Impact of Menu Designs and Personal Dietary Behaviors on Young Millennials' Restaurant Menu Choices

Yuan Tian
University of Nevada, Las Vegas, tian@unlv.nevada.edu

Follow this and additional works at: http://digitalscholarship.unlv.edu/thesesdissertations

Part of the Business Administration, Management, and Operations Commons, Marketing Commons, and the Nutrition Commons

Repository Citation
http://digitalscholarship.unlv.edu/thesesdissertations/2437

This Thesis is brought to you for free and open access by Digital Scholarship@UNLV. It has been accepted for inclusion in UNLV Theses, Dissertations, Professional Papers, and Capstones by an authorized administrator of Digital Scholarship@UNLV. For more information, please contact digitalscholarship@unlv.edu.
IMPACT OF MENU DESIGNS AND PERSONAL DIETARY BEHAVIORS ON
YOUNG MILLENNIALS’ RESTAURANT MENU CHOICES

By

Yuan Tian

Bachelor of Science in Business Administration
Ohio State University
2012

A thesis submitted in partial fulfillment of the requirements for the

Master of Science - Hotel Administration

William F. Harrah College of Hotel Administration
The Graduate College

University of Nevada, Las Vegas
May 2015
We recommend the thesis prepared under our supervision by

Yuan Tian

entitled

“Impact of Menu Designs and Personal Dietary Behaviors on Young Millennials’ Restaurant Menu Choices

is approved in partial fulfillment of the requirements for the degree of

Master of Science - Hotel Administration

William F. Harrah College of Hotel Administration

Christine Bergman, Ph.D., Committee Chair
Jean Hertzman, Ph.D., Committee Member
Carola Raab, Ph.D., Committee Member
Karl Kingsley, Ph.D., Graduate College Representative
Kathryn Hausbeck Korgan, Ph.D., Interim Dean of the Graduate College

May 2015
Abstract

The global prevalence of obesity has more than doubled since 1980. In response to this health crisis, the U.S. Food and Drug Administration finalized the Menu Calorie Labeling Rule in 2014. It requires that food service chains post Calorie information next to all food items on menus. Young Millennials aged 18-24 reportedly have poor dietary habits, which contributes to obesity rates. This on-line study surveyed 505 young Millennials to evaluate the relationship between young Millennials’ Calorie choices on restaurant menus and various factors, including menu design, personal dietary behaviors, and demographic characteristics. The survey data was analyzed using logistic regression. Specifically, the relationship between a binary dependent variable, the participants’ Calorie choices, and the independent variables, including menu design, the stage of change (from the Transtheoretical Model), gender, race, educational level and weight status was evaluated. The results indicated that the light and fresh menu designs, the personal dietary behavior defined by stage of change, gender and weight status were all associated with the participants’ Calorie choices on menus in this study. Participants who randomly received the menu with green symbols (signifying a lower-than-600-Calorie item), participants who have started to control their daily Calorie consumption, participants who were of normal weight status, and participants who were female were significantly more likely to choose menu items lower-than-600 Calories. These results suggest that including Calories on restaurant menus will only influence the food choices of certain demographics and that menu designs may increase the percentage of people that make lower Calorie menu item choices.
Acknowledgments

I would never been able to finish my thesis without the guidance of my committee members, help from my friends, and support from my family.

I would like to acknowledge Dr. Christine Bergman for being an extraordinary committee chair for my thesis. She showed me the road and helped to get me started on the path to my thesis and M.S. degree. She was always available for my questions and she was positive and gave generously of her time and vast knowledge.

I am grateful for all of the guidance and assistance that were provided by my committee members, Dr. Jean Hertzman, Dr. Karl Kingsley, and Dr. Carola Raab. Without your knowledge, help, and inspiration, this achievement would have never been possible.

I wish to express my sincere thanks to my parents, Xuehua Cui and Jianke Tian, for being the best parents in the world and supporting me spiritually throughout my life.

Last but not least, I would like to show my gratitude to William F. Harrah College of Hotel Administration, all the participants in my study, and all my dearest friends.
# Table of Contents

List of Tables ........................................................................................................... viii  

CHAPTER 1  INTRODUCTION ..................................................................................... 1  
Background .................................................................................................................. 1  
Statement of the Problem ............................................................................................ 2  
Purpose of the Study .................................................................................................... 2  
Research Questions/Hypothesis .................................................................................... 3  
Theoretical Framework .................................................................................................. 4  
Definition of Terms ...................................................................................................... 5  
Research Process .......................................................................................................... 7  
Significance of the Study .............................................................................................. 8  
Summary ....................................................................................................................... 9  

CHAPTER 2  LITERATURE REVIEW ......................................................................... 10  
Introduction .................................................................................................................. 10  
Background .................................................................................................................. 10  
  Dining Out Trend and Obesity .................................................................................... 10  
  Menu Calorie Labeling Rules ..................................................................................... 11  
Potential Impact of National Menu Labeling Rules ..................................................... 13  
Menu Design Psychology ............................................................................................. 16  
  Serial Position Effect .................................................................................................. 17  
  Gaze Motion Theory .................................................................................................. 18  
  Visual Appearance of Menu ....................................................................................... 19  
  Pricing Psychology and Perception of Value ............................................................ 20  
Trans-theoretical Model ............................................................................................... 21  
  Stage of Change ......................................................................................................... 21  
  Self-efficacy ............................................................................................................... 24  
  Decisional Balance ..................................................................................................... 24  
  Staging Instrument ..................................................................................................... 25  
Existing TTM Studies on Dietary Behaviors ................................................................. 26  
Millennial Generation .................................................................................................... 26  
  Young Millennials ........................................................................................................ 28  
  U.S. Young Millennial Demographics ....................................................................... 30  
Summary ....................................................................................................................... 31  

CHAPTER 3  RESEARCH METHODS ......................................................................... 33  
Introduction .................................................................................................................. 33  
Research Questions ...................................................................................................... 33  
Population and Sample ............................................................................................... 35  
  Sampling Methods ....................................................................................................... 35  
Sample Size Determination .......................................................................................... 37
List of Tables

Table 1 Race of the U.S. Young Millennial Population ............................................. 31
Table 2 Educational Levels of the U.S. Young Millennial Population ......................... 31
Table 3 Logic Questions from Staging Instrument ..................................................... 43
Table 4 Modified Staging Algorithm Scoring ............................................................. 44
Table 5 Descriptive Statistics of Sampling Methods .................................................... 54
Table 6 Demographics of the Sample .......................................................................... 56
Table 7 Races between the Population and the Sample ............................................... 57
Table 8 Education Levels between the Population and the Sample ............................... 57
Table 9 Overall Calorie Choices on Menus ................................................................. 60
Table 10 Amount of Responses on Twelve Menus ....................................................... 63
Table 11 Calorie Choices on Twelve Menus ................................................................. 64
Table 12 Relationships between Menu Types and Calorie Choices ............................... 66
Table 13 Calorie Choices on Four Menu Designs ......................................................... 68
Table 14 Relationships between Menu Designs and Calorie Choices ........................... 69
Table 15 Distribution of Participants in Five Stages of Change .................................... 70
Table 16 Calorie Choices among People in Five Stages of Change .............................. 71
Table 17 Relationship between Stage of Change and Calorie Choices ........................ 72
Table 18 Calorie Choices among People in Different Genders ...................................... 74
Table 19 Relationship between Gender and Calorie Choices ....................................... 75
Table 20 Calorie Choices among People in Different Educational Levels ................... 75
Table 21 Relationship between Educational Level and Calorie Choices ...................... 77
Table 22 Calorie Choices among People in Different Races ......................................... 78
Table 23 Relationship between Race and Calorie Choices .......................................... 79
Table 24 Calorie Choices among People in Different Weight Status ............................ 80
Table 25 Relationship between Weight Status and Calorie Choices ............................ 81
Table 26 Collinearity Diagnostics ............................................................................... 82
Table 27 Relationship Between Calorie Choices and Various Predictors .................... 84
CHAPTER 1

INTRODUCTION

Background

The average U.S. adult spends approximately 42% of their meal budget outside of the home, consumes an additional 143 calories and gains two pounds each year by dining out once a week (Morrison, Mancino, & Variyam, 2011; Todd, Mancino, & Lin, 2010). Although dining at foodservice operations offers consumers convenience and pleasant experiences, it is also a causal variable associated with the US obesity epidemic. It is estimated that each year American families, businesses, and governments spend approximately $147 billion on obesity related chronic disease such as diabetes and heart disease (U.S. Department of Health and Human Services, 2011).

In response to this health crisis, the U.S. Food and Drug Administration (FDA) finalized the Menu Calorie Labeling Rule on November 25th, 2014 requiring all food service establishments that have 20 or more locations in the U.S. to post Calorie information next to all available food items on menus and menu boards (FDA, 2014).

With the finalization of the national Menu Calorie Labeling Rule, chain restaurant managers surely cannot neglect the potential influence of menu labeling to the chain restaurants in the near future anymore.

The restaurant menu has been considered a key marketing tool that influences consumers’ purchasing behaviors by promoting certain items. Menu designers and restaurant managers have operated on the precondition that the menu design affects restaurant sales directly (Merritt, Pinckney, & Reynold, 2005), and this appears to be theoretically supported in some instances. Seaberg firstly introduced menu design
psychology in 1971 and there are various methods and theories that help restaurateurs achieve efficient promotion of certain menu items. Some recommendations for the promotion of certain menu items through menu design include: provide symbols or highlights on the items (Zwicky & Zwicky, 1980), place the items at the top and/or the bottom of the list (Bar-Hillel & Dayan, 2011), and place the items in sweet spots where customers’ eyesight reach most frequently (Gallup Organization, 1987).

**Statement of the Problem**

Existing studies mostly emphasize people’s reactions and purchasing behaviors related to Calorie labels on menus. For instance, a recent review concludes that the inclusion of contextual or interpretive nutrition information along with Calorie information on menus may help consumers select fewer Calories when eating in foodservice establishments (Downs, Lowenstein, Wansink, & Wisdom, 2013; Milich, Anderson, & Mills, 1976). However, there is no consensus on the impact of Calorie labels; Bishop, Brown, Heins and Mayer (1987) found that Calorie information had no effect on Calorie intake when dining in a restaurant. The common characteristics of existing studies on menu labeling or food packaging are the randomness in subjects’ selections, regardless of subjects’ lifestyle and healthy behaviors; only a few studies indicated that personal dietary behaviors and demographics are key factors of caloric intake (Ellison, Lusk, & Davis, 2014).

**Purpose of the Study**

The purpose of this study is to evaluate the relationship between young Millennials’ Calorie choices on restaurant menus and various factors, including the menu designs, personal dietary behaviors, and demographic characteristics.
Research Questions/Hypothesis

RQ1: Are young Millennials’ menu choices on low-Calories items correlated with different menu designs applying menu psychology?

H1A0: Young Millennials’ menu choices on low-Calorie items are not correlated with the menu design applying the serial position effect.

H1A1: Young Millennials’ menu choices on low-Calorie items are correlated with the menu design applying the serial position effect.

H1B0: Young Millennials’ menu choices on low-Calorie items are not correlated with the menu design applying the gaze motion theory.

H1B1: Young Millennials’ menu choices on low-Calorie items are correlated with the menu design applying the gaze motion theory.

H1C0: Young Millennials’ menu choices on low-Calorie items are not correlated with the menu design applying the salience building method.

H1C1: Young Millennials’ menu choices on low-Calorie items are correlated with the menu design applying the salience building method.

RQ2: Are young Millennials’ menu choices on low-Calorie items correlated with personal dietary behavior and behavior change?

H20: Young Millennials’ menu choices on low-Calorie items are not correlated with personal dietary behavior and behavior change.

H21: Young Millennials’ menu choices on low-Calorie items are correlated with personal dietary behavior and behavior change.

RQ3: Are young Millennials’ menu choices on low-Calorie items correlated with the demographic characteristics?
H3A₀: Young Millennials’ menu choices on low-Calorie items are not correlated with the gender.

H3A₁: Young Millennials’ menu choices on low-Calorie items are correlated with the gender.

H3B₀: Young Millennials’ menu choices on low-Calorie items are not correlated with the educational level.

H3B₁: Young Millennials’ menu choices on low-Calorie items are correlated with the educational level.

H3C₀: Young Millennials’ menu choices on low-Calorie items are not correlated with the race.

H3C₁: Young Millennials’ menu choices on low-Calorie items are correlated with the race.

H3D₀: Young Millennials’ menu choices on low-Calorie items are not correlated with the Body Mass Index (BMI).

H3D₁: Young Millennials’ menu choices on low-Calorie items are correlated with the Body Mass Index (BMI).

**Theoretical Framework**

Two main theoretical frameworks were applied in this study, which were the menu design psychology and the Trans-theoretical Model (TTM). Albin Seaberg who introduced menu design psychology to the industry in 1971, pointed out that a well-designed menu could achieve promotion of specific items by directing customers’ attention thus raising the odds of choosing them. Three theories under menu design psychology were applied in this study, including the serial position effect, the gaze
motion theory, and salience builder effect. The serial position effect stated that people tend to remember the first and the last of the list the most (Bar-Hillel & Dayan, 2011; Gallup Organization, 1987). The gaze motion theory addresses that people scan menus in a zigzag way, and the most frequently viewed area is the upper right corner of the menu, which is also called “sweet spot”. Salience builders can be used for distraction from default preferences, such as contrasting font, font color, font size, pictures, icons, as well as signposts such as traffic green lights on low Calorie items, etc. (Zwicky & Zwicky, 1980).

Prochaska firstly introduced the TTM in 1977. The TTM estimates an individual’s readiness to conduct a new healthier behavior (Prochaska & Velicer, 1997). The core construct of the TTM, the stage of change, is applied mainly for the assessment of an individual’s readiness to perform a new healthier behavior. The stage of change allocates people into different stages based on their personal health behaviors and behavior changes (Prochaska & Velicer, 1997). Curry, Kristal, and Bowen’s staging instrument based on the stage of change in the TTM was applied for the estimation of participants’ dietary behaviors and behavior changes by asking five logic questions (See Appendix B). This instrument is considered as the prototype of dietary staging instrument and therefore guarantees the reliability and validity of the instrument (Lamb & Joshi, 2004).

Definition of Terms

Body Mass Index – Also called as Quetelet Index, the Body Mass Index (BMI) is a measure of relative weight based on an individual’s mass and height (U.S. Centers for Disease Control and Prevention [CDC], n.d.). The BMI can be calculated using the
equation \[ BMI = \frac{\text{mass (kg)}}{(\text{height (m)})^2} = \frac{\text{mass (lb)}}{(\text{height (in)})^2} \times 703. \] Based on the rule by the CDC (n.d.), an individual is considered underweight if the BMI is below 18.5, is considered overweight if the BMI is between 25 and 29.9, and is considered obese if the BMI is equal to or higher than 30.

*Kilocalorie and Calorie* – Kilocalorie is defined as “the amount of energy required to raise the temperature of one kilogram of water one degree centigrade at sea level”. The kilocalorie is a more scientific term that refers to 1000 true of calories of energy. In nutritional terms, the word calorie is commonly used to refer to food energy by units and the word Calorie with capital c is applied as standard terminology (Conn & Kravitz, n.d.).

*Menu* – A piece or a set of papers provided by restaurants, on which expressions and demonstrations of available dishes are printed (Seaberg, 1971).

*Millennial Generation* – Also referred to as the Generation Y, the Millennial Generation is the demographic cohort following the Generation X. People in Millennial Generation are called “Millennials”. There are no precise lines on the start date and end date of the generation, however researchers typically refer Millennials to people whose birth years range from early 1980s to the early 2000s (Strauss & Howe, 2000).

*Overweight and obesity* – Overweight and obesity refer to “abnormal or excessive fat accumulation that may impair health” (World Health Organization [WHO], 2015).

*Point of purchase* – The place where a retail transaction is completed, which also refers to as point of sale or POS. In recent computerization, people also apply terms such as electronic point of sale or EPOS (“Point of purchase”, n.d.).
*Restaurant chain* – A restaurant chain refers to two or more eating establishments that are either under common ownership or franchising agreements that are located in many different places (Wyckoff & Sasser, 1978). Typically, restaurants under one chain are built and developed under standard format in terms of furnishing style, menu and services.

**Research Process**

The study received 505 responses from young adults who were 18-24 years old, from March 24th to April 4th. Instead of distributing paper menus in local areas, the study took place online via Qualtrics by displaying menus in survey that are adapted from real chain restaurants. The survey responses were collected in several ways, including Amazon Mechanical Turk (MTurk), Facebook Page, and convenience data from friends and the campus community.

For the flow of the survey, the participants first were requested to select a meal of their choices by selecting one entrée item and one beverage item optionally. Second, questions regarding to recent dietary habits and the self-efficacy about changing to healthier dietary habits were asked. Last the participants were requested to provide their demographic information including gender, race, educational level, current weight and height. The whole study was conducted online via Qualtrics, and the participant’s selection on menus in terms of food names and Calorie amount were collected, along with the questionnaire answers.

The entire process did not involve any factors or information that could harm the subjects and researchers. The anonymity and confidentiality of the experiment was illustrated and emphasized to participants in the unsigned consent document provided
before the survey questions. The name and personal information of the participants was not tied to the data. Because this research project involved human subject, approval from Institutional Review Board (IRB) was obtained before launching the survey (See Appendix A).

**Significance of the Study**

With the finalization of the FDA calorie labeling regulation on November 25, 2014 that all chain restaurants with 20 or more locations must provide standard Calorie information on their menus in the next few years, this study provides a supportive reference for chain restaurant managers to estimate whether or not the implementation of national Menu Calorie Labeling Rule will influence their customers’ menu choices and the overall sales, especially for the restaurants that the majority of customers are young adults. This study also provides a supportive reference for chain restaurant managers who want to estimate which specific method of menu design can facilitate the promotion on certain menu items.

The obesity problem has been a severe issue over the past years. The worldwide obesity rate has almost doubled since 1980 (WHO, 2015). Hence in recent years there have been many restaurants that are focusing on not only the profit and sales of the dishes, but also the nutrition and healthy facts of dishes that are provided to their customers (Wansink & Love, 2014). This study can be a supportive case to the restaurateurs who are looking for a strategy that help them promote the dishes that are in high contribution margin and in low Calories at the same time.
Summary

Chapter 2 discusses the review of existing literatures that mainly focus on the Menu Labeling Rule by FDA, background of young Millennial generation, the menu design psychology, and the stage of change in the TTM. Chapter 3 discusses the research questions/hypotheses, the population and the sample of the study, the proposed research design including menu design, survey flow and the staging instrument, the data analysis methods, the role of the researcher, and the information consent and ethical considerations. Chapter 4 discusses the results of the study, including the date collection process, the treatment of data, and the data results. Chapter 5 discusses findings and conclusions of the study, limitations of the study that were observed through the study, as well as the implications of the study with a discussion on how this study would contribute to academic area and restaurant industry.
CHAPTER 2
LITERATURE REVIEW

Introduction

The purpose of this study is to evaluate the relationship between young Millennials’ Calorie choices on restaurant menus and various factors, including the menu designs, personal dietary behaviors, and demographic characteristics. The review of the literature for this study is extensive and covers multiple disciplines. The following databases were applied: Academic Research Premier, Google Scholar, Hospitality & Tourism Complete, Las Vegas Review-Journal, and Sage Journals Online. This chapter consists of following subsections: the obesity issue and dining out trend, the menu labeling rules that were released locally or nationally, the menu design psychology, the stage of change in the TTM, and background of young Millennial generation.

