? [Very Difficult (1) to Very Easy (5)]

*Purchase Intentions*

14. How would this nutrition label influence your decision to buy the product [Not at all (1) to Completely (5)]

*Perceived Credibility*

15. How credible is this nutrition label for you? [Not at all Credible (1) to Extremely Credible (5)]

*Demographics*

16. Age: What is your age?

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65-69

17. Gender: What is your gender?

- Male
- Female

18. Ethnicity: Please specify your ethnicity.

- White
- Hispanic or Latino
- Black or African American
- Native American or American Indian
- Asian / Pacific Islander
- Other: \_\_\_\_\_

19. Education level: What is the highest degree or level of school you have completed? If currently enrolled, highest degree received.

- Some high school
- High school graduate, diploma or the equivalent (for example: GED)
- Some college credit, no degree
- Associate degree
- Bachelor's degree
- Master's degree
- Postgraduate/professional

20. Income Level: Please specify what your income level

- Under \$25,000
- \$25,001 - \$49,000
- \$50,000 - \$74,999
- \$75,000 - \$99,999
- \$100,000 and over

21. Marital Status: Please specify your marital status

- Single, never married
- Married or domestic partnership
- Widowed
- Divorced

22. Household Composition: Including yourself, how many persons are in your household?

- One
- Two
- Three
- Four
- Five or more

23. Weight: Please report your current weight in pounds.

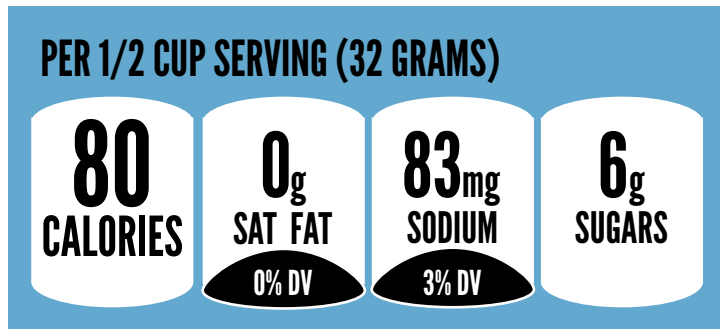
- [fill in the blank]

24. Height: Please report your current weight in feet and inches (ex: 5'3")

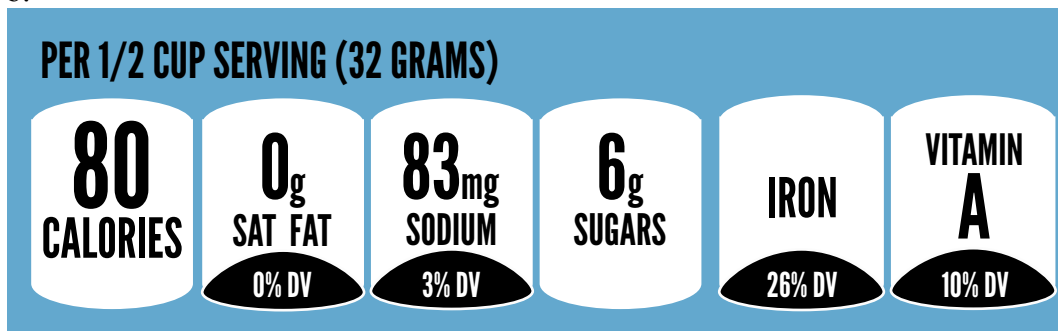
- [fill in the blank]

## **APPENDIX B: FOP LABELS**

a.



b.



c.



Fig. 1. Front-of-Package labeling formats used: (a) Facts Up Front; (b) Facts Up Front extended; (c) Healthy Check

APPENDIX C: PRODUCT PICTURES

a.



b.



c.



d.



e.



f.



Fig. 2. Cereal products used: (a) All Bran Facts Up Front; (b) All Bran Facts Up Front extended; (c) All Bran Healthy Check; (d) Krave Facts Up Front; (e) Krave Facts Up Front extended; (f) Krave No-Check

a.



b.



c.



d.



e.



f.



Fig. 3. Dairy products used: (a) Kraft Slice Facts Up Front; (b) Kraft Slice Facts Up Front extended; (c) Kraft Slice Healthy Check; (d) Kraft Cheddar Facts Up Front; (e) Kraft Cheddar Facts Up Front extended; (f) Kraft Cheddar No-Check



a.



b.



c.



d.



e.



f.



Fig. 4. Snack products used: (a) Nilla Wafers Facts Up Front; (b) Nilla Wafers Facts Up Front extended; (c) Nilla Wafers Healthy Check; (d) Mallomars Facts Up Front; (e) Mallomars Facts Up Front extended; (f) Mallomars No-Check

## VITA

EMILY LAUREN IRVIN

---

502 Cumberland Place Oxford, MS 38655 eirvin@go.olemiss.edu

### EDUCATION

M.S., Food and Nutrition Services, University of Mississippi, May 2009

Thesis: A STUDY OF THE EFFECTIVENESS OF FRONT-OF-PACKAGE  
NUTRITION LABELS IN THE US

B.S., Dietetics and Nutrition, University of Mississippi, May 2014

### HONORS and FELLOWSHIPS

Nutrition and Hospitality Management Graduate Achievement Award, 2016

Phi Kappa Phi Honor Society, 2016

Alpha Lambda Delta Honor Society, 2015

Graduate Assistantship, National Food Service Management Institute, 2014

Kappa Omicron Nu National Honors Society, 2014