Background

Dining Out Trend and Obesity

In recent decades dining out is no longer reserved for special occasions; Americans now are consuming a large portion of their meals from foods prepared outside the home on a weekly, or even daily basis. It is estimated that approximately 42 % of household’s meal expenditures were spent on food away from home in 2009, and 12 % of surveyed adults are reported dining away from home more than seven times per week (Morrison, Mancino, & Variyam, 2011).

People enjoy dining in restaurants for various reasons and occasions such as convenience and time saving; however, in recent years there is an increasing concern that such eating patterns will have unfavorable effects on an individual’s diet and overall
health. People tend to choose lower nutritional quality of food with higher Calorie when dining out than when preparing and eating at home (Morrison et al., 2011; Todd, Mancino, & Lin, 2010). The decrease in nutrition may be attributed to the fact that dishes in restaurants tend to have larger portion sizes, be lower in fiber, and be higher in Calories, saturated fat, cholesterol, and sodium (Diliberti, Bordi, Conklin, Roe, & Rolls, 2004; Guthrie, Lin, & Frazao, 2002; Young & Nestle, 2002). In 2009, the average American obtained an additional 134 calories from each dining out meal and gained two pounds per year by dining outside the home once a week (Morrison et al., 2011).

Worldwide obesity has almost doubled since 1980 (WHO, 2015). It is estimated that among American families, businesses and governments the annual medical costs relating to the obesity epidemic increased to approximately 10% of overall medical spending, which accounted for almost $147 billion in 2008 (Finkelstein, Trogdon, Cohen, & Dietz, 2009). Obesity and overweight increase the risk of chronic conditions such as heart disease and diabetes, which contribute to 5% - 15% of annual deaths and over 2.8 million deaths each year (WHO, 2015).

**Menu Calorie Labeling Rules**

One of the causes for making less nutritious choices when dining in restaurants than when preparing at home may be lack of information (Morrison et al., 2011). Unlike the packaged food items that provide detailed nutrient information on packaging due to the enactment of Nutrition Labeling and Education Act of 1990, the nutrient content of food provided in restaurants is difficult for customers to compare since restaurants fail to disclose standard nutrition content at the point of purchase (Fielding, Jarosz, Kuo, & Simon, 2009). In recent years, the increasing obesity and overweight rate in the U.S. has
been brought to the attention of policymakers, and restaurant chains have become natural targets for policy interventions to fight obesity (Downs, Lowenstein, Wansink, & Wisdom, 2013).

Since 2007, several states and cities have proposed or passed regional legislations that require the presentation of nutrient information on menus and menu boards of chain restaurants (Pomeranz & Brownell, 2008). For instance, New York City (Amended Health Code §81.50 2007), King County, WA (House Bill 3160 2008), Philadelphia, PA (City Council Bill 080167 2008), and Westchester County, NY (Chapter 708 2008) have all implemented mandatory Calorie labeling regulations (Center for Science in the Public Interest [SCPI], 2010). Albany County, NY (Local Law No. “B” for 2009), California State (SB120 2008), Davidson County, TN (HB 0950 2009), Maine State (LD 1259 2009), Massachusetts State (105 CMR 590.000 2009), Montgomery County, MD (Bill no. 19-07 2007), Multnomah County, OR (Order No. 08-114 2008), New Jersey State (22-15 2010), San Francisco, CA (Ordinance No. 40---08 2009), and Oregon State (HB 2726 2009) have passed nutrition labeling regulations in to local law (CSPI, 2010).

For the nationwide popularization of nutrient display in restaurants, the Patient Protection and Affordable Care Act of 2010 (2010 Act) enacted section 4205 on March 23, 2010 (FDA, 2010). The 2010 Act authorized the FDA to establish requirements for menu labeling of menu items in chain restaurants, similar retail food establishments, and chain vending machine operators (FDA, 2010). It has been four years since the FDA proposed nutrition labeling regulation and eventually this nationwide regulation on chain restaurant menu and menu boards was finalized and released on November 25, 2014 (FDA, 2014). For chain restaurants and similar retail food establishments that possess 20
or more locations, the basic requirements include: (1) detailed Calorie information of all food items sold on all menus, menu boards, food tags, and drive-through, (2) availability of additional information on nutrient content for all menu items upon request, and (3) a statement of recommended daily Calorie consumption for the average individuals, which is approximately 2,000 Calories per day (FDA, 2014).

**Potential Impact of National Menu Labeling Rules**

Several states and cities have proposed or passed regional legislations that require the presentation of nutrient information on menus and menu boards of chain restaurants (Pomeranz & Brownell, 2008). In recent years there has been an increase of studies on the evaluation of potential impact on national menu labeling rules.

Existing studies on impact of Calorie solely were mainly conducted in real chain restaurant that had already been providing Calorie information on the menus or menu boards. Numerous researchers conducted their experiments in the fast food stores, by observing the real customers’ food choices on menu or menu board that with and without Calorie information, or distributing a survey about Calorie information on menus. For instance, a survey conducted at 45 fast food restaurants in New York City indicated that 72% of participants noticed the Calorie information being posted on the menu or menu board, whereas only 27% of them took the Calorie information into considerations when making their decisions (Dumanovsky, Huang, Bassett, & Silver, 2010). Additionally, other studies on fast food restaurants also concluded that the customers did notice the Calorie information on menus but this information there was not significant changing in people’s purchase behaviors in terms of the food choices and sales (Breck, Cantor, Martinez, & Elbel, 2014; Finkelstein, Strombotne, Chan, & Krieger, 2010). However,
distinct results were produced from the study on customers’ purchasing behaviors in full service casual restaurants and fine-dining restaurants. The findings of the studies on full service restaurants reflected an obvious reduction in sales of the items with high Calories (Auchincloss et al., 2013; Maryam, 2013; Pulos & Leng, 2010).

Different findings were reviewed from the studies targeting different groups of populations. Two population groups were mainly targeted in existing studies, which are children/parents and high school students/teenagers. Several studies found that the parents in average did not choose lower Calories food for their children when they were provided with Calorie information (Dodds et al., 2014; Holmes, Serrano, Machin, & Davis, 2013; Graves, Thompson, & Hilton, 2012). Similar but even more distinct results were reviewed from teenagers’ reaction to exposure of Calorie information. Teenagers conducted very unhealthy dietary behaviors especially when they were at school; they tended to snack throughout the day and used the vending machine frequently, without noticing the Calorie information on the vending machine (Pasch et al., 2011). To give an overview of teenager’s poor eating behavior, a national survey about dietary behaviors among high school students indicated that during the seven days before the survey, six percent of them had not consumed vegetables, five percent of them had not eaten fruit, thirteen percent of them had not eaten breakfast, and eleven percent of them had consumed at least three cans of soda per day (CDC, 2011).

In addition, among the literature that proved the positive effect, the magnitude of such effect tends to be small and inconspicuous. For instance, Yamamoto, Yamamoto, Yamamoto and Yamamoto (2005) concluded that 29% of consumers changed their
selections when the menus with Calorie information were provided, whereas in Balfour, Moody, Wise and Brown’s experiment (1996) 16% of customers changed their selections.

Therefore, there is no overall consensus on the impact of menu labeling on food selections among existing scholarly studies. However, it can be estimated from the existing studies that customers’ reactive behaviors to menu labeling are influenced by numerous factors such as type of restaurant and demographic characteristics.

The impact of different types of nutrition labels other than Calorie labels were examined in previous studies as well. Numerous studies indicated that additional nutrition information such as detailed descriptions, statement of recommended daily Calorie consumption, and traffic lights being provided at the point of purchase has positive effect on selections of healthy foods; here traffic lights refer to symbols on menu items, such as red pepper symbols for spicy dishes and leaf symbols for vegan dishes (Almanza, Mason, Widdows, & Girard, 1993; Chu, Frongillo, Jones, & Kaye, 2009; Cranage, Conklin, & Lambert, 2004; Pulos & Leng, 2010). However, since most restaurant menus have limited space to provide a great deal of information and too much information may lead to complications and confusion for the guests, more efforts should be made by restaurateurs to offer a clear menu with an appropriate and effective amount of nutrition information, which helps customers make healthier food selections. More review of literatures on menu designs is discussed in the “menu design psychology” section.

For the menu labeling impact on restaurateurs, it is not surprising to see that profit margin still is the primary determinant for whether or not to provide healthier food alternatives on menus, which is supported by 61% of respondents (Glanz et al., 2007).
Health and nutrition were selected by 21% of respondents as secondary in terms of importance (Glanz et al., 2007).

**Menu Design Psychology**

A menu is a piece or a set of papers on which expressions and demonstrations are printed, and it should be colorful, appealing, neat, and reflective that represents the quality, culture, and style of the restaurant (Seaberg, 1971). A menu serves as the first impression and the spokesperson of the restaurant, which is similar in character to a professional speech (Bowen & Morris, 1995). Customers in full-service restaurants on average spend merely 109 seconds studying the menu; with default choices in mind, they in fact do not read all the menu items before the decisions being made (Hanks, Just, Smith, & Wansink, 2012; Kolodinsky, Reynolds, Cannella, Timmons, & Bromberg, 2009). Hence there is a time limit that restaurateurs have to deliver their messages effectively and make sure the menu items that they want to promote are designed in the place where customers can see and consider them easily (Gallup Organization, 1987; Pavesic, 2005). In most cases the promoted items should be the popular ones with high profit margin. In this study the promoted items are defined as the ones with lower Calorie amount.

Albin Seaberg introduced the concept of menu design psychology, which is also called menu psychology, to the industry in his book “Menu Design” published in 1971. Seaberg (1971) pointed out that a well-designed menu could achieve promotion of specific items by directing customers’ attention thus raising the odds of choosing them. It happens too often that the printers or graphics specialist take charge of the menu design without any input from the restaurateurs (Pavesic, 2005). Knowledge of “menu
“psychology” would greatly improve the menu design at this point. The restaurant menu has long been utilized as a marketing strategic tool to influence customers’ choices directly and affect sales effectively (Merritt, Pinckney, & Reynold, 2005). In recent years restaurateurs and researchers have made efforts to achieve maximum utilization of menu psychology; according to restaurant consultants interviewed by Restaurant USA, a menu redesign can facilitate up to 10% of increase in sales (Panitz, 2000). Menu design psychology contains various theories and methods that can influence customers’ choices directly and affect sales effectively, in this study the following four menu design psychologies were further explained and applied.

Serial Position Effect

The serial position effect (aka. the rules of recency and primacy) addresses that the items at the beginning and the end of the list are more popular ones for customers to memorize easily and order frequently (Bar-Hillel & Dayan, 2011; Gallup Organization, 1987). In psychological terms, the primacy effect can be described as people best remember the items at the beginning of the list; the recency effect states people tend to remember the items that come at the end of the list. The serial position effect has been applied in various areas with positive outcomes. For instance, hotels and resorts emphasize the importance of first impression with comfortable lobby and smooth greetings at front desk (Garnefeld & Steinhoff, 2013); on the other hand, theme parks often place a series of popular attractions next to exit to offer memorable impression to guests before they leave (Johnston, 1995).
**Gaze Motion Theory**

The pattern of gaze movement describes the moving directions of eyes when customers read the menus and how such movement affects the ultimate choices. It has been addressed in several studies that people scan menus in a zigzag way, starting with the center of the menu and in the sequence of upper right corner, upper left corner, bottom left corner, upper right corner, bottom right corner, then back to first eye focus (Miller & Pavesic, 1996; Panitz, 2000).

The William Doerflier model, which was introduced by Livingston (1978), discovered the “sweet spots” or “power positions” of the menu where customers tend to focus their initial attention and view the most. The most frequently viewed areas are the spots just above the middle of the single panel, and the upper-right hand corner in double-fold menu (Livingston, 1978; Miller & Pavesic, 1996; Panitz, 2000; von Keitz, 1988). Although several studies implied that the menu viewers studied the menus as reading a book instead of remaining on sweet spots, from top to bottom and left to right, many restaurateurs still place higher-profit items in the “sweet spots”, alternatively with boxes and highlights (Gallup Organization, 1987; Yang, 2012).

However, the gaze movement of viewers may vary depending on their cultural backgrounds and physical features (Choi, Lee, & Mok, 2010). For instance, according to Left Marketing Theory people who live in a keep-to-the-left culture customarily gaze at the left side rather than the right side. Furthermore, according to Gallup Organization’s test of Doerfler’s theory in 1987, the gaze movement theory is reliable only in the single-panel menu; different outcomes were produced from double and triple-panel menus. For
more ideal results, such variations will be taken into considerations in the stage of the experimental design.

**Visual Appearance of Menu**

Consumer responses are fundamentally impacted by numerous visual factors, including menu background color, text styles, menu texture, pictures, menu size, etc. (Panitz, 2000). In recent years, color and texture are fundamental features of natural pictures that play an essential role in visual perception and object identification (Pouladzadeh, Shirmohammadi, & Al-Maghrabi, 2014). For instance, Lohse (1997) reported that advertisements featuring color in the “Yellow Pages” were viewed more often and longer than those without color. Different characters of color and texture are combined together to deliver message and promote items more effectively (Jain & Healey, 1998). Salience builders can be used for distraction from customer default preferences, such as contrasting font, font color, font size, pictures, icons, as well as signposts such as traffic green lights on low Calorie items, etc. (Zwicky & Zwicky, 1980).

In terms of the menu size, customers have commented that the menus sometimes were too large for the table and were blocking their sight when talking with their dining partners (Pavesic, 2005). Over the decades, restaurants such as TGI Friday’s and Cheesecake Factory have been renowned for their multi-paged menus with a great deal of choices. Especially for first-time guests, it may take longer for them to make a decision and the table turnover rate will be lowered (Pavesic, 2005). Pavesic also reported that 18-24 menu items contributed to 60 – 70% of restaurant sales; hence it did not make a difference to provide extensive listings of menu items. A menu with smaller size and
fewer items will not only shorten the order time but also reduce the inventory and relevant costs (Pavesic, 2005).

According to Wansink and Love (2014), restaurateurs can help patrons enhance their taste expectations by providing appealing names and detailed descriptions on ingredients. Panitz (2000) argued that a menu with common and familiar descriptions would not attract sophisticated customers; certain words hold more marketing power than others. For instance, “roasted” or “cooked in wood-fire oven” appears more appealing than “fried” to customers, and the word “fried” can be replaced by “hand-battered” (Panitz, 2000). Hence, restaurateurs can direct customers to certain healthy items with high profit by using appealing descriptions.

**Pricing Psychology and Perception of Value**

Tse (2001) reported that when customers select restaurants they consider the prices the most, especially among young customers. Poundstone (2010) suggested avoiding putting the prices into one column in menu design, since customers tend to look for the less expensive items first before studying the menu items. Kershaw (2009) also advised not to use dollar signs in menu to avoid drawing additional attention to the price. In additions, Naipaul and Parsa (2001) claimed that there was correlation between price endings and customer perception of value; it was indicated that listing a price as “$14” would bring more sales than listing a price as “$14.00”, since fewer numbers unconsciously implied lower prices to people. On the other hand, Carmin and Norkus (1990) found that the items in odd-cents price such as $8.95 led customers to consider such items as discounted ones, in comparison with the items in whole price such as $9.00.
Trans-theoretical Model

It is estimated that dietary choice is in fact a very complicated behavior rather than a seemingly simple one, which is influenced by numerous interacting factors (Koster, 2009). Health behavior changes influence not only the physical activities and habits, but also the dietary choices. There are numerous models that explain and measure individual health behavior change, such as Health Belief Model (HBM), Theory of Reasoned Action/Planned Behavior (TRA), Social Cognitive Theory (SCT), Trans-theoretical Model (TTM), etc. (Redding, J Rossi, S Rossi, Velicer, & Prochaska, 2000). According to Fishbein and colleagues’ study on important variables and factors that could influence behaviors and behavior changes in reducing HIV risk, it was outlined that many constructs from each health behavior change theory are in fact fairly similar (Fishbein et al., 2001). In this study the TTM was applied to predict and explain the personal dietary behaviors and behavior changes in terms of Calorie consumption in restaurants.

Prochaska firstly introduced the TTM in 1977; the model is based on use of different theories of psychotherapy, hence it is called “trans-theoretical”. The TTM estimates an individual’s readiness to conduct a new healthier behavior (Prochaska & Velicer, 1997). The core construct of the TTM, the stage of change, is applied mainly for the assessment of an individual’s readiness to perform a new healthier behavior. The stage of change allocates people into six stages based on people’s recent health behavior and behavior change (Prochaska & Velicer, 1997).

Stage of Change

The TTM differentiates it from other health behavior models by focusing on the sequence of operations of these factors (Azjen & Madden, 1986; Janz & Becker, 1984).
In most health behavior models, behavior change is usually constructed as an event, such as quitting smoking, drinking, or overeating. The TTM, however, interprets behavior change as a process in involving progress through a series of six stages, which is called the stages of change and is the core construct of the TTM (Prochaska & Velicer, 1997).

Pre-contemplation: People in the pre-contemplation stage are not ready and intending to take action in the foreseeable future, which is usually measured as the following six months, and can be unaware that their behavior is problematic (Prochaska & Velicer, 1997). In terms of healthy dietary behaviors, people in this stage have not changed their diets to healthier options in the past and tend not to change their eating habits to be healthier such as decreasing the amount of fat intake in their diets in the near future (Curry, Kristal, & Bowen, 1992). People in this stage typically underestimate the pros of changing to healthier dietary behavior and overestimate the cons of changing it (Prochaska & Velicer, 1997). According to the staging instrument by Curry et al. (1992), people in pre-contemplation are not currently limiting the fat consumption in their diet, and have no plans and intention to change this situation in the next six months.

Contemplation: People in the contemplation stage are beginning to recognize that their behavior is problematic, and are getting ready and intending to change their behaviors in the next six months (Prochaska & Velicer, 1997). In addition, people in contemplation stage are more aware of both the pros and cons of changing their behaviors, but the balance of pros and cons can produce profound ambivalence that people in this stage tend to keep stuck and cannot move forward to next stage of change for long periods of time (Prochaska et al., 1994; Prochaska & Velicer, 1997). In terms of dietary fat consumption, people in this stage are not currently decreasing their amount of fat.
intake and have not decreased the fat intake in the past; however, in the past month they have been thinking about changes they could make in their diets in the near future with zero or little confidence (Curry et al., 1992).

Preparation: People in the preparation stage are intending to take action in the immediate future, which usually measured as the next month, and typically have taken some significant action in the past (Prochaska & Velicer, 1997). In terms of healthy dietary fat behaviors, people in this stage are not currently decreasing their amount of fat intake; however, they may have made changes in the past and have been thinking about changes they could make again in their diets in the near future with medium or high confidence (Curry et al., 1992).

Action: People in the action stage have specifically changed their behaviors in the past six months and need to work hard to keep moving ahead (Prochaska & Velicer, 1997). In terms of healthy dietary consumption, people in this stage are currently limiting the amount of fat in their diets and have been done this for less than six months (Curry et al., 1992).

Maintenance: People in the maintenance stage have changed their behaviors six months ago and are working constantly to prevent relapse to unhealthy behavior (Prochaska & Velicer, 1997). In terms of dietary fat consumption, people in this stage are currently limiting the amount of fat in their diets and have been done this for more than six months (Curry et al., 1992).

Termination: People in the sixth stage have zero temptation and 100% self-efficacy, and will never return to old unhealthy habit in any circumstance (Prochaska & Velicer, 1997). Since this stage is too unrealistic that it becomes an ideal goal for
majority of people in their lifetime, the termination stage will not been given as much emphasis and the instrument in this study contained the first five stages of change only.

**Self-efficacy**

Self-efficacy reflects a person’s confidence in his or her ability to overcome the obstacles and perform a certain mission in various situations without relapsing to unfavorable or high-risk behaviors (Abusabha & Achterbeg, 1997; Prochaska & Velicer, 1997; Redding et al., 2000). Self-efficacy appears to be a major factor in explaining more than half of inconsistency in health-related behaviors, and it appears essential in arranging nutrition interventions (Abusabha & Achterberg, 1997). In nutrition, self-efficacy may forecast which health behavior people feel comfortable with, how much efforts they will make to adapt to this health behavior, and how long they will persist when obstacles occurred (Abusabha, & Achterber, 1997). In the TTM, the higher stage the person is located in, the higher self-efficacy this person possesses (Prochaska & Velicer, 1997). Therefore, questions about self-efficacy became a major tool in instrument for categorizing people into different stages of behavior change.

**Decisional Balance**

Decisional balance reflects an individual’s personal weighing of perceived pros and perceived cons of changing behaviors (Prochaska & Velicer, 1997). The pro refers to the welfare or benefits that individual can obtain from the changes, and the con refers to barriers individuals may have to face with when engaging in new healthier behavior (Rosenstock, 1990). It is estimated in the stage of change that when an individual moves up to the next stage of change, he or she tends to perceive more benefits of changing to a
healthier lifestyle, and has more confidence in overcoming the barriers from the changes (Prochaska & Velicer, 1997).

**Staging Instrument**

Several staging instruments have been evaluated and applied for estimation of stage of change in various areas, from HIV disease, quit smoking, to the dietary fat consumptions. There is one staging instrument that has been frequently applied in dietary behaviors, which is Curry et al.’s (1992) instrument. Curry et al.’s instrument was based on Prochaska and DiClemente’s (1983) smoking cessation questions. The questions from Prochaska and DiClemente’s study were popularly adopted in numerous studies, including studies on dietary fat reductions and studies on healthy diet promotion (Greene, Rossi, Reed, Willey, & Prochaska, 1994; Kristal, Glanz, Curry, & Patterson, 1999). Prochaska and DiClemente’s (1983) questions focus on changes that people recently made by asking questions such as “Have you ever tried to smoke less?” The advantage of asking question about behavior change is that people tend to easily and sincerely recall and answer their recent behaviors, without believing their frequency of smoking is cutting down (Lamb & Joshi, 2004).

Curry et al.’s instrument is considered as the prototype of dietary staging instrument (Lamb & Joshi, 2004). The Curry et al.’s instrument emphasizes on current behavior of people, which is easy for participants to recall and answer, and it clearly defines the five stages of behavior change simply by five logic questions (see Appendix B). It also clearly defines the confidence, which is self-efficacy in the TTM, of making changes in the near future among people in different stage of change (Lamb & Joshi, 2004).
Existing TTM Studies on Dietary Behaviors

There have been numerous studies focusing on the TTM and certain dietary behaviors such as dietary fat intake and eating green; however, barely existing studies on the TTM have emphasized on the effect of lowering Calorie intake amount (Curry et al., 1992; Weller et al., 2014). Numerous existing studies focus on the low-fat diet instead of the low-Calorie diet. For instance, the study by Vallis et al. applied staging instrument to estimate stage-based differences in demographics, dietary behaviors and psychosocial factors in order to identify diabetes-related characteristics of individuals at different stages of readiness to change to healthier life with lower dietary fat consumption; Weller et al. (2014) tried to develop a Green Eating Trans-theoretical Model to assess environmentally conscious eating behavior (BEH) based on the TTM constructs including stage of change, self-efficacy and decisional balance; Curry et al. (1992) who developed the staging instrument provided studies on dietary fat reduction. Therefore, the evaluation of Curry et al.’s staging instrument on Calorie consumption can be a supportive material for further research on dietary Calorie reduction.

Millennial Generation

Proper market segmentation allows restaurateurs and manufacturers to get a better understanding of the characteristics and preferences of their customers in particular groups, to estimate the effectiveness of certain promotional efforts among them, and to develop particular promoting strategies based on group features (Dodd & Bigotte, 1997). One criterion for the segmentation of customers can be age, and it has been suggested for decades that age affects people’s attitude and behaviors (Beatty & Smith, 1987).
Millennial Generation, which is also referred as the Generation Y, is the demographic cohort following the Generation X. People in Millennial Generation are called “Millennials”. There are no precise lines on the start date and end date of the generation, however researchers typically refer Millennials to people whose birth years range from early 1980s to early 2000s (Strauss & Howe, 2000).

In recent years the Millennial Generation has become a challenging market, yet with enormous potential in the foodservice industry (Lukovitz, 2009). This generation contributes to approximately 80 million consumers in the U.S., and it is three times in size in comparison with the Generation X (Palmer, 2008; Smith, 2008). Millennials belong to the most influential consumer group that has more disposable income than any other generations (Frank & Chong, 2002). They spend approximately $100 per person on disposable purchases per week that amounts to $150 billion dollars annually, with a great proportion on food and beverage (Apreslsy, 2010). Such huge purchasing power reveals great opportunities for service providers and manufacturers. Sheahan (2005) reported results from the Food Marketing Institute of the U.S. that Millennials on average dine outside the home more than three times per week, which is twice as much as other generations. Although the percentage of dining away from home at least once per week among Millennials has dropped from 60 % to 49 % between 2011 and 2014, they still eat out more often than people in other generations - 43 % in Generation X and 35 % in Boomers respectively (The Hartman Group, 2014). In addition, the foodservice guests in Millennial Generation are more adventurous and curious about new experience than the customers in older generations (Kueh & Voon, 2007). In terms of gender characteristics,
more males in Millennial Generation (53%) eat out at least once per week than females (45%) (The Hartman Group, 2014).

**Young Millennials**

As a subgroup of Millennial Generation, young Millennials which typically refer to people aged 18-24, currently represents 31.4 million people in the U.S. (U.S. Census Bureau, 2012). This generational segment is part of the most diverse generation in the U.S. history, with 19% of Spanish population, 15% of African American population, and 5% of Asian population (U.S. Census Bureau, 2012a).

Young Millennials are faced with fewer job opportunities and higher unemployment rate; roughly 18% of 18-19 year olds are unemployed and 11% of 20-24 year olds are looking for a job, compared to the average unemployment rate of 6% in the U.S. (U.S. Census Bureau, 2012c). Nearly half of young Millennials in the U.S. are enrolled in a degree-granting institution, and they are more likely to stay at schools, work part-time or have entry-level jobs, which indicates 20,000 less discretionary income than old Millennials aged 25-34. Therefore, young Millennials are perceived as price-sensitive customers, and affordable dining options are high priorities for them. A survey by Knutson (2000) with a sample of young adults (≤30 years old) found that price was selected as one of the three most essential features when dining out, along with cleanliness and friendliness, and two thirds of participants had the highest sensitivity to price changes. The marriage rate is pretty low among young Millennials and 54% of young Millennials live with their families, but such this is not necessarily a negative factor for restaurateurs (U.S. Census, 2012c). Young Millennials are more likely than
other generations to visit restaurants to hang out with their friends and socialize, and it is also an excuse for them to get out of the house (Bakewell & Mitchell, 2003).

Young Millennials are looking for the food that fits in their budgets and financial constraints but still delivers great value at the same time. They may not have the most discretionary income, but they are willing to spend a little more for a quality dining experience. Unlike the older generation who focus more on their marriages and families, young Millennials really focus on their own development and establish their own eating habits. In terms of dining habits, 62% of young Millennials consider themselves “adventurous eaters”, and 27% of them say they are the first among their friends to try new food products in restaurants (Mintel, 2014a). In addition, instead of traditionally having three meals every day, most young Millennials tend to snack throughout the day (Mintel, 2014b).

However, young Millennials have poor dietary habits in terms of nutrient intake, which contributes to the early progress of obesity. An overview of a national survey about dietary behaviors among high school students indicated that during the seven days before the survey, six percent of them had not consumed vegetables, five percent of them had not eaten fruit, thirteen percent of them had not eaten breakfast, and eleven percent of them had consumed at least three cans of soda per day (U.S. Department of Health and Human Services, 2011). The most evident increase in weight gain and obesity has been reported between the ages of 18 and 29, typically among college students (U.S. Department of Health and Human Services, 2011). Currently over one third of college students are perceived as overweight or obese; they typically gain weight during their freshman year due to transitional stress from environmental changes, which is known as
“Freshman 15” (Delinsky & Wilson, 2008; Racette, Deusinger, Strube, Highstein, & Duesinger, 2008).

**U.S. Young Millennial Demographics**

Tables 1 and 2 describe the demographic background of U.S. young Millennial population in 2012 in terms of races and educational levels (U.S. Census Bureau, 2012a, 2012b). The data shown in Tables 1 and 2 was applied in Chapter 4 for the comparison of demographic characteristics between the sample and the U.S. young Millennial population, for the sake of evaluating the representativeness of the sample in this study.
Table 1

*Races of the U.S. Young Millennial Population*

<table>
<thead>
<tr>
<th>Population (in million)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian/Pacific Islander</td>
<td>1.6</td>
</tr>
<tr>
<td>Black or African American</td>
<td>4.7</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>6.4</td>
</tr>
<tr>
<td>Multiracial</td>
<td>0.8</td>
</tr>
<tr>
<td>Native American or American Indian</td>
<td>0.3</td>
</tr>
<tr>
<td>White</td>
<td>17.6</td>
</tr>
</tbody>
</table>

Table 2

*Educational Levels of U.S. Young Millennial Population*

<table>
<thead>
<tr>
<th>Population (in million)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Education</td>
<td>0.04</td>
</tr>
<tr>
<td>High school or equivalent</td>
<td>14.00</td>
</tr>
<tr>
<td>Some college credit, no degree</td>
<td>11.50</td>
</tr>
<tr>
<td>Vocational training/technical school</td>
<td>0.70</td>
</tr>
<tr>
<td>Associate degree</td>
<td>1.00</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>2.70</td>
</tr>
<tr>
<td>Master’s degree</td>
<td>0.20</td>
</tr>
</tbody>
</table>

**Summary**

This chapter discusses the review of existing literatures that mainly focus on the Menu Labeling Rule by FDA, the impact of menu labeling on existing studies, , the menu
design psychology, the stage of change in the TTM, and the background of young Millennial generation. Chapter 3 discusses the research questions/hypotheses, the population and sample of the study, the proposed research design including menu design, survey flow and the staging instrument, the data analysis methods, the role of the researcher, and the information consent and ethical considerations.
CHAPTER 3
RESEARCH METHODS

Introduction

The purpose of this study is to evaluate the relationship between young Millennials’ Calorie choices on restaurant menus and various factors, including the menu designs, personal dietary behaviors, and demographic characteristics. The experiment was conducted via online survey, and Institutional Review Board (IRB) approval was obtained prior to launching the survey (See Appendices A and C). Three research questions were designed to examine the relationship between the food choices on restaurant menus as dependent variables and personal dietary behaviors, demographic background and menu designs as independent predictors. This chapter discusses the research questions/hypotheses, the population and sample of the study, the proposed research design including menu design, survey flow and the staging instrument, the reliability and validity of the research methods, the data analysis, the role of the researcher, the information consent and ethical considerations.

Research Questions

RQ1: Are young Millennials’ menu choices on low-Calories items correlated with different menu designs applying menu psychology?

H1A0: Young Millennials’ menu choices on low-Calorie items are not correlated with the menu design applying the serial position effect.

H1A1: Young Millennials’ menu choices on low-Calorie items are correlated with the menu design applying the serial position effect.
H1B₀: Young Millennials’ menu choices on low-Calorie items are not correlated with the menu design applying the gaze motion theory.

H1B₁: Young Millennials’ menu choices on low-Calorie items are correlated with the menu design applying the gaze motion theory.

H1C₀: Young Millennials’ menu choices on low-Calorie items are not correlated with the menu design applying the salience building method.

H1C₁: Young Millennials’ menu choices on low-Calorie items are correlated with the menu design applying the salience building method.

RQ2: Are young Millennials’ menu choices on low-Calorie items correlated with personal dietary behavior and behavior change?

H2₀: Young Millennials’ menu choices on low-Calorie items are not correlated with personal dietary behavior and behavior change.

H2₁: Young Millennials’ menu choices on low-Calorie items are correlated with personal dietary behavior and behavior change.

RQ3: Are young Millennials’ menu choices on low-Calorie items correlated with the demographic characteristics?

H3A₀: Young Millennials’ menu choices on low-Calorie items are not correlated with the gender.

H3A₁: Young Millennials’ menu choices on low-Calorie items are correlated with the gender.

H3B₀: Young Millennials’ menu choices on low-Calorie items are not correlated with the educational level.
H3B₁: Young Millennials’ menu choices on low-Calorie items are correlated with the educational level.

H3C₀: Young Millennials’ menu choices on low-Calorie items are not correlated with the race.

H3C₁: Young Millennials’ menu choices on low-Calorie items are correlated with the race.

H3D₀: Young Millennials’ menu choices on low-Calorie items are not correlated with the Body Mass Index (BMI).

H3D₁: Young Millennials’ menu choices on low-Calorie items are correlated with the Body Mass Index (BMI).

**Population and Sample**

The targeted population for this survey was young Millennials aged from 18 to 24 in the US, which was around 31.4 million in 2011 (U.S. Census Bureau, 2012a). The survey was created and conducted online via Quartrics, and IRB approval was obtained prior to launching the survey (See Appendices A and C). For the validity and reliability of the results, between subject design was conducted so that participants did not attend the experimental group and the control group at the same time. The survey was distributed via several channels, including MTurk, Facebook campaign, convenient sampling and snowball sampling. Descriptive data of data collection methods is discussed in Chapter 4.

**Sampling Methods**

The main data collection channel in this study was MTurk, which is an online marketplace for work that provides businesses and developers access to an on-demand,
scalable workforce. As a requester, the researchers can distribute the survey link via MTurk. The main advantage of applying MTurk is the responses can be collected throughout the U.S. in an efficient way, which facilitates the representativeness of the sample. However, the participants on MTurk may not take the survey as seriously as the ones from convenience sampling such as friends; therefore, the survey data cleansing process is necessary before officially analyzing the data. Additionally, even though the young Millennials are considered fairly active on Internet, possibility still exists that Internet and computers are not accessible to some young Millennials.

It is nothing new that young Millennials are spending more time online than their older counterparts. According to a study by Ipso’s Canadian Media Landscape, the young Millennials spend the most time on social networking overall, at 48 minutes a day or 13% of their total media time (Ipsos, 2015). Therefore, a Facebook page named “piece of menu” was established exclusively for the study, with frequent updates on relating information about the study and the link to take the survey. Social media is also ideal for the snowball sampling, since the survey link or website page can be shared with someone else online just by one click.

The principle investigator of the study, Dr. Christine Bergman, distributed the survey link via UNLV hotel college email list and in her undergraduate nutrition and food science class. Convenience sampling is free of charge, ideal for snowball sampling and in high response rate. However, the study that highly relies on convenience sampling may hurt the representativeness of the study. In this study, convenience sampling was not the primary method for data collection.
Sample Size Determination

The sample size calculation and determination in this study were based on two methods. According to the U.S. Census Bureau (2012a), the population of young millennial generation was 31.4 million. Hence, based on a 95% confidence level with 1.96 z-score (z), ±5% margin errors (e) and 31.4 million of population size (N), the ideal sample size was calculated as 385 using the equation “Sample Size = \( \frac{z^2 \times p(1-p)}{e^2} \times \frac{1}{N} \)”. On the other hand, logistic regression was applied in the data analysis process of the study and the sample size calculation for logistic regression is a complex problem, hence in this study the sample determination was also suggested by the work of Peduzzi, Concato, Kemper, Holford, and Feinstein (1996) as follows: “Let p be the smallest of the proportions of negative or positive cases in the population and k the number of covariates (the number of independent variables), then the minimum number of cases to include is \( N = 10k/p \).” In this equation p referred to the smaller proportion of the binary responses, which was estimated to be lower-than-600-Calorie items in this study; k referred to the number of independent variables, which was 12 in this study since there were 12 kinds of menus as independent variables. Hence the ideal sample size is decided by the percentage of participants who choose the lower than 600 Calories items. For instance, if the percentage of participants who choose lower-than-600-Calorie item is 30%, the ideal sample size will be at least 400 (\( N = 10k/p = 10*12/30\% = 400 \)). Additionally, Peduzzi et al. (1996) also suggested that the minimum cases amount of each value under each independent variable is 10. In other words, in this study it is recommended to have at least ten participants choosing lower-than-600-Calorie items and at least ten participants choosing higher-than-600-Calorie items under each menu.
Instrumentation and Procedures

Experimental Design and Survey Flow

The survey consisted of two subsections: the menu selection section and the multiple-choice questions section (see Appendix C). In order to make sure the questions were displayed clearly to participants in all cases, before launching the survey all menus and questions were reviewed and tested on multiple devices, including smartphones, tablets, laptop, and desktop. The following is the flow of the survey:

1. The participants were provided with the document named “Unsigned consent document for web-based online survey” at the beginning (see Appendix A); the subjects were requested to click on the “accept” button in order to start the survey. The unsigned consent document was included in the IRB package and was approved by the UNLV Office of Research Integrity Human Subjects on March 18th, 2015.

2. After accepting the information consent document, by asking the question “How old are you?” participants who did not choose “18-24 years old” were directed to exit the survey and no further data were collected from them.

3. Participants who answered “18-24 years old” were able to continue the survey and were asked which type of platform they were using to take the survey. People who chose “tablet” or “smartphone” option were informed to switch their screen to landscape orientation in order to see the menu clearer in the following menu choice section.

4. Participants then were requested to choose their preferred restaurant among “Urban Mexican”, “Asian Fusion”, and “California Café”. One menu was
randomly picked up after people choosing their preferred restaurant type; adding randomizer in the survey flow section could achieve the randomization in displaying menus (See Appendix D-O). Participants were requested to make a meal choice by choosing one item in lunch special section; the selection in beverage section was optional. The “menu design” subsection in this chapter discusses twelve menus in details.

5. After finishing the menu selections, participants were requested to answer a few multiple-choice questions about their recent dietary behavior and behavior change, which were based on the staging instrument by Curry, Kristal, and Bowen (1992). The “staging instrument” subsection in this chapter discusses the staging instrument and the logic questions in details.

6. At the end of survey, questions about demographic information and how they reached this survey were asked.

**Menu Design**

A total of twelve types of menus were included in this study, and standardized layout design was applied to all twelve menus (See Appendix D-O). All menus were in the same size and in white background color, with two columns in lunch special section and two rows in beverage section (See Appendix D-O). All menus were in landscape orientation to fit better in screen, therefore participants did not need to scroll down the screen that might affect their menu choices and create bias (See Appendix D-O). The color and format of the text and listed prices were standardized among twelve menus (See Appendix D-O).
There were twelve food items in the lunch special section of all menus (See Appendix D-O). All the food items in lunch special section were designed to have same price as “9.99” (See Appendix D-O). The recommended daily Calorie intake statement was provided in the same wording and format on all menus, locating at the bottom of the menu (See Appendix D-O). All menus were listed with identical list of beverage at the bottom of the menu, with same Calorie information and price as “1.99” (See Appendix D-O). The purpose of having same prices for the entrée items and the beverage items was to control the bias in results that price might produce when participants made choices on menus.

Since the young Millennial generation is typically diverse in terms of ethnicity and cultural background, their personal food preferences can be totally different from each other (Hammond, Velikova, & Dodd, 2013). Therefore, the randomized block design was applied in this study in order to control the subjective variations in personal preference on restaurants. Before participants saw certain menus and made food choices, participants were requested make a selection among “Urban Mexico”, “Asian Fusion”, and “California Cafè” restaurants (see SQ 4 in Appendix C). There were four menus under each restaurant type; after the subjects made their selection on restaurant, one of four menus from selected restaurant were randomly assigned to subjects.

All four menus from each restaurant had the same twelve food items in lunch special section, with four lower-than-600-Calorie items and eight higher-than-600-Calorie items (See Appendix D-O). The Calorie information was provided next to each food item in Italic format (See Appendix D-O). To achieve a better control of variations in personal preferences, all menus provided three vegetarian dishes, three pork/ham
dishes, three beef/steak dishes, and three chicken/turkey dishes; each category of dishes included one lower-than-600-Calorie dish and two higher-than-600-Calorie dishes (See Appendix D-O).

The only difference among four menus under each type of restaurant was placement of menu items in lunch special section, which produced the following one control menu and three treatment menus: the control menus had the standard design with four lower-than-600-Calorie items located randomly (See Appendix D, Appendix H and Appendix L); the first treatment menus named “first and last” menus had four lower-than-600-Calorie items that were located at the beginning and the end of two columns (See Appendix E, Appendix I and Appendix M); the second treatment menus named “sweet spot” menus had four lower-than-600-Calorie items located in sweet spot which is upper right corner of the lunch special section (See Appendix F, Appendix J and Appendix N); the third treatment menus named “light and fresh” menus had green light symbol next to lower-than-600-Calorie items, and the “light and fresh” menus had the same items placement as the control menus (See Appendix G, Appendix K and Appendix O).

Since the study focused on participants’ selections of food dishes, the participants’ beverage selections were not taken into considerations in further data collection and analysis process in this study. The purpose of providing beverage section is to design the menu as real as possible. No alcoholic drinks were provided since a big portion of the participants in this study was younger than 21 years old.

The “Hot Spot” question type in Qualtrics provides the platform for distributing menus online. The “Hot Spot” question type is used to gather feedback on images, which
stands for the menus in this study. The participants were presented with a certain menu as an image, and were invited to make food choices by selecting portions of the menu. The portions of menus were defined by drawing regions on top of food items so that participants could click on to select them. The process of setting up a Hot Spot type question was: First, converted the menu into images such as JPEG, JPG, or PNG; second, created a Hot Spot type question in edit page, and uploaded the menu image by clicking on “choose graphic” option; third, defined the regions participants could select on the menu by drawing rectangular regions on top of each food item. The region name was typed in the text box beneath the region; region names did not display to participants, but was shown in survey outputs. The validation of answer range was set so that participants could only make one selection in entrée section and one selection in beverage section.

**Staging Instrument**

After finishing the menu selections, participants were requested to complete multiple-choice questions about their recent dietary behavior and behavior changes, which were based on the staging instrument by Curry et al. (1992). The original instrument and the modified instrument could be found in Appendix B and Appendix P. Table 3 lists the multiple-choice questions that were being asked after the menu selections.
Table 3

*Logic questions from staging instrument (after Curry et al., 1992)*

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I have never changed my eating habits to decrease the amount of Calories in my diet.</td>
<td>Yes No</td>
</tr>
<tr>
<td>2. I am currently limiting the amount of Calories in my diet.</td>
<td>Yes No</td>
</tr>
<tr>
<td>3. I have been limiting the amount of Calories in my diet for …</td>
<td>Less than 30 days 1-6 months 7-12 months &gt;1 year</td>
</tr>
<tr>
<td>4. In the past month I have thought about changing what I eat to reduce the amount of Calories in my diet</td>
<td>Yes No</td>
</tr>
<tr>
<td>5. I am confident that I can reduce the Calorie amount in my diet in the next month.</td>
<td>Strongly disagree Disagree Strongly disagree Agree</td>
</tr>
</tbody>
</table>

Display logic function was applied to these five questions in Qualtrics. In question 1, participants who answered “yes” were directed to question 4, and “no” were directed to question 2. In question 2, participants who answered “yes” were directed to question 3, and “no” were directed to question 4. In questions 4, participants who answered “yes” were directed to question 5. Based on the answers the participants were allocated into five stages: the pre-contemplation stage, the contemplation stage, the preparation stage, the action stage, and the maintenance stage. Table 4 explains how the participants were categorized bases on their answers.
Table 4

*Staging Algorithm Scoring (after Curry et al., 1992)*

<table>
<thead>
<tr>
<th>Stage of Change</th>
<th>Question Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-contemplation</td>
<td>Participants are not currently limiting their Calorie amount in their diets, and did not think about it over the past month.</td>
</tr>
<tr>
<td>Contemplation</td>
<td>Participants are not currently limiting their Calorie amount in their diets, but are used to think about it and have a little confidence in changing the current diet in the next month.</td>
</tr>
<tr>
<td>Preparation</td>
<td>Participants are not currently limiting their Calorie amount in their diets, but are used to think about it and are somewhat confident to start to control their diet in the next month.</td>
</tr>
<tr>
<td>Action</td>
<td>Participants are currently limiting their Calories in their diets, and have been done it for less than 6 months.</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Participants are currently limiting their Calories in their diets, and have been done it for at least 6 months.</td>
</tr>
</tbody>
</table>

**Demographic Questions**

After the logic questions, participants were requested to provide their demographic background. The demographic questions contained gender, education and ethnicity. Common demographic questions such as marital status and annual household income were not asked since as mentioned in Chapter 2 people aged 18-24 have low marriage rate and high unemployment rate with less discretionary income than older generations (U.S. Census Bureau, 2012c). Questions about exact age was also not asked as well since all participants have fallen into comparatively narrow age range from 18 to 24. Questions about the height and body weight of participants were included in questionnaire as well in order to calculate the Body Mass Index (BMI) of participants. Based on the rule by the CDC (n.d.), an individual is considered underweight if the BMI
is below 18.5, is considered overweight if the BMI is between 25 and 29.9, and is considered obese if the BMI is equal to or higher than 30.

**Reliability and Validity of Research Methods**

The five logic questions on dietary behavior changes were based on Curry et al.’s staging instrument on dietary fat behavior that was published in 1992 (See Appendix B). Curry et al.’s instrument is considered as the prototype of dietary staging instrument, which help increase the reliability and validity of the original instrument (Lamb & Joshi, 2004). Curry et al.’s instrument emphasizes on current behavior and confidence of people, which is easy for participants to recall and answer, and it clearly defines the five stages of behavior change simply by five logic questions. The original instrument and the modified instrument for this study can be found in Appendix B and Appendix P. It can be observed that the only difference is that the original instrument focuses on dietary fat consumptions, while the modified instrument focuses on Calorie consumptions. Only the word “fat” was changed to “Calorie”.

All the Calorie information, menu items and descriptions were obtained from the real U.S. chain restaurants that have already published and provided Calorie information on their menus. The “Asian Fusion” menus were based on menu from Pei Wei Asian Diner (See Appendices D-G); the “California Café” menus were based on the menu from Panera Bread (See Appendices H-K), and the “Urban Mexican” menus were based on the menu from Baja Fresh Mexican Grill (See Appendix L-O). Although it was not shown on the menu, all the entrée menu items were in the same portion size. All the referential restaurant menus provide statements online that the nutrition information provided on
their menus is based on “analysis using standard industry software, published resource, and/or testing in accredited laboratories.”

Each designed menu contained four lower-than-600-Calorie items and eight higher-than-600-Calorie items; in fact, all the higher-than-600-Calorie items were at least 800 Calories (See Appendix D – O). Having bigger differences between two values of binary dependent variables helped increase the validity of the data results.

Randomized block design was applied in order to control the data variance in personal preference on restaurants. Before making the food selections, participants were requested to choose their preferred restaurant among “Urban Mexican”, “Asian Fusion”, and “California Café”. One menu was randomly picked up after people choosing their preferred restaurant type. The blocking factor in this study was the personal restaurant preference of participants; it is a variability that was not of primary interest to this study.

In addition to the randomized block design, the between subject design was applied in this study by having one control group and three treatment groups under each restaurant type. With the between subject design, multiple levels of a variable can be test simultaneously, which saves a great deal of time. The study was conducted via online survey, people in same IP address could not take the survey more than once so that participants could not attend the control group and treatment groups at the same time.

Before officially launching the survey, the instrument and survey were reviewed and pretested by four professionals in the advisory committee who are well versed in biological and social science. This encouraged the reliability and validity of experimental design and instrument in this study.
Data Analysis

SPSS statistical program was applied in this study for data management, screening, and analysis. Before running the data, the data cleansing process was required to remove all the responses that were not valid. The data analysis process included descriptive statistics, cross tabulations, collinearity diagnostics, as well as the logistic regression.

Descriptive statistics of demographic variables were utilized to help describe the sample, which aid in evaluating generalizability and representative of the findings. Frequencies and percentage of the sample were displayed to explore and describe the demographic characteristics of participants in terms of race, gender, education, and BMI.

The BMI equation \( \text{BMI} = \frac{\text{mass (kg)}}{(\text{height (m)})^2} = \frac{\text{mass (lb)}}{(\text{height (in)})^2} \times 703 \) was applied for the assessment and comparison of participants’ weight status (CDC, n.d.). Based on the rule by the CDC (n.d.), an individual is considered underweight if the BMI is below 18.5, is considered overweight if the BMI is between 25 and 29.9, and is considered obese if the BMI is equal to or higher than 30.

Cross tabulations were applied to help interpret the relationship between food choices on restaurant menus as dependent variable and the independent variables individually. Binary logistic regression was applied for the data analysis process in this study. Followings are assumptions or preliminary steps that are required to check before running the logistic regression:

First, binary logistic regression measures the relationship between the binary dependent variable and one or more independent variable that can be continuous or categorical (Cox, 1958). In this study, the dependent variable, participant’s food choice
on given menus, had only two outputs since the answers on food selections were classified into choices that are higher than 600 Calories and choices that are lower than 600 Calories.

Second, since the logistic regression assume $P(Y=1)$ to be the probability of the event occurring, it is necessary to code the dependent variables before running the regression analysis in SPSS (Cox, 1958; Julie, 2013). In this study the event occurred when the participants chose lower-than-600-Calorie items on given menus. Before running the logistic regression the participants’ food choices were coded into “0” as choices on lower-than-600-Calorie items and “1” as choices on higher-than-600-Calorie items. Table of dummy variables can be found in Appendix Q.

Third, for the independent variables that are categorical, logistic regression requires them to be coded into dummy variables in order to run the regressions in SPSS (Julie, 2013). In this study, all the independent variables are categorical, including menu designs, stage of change, gender, race, education, and weight status. Information about the coded dummy variables and types of the independent variables can be found in Appendix Q.

Fourth, the regression should have little or no collinearity (Cox, 1958). In other words, the independent variables should be independent from each other. The most common example of collinearity would be when there were two completely overlapping independent variables in the model, indicating that such overlapping can fairly violate the regression model. Therefore the collinearity diagnostics were applied before the logistic regression analysis in order to detect and remove the redundant variables. The linear regression in SPSS is suggested for the collinearity diagnostics among categorical
independent variables that include both nominal and ordinal ones (Julie, 2013). The collinearity diagnostics in linear regression concern the relationship among the predictors, ignoring the dependent variables. Whether or not the predictors have collinearity issues are determined by variance inflation factor (VIF) values and the tolerance values. A variable whose VIF value is greater than 10 may require further investigations; a variable whose “tolerance” value is smaller than .10 may require further investigations (Kutner, Nachtsheim, & Neter, 2004).

Fifth, logistic regression requires that the model should fit correctly (Cox, 1958). That is, the model should include all the independent variables that are meaningful, and remove all the independent variables that are not meaningful. The process of testing significance of independent variables and removing the unnecessary variables are shown in Chapter 4. The assumptions above were checked for the final regression model in Chapter 4.

**Role of the Researcher**

The role of the researcher was to develop the online survey, to submit the IRB documents, to distribute the survey, to answer the questions from participants, to evaluate the statistics using SPSS, and to interpret and conclude the study findings. The survey package included the unsigned consent document for online survey and the survey questions (See Appendix A and Appendix C). The survey did not start until the IRB approval was received.

**Informed Consent and Ethical Considerations**

The Office of Research Integrity - Human Subjects in University of Nevada, Las Vegas approved the exemption status of this study. The protocol number is #724286-2,
and the exemption start date is March 18th, 2015 (See Appendix A). The waiver of the signature requirement on the Informed Consent was requested and approved, since the study was conducted online that written signatures could not be obtained. The Unsigned Consent Document for Web-based Online Survey was shown at the first page of the survey, which provided identical information as the Informed Consent document, except one fact that people agree to participate in this survey by clicking “next” button instead of leaving signatures (see Appendix A).

All information in this study was anonymous to the researchers, and there was little potential for harm. However, because of the nature of web-based surveys, it is possible that respondents could be identified by the IP address or other electronic record associated with the response. Neither the researcher nor anyone involved with this study captured that data.

All information gathered in this study was kept as confidential as possible. Any reports or publications based on this research will use only group data and will not identify any individual as being affiliated with this study. No reference was made in written or oral materials that could link the respondents to the study. All records were stored in a locked facility at UNLV for 3 years after completion of the study; after the storage time the information gathered will be deleted.

Summary

This chapter discusses the research questions/hypotheses, the population and sample of the study, the proposed research design including menu design, survey flow and the staging instrument, the data analysis methods, the role of the researcher, the information consent and ethical considerations. The research questions section lists four
research questions and the hypotheses associate with them. The population and the sample section discuss the target population and how the sample size was determined, as well as the sampling methods for the data collection process. The research design discusses the flow of the whole survey, the theoretical framework for the research design including menu design psychology and the staging instrument based on the stage of change in the Tran-theoretical Model. The data analysis section discusses the statistical tools for the data analysis of the study. Chapter 4 discusses the data collection process, the treatment of data, as well as the results of the data.
CHAPTER 4

RESULTS

Introduction

The purpose of this study is to evaluate the relationship between young Millennials’ Calorie choices on restaurant menus and various factors, including the menu designs, personal dietary behaviors, and demographic characteristics. Three research questions (RQs) were designed in this study:

RQ1: Are young Millennials’ menu choices on low-Calories items correlated with different menu designs applying menu psychology?

RQ2: Are young Millennials’ menu choices on low-Calorie items correlated with personal dietary behavior and behavior change?

RQ3: Are young Millennials’ menu choices on low-Calorie items correlated with the demographic characteristics?

This chapter is divided into three subsections: data collection, treatment of data, and result of the study. First, the date collection subsection discusses the data collection procedures in details, including the IRB process, the duration of survey collection and data collection methods. Second, the treatment of data section describes the survey data cleansing process, demographic characteristics of the sample after the data cleansing process, as well as the procedure of recoding dependent and independent variables into dummy variables. Third, the result of the study interprets data results applying descriptive statistics, cross tabulation, collinearity diagnostics, and logistic regression. SPSS was applied to generate and analyze the data.
Data Collection

UNLV Office of Integrity Human Subject approved the IRB exemption status of the study on March 18th, 2015 (See Appendix A). Before officially launching the survey, the survey was pretested and reviewed among friends that are not 18-24 years old, as well as four professionals in advisory committee who are well versed in biological and social science research. Four professional reviewed all the survey questions and the instrument to help increase the validity and reliability of the instrument.

The survey was launched at 8:00 PM on March 24th, 2015, and it ended at 12:00 AM on April 4th, 2015. All the responses were anonymous, and based on the IP address participants were not allowed to take the survey more than once in order to achieve between subject designs. As mentioned in Chapter 3, responses were collected via several methods, including MTurk, Facebook campaign, and convenience data from campus and friends.

By 12:00AM on April 4th, 826 responses were collected with 28.09% dropout rate from the survey. By asking the question “How old are you?” at the beginning of the survey, participants who did not choose “18-24 years old” were directed to exit the survey and no further data were collected from them, therefore there were 321 invalid responses. The age requirement for the participants was informed in the unsigned consent document at the beginning; therefore from the response results there were a small proportion of participants who were not 18-24 years old. As a result, 505 valid responses were collected from the young Millennials. Table 5 lists the breakdown of the sampling methods. As shown in Table 5, the main method for data collection was MTurk, which is
an online marketplace for work that provides businesses and developers access to an on-demand, scalable workforce.

Table 5

*Descriptive Data of Sampling Methods*

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook Page</td>
<td>46</td>
<td>9.1</td>
</tr>
<tr>
<td>MTurk</td>
<td>411</td>
<td>81.4</td>
</tr>
<tr>
<td>Friends</td>
<td>14</td>
<td>2.8</td>
</tr>
<tr>
<td>Class/UNLV</td>
<td>34</td>
<td>6.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>505</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Treatment of Data*

This section explains the procedures for the treatment of data before officially running the data. The procedures included the survey data cleansing process, demographic information, and the dummy variables transformation. There were 505 responses before these procedures.

*Survey Data Cleansing Process*

The first step of data treatment process was the survey data cleansing process. First, the responses that did not answer all the questions were deleted; at this point, five responses were deleted. Second, responses that chose more than one entrée items in the food selection section were deleted; at this point, 29 responses were deleted. After the data cleansing process, 471 responses were ready for data analysis process.
Demographics of the Sample

Besides common demographic questions such as gender, race and education, questions about height and weight of participants were asked as well in order to obtain the body mass index (BMI) of participants. The BMI can be calculated by applying the equation $BMI = \frac{mass (kg)}{(height (m))^2} = \frac{mass (lb)}{(height (in))^2} \times 703$ (CDC, n.d.). Based on the rule by the CDC (n.d.), an individual is considered underweight if the BMI is below 18.5, overweight if the BMI is between 25 and 29.9, and obese if the BMI is equal to or higher than 30. Table 6 lists the demographic characteristics and BMI on 471 responses after the data cleansing process. It is shown in Table 6 that most of respondents were white, and 65.4% of participants were currently enrolled in the college or already got the bachelor’s degree. Additionally, more than half of participants were in normal weight.
Table 6

Demographics of the Sample

<table>
<thead>
<tr>
<th>Responses</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>272</td>
<td>57.7</td>
</tr>
<tr>
<td>Female</td>
<td>194</td>
<td>41.2</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>1.1</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>62</td>
<td>13.2</td>
</tr>
<tr>
<td>Black or African American</td>
<td>34</td>
<td>7.2</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>35</td>
<td>7.4</td>
</tr>
<tr>
<td>Multiracial</td>
<td>23</td>
<td>4.9</td>
</tr>
<tr>
<td>Native American or American Indian</td>
<td>2</td>
<td>0.4</td>
</tr>
<tr>
<td>White</td>
<td>315</td>
<td>66.9</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school or equivalent</td>
<td>67</td>
<td>14.2</td>
</tr>
<tr>
<td>Some college credit, no degree</td>
<td>147</td>
<td>31.2</td>
</tr>
<tr>
<td>Vocational training/technical school</td>
<td>11</td>
<td>2.3</td>
</tr>
<tr>
<td>Associate degree</td>
<td>68</td>
<td>14.4</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>161</td>
<td>34.2</td>
</tr>
<tr>
<td>Master’s degree</td>
<td>17</td>
<td>3.6</td>
</tr>
<tr>
<td><strong>BMI</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>23</td>
<td>4.9</td>
</tr>
<tr>
<td>Normal</td>
<td>266</td>
<td>56.5</td>
</tr>
<tr>
<td>Overweight</td>
<td>114</td>
<td>24.2</td>
</tr>
<tr>
<td>Obese</td>
<td>68</td>
<td>14.4</td>
</tr>
</tbody>
</table>

Representativeness of the Sample

Data from the U.S. Census Bureau was adopted to evaluate the representative of the data. Based on the U.S. Census Bureau’s annual estimates of resident population race and the education attainment in the United States (2012a, 2012b), the comparisons
between the sample and the U.S. population in terms of race and education are shown in Tables 7 and 8:

Table 7

*Race between the Population and the Sample (in 2012)*

<table>
<thead>
<tr>
<th>Percentage (%)</th>
<th>U.S. Population</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian/Pacific Islander</td>
<td>5.1</td>
<td>13.2</td>
</tr>
<tr>
<td>Black or African American</td>
<td>15.0</td>
<td>7.2</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>20.3</td>
<td>7.4</td>
</tr>
<tr>
<td>Multiracial</td>
<td>2.5</td>
<td>4.9</td>
</tr>
<tr>
<td>Native American or American Indian</td>
<td>1.0</td>
<td>0.4</td>
</tr>
<tr>
<td>White</td>
<td>56.1</td>
<td>66.9</td>
</tr>
</tbody>
</table>

Table 8

*Educational Level between the Population and the Sample (in 2012)*

<table>
<thead>
<tr>
<th>Percentage (%)</th>
<th>U.S. Population</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Education</td>
<td>0.1</td>
<td>0.0</td>
</tr>
<tr>
<td>High school or equivalent</td>
<td>46.1</td>
<td>14.2</td>
</tr>
<tr>
<td>Some college credit, no degree</td>
<td>37.8</td>
<td>31.2</td>
</tr>
<tr>
<td>Vocational training/technical school</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Associate degree</td>
<td>3.3</td>
<td>14.4</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>8.9</td>
<td>34.2</td>
</tr>
<tr>
<td>Master’s degree</td>
<td>0.7</td>
<td>3.6</td>
</tr>
</tbody>
</table>
As shown in Tables 7 and 8, there was a big difference in demographic background between the sample and the population in terms of race and education. More than 80% of participants in this study were white and Asian, while in national scale it was 60% in total in 2012. There are much more black and Hispanic in the population instead. On the other hand, the average level of education among participants was higher than the national level. Nearly half of the participants have an associate degree, bachelor’s degree and master’s degree whereas approximately 80% of the U.S. young Millennials population have a high school degree and/or are currently attending colleges. Such significant differences between the population and the sample in terms of race and education background indicated that the sample in this study was not able to confidently represent the population of the U.S. young Millennials.

**Dummy Variables**

The dependent variables in this study were the participants’ entree choices; the participant was requested to make one entree choice and optional beverage choice on give menus in the survey. Results of beverage choices were not interpreted and analyzed in this study. Participants’ entree choices were binary variables as the participants’ menu choices were put into two categories – the lower-than-600-Calorie items and the higher-than-600-Calorie items. The dependent variables were recoded into dummy variables in order to run logistic regression in data analysis procedure. In this study, the dummy variable “1” referred to lower-than-600-Calorie item choices, and dummy variable “0” referred to higher-than-600-Calorie item choices.

The independent variables in this were menu designs, gender, race, education, weight status, and stage of change, which were all categorical variables. Since
categorical variables cannot be the predictors for the logistic regression, all the
categorical independent variables were also recoded into indicator (dummy) variables in
order to run collinearity analysis, which does not have facility for declaring a predictor to
be categorical.

Information about dummy variables can be found in Appendix Q. As shown in
the Appendix Q, all the categorical independent variables were recoded into dummy
variables that started from “1”, and the menu choices as binary dependent variables was
coded with “1” for lower-than-600-Calorie food choices level and “0” for higher-than-
600-Calorie food choices.

**Results of the Study**

The results of the data were explained and interpreted by descriptive statistics,
cross tabulation, collinearity diagnostics for two or more independent variables, and the
logistic regression. SPSS was applied to generate and analyze the data.

The frequency in descriptive statistics was applied for the data description for the
demographic characteristics, positions in stage of change, and menu types as independent
variables, as well as the food choices on certain menus as dependent variables. The cross	abulation was applied for a clear and simple demonstration of the relationship between
the binary dependent variable and each independent variable. The multicollinearity
option under linear regression function in SPSS is suggested for the multicollinearity
diagnostics among categorical independent variables that are nominal and ordinal. For
the analysis of relationship between Calories amount of entrée items that participants
selected and their demographics along with their positions in stage of change model and
different menu designs, the logistic regression was applied in this study since there were
two or more categorical independent variables and one binary dependent variable.

Information about the dependent and independent variables can be found in Appendix Q.

The study is composed of three research questions (RQ) that evaluate the impact of menu designs, positions in stage of change, and demographic characteristics on young Millennials’ food choices on restaurant menus. For a clear display and explanations of data results, the flow of this section is divided by the research questions.

**Impact of Calorie Information Alone on Menu Choices**

Table 9 lists the descriptive statistics of food choices that based on participants’ responses. As shown in Table 9, the percentage of participants who chose lower-than-600-Calorie items was 36.3%.

Table 9

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower than 600 Calories</td>
<td>171</td>
<td>36.3</td>
</tr>
<tr>
<td>Higher than 600 Calories</td>
<td>300</td>
<td>63.7</td>
</tr>
<tr>
<td>Total</td>
<td>471</td>
<td>100.0</td>
</tr>
</tbody>
</table>

In this study, since there were eight higher-than-600-Calorie items and four lower-than-600-Calorie items in each menu, the percentage of food items that were lower than 600 Calories in each menu was calculated as 33.3%. On the other hand, the overall rate of participants who chose lower-than-600-Calorie-items in the survey was 36.3%. There was no significant difference between the percentage of lower-than-600-Calorie items in each menu and the percentage of selections on lower-than-600-Calorie items. It indicated there might be no significant relationship between the display of Calorie
information alone on menus and participants’ Calorie choices on menus. The impact of Calorie display alone was not the main research objective of this study.

According to the sample size calculation method mentioned in Chapter 3, the minimum sample size for acceptable level of statistic power in logistic regression was calculated as $N = 10k/p = 10*12/36.3\% \approx 331$, where $p$ refers to the proportion of the responses that chose lower-than-600-Calorie items, and $k$ refers to the quantity of menu types as independent variables (Peduzzi, Concato, Kemper, Holford, & Feinstein, 1996). It appeared that 471 responses was an ideal sample size in this study. However, whether or not the case amount under each type of menus as independent variable was large enough to have acceptable level of statistic power required further discussions.

**Impact of Menu Designs on Menu Choices**

The first research question (RQ1) is designed to evaluate the correlation between different menu designs and young Millennials’ Calorie choices on restaurant menus. RQ(1) is: Are young Millennials’ menu choices on low-Calories items correlated with different menu designs applying menu psychology? The hypotheses associated with this RQ are:

H1A0: Young Millennials’ menu choices on low-Calorie items are not correlated with the menu design applying the serial position effect.

H1A1: Young Millennials’ menu choices on low-Calorie items are correlated with the menu design applying the serial position effect.

H1B0: Young Millennials’ menu choices on low-Calorie items are not correlated with the menu design applying the gaze motion theory.
H1B₁: Young Millennials’ menu choices on low-Calorie items are correlated with
the menu design applying the gaze motion theory.
H1C₀: Young Millennials’ menu choices on low-Calorie items are not correlated
with the menu design applying the salience building method.
H1C₁: Young Millennials’ menu choices on low-Calorie items are correlated with
the menu design applying the salience building method.

There were 12 types of menus in this study; after choosing their restaurant
preference at the beginning of the survey, the participants were randomly assigned to one
of four menus under the chosen restaurant type. Table 10 lists the descriptive data of
restaurant preferences and menu types.
Table 10

*Amount of Responses on Twelve Menus*

<table>
<thead>
<tr>
<th>Menu Type</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Urban Mexican</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Menu</td>
<td>55</td>
<td>11.7</td>
</tr>
<tr>
<td>First and Last</td>
<td>53</td>
<td>11.3</td>
</tr>
<tr>
<td>Light and Fresh</td>
<td>54</td>
<td>11.5</td>
</tr>
<tr>
<td>Sweet Spot</td>
<td>51</td>
<td>10.8</td>
</tr>
<tr>
<td>Total</td>
<td>213</td>
<td>45.2</td>
</tr>
<tr>
<td><strong>Asian Fusion</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Menu</td>
<td>40</td>
<td>8.5</td>
</tr>
<tr>
<td>First and Last</td>
<td>39</td>
<td>8.3</td>
</tr>
<tr>
<td>Light and Fresh</td>
<td>37</td>
<td>7.9</td>
</tr>
<tr>
<td>Sweet Spot</td>
<td>37</td>
<td>7.9</td>
</tr>
<tr>
<td>Total</td>
<td>153</td>
<td>32.5</td>
</tr>
<tr>
<td><strong>California Cafe</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Menu</td>
<td>28</td>
<td>5.9</td>
</tr>
<tr>
<td>First and Last</td>
<td>23</td>
<td>4.9</td>
</tr>
<tr>
<td>Light and Fresh</td>
<td>28</td>
<td>5.9</td>
</tr>
<tr>
<td>Sweet Spot</td>
<td>26</td>
<td>5.5</td>
</tr>
<tr>
<td>Total</td>
<td>105</td>
<td>22.3</td>
</tr>
</tbody>
</table>

It is shown from Table 10 that the “Urban Mexican” was the most popular restaurant type among the participants. The “California Café” was the least popular restaurant type that only 22.3% of participants chose it. Whether or not the sample size under each restaurant type was large enough to have sufficient statistical power is discussed later in this chapter. Table 11 shows the cross tabulation between menu type as independent variable and menu choice as binary dependent variables. Under each restaurant type, all four menus received similar amount of responses since the menus were designed in the Qualtrics to be evenly presented to participants. For how many
participants chose lower-than-600-Calorie items under each menu, Table 11 lists the cross tabulation between twelve types of menus and food choices.

Table 11

*Calorie Choices on Twelve Menus*

<table>
<thead>
<tr>
<th>Restaurant Type</th>
<th>Menu Type</th>
<th>N</th>
<th>&lt; 600 Calories</th>
<th>≥ 600 Calories</th>
<th>Total Calories</th>
<th>% &lt; 600 Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Mexican</td>
<td>Control Menu</td>
<td>15</td>
<td>40</td>
<td>55</td>
<td>73</td>
<td>27.3</td>
</tr>
<tr>
<td></td>
<td>First and Last</td>
<td>19</td>
<td>34</td>
<td>53</td>
<td>72</td>
<td>35.8</td>
</tr>
<tr>
<td></td>
<td>Light and Fresh</td>
<td>27</td>
<td>27</td>
<td>54</td>
<td>81</td>
<td>50.0</td>
</tr>
<tr>
<td></td>
<td>Sweet Spot</td>
<td>12</td>
<td>39</td>
<td>51</td>
<td>72</td>
<td>23.5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>73</td>
<td>140</td>
<td>213</td>
<td>213</td>
<td>34.3</td>
</tr>
<tr>
<td>Asian Fusion</td>
<td>Control Menu</td>
<td>10</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>First and Last</td>
<td>15</td>
<td>24</td>
<td>39</td>
<td>54</td>
<td>38.5</td>
</tr>
<tr>
<td></td>
<td>Light and Fresh</td>
<td>10</td>
<td>27</td>
<td>37</td>
<td>47</td>
<td>27.0</td>
</tr>
<tr>
<td></td>
<td>Sweet Spot</td>
<td>15</td>
<td>22</td>
<td>37</td>
<td>52</td>
<td>40.5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>50</td>
<td>103</td>
<td>153</td>
<td>153</td>
<td>32.7</td>
</tr>
<tr>
<td>California Cafe</td>
<td>Control Menu</td>
<td>13</td>
<td>15</td>
<td>28</td>
<td>48</td>
<td>46.4</td>
</tr>
<tr>
<td></td>
<td>First and Last</td>
<td>6</td>
<td>17</td>
<td>23</td>
<td>35</td>
<td>26.1</td>
</tr>
<tr>
<td></td>
<td>Light and Fresh</td>
<td>15</td>
<td>13</td>
<td>28</td>
<td>48</td>
<td>53.5</td>
</tr>
<tr>
<td></td>
<td>Sweet Spot</td>
<td>14</td>
<td>12</td>
<td>26</td>
<td>42</td>
<td>53.8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>48</td>
<td>57</td>
<td>105</td>
<td>105</td>
<td>45.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>171</td>
<td>300</td>
<td>471</td>
<td>471</td>
<td>36.3</td>
</tr>
</tbody>
</table>

A minimum of ten observations in both positive responses (or 1) and negative responses (or 0) of binary dependent variables under each independent variable is recommended to achieve ideal level of statistic power (Peduzzi et al., 1996). It is shown
from Table 11 that there were only six people who got the “first and last” menu from California Café restaurant chose the lower-than-600-Calorie items; so did the ten people who got the control menu from Asian Fusion restaurant and ten people who got the “light and fresh” menu from Asian Fusion Restaurant. Therefore Calorie choices on these menus require attentions from researchers that sample size for certain menus may not be large enough for the logistic regression analysis.

For the measurement of relationship between twelve types of menus as a categorical independent variable and the food choices on menus as a binary dependent variable, logistic regression was applied. The results are shown in Table 12, with a confidence level of 95% and a prevision of ± 5%.
Table 12

*Relationships between Menu Types and Calorie Choices*

<table>
<thead>
<tr>
<th>Menus</th>
<th>B</th>
<th>Df</th>
<th>Sig</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mexican</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First and Last</td>
<td>.339</td>
<td>1</td>
<td>.339</td>
<td>1.490</td>
</tr>
<tr>
<td>Light and Fresh</td>
<td>.981</td>
<td>1</td>
<td>.016</td>
<td>2.667</td>
</tr>
<tr>
<td>Sweet Spot</td>
<td>-.198</td>
<td>1</td>
<td>.659</td>
<td>.821</td>
</tr>
<tr>
<td>Constant</td>
<td>-.685</td>
<td>1</td>
<td>.000</td>
<td>.504</td>
</tr>
<tr>
<td><strong>Asian</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First and Last</td>
<td>.629</td>
<td>1</td>
<td>.201</td>
<td>1.875</td>
</tr>
<tr>
<td>Light and Fresh</td>
<td>.105</td>
<td>1</td>
<td>.839</td>
<td>1.111</td>
</tr>
<tr>
<td>Sweet Spot</td>
<td>.716</td>
<td>1</td>
<td>.149</td>
<td>2.045</td>
</tr>
<tr>
<td>Constant</td>
<td>-.736</td>
<td>1</td>
<td>.000</td>
<td>.479</td>
</tr>
<tr>
<td><strong>California</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First and Last</td>
<td>-.898</td>
<td>1</td>
<td>.139</td>
<td>.407</td>
</tr>
<tr>
<td>Light and Fresh</td>
<td>.286</td>
<td>1</td>
<td>.593</td>
<td>1.331</td>
</tr>
<tr>
<td>Sweet Spot</td>
<td>.297</td>
<td>1</td>
<td>.586</td>
<td>1.346</td>
</tr>
<tr>
<td>Constant</td>
<td>-.222</td>
<td>1</td>
<td>.277</td>
<td>.801</td>
</tr>
</tbody>
</table>

“Simple contrast” function was applied in this logistic regression model in order to compare each group of menus to the reference group; the reference groups here were the control menus in each restaurant. It is shown from the table that for the participants who chose the Mexican menus, there was a significant difference between the control menu and the treatment menus in terms of the participants’ Calorie choices (Sig. = .023 P-Value < .05). Especially in the “light and fresh” menu, compared with the participants who got the control menu there was a significance increase in percentage of participants who chose lower-than-600-Calorie items in the “light and fresh” menu (B = +.981, Sig.
= .016, P-Value < .05). There were no significant correlations between participants’ Calorie choices and the menus from urban Mexican and the menus from Asian fusion; as mentioned before one possible reason would be the sample size and the case amount under each menu.

In order to solve the problem that the sample size of four Asian fusion menus and four urban Mexican menus might be not large enough, the sample was then divided by four kinds of menu designs instead. That is, to change the categorical independent variables from the twelve types of menus to four types of menu design. All the responses from the control menus of three restaurants were combined into one group of responses under control menu design; all the responses from the “first and last” menus of three restaurants were combined into one group of responses under “first and last” menu design; all the responses from the “light and fresh” menus of three restaurants were combined into one group of responses under “light and fresh” menu design; all the responses from the “sweet spots” menus of three restaurants were combined into one group of responses under “sweet spots” menu design. Table 13 lists the descriptive statistics of new independent variables in cross tabulation.
Table 13

*Calorie Choices on Four Menu Designs*

<table>
<thead>
<tr>
<th>Menu Design</th>
<th>N</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 600 Calories</td>
<td>≥ 600 Calories</td>
<td></td>
</tr>
<tr>
<td>Control Menu</td>
<td>38</td>
<td>85</td>
<td>123</td>
</tr>
<tr>
<td>First and Last</td>
<td>40</td>
<td>75</td>
<td>115</td>
</tr>
<tr>
<td>Light and Fresh</td>
<td>52</td>
<td>67</td>
<td>114</td>
</tr>
<tr>
<td>Sweet Spot</td>
<td>41</td>
<td>73</td>
<td>114</td>
</tr>
<tr>
<td>Total</td>
<td>171</td>
<td>300</td>
<td>471</td>
</tr>
</tbody>
</table>

It is shown that after transferring the independent variables from twelve types of menus into four types of menu designs, there were over 100 participants under each type of menu design and it appeared to be ideal sample size for the logistic regression.

Compared with the control menu design, the percentage of people who chose lower-than-600-Calorie items increased in all of three treatment menu designs. Whether or not such increase was significant enough is analyzed and determined by the following logistic regression. For the measurement of relationship between four menu designs as categorical independent variables and the Calorie choices on menus as a binary dependent variable, logistic regression was applied and the results are shown Table 14, with a confidence level of 95% and a prevision of ±5%.
Table 14

*Relationships between Menu Designs and Calorie Choices*

<table>
<thead>
<tr>
<th>Menu Design</th>
<th>B</th>
<th>Df</th>
<th>Sig</th>
<th>Exp</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>.216</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First and Last</td>
<td>.176</td>
<td>1</td>
<td>.523</td>
<td>1.193</td>
</tr>
<tr>
<td>Light and Fresh</td>
<td>.552</td>
<td>1</td>
<td>.040</td>
<td>1.736</td>
</tr>
<tr>
<td>Sweet Spot</td>
<td>.228</td>
<td>1</td>
<td>.408</td>
<td>1.256</td>
</tr>
<tr>
<td>Constant</td>
<td>-.453</td>
<td>1</td>
<td>.000</td>
<td>.568</td>
</tr>
</tbody>
</table>

“Simple contrast” function was applied in this logistic regression model in order to compare each menu design to the reference group; the reference group here referred to the control menu. It is shown that there was no significant relationship between different menu designs and participants’ food choice in general (Sig. = .216, P-Value > .05). However, the “light and fresh” menu design by putting green symbol next to lower-than-600-Calorie items resulted in a significant increase in percentage of participants who chose items in lower Calories (B = .552, Sig. = .040, P-Value < .050). Therefore it was able to identify that there was a significant relationship between the participants’ food choices on low Calorie items and the “light and fresh” menu design; percentage of participants that chose lower-than-600-Calorie items increased if the menu was designed with green symbols on lower Calorie items. As a result, the statistics failed to reject the null hypotheses H1A₀ and H1B₀ and rejected the null hypothesis H1C₀ of the RQ1.

**Impact of Personal Dietary Behavior Change on Menu Choices**

In this study, the TTM was applied to categorize people into five stages of behavioral change according to their dietary behavior and behavior change. Based on the
modified staging instrument adapted from Curry, Kristal, and Bowen (2012), participants were categorized into five stages of change by answering five logic questions (See Chapter 3 and Appendix O). The second research question (RQ2) is designed to evaluate the correlation between personal dietary behavior and young Millennials’ Calorie choices on restaurant menus. RQ(2) is: Are young Millennials’ menu choices on low-Calorie items correlated with personal dietary behavior and behavior change?

The hypotheses associated with this RQ are:

\( H_{0} \): Young Millennials’ menu choices on low-Calorie items are not correlated with personal dietary behavior and behavior change.

\( H_{1} \): Young Millennials’ menu choices on low-Calorie items are correlated with personal dietary behavior and behavior change.

The descriptive statistics of stage of change and the cross tabulation between stage of change and food choices on restaurant menus are shown Tables 15 and 16.

Table 15

*Distribution of Participants in Five Stages of Change*

<table>
<thead>
<tr>
<th>Stage of Change</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-contemplation</td>
<td>226</td>
<td>48.0</td>
</tr>
<tr>
<td>Contemplation</td>
<td>33</td>
<td>7.1</td>
</tr>
<tr>
<td>Preparation</td>
<td>85</td>
<td>18.0</td>
</tr>
<tr>
<td>Action</td>
<td>85</td>
<td>18.0</td>
</tr>
<tr>
<td>Maintenance</td>
<td>42</td>
<td>8.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>471</td>
<td>100.0</td>
</tr>
</tbody>
</table>

As shown Table 15, most participants were in the pre-contemplation stage, indicating that 48% of participants were not currently limiting their daily Calorie...
consumptions, and were not planning to change their dietary behavior in the near future.

Table 16 shows what the participants in five stages of dietary change chose on the given menus.

Table 16

*Calorie Choices among People in Five Stages of Change*

<table>
<thead>
<tr>
<th>Stage</th>
<th>N</th>
<th>Total</th>
<th>%</th>
<th>&lt; 600 Calories</th>
<th>≥ 600 Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-contemplation</td>
<td>68</td>
<td>226</td>
<td>30.1</td>
<td>68</td>
<td>158</td>
</tr>
<tr>
<td>Contemplation</td>
<td>12</td>
<td>33</td>
<td>36.4</td>
<td>12</td>
<td>21</td>
</tr>
<tr>
<td>Preparation</td>
<td>32</td>
<td>85</td>
<td>37.6</td>
<td>32</td>
<td>53</td>
</tr>
<tr>
<td>Action</td>
<td>41</td>
<td>85</td>
<td>48.2</td>
<td>41</td>
<td>44</td>
</tr>
<tr>
<td>Maintenance</td>
<td>18</td>
<td>42</td>
<td>42.9</td>
<td>18</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>171</td>
<td>471</td>
<td>36.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Compared with the percentage of people who chose the lower-than-600-Calorie items in the pre-contemplation stage, there were higher percentages of participants who chose the lower-than-600-Calorie items in the other four stages. As the position in stage of change went up, the percentage of people who chose the lower-than-600-Calorie items increased as well. It indicated that as the participant became more likely to switch to a healthier lifestyle in terms of daily Calorie consumptions and became more likely to maintain the healthy dietary behaviors, people would be more likely to progress to the next level and the likelihood of choosing lower Calorie items on restaurant menus increased as well, except for the maintenance stage. The biggest increase in percentage of people who chose lower-than-600-Calorie items happened in the action stage, indicating that participants who just started to control their Calorie amount in their diet
over the past six months or less provided the strongest reaction to the Calorie information on the menu.

Whether or not the impact of the participants’ positions in the stage of change model on their food choices was significant enough was analyzed and determined by the following logistic regression. For the measurement of relationship between five stages of change as ordinal/categorical independent variables and the food choices on menus as a binary dependent variable, logistic regression was applied and Table 17 is the outputs, with a confidence level of 95% and a prevision of ± 5%.

Table 17

*Relationship between Stage of Change and Calorie Choices*

<table>
<thead>
<tr>
<th>Stage of Change</th>
<th>B</th>
<th>Df</th>
<th>Sig</th>
<th>Exp</th>
</tr>
</thead>
<tbody>
<tr>
<td>From Stage 1 to 2</td>
<td>.283</td>
<td>1</td>
<td>.467</td>
<td>1.328</td>
</tr>
<tr>
<td>From Stage 2 to 3</td>
<td>.197</td>
<td>1</td>
<td>.507</td>
<td>1.217</td>
</tr>
<tr>
<td>From Stage 3 to 4</td>
<td>.565</td>
<td>1</td>
<td>.032</td>
<td>1.760</td>
</tr>
<tr>
<td>From Stage 4 to 5</td>
<td>.207</td>
<td>1</td>
<td>.538</td>
<td>1.230</td>
</tr>
<tr>
<td>Constant</td>
<td>-.453</td>
<td>1</td>
<td>.000</td>
<td>.636</td>
</tr>
</tbody>
</table>

The stage of change is a healthy behavior model that assigns individuals into one of five correlated and progressive stages based on certain health behavior change, and people can only progress to the next stage or relapse to the previous stage (Prochaska & Velicer, 1997). “Difference contrast” function was applied in this logistic regression model in order to compare each stage of change to the previous stage. “From stage 1 to 2” compared the data in contemplation stage to the data in pre-contemplation stage; “from stage 2 to 3” compared the data in preparation stage to the data in contemplation stage;
“from stage 3 to 4” compared the data in action stage to the data in preparation stage; “from stage 4 to 5” compared the data in maintenance stage to the data in preparation stage.

Table 17 shows that there was a significant correlation between the participants’ dietary behavior change and their Calorie choices on restaurant menus (Sig. = .046, P-Value < .05). Additionally, compared with people in preparation stage (stage 3), there is a significant increase in percentage of choosing lower-than-600-Calorie items among people in action stage (stage 4) (B = +.565, Sig. = .032, P-Value < .05). It indicated that people in action stage who just changed to a healthier diet over the past six months or less were significantly sensitive to the Calorie information on restaurant menus.

Therefore it was summarized that there was a significant correlation between the participants’ dietary behavior change and their food choices on restaurant menus; in typical, people in action stage reacted to the Calorie information on menus distinctly. As a result, the statistics rejected the null hypothesis H2o of the RQ2.

**Impact of Demographic Characteristics on Menu Choices**

The third research question (RQ3) is designed to evaluate the impact of demographic characteristics on restaurant food choices among young Millennials. Descriptive characteristics of participants can be found in Table 7. RQ(3) is: Are young Millennials’ menu choices on low-Calorie items correlated with the demographic characteristics? There were four demographic characteristics being evaluated in this study, including gender, educational level, race, and BMI/weight status.

The first predictor under demographic characteristics was gender. The hypotheses associated with the gender in RQ3 list as follows:
H3A0: Young Millennials’ menu choices on low-Calorie items are not correlated with the gender.

H3A1: Young Millennials’ menu choices on low-Calorie items are correlated with the gender.

Table 18 lists the cross tabulation between participants’ gender and their Calorie choices on restaurant menus. It is indicated that even though there were more male participants than female participant in this study, the percentage of female objects choosing lower-than-600-Calorie items is much higher than the male objects choosing lower-than-600-Calorie items (45.9% vs. 30.1%).

Table 18

Calorie Choices among People in Different Genders

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 600 Calories</td>
<td>≥ 600 Calories</td>
<td></td>
<td>&lt; 600 Calories</td>
</tr>
<tr>
<td>Female</td>
<td>89</td>
<td>105</td>
<td>194</td>
<td>45.9</td>
</tr>
<tr>
<td>Male</td>
<td>82</td>
<td>190</td>
<td>272</td>
<td>30.1</td>
</tr>
<tr>
<td>Others</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>171</td>
<td>300</td>
<td>471</td>
<td>36.3</td>
</tr>
</tbody>
</table>

Whether or not the impact of the participants’ gender on their food choices was significant enough is analyzed and determined by the logistic regression. For the measurement of relationship between gender as categorical independent variables and the Calorie choices on menus as a binary dependent variable, logistic regression was applied and Table 19 is the outputs, with a confidence level of 95% and a prevision of ± 5%. 

74
As nominal variables, “simple contrast” function was applied to gender as independent variables in this logistic regression model in order to compare female and bigender participants to the reference group; the reference group here was the male participants. It is shown that in general there was significant relationship between gender and participants’ Calorie choices (Sig. = .003, P-Value < .05). Typically, in comparison with the male participants, there was a significant increase in percentage of lower-than-600-Calorie items selection among female participants (B = .675, Sig. = .001, P-Value < .05). As a result, in RQ3 the statistics rejected the null hypothesis (H3A0).

The second predictor under demographic characteristics was educational level. The hypotheses associated with the educational level in RQ3 list as follows:

H3B0: Young Millennials’ menu choices on low-Calorie items are not correlated with the educational level.

H3B1: Young Millennials’ menu choices on low-Calorie items are correlated with the educational level.

Table 20 lists the cross tabulation between participants’ educational levels and their Calorie choices on restaurant menus. As the educational level of participants went

<table>
<thead>
<tr>
<th>Gender</th>
<th>B</th>
<th>Df</th>
<th>Sig</th>
<th>Exp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compare Female to Male</td>
<td>.675</td>
<td>1</td>
<td>.001</td>
<td>1.964</td>
</tr>
<tr>
<td>Compare Bigender to Male</td>
<td>-20.363</td>
<td>1</td>
<td>.999</td>
<td>.000</td>
</tr>
<tr>
<td>Constant</td>
<td>-.453</td>
<td>1</td>
<td>.000</td>
<td>.001</td>
</tr>
</tbody>
</table>

Table 19

*Relationship between Gender and Calorie Choices*
up, there was not any obvious increase or decrease trend in the percentage of lower-than-600-Calorie food choices.

Table 20

*Calorie Choices among People in Different Educational Levels*

<table>
<thead>
<tr>
<th>N</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 600 Calories</td>
<td>≥ 600 Calories</td>
</tr>
<tr>
<td>High school or equivalent</td>
<td>23</td>
<td>44</td>
</tr>
<tr>
<td>Some college credit, no degree</td>
<td>45</td>
<td>102</td>
</tr>
<tr>
<td>Vocational</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>training/technical school</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associate degree</td>
<td>26</td>
<td>42</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>63</td>
<td>98</td>
</tr>
<tr>
<td>Master’s degree</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>171</td>
<td>300</td>
</tr>
</tbody>
</table>

In other words, from the cross tabulation we cannot see a relationship between participants’ educational level and their food choices on low Calorie items. Whether or not there was an underlying relationship between participants’ educational level and food choices was analyzed and determined by the following logistic regression. For the measurement of relationship between educational level as categorical independent variables and the food choices on menus as a binary dependent variable, logistic regression was applied and Table 21 is the outputs, with a confidence level of 95% and a prevision of ± 5%.
As ordinal variables, “difference contrast” function was applied to the independent variables in this logistic regression model in order to compare Calorie choices among people in different educational levels. As shown in Table 21, the “some college credits, no degree” was compared with the “high school degree”; the “vocational training/technical school” was compared with the “some college credits, no degree”; the “associate degree” was compared with the “vocational training/technical school”; the “bachelor’s degree” was compared with the “associate degree”; finally, the “master’s degree” was compared with the “bachelor’s degree”. It is shown in Table 21 that all the Sig. values were larger than .05; neither was there significant relationship between educational level in general and food choices on low Calorie items, nor was there specific educational level that people in this level had significantly sensitive reaction to low Calorie items. As a result, in RQ3 the statistics failed to reject the null hypothesis (H3B0).

The third predictor under demographic characteristics was race. The hypotheses associated with the race factor in RQ3 list as follows:

Table 21

Relationship between Educational Level and Calorie Choices

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some college credit, no degree</td>
<td>-.170</td>
<td>1</td>
<td>.588</td>
<td>.844</td>
</tr>
<tr>
<td>Vocational training/technical school</td>
<td>.551</td>
<td>1</td>
<td>.378</td>
<td>1.735</td>
</tr>
<tr>
<td>Associate degree</td>
<td>.070</td>
<td>1</td>
<td>.835</td>
<td>1.073</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>.090</td>
<td>1</td>
<td>.710</td>
<td>1.095</td>
</tr>
<tr>
<td>Master’s degree</td>
<td>.632</td>
<td>1</td>
<td>.214</td>
<td>1.881</td>
</tr>
<tr>
<td>Constant</td>
<td>-.409</td>
<td>1</td>
<td>.006</td>
<td>.664</td>
</tr>
</tbody>
</table>

As a result, in RQ3 the statistics failed to reject the null hypothesis (H3B0).
H3C₀: Young Millennials’ menu choices on low-Calorie items are not correlated with the race.

H3C₁: Young Millennials’ menu choices on low-Calorie items are correlated with the race.

Table 22 lists the cross tabulation between race of participants and their food choices on restaurant menus.

Table 22

*Calorie Choices among People in Different Races*

<table>
<thead>
<tr>
<th>Race</th>
<th>N</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 600 Calories</td>
<td>≥ 600 Calories</td>
<td>Total</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>20</td>
<td>42</td>
<td>62</td>
</tr>
<tr>
<td>Black or African American</td>
<td>11</td>
<td>23</td>
<td>34</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>13</td>
<td>22</td>
<td>35</td>
</tr>
<tr>
<td>Multiracial</td>
<td>11</td>
<td>12</td>
<td>23</td>
</tr>
<tr>
<td>Native American or American Indian</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>White</td>
<td>116</td>
<td>199</td>
<td>315</td>
</tr>
<tr>
<td>Total</td>
<td>171</td>
<td>300</td>
<td>471</td>
</tr>
</tbody>
</table>

According to Table 22, people who were multiracial had the highest proportion on choosing lower-than-600-Calorie items. Besides the multiracial participants, however, the proportions of people who chose lower-than-600-Calorie items among all the other races were fairly close to each other, which were around 32% – 37%. Additionally, the sample size in multiracial, Native American or American Indian, Hispanic and Black were so small in this study that these might create bias on data results. For the
measurement of relationship between race as categorical independent variables and the food choices on menus as a binary dependent variable, logistic regression was applied and Table 23 is the outputs, with a confidence level of 95% and a prevision of ±5%.

As nominal variables, “deviation contrast” function was applied to race as independent variables in this logistic regression model in order to compare participants in different race to the overall mean value. According to Table 23, there was not a significant relationship between races in general and food choices on low Calorie items, nor was there specific race that had significant association with lower Calorie choices.

As a result, in RQ3 the statistics failed to reject the null hypothesis (H3C0).

The fourth predictor under demographic characteristics was weight status. The hypotheses associated with the BMI in RQ3 list as follows:

H3D0: Young Millennials’ menu choices on low-Calorie items are not correlated with the Body Mass Index (BMI).
H3D$_1$: Young Millennials’ menu choices on low-Calorie items are correlated with the Body Mass Index (BMI).

Table 24 lists the cross tabulation for overweight and obesity by menu choice. From the underweight status to the overweight status, the higher BMI the participants had, the lower percentage of them chose lower Calories food. Except the participants who were in obese status; compared with the participants in overweight status, the percentage of participants who chose lower-than-600-Calorie items in the obese status decreased. One assumption would be people who were in obese status had noticed their health issues in terms of their weight, and therefore some of them started to try to control their Calorie consumptions.

Table 24

*Calorie Choices among People in Different Weight Status*

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;600 Calories</td>
<td>≥600 Calories</td>
<td>Total</td>
</tr>
<tr>
<td>Underweight</td>
<td>14</td>
<td>9</td>
<td>23</td>
</tr>
<tr>
<td>Normal</td>
<td>92</td>
<td>174</td>
<td>266</td>
</tr>
<tr>
<td>Overweight</td>
<td>38</td>
<td>76</td>
<td>114</td>
</tr>
<tr>
<td>Obese</td>
<td>27</td>
<td>41</td>
<td>68</td>
</tr>
<tr>
<td>Total</td>
<td>171</td>
<td>300</td>
<td>471</td>
</tr>
</tbody>
</table>

Whether or not the impact of the participants’ weight status on their food choices was significant enough is analyzed and determined by the following logistic regression. For the measurement of relationship between weight status as ordinal independent variables and the food choices on menus as a binary dependent variable, logistic
regression was applied and Table 25 is the outputs, with a confidence level of 95% and a
prevision of ± 5%.

Table 25

*Relationship between Weight Status and Calorie Choices*

<table>
<thead>
<tr>
<th>Weight Status</th>
<th>B</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal weight</td>
<td>-1.079</td>
<td>1</td>
<td>0.016</td>
<td>0.340</td>
</tr>
<tr>
<td>Overweight</td>
<td>-0.595</td>
<td>1</td>
<td>0.046</td>
<td>0.551</td>
</tr>
<tr>
<td>Obese</td>
<td>-0.122</td>
<td>1</td>
<td>0.682</td>
<td>0.886</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.327</td>
<td>1</td>
<td>0.017</td>
<td>0.721</td>
</tr>
</tbody>
</table>

As ordinal variables, “difference contrast” function was applied to weight status
as independent variables in this logistic regression model in order to compare each
weight status to the weight status that has lower BMI range than them. “Normal weight”
compared the participants in normal weight status to the participants in underweight
status; “Overweight” compared the participants in overweight status to the participants in
normal weight status; “Obese” compared the participants in obese status to the
participants in overweight status.

From the data results, there is no significant relationship between the weight
status as a whole and their food choices on low Calories items (Sig. = .084, P-
Value >.05). However, in comparison with the participants in underweight status, the
participants in normal weight status had significant decrease in percentage of choosing
lower-than-600-Calorie items (B = -1.019, Sig. = .016, P-Value < .05). Similarly, in
comparison with the participants in normal weight status, the participants in overweight
status had significant decrease in percentage of choosing lower-than-600-Calorie items
(B = -.595, Sig. = .046, P-Value < .05). In conclusion, there was significant correlation between participants in normal weight or overweight status and their food choices on lower Calories items; as their BMI went up, they were less likely to choose lower-than-600-Calorie items. As a result, in RQ3 the statistics rejected the null hypothesis (H3D0).

**Collinearity Diagnostics**

Before running the logistic regression among several predictors and dependent variables, collinearity diagnostics were applied in order to detect and remove the redundant variables. Table 26 lists the VIF values and the “tolerance” values of predictors for collinearity diagnostics.

Table 26

<table>
<thead>
<tr>
<th>Collinearity Diagnostics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Collinearity Statistics</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Tolerance</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>Menu Design</td>
</tr>
<tr>
<td>Stage of Change</td>
</tr>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Educational Level</td>
</tr>
<tr>
<td>Race</td>
</tr>
<tr>
<td>Weight Status</td>
</tr>
</tbody>
</table>

Variables whose VIF values are greater than 10 and variables whose “tolerance” value are smaller than .10 may require further investigations. As shown in Table 26, all the “tolerance” values are much larger than .10 and all the “VIF” values are much smaller than 10, indicating that none of the predictors need to be removed from the regression model.
The Regression Model

There were six potential predictors for the final regression model: menu designs, stage of change, gender, race, educational level, and weight status. According to the regression analysis on these categorical predictors individually in the previous subsections, two predictors were removed for the final model, which were race and educational level. Table 27 lists the final logistic regression model between menu food choices as binary dependent variables and participants’ gender, weight status, positions in stage of change and menu designs as categorical independent variables.
Table 27

*Relationship between Calorie Choices and Various Predictors*

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>Df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Menu Design</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First and Last</td>
<td>.038</td>
<td>1</td>
<td>.896</td>
<td>1.039</td>
</tr>
<tr>
<td>Light and Fresh</td>
<td>.594</td>
<td>1</td>
<td>.036</td>
<td>1.811</td>
</tr>
<tr>
<td>Sweet Spot</td>
<td>.244</td>
<td>1</td>
<td>.396</td>
<td>1.276</td>
</tr>
<tr>
<td><strong>Stage of Change</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>From Stage 1 to 2</td>
<td>.440</td>
<td>1</td>
<td>.287</td>
<td>1.552</td>
</tr>
<tr>
<td>From Stage 2 to 3</td>
<td>.118</td>
<td>1</td>
<td>.703</td>
<td>1.126</td>
</tr>
<tr>
<td>From Stage 3 to 4</td>
<td>.649</td>
<td>1</td>
<td>.019</td>
<td>1.913</td>
</tr>
<tr>
<td>From Stage 4 to 5</td>
<td>-.038</td>
<td>1</td>
<td>.913</td>
<td>.962</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female to Male</td>
<td>.604</td>
<td>1</td>
<td>.004</td>
<td>1.830</td>
</tr>
<tr>
<td>Bigender to Male</td>
<td>-20.208</td>
<td>1</td>
<td>.999</td>
<td>.000</td>
</tr>
<tr>
<td><strong>Weight Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight to Normal</td>
<td>-1.032</td>
<td>1</td>
<td>.024</td>
<td>.356</td>
</tr>
<tr>
<td>Normal to Overweight</td>
<td>-.623</td>
<td>1</td>
<td>.054</td>
<td>.537</td>
</tr>
<tr>
<td>Overweight to Obese</td>
<td>-.218</td>
<td>1</td>
<td>.486</td>
<td>.804</td>
</tr>
<tr>
<td>Constant</td>
<td>-7.027</td>
<td>1</td>
<td>.999</td>
<td>.001</td>
</tr>
</tbody>
</table>

Same as mentioned in previous subsections, the “difference contrast” function was applied to ordinal variables including the stage of change and weight status, and the “simple contrast” function was applied to nominal variables including gender and menu designs, in order to run the logistic regression. According to Table 27, when combing the predictors together for logistic regression, most of the variables have same level of significance, except for the “normal to overweight” value. When running the logistic regression individually, the significance value of “normal to overweight” was below .05
(Sig. = .046, P-Value < .05) whereas in the logistic regression model with multiple predictors, the significance value went up and became higher than .05 (Sig. = .054, P-Value > .05). It might be attributed to the influence by other variables, and in the final model the significance value that was higher than .05 was adopted. The conclusions from the final multilogistic regression model are listed as follows:

1. Participants’ Calorie choices were associated with their gender. Female tend to order food in low Calories in restaurant more frequently than male.

2. For participants who are in normal weight, their BMI were associated with their Calorie choices on restaurant menus.

3. Participants’ personal dietary behavior and behavior change in terms of daily Calorie consumption were associated with their Calorie choices on restaurant menus in this study.

4. For participants in action stage of change who had just switched to healthier dietary behaviors in less than six months, their recent dietary behaviors were highly associated with their Calorie choices on restaurant menus.

5. For participants who received the “light and fresh” menus in the survey, their Calorie choices were associated with this menu design.

**Summary**

This chapter discussed the result of the study, including the data collection, treatment of data, and result of the study. First, the date collection subsection discussed the data collection procedures in details, including the IRB process, the duration of survey collection and data collection methods. Second, the treatment of data section described the survey data cleansing process, demographic characteristics of the sample
after the data cleansing process, as well as the recoding procedure of dummy variables for dependent and independent variables. Third, result of the study interpreted data results applying descriptive statistics, cross tabulation, collinearity diagnostics, and logistic regression. SPSS was applied to generate and analyze the data.

As a result, the light and fresh menu designs, the personal dietary behavior change defined by stage of change model, and gender were all associated with the participants’ Calorie choices on menus in this study. What’s more, participants in action stage of Tran-theoretical Model and participants in normal weight status had significant reaction to the exposure of Calorie information.

Chapter 5 discusses findings of the study, limitations of the study that were observed through the study, as well as the implications of the study with a discussion on how this study would contribute to academic area and restaurant industry.
CHAPTER 5

INTERPRETATIONS, LIMITATIONS, AND IMPLICATIONS

Introduction

The purpose of this study is to evaluate the relationship between young Millennials’ Calorie choices on restaurant menus and various factors, including the menu designs, personal dietary behaviors, and demographic characteristics. This chapter is divided into three subsections: interpretation of the findings, limitations of the study, and implications. The interpretation of the findings discusses how the menu design psychology, the personal dietary behavior change and demographics of participants influenced their Calorie choices on restaurant menus, and how the results supported or discouraged the existing studies. The limitations of the study indicate the issues with the study that may create bias and errors in the results, such as the issues about the representativeness of the sample, the statistical power of the sample, and the disadvantages of conducting an online survey. The implications discuss the significance of the study and how the results of the study provided supportive information to chain restaurateurs and scholars.

Interpretations of the Findings

Interpretation of the Menu Design Psychology

RQ1 is designed to evaluate the correlation between different menu designs and young Millennials’ Calorie choices on restaurant menus. RQ(1) is: Are young Millennials’ menu choices on low-Calories items correlated with different menu designs applying menu psychology?
According to Table 10, the “Urban Mexican” restaurant got the most responses and the “California Café” got the least responses. The percentage of participants who chose lower-than-600-Calories items in “California Café” (45.7%) was higher than the participants in the “Urban Mexican” (34.3%) and the participants in the “California Café” (32.7%). In total the percentage of participants who chose lower-than-600-Calorie items was 36.7%.

Under each restaurant, the relationship between the participants’ Calorie choices and menu designs was tested by running the logistic regression between the menu types as independent variables and food choices on menus as binary dependent variables (See Table 12). According to the percentage of people choosing low Calories food in “Urban Mexican” menus, there is a significant difference in food selections between the control menu and the treatment menus (Sig. = .023, P-Value < .05), especially the “light and fresh” ones (Sig. = .016, P-Value < .05). There was no significant relationship between different menu designs and participants’ Calorie choices on “Asian Fusion” menus (Sig. = .361, P-Value >.05) and “California Café” menus (Sig. = .193, P-Value >.05).

Such differences in results may due to the lack in sample size; by combining all results from the menus that applied the same menu design psychology, the logistic regression was applied again between four menu designs as independent variables and Calorie choices as binary dependent variables (See Table 14). As a result, the “light and fresh” menu resulted in a significant increase in percentage of participants who chose items in lower Calories (B = +.552, Sig. = .040, P-Value < .050). Other menu designs revealed no significant change in Calorie choices.
In conclusion, the “light and fresh” menu design by putting a green symbol next
to lower-than-600-Calorie items was significantly associated with participants’ food
selections; hence it was implied in this study that the green symbols had directed
customers’ attentions and achieved promotions on these low Calories items. The impact
of placement of menu items by putting the promoted items at the beginning or the end of
the list, or putting the promoted items at the upper right corner of the menu, did not
produce significant correlation with participants’ Calorie choices.

The conclusions supported the results from existing menu design psychology
studies stating that salience builders such as symbol and highlights helped increase the
sales of certain item (Almanza, Mason, Widdows, & Girard, 1993; Chu, Frongillo, Jones,
& Kaye, 2009; Cranage, Conklin, & Lambert, 2004; Pulos & Leng, 2010; Wansink, &
Love, 2014; Zwicky & Zwicky, 1980). The result also supported the existing studies
concluding that the numeric presentation of Calorie information only did not have
significant impact on food choices, and the power of symbolic Calorie label by putting
symbols to items with low Calories has more significant power than numeric presentation
of Calorie information only (Bishop, Brown, Heins, & Mayer, 1987; Ellison, Lusk, &
Davis, 2014).

However, according to the literature review on existing studies about Calorie
labeling there is no overall consensus on the influence of menu labeling on food
selections among existing scholarly studies. The results of this study conflicts the studies
that providing nutritional and Calorie information on menus lowered the Calorie intake
The study result supported the existing studies on gaze motion that people do not scan the menu in certain ways and the “sweet spot” does not exist (Yang, 2012).

**Interpretation of the Stage of Change**

RQ2 is designed to evaluate the relationship between personal dietary behavior or behavior change and Calorie choices on restaurant menus among young Millennials, which is “Are young Millennials’ menu choices on low-Calorie items correlated with personal dietary behavior and behavior change?” According to Table 15, most participants were in the pre-contemplation stage, indicating that 48% of participants are not currently limiting their daily Calorie consumptions and are not planning to change their dietary behavior in the near future.

In terms of the Calorie consumptions among participants in each stage of behavior change, the participants in next level were more likely to choose lower-than-600-Calorie items than the participants in previous level (See Table 16). According to the logistic regression between stage of change and Calorie choices, there was a significant relationship between the participants’ dietary behavior change and their Calorie choices on restaurant menus (Sig. = .046, P-Value < .05). Specifically, compared with people in preparation stage (stage 3), there is a significant increase in the percentage of choosing lower-than-600-Calorie items among people in action stage (stage 4) (B = +.565, Sig. = .032, P-Value <.05). It indicated that people in the action stage who just changed to a healthier diet over the past six months or less had a much more significant reaction to the exposure of the Calorie information on restaurant menus, in comparison with the people who were ready to change to a healthier diet immediately but had not yet started.
In conclusion, the individual dietary behavior change in terms of their positions in the stage of change in the TTM was significantly associated with their Calories choices on restaurant menus. People in action stage had the most distinct reaction to the exposure of Calorie information on restaurant menus.

**Interpretation of the Demographics**

RQ3 is designed to evaluate the relationship between demographic characteristics and Calorie choices among young Millennials, which is “Are young Millennials’ menu choices on low-Calorie items correlated with the demographic characteristics?”

Logistic regression was applied to analyze the relationship between demographic characteristics and the participants’ Calorie choices. In comparison with the male participants, there is a significant increase in percentage of lower-than-600-Calorie items selection among female participants (See Table 19, B = .675, Sig. = .001, P-Value < .05). It indicated that female participants were more sensitive to the Calorie information on restaurant menus. There was no significant relationship between educational level in general and Calorie choices, nor did the specific educational level that had significant relationship with Calorie choices (See Table 21). There was no significant relationship between race of participants and their Calorie choices, nor did the specific race that had significant relationship with Calorie choices (See Table 23). In comparison with the participants in underweight status, in normal weight group the percentage of participants who chose lower-than-600-Calorie items was significantly lower (B = -1.019, Sig. = .016, P-Value < .05). Similarly, in comparison with the participants in normal weight status, in overweight group the percentage of participants who chose lower-than-600-Calorie items was significantly lower (B = -.595, Sig. = .046, P-Value < .05). These indicated that the
Calorie information on restaurant menus were closely associated with participants in normal weight or overweight status; as their BMI went up, they were less likely to choose lower-than-600-Calorie items.

In conclusion, the demographic characteristics that were significantly correlated with their Calorie choices in this study were gender and weight status. Findings about personal educational level and race did not provide significant association with Calorie choices.

**Limitations of the Study**

Potential limitations and errors in the research process required cautions to be taken when considering the results. The major limitation of this study was the insufficiency in sample size, in terms of demographic characteristics of the participants and the data analysis process. Other limitations include the weakness of conducting online survey and applying BMI for measuring individuals’ weight status.

**Limitations of the Sample Size**

The major limitation in this study was the insufficiency in sample size. A minimum of 10 observations in both positive responses (or 1) and negative responses (or 0) of binary dependent variables under each independent variable is recommended to achieve ideal level of statistic power (Peduzzi, Concato, Kemper, Holford, & Feinstein, 1996).

According to Table 6 there were only two Native American among the participants. This might be one of the reasons why the participants’ races are not significantly associated with participants’ Calorie choices. Furthermore, according to Table 11 only six people chose the lower-than-600-Calorie items when they got the first
and last menu from California Café restaurant. Only ten people who got the control menu from Asian Fusion restaurant chose lower-than-600-Calorie items, so did ten people who got the Light and Fresh menu from Asian Fusion Restaurant. Therefore, to achieve better statistical power the menu designs as independent variables were transformed from twelve types of menus into four types of menus by combing the menus from three restaurants that applied the same menu design psychology. This method might create bias that people in certain restaurant preference may have healthier dietary behavior than others. A further research can be done for the assessment of the relationship between young Millennials’ restaurant preferences and their Calorie choices on restaurant menus.

Limitations of the Online Survey

The study was conducted via a web-based online survey, and the main sampling method was the MTurk. First, one typical weakness of the online survey is that it cannot get exposed to everyone in target population. Even though the young Millennials are considered fairly active on Internet, it is still possible that Internet and computers are not accessible to some U.S. young Millennials (Ipsos, 2015). Additionally, the studies about the validity of conducting social science experiments using MTurk participants reported that the US MTurk population is mostly white, and is somewhat more educated than the U.S. population overall (Buhrmester, Kwang, & Gosling, 2011; Paolacci, Chandler, & Ipeirotis, 2010). It is also shown in Tables 7 and 8 that there were apparent biases in race and educational levels between the sample and the U.S. young Millennial population. The average educational level of participants in this study was higher than the average educational level of U.S. young Millennial population, and there was a higher proportion of White and Asian among participants than the U.S. young Millennial population.
Therefore in terms of the demographic characteristics of the participants, the sample was not fairly representative for the U.S. young Millennial population and it might create errors in data results.

Second, since the study conducted the experiment on menu selections by providing the menus online to participants, no matter how hard the researchers try to design the menu as real as possible, the online menus still may create bias and errors on results and hurt external validity. Since the participants were not making real food choices in the restaurants, their Calorie choices online could be totally different from their Calorie choices in real chain restaurants. Furthermore, participants’ Calorie choices could be different depended on their current conditions while taking the survey. For instance, participants might feel not hungry at all when taking the survey, they might be specifically craving on some dishes that were not available on the menu, or they might be not interested in any dishes on the given menus.

**Limitation of the BMI**

The study adopted the BMI as one predictor for the Calorie choices on restaurant menus. However, BMI is not a direct measure of body and it is calculated from an individual’s weight that includes both muscle and fat (CDC, n.d.). As a result, some participants may have a high BMI but not have a high percentage of fat.

**Implications**

**Implications for Restaurateurs**

With the finalization of the national Menu Calorie Labeling Rule by FDA on November 25, 2014 that requires all chain restaurants with 20 or more locations to provide standard Calorie information on their menus in the next few years, restaurateurs
surely cannot neglect the potential influence of menu labeling to the chain restaurateurs in the near future anymore. Furthermore, before the national rule being finalized there has been many chain restaurant managers paying attention to the Calorie labeling on their menus and the impact on sales and profits for a few years, because there has been several states or cities released their local menu Calorie labeling laws or regulations since 2007 (CSPI, 2010).

This study provides chain restaurant managers with evidence that the implementation of national Menu Calorie Labeling Rule may influence their customers’ menu choices, especially for the restaurateurs whose primary customers are young adults. In this study, since there were eight higher-than-600-Calorie items and four lower-than-600-Calorie items in each menu, the percentage of food items that were lower than 600 Calories was calculated as 33.3%. On the other hand, the overall rate of participants who chose lower-than-600-Calorie-items in the survey was 36.3%. It indicated there might be no direct relationship between the display of Calorie information on menus and participants’ Calorie choices on restaurant menus. This result supported numerous studies on the impact of Calorie display on chain restaurant menus, concluding that Calorie information on chain restaurant menus did not significantly affect people’s purchase behavior in terms of the food choices and food sales (Breck et al, 2014; Dumanovsky et al., 2010; Finkelstein et al., 2010).

This study went further than those mentioned in the previous paragraph. It evaluated the influence of independent variables other than just labeling menu items with Calorie levels. The results indicated that the relationship between participants’ food choices and different menu designs, the “light and fresh” menus that marked lower-than-
600-Calorie items with green symbol had significant correlation with participants’ Calorie choices (See Table 14). According to Table 14, 30.9% of participants chose lower-than-600-Calorie items on control menus, while 45.6% of participants chose higher-than-600-Calorie items on “light and fresh” menu. The “first and last” menu design that put the lower-than-600-Calorie items at the beginning and end of the list did not increase the selections on these low Calorie items significantly, so did the “sweet spot” menu design that put the lower-than-600-Calorie items at the upper right corner of the menu. This study result suggest that the significant correlation between display of salience builder and Calorie choices that restaurant manager can apply symbols and highlights on certain menu items as an efficient marketing tool for promotion. Such marketing tool might be more effective than placing promoted items to certain area of the menu.

The obesity problem has been a severe issue over the past years that the worldwide obesity has almost doubled since 1980 (WHO, 2015). Hence in recent years there have been many restaurants that are focusing on not only the profit and sales of the dishes, but also the nutrition and healthy facts of dishes that are provided to their customers (Wansink & Love, 2014). Based on the growth-share matrix, the traditional menu engineering approach categorize menu items into four groups by profitability and popularity and then concentrate on items that have high contribution margin and high popularity (Henderson, 1970). This study can be a supportive case to the restaurateurs who are looking for a strategy that help them promote the dishes that have a high contribution margin and can be marketed as being low in Calories.
Along with the finalization of national Menu Calorie Labeling Rule by the FDA on November 25, 2014, for restaurateurs the influence of the rule can be double-sided, which highly depends on the corresponding menu manipulations. A win-win situation can be established when the restaurateurs successfully promote and popularize their profitable items with low Calorie and high nutrition to customers. Instead of simply hoping the exhibition of nutritional information to change customers’ purchasing behaviors, principles of menu psychology and health behavior theories should be utilized as well to conduct menu redesign for leading healthier choices to young Millennial customers (Wansink & Love, 2014).

This study mainly focused on the young Millennials’ reaction to the exposure of Calorie information in terms of their food choices on certain menus, and the beverage selections made by the participants were not taken into consideration for further data analysis in this study. Hence the results and related information in this study may not be a supportive material for restaurateurs from the chain brands that mainly sell beverage such as Starbucks and Jamba Juice.

**Implications for Stage of Change studies**

The study applied Curry, Kristal, and Bowen’s instrument that is perceived as the prototype of dietary staging instrument (Curry et al., 1992; Lamb & Joshi, 2004). Numerous studies have worked on the dietary fat consumption applying this instrument (Armitage & Arden, 2001; Burke et al., 2000); however, bare literatures were found that applied the staging instrument for the measurement of Calorie consumption among people in different stages of change. Therefore this study can be supportive materials for further studies on Calorie consumptions and stage of change.
According to several studies that applied staging instrument to categorize people into different stages in terms of personal dietary behavior such as fat consumption, 50% or more people in those studies were classified into the action stage or the maintenance stage (Armitage & Arden, 2001; Brug, Hospers, & Kok, 1997; Burke et al., 2000). The results of this study conflicts the studies listed above that 50% or more people in this study were classified into the pre-contemplation and contemplation stages.

One potential reason why most of participants were in the pre-contemplation stage and the contemplate stage is that the U.S. young Millennials are conducting a typically different dietary behaviors from older generations. Young Millennials have poor dietary habits in terms of nutrient intake, which contributes to the early progress of obesity. For instance, the most evident increase in weight gain and obesity has been reported between the ages of 18 and 29, typically among college students (U.S. Department of Health and Human Services, 2011). Currently over one third of college students are perceived as overweight or obese; they typically gain weight during their freshman year due to transitional stress from environmental changes, which is known as “Freshman 15” (Delinsky & Wilson, 2008; Racette, Deusinger, Strube, Highstein, & Duesinger, 2008).

Summary

In this chapter, the interpretation of the findings discusses how the several menu design psychologies, the personal dietary behavior change and demographics of participants influenced their Calorie choices on restaurant menus. From the study results, the “light and fresh” menu design by putting green symbol to lower-than-600-Calorie items significantly increased the proportion of participants choosing the lower Calories
dishes. Additionally, participants in action stage of change who just started a healthier diet over the past six months or less were significantly more likely to choose low Calories items in this study, so did the female participants.

The limitations of the study indicate the issues along with the study that might create bias and errors in the study results. In terms of the race and educational level, the bias in distribution of demographic characteristics between the sample and the population weakened the representativeness of the sample. For the representativeness of the sample, the sample size might be not large enough to represent the U.S. young Millennials whose preferred restaurant types are Asian restaurant and western bistro. Additionally, this web-based online survey might create errors by applying simple random sampling methods, and it might not be accessible to the whole population.

The implications list the significance of the study and how the results of the study provided supportive information to chain restaurateurs and scholars; the results and information collected from this study may be informative to chain restaurant managers who want to know the potential impact of Calorie labeling on their young customers’ food selections and overall sales, and who are looking for a menu design technique that could promote items that are in high contribution margin and/or in low Calories. The results about the relationship between the young adults’ positions in stage of change and their Calorie choices on menus may be informative to scholars who is working on the studies that evaluate relationship between positions in stage of change and Calorie consumptions, as there are barely existing studies applying the staging instrument in the TTM for the studies on daily Calorie consumptions.
Appendix A: IRB Exemption Approval

UNLV

UN SIGNED CONSENT DOCUMENT FOR WEB-BASED ONLINE SURVEY
Department of William F. Harrah College of Hotel Administration

TITLE OF STUDY: Impact of Menu Design and Personal Health Belief on Young Millennials’ Restaurant Menu Choices

INVESTIGATOR (S): Dr. Christine Bergman, Ms. Yuan Tian

For questions or concerns about the study, please feel free to contact Ms. Yuan Tian at 702-686-1380, the person mainly responsible for the research. You may also contact Dr. Christine Bergman at 702-895-5458, the Principal Investigator.

For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted, contact the UNLV Office of Research Integrity – Human Subjects at 702-895-2794, toll free at 877-895-2794 or via email at IRB@unlv.edu.

Purpose of the Study
We would like to invite you to participate in a web-based online survey. The survey is part of a research study whose purpose is to evaluate the effects of several menu designs on young Millennials’ food choices in restaurants, and how young Millennials with different dietary beliefs and behaviors react to exposure to menu designs.

Participants
You are being requested to participate in the study because you fit in the generation called “young Millennial”, whose age range from 18-24.

Procedures
If you volunteer to participate in this study, you will be asked to finish the following survey. Firstly, you will be asked to make selections on given restaurant menu as you normally do in a casual dining area. Then, you will be requested to answer a few questions about the menu and personal dietary habits.

Benefits of Participation
There are no direct benefits to you as a participant in this survey. However, we hope this study can have positive impact on your personal dietary habits and lifestyle. Also, your responses may help us know more about young Millennials’ food choices and dietary behaviors.

Risks of Participation
There are no known risks or discomforts associate with this survey; however, there are risks involved in all research studies. This survey may include only minimal risks that you may feel uncomfortable to answer some questions; if so, you can decide to skip the question(s) or quit the survey at anytime.

Cost /Compensation
There is no financial cost to you to participate in this survey. The survey will take 8-10 minutes of your time. You will not be compensated for your time.

Protocol #724285-2, Exempted: 03/18/15

Page 1 of 2
Confidentiality
Your part in this study is anonymous to the researchers. However, because of the nature of web based surveys, it is possible that respondents could be identified by the IP address or other electronic record associated with the response. Neither the researcher nor anyone involved with this survey will be capturing those data.

All information gathered in this study will be kept as confidential as possible. Any reports or publications based on this research will use only group data and will not identify you or any individual as being affiliated with this research. No reference will be made in written or oral materials that could link you to this study. All records will be stored in a locked facility at UNLV for 3 years after completion of the study. After the storage time the information gathered will be deleted.

Voluntary Participation
Your participation in this study is voluntary. You may refuse to participate in this study or in any part of this study. You may withdraw at any time without prejudice to your relations with UNLV. You are encouraged to ask questions about this study at the beginning or any time during the research study.

Participant Consent:
By clicking on the “accept” button below I am indicating that I have read the above information and consent to participate in this study. I have been able to ask questions about the research study. I am at least 18 years of age.
Appendix B: Original Staging Instrument

Staging questions (Curry et al., 1992)

1. Have you ever changed your eating habits to decrease the amount of fat in your diet?
   a. If NO, please go to question 2.
   b. If YES, are you currently limiting the amount of fat in your diet?
      i. If NO, please go to question 2.
      ii. If YES, how long have you been limiting the amount of fat in your diet?
          Less than 30 days  1-6 months  7-12 months  >1 year

2. In the past month have you thought about changes you could make to reduce the amount of fat in your diet?
   a. If NO, please exit to question 3
   b. If YES, how confident are you that you will make some of these changes in the next month?
      Very confident  Somewhat confident  Mildly confident  Not at all confident

Staging algorithm scoring (Curry et al., 1992)

<table>
<thead>
<tr>
<th>Stage</th>
<th>Question(s)</th>
<th>Answer(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-contemplation</td>
<td>1 or 1a</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>Contemplation</td>
<td>1 or 1a</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>2a</td>
<td>Mildly or not at all confident</td>
</tr>
<tr>
<td>Preparation</td>
<td>1 or 1a</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>2a</td>
<td>Somewhat or very confident</td>
</tr>
<tr>
<td>Action</td>
<td>1 and 1a</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>1b</td>
<td>6 months or less</td>
</tr>
<tr>
<td>Maintenance</td>
<td>1 and 1a</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>1b</td>
<td>7 months or more</td>
</tr>
</tbody>
</table>
Appendix C: Survey Questions

1. How old are you?
   a. 18-24 years old
   b. 25-34 years old
   c. 35-44 years old
   d. 45-54 years old
   e. 55-64 years old
   f. 65+ years old

2. What kind of platform are you using to take this survey right now?
   a. Small phone
   b. Tablet
   c. Laptop
   d. Desktop
   e. Others_____

3. If you are using a tablet or a smartphone, please make sure that your device is in landscape orientation from now. Thank you!

4. If you were to have meal outside the home, which one of the following restaurants would you prefer?
   a. Urban Mexican
   b. Asian Fusion
   c. West Coast Bistro

5. Next you will see a menu based on your restaurant preference. Please make ONE entrée and ONE beverage selection by clicking on the menu that you would like to order in a real casual-dining restaurant. You can click on the items again to deselect them, if you change your mind. (See Appendix B-M)
   a. Strongly disagree
   b. Disagree
   c. Undecided
   d. Agree
   e. Strongly agree
6. I have never changed my eating habits to decrease the amount of Calories in my diet.
   a. Yes
   b. No

7. I am currently limiting the amount of Calories in my diet?
   a. Yes
   b. No

8. I have been limiting the amount of Calories in my diet for …
   a. Less than 30 days
   b. 1-6 months
   c. 7-12 months
   d. >1 year

9. In the past month I have thought about changing what I eat to reduce the amount of Calories in my diet.
   a. Yes
   b. No

10. I am confident that I can reduce the amount of Calorie intake in my diet in the next month.
    a. Strongly disagree
    b. Disagree
    c. Undecided
    d. Agree
    e. Strongly agree

11. What is your gender? ___________

12. What is the highest level of education you have completed?
    a. High school or equivalent
    b. Some college credit, no degree
    c. Vocational training/trade/technical school
    d. Associate degree
    e. Bachelor’s degree
    f. Master’s degree
g. Other ______________________

13. How would you classify yourself?
   a. Asian/Pacific Islander
   b. Black or African American
   c. White
   d. Hispanic or Latino
   e. Native American or American Indian
   f. Multiracial
   g. Other ______________________

14. What is your current body weight in pound or kilogram?
   a. Please specify _______ pounds
   b. Please specify _______ kilograms

15. What is your current height in inches or centimeters?
   a. Please specify _______ feet _______ inches
   b. Please specify _______ centimeters

16. What directed you to this survey?
   a. Facebook page
   b. MTurk
   c. Friends
   d. Class/UNLV
   e. Others (please specify): _______________
## Appendix D: Asian Fusion Control Menu

<table>
<thead>
<tr>
<th>Entree</th>
<th>Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coffee (Regular or Decaf)</td>
<td>151 Cal</td>
</tr>
<tr>
<td>Orange Juice</td>
<td>168 Cal</td>
</tr>
<tr>
<td>Lemonade</td>
<td>148 Cal</td>
</tr>
<tr>
<td>Diet Coke</td>
<td>0 Cal</td>
</tr>
<tr>
<td>Diet Water</td>
<td>0 Cal</td>
</tr>
<tr>
<td>99¢ Bottle Water</td>
<td>0 Cal</td>
</tr>
<tr>
<td>99¢ Lemonade</td>
<td>0 Cal</td>
</tr>
</tbody>
</table>

### Vegetarian Entrée Menu

- Spicy Tuna Roll: Served with wasabi, ginger, and striped with sesame seeds, served with spicy tuna, cucumbers, seaweed, rice, toasted sesame seeds, rice, 8-piece roll with spicy tuna, cucumbers, mango, seaweed, Cal 1000
- Spicy California Roll: Served with wasabi, ginger, and striped with sesame seeds, served with spicy tuna, cucumbers, mango, seaweed, Cal 365
- Kimono Beef Lettuce Wrap: Served with wasabi, ginger, and striped with sesame seeds, served with spicy tuna, cucumbers, mango, seaweed, Cal 760
- Chicken Lettuce Wrap: Served with wasabi, ginger, and striped with sesame seeds, served with spicy tuna, cucumbers, mango, seaweed, Cal 570

### Asian Fusion Entrée Menu

- Chicken Doner Noodle: Served with wasabi, ginger, and striped with sesame seeds, served with spicy tuna, cucumbers, mango, seaweed, Cal 840

### Lunch Special

- Spicy Tuna Roll: Served with wasabi, ginger, and striped with sesame seeds, served with spicy tuna, cucumbers, mango, seaweed, Cal 1000
- Spicy California Roll: Served with wasabi, ginger, and striped with sesame seeds, served with spicy tuna, cucumbers, mango, seaweed, Cal 365
- Kimono Beef Lettuce Wrap: Served with wasabi, ginger, and striped with sesame seeds, served with spicy tuna, cucumbers, mango, seaweed, Cal 760
Appendix E: Asian Fusion First and Last Menu

A 2,000 Calorie (Cal) daily diet is used as the basis for general nutrition advice; however, individual needs may vary.

<table>
<thead>
<tr>
<th>Item</th>
<th>Calories (Cal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coffee (regular or decaf)</td>
<td>151</td>
</tr>
<tr>
<td>Lemonade (Cal 114)</td>
<td>0</td>
</tr>
<tr>
<td>Diet Coke (Cal 0)</td>
<td>0</td>
</tr>
<tr>
<td>Orange Juice (Cal 108)</td>
<td>0</td>
</tr>
<tr>
<td>Diet Water (Cal 0)</td>
<td>0</td>
</tr>
<tr>
<td>Lemonade (Cal 114)</td>
<td>0</td>
</tr>
<tr>
<td>Diet Coke (Cal 0)</td>
<td>0</td>
</tr>
</tbody>
</table>

Beverage 12 fl oz 1.99

---

Korean red chili sauce: Served with lemon wrap dipping sauce.
Korean short rib wraps: Served with lemon wrap dipping sauce.
Dipping sauce: Served with lemon wrap dipping sauce.
Spicy tuna roll: Served with lemon wrap dipping sauce.

---

Asian Fusion

Lunch Special 9.99
Appendix F: Asian Fusion Sweet Spot Menu

Lunch Special: 9.99

Asian Fusion

- Chicken Dam Dam Noodle
  - Chicken, bamboo, mushrooms, and egg noodles in a spicy peanut sauce
  - Price: $8.40

- Chicken Lemongrass
  - Chicken with lemongrass, thai curry, and coconut milk
  - Price: $10.00

- Turkey Curry
  - Turkey with tomato sauce, lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemongrass, bell peppers, and coconut milk
  - Price: $9.00

- Thai Green Curry
  - Chicken or Shrimp with lemg
Appendix C: Asian Fusion Light and Fresh Menu
California Cafe Control Menu

Lunch Special: 9.99

- Freshly baked, thick-sliced white bread
- California cheese spread and a four cheese Italian blend on an Italian roll
- Vermilion white cheddar, romano, reduced-fat chive x发生变化
- Fontina grilled cheese
- Swiss cheese, applewood-smoked bacon, lettuce, tomato
- Italian combo sandwich
- Roasted turkey & avocado BLT
- Grilled chicken blackened with a smoky, creamy sauce served with a side of rice and a salad
- New England clam chowder
- Tomato & mozzarella flatbread
- Steak & Cheddar Panini

Menu Options:
- Soup of the Day
- House Salad
- Caesar Salad
- Italian Combo Salad
- Greek Salad
- House Meatball
- Italian Combo Meal
- Caesar Combo Meal
- Italian Combo Meal
- Greek Combo Meal
- House Meatball
- New England Clam Chowder

Drinks:
- Coffee (regular or decaf)
- Oatmeal coffee
- Cappuccino
- Chai tea
- Iced tea
- Lemonade
- Diet Lemonade
- Coconut & Lime
- Iced water
- Diet water

Appendix H: California Cafe Control Menu
Appendix I: California Cafe First and Last Menu

Lunch Special 9.99

Beverage

12 fl oz

Coffee (Regular or Decaf) Cal 149
Lemonade Cal 140
Orange Juice Cal 148
Diet Coke Cal 0
Diet Pepsi Cal 0

Smoked Ham & Swiss Sandwich
Cal 590

Ham & Swiss Sandwich
Cal 590

Lettuce, tomato, pepper jack cheese, and ham on white bread.

Tuna Salad Sandwich
Cal 510

Tuna, hard-cooked egg, celery, and red onion on white bread.

Chicken Club with Avocado Salad
Cal 850

Chicken, tomato, lettuce, bacon, avocado, and ranch dressing on a toasted sandwich.

Steak & Blue Cheese Salad
Cal 860

Beef sirloin, blue cheese, tomato, and mixed greens on a toasted sandwich.

New England Clam Chowder
Cal 1140

Chop suey, rice, and vegetables.

Vegetarian White Cheddar Cheese Sandwich
Cal 980

Vegetarian, white cheddar cheese, and vegetables on white bread.

Beef Stroganoff
Cal 1050

Ground beef, mushrooms, sour cream, and egg noodles.

grassfed organic green salad, mixed greens, with a selection of dressings: balsamic vinaigrette, ranch, or blue cheese.

Roasted Turkey & Avocado BLT
Cal 510

Roasted turkey, avocado, lettuce, tomato, and bacon on wheat bread.

Green Salad
Cal 490

Lettuce, cherry tomatoes, and cheese.

Baked Potato
Cal 315

Smoked gouda cheese, sour cream, and sour cream.


day is used as the basis for general nutrition advice; however, individual needs may vary.
### Appendix J: California Cafe

#### Sweet Spot Menu

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lunch Special</strong></td>
<td>$9.99</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Coffee</strong> (Regular or Decaf)</td>
<td></td>
</tr>
<tr>
<td>+ Orange Juice</td>
<td>$1.75</td>
</tr>
<tr>
<td>+ Lemonade</td>
<td>$1.49</td>
</tr>
<tr>
<td>+ Brown Water</td>
<td>$0.79</td>
</tr>
<tr>
<td>+ Diet Coke</td>
<td>$0.40</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Beverage</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Baked Turkey &amp; Avo Bistro B.L.T.</strong></td>
<td>$9.99</td>
</tr>
</tbody>
</table>

---

Suggested sides include fresh baked French bread, potatoes, fresh noodles with reduced-fat cheese, and freshly baked cornbread. All portions include fresh mozzarella cheese, fresh baked bread, and freshly made sides.
Appendix K: California Cafe Light and Fresh Menu

Light and fresh, under 600 calories.

**Lunch Special**

California Cafe

9.99

Coffee (Regular or Decaf) Cal 0
Lemonade Cal 140
Orange Juice Cal 108
Dine In Cal 151
Hot Tea Cal 0

**Beverage**

12 fl oz

Steak & White Cheddar Panini Cal 1050

Steak & White Cheddar Panini

Vegetarian, then topped with fresh avocado.
Beef, home-breaded and tossed in a spicy pepper seasoning.

Smoked Turkey & Avocado BLT Cal 310

Roasted Turkey & Avocado BLT

Mediterranean Veggie Sandwich Cal 570

Mediterranean Veggie Sandwich

Smoked Ham & Swiss Sandwich Cal 940

Smoked Ham & Swiss Sandwich

Tuscan Salad: Home made bleu cheese dressing & mixed greens Cal 860

Tuscan Salad: Home made bleu cheese dressing & mixed greens

Seared Steak, home fried potatoes & mixed greens Cal 850

Seared Steak, home fried potatoes & mixed greens

California Combo Sandwich Cal 710

California Combo Sandwich

Vegetarian, gluten-free.

Stacked Chicken Cal 505

Stacked Chicken

Light and fresh.

Vegetarian, then topped with fresh avocado.
Beef, home-breaded and tossed in a spicy pepper seasoning.

Smoked Turkey & Avocado BLT Cal 310

Roasted Turkey & Avocado BLT

Mediterranean Veggie Sandwich Cal 570

Mediterranean Veggie Sandwich

Smoked Ham & Swiss Sandwich Cal 940

Smoked Ham & Swiss Sandwich

Tuscan Salad: Home made bleu cheese dressing & mixed greens Cal 860

Tuscan Salad: Home made bleu cheese dressing & mixed greens

Seared Steak, home fried potatoes & mixed greens Cal 850

Seared Steak, home fried potatoes & mixed greens

California Combo Sandwich Cal 710

California Combo Sandwich

Vegetarian, gluten-free.

Stacked Chicken Cal 505

Stacked Chicken

Light and fresh.

Vegetarian, then topped with fresh avocado.
Beef, home-breaded and tossed in a spicy pepper seasoning.

Smoked Turkey & Avocado BLT Cal 310

Roasted Turkey & Avocado BLT

Mediterranean Veggie Sandwich Cal 570

Mediterranean Veggie Sandwich

Smoked Ham & Swiss Sandwich Cal 940

Smoked Ham & Swiss Sandwich

Tuscan Salad: Home made bleu cheese dressing & mixed greens Cal 860

Tuscan Salad: Home made bleu cheese dressing & mixed greens

Seared Steak, home fried potatoes & mixed greens Cal 850

Seared Steak, home fried potatoes & mixed greens

California Combo Sandwich Cal 710

California Combo Sandwich

Vegetarian, gluten-free.
Appendix L: Urban Mexican Control Menu

Lunch Special 99¢

Urban Mexican
Appendix N: Urban Mexican Sweet Spot Menu

---

116

---

Lunch Special 99¢

Urban Mexican


Appendix O: Urban Mexican Light and Fresh Menu

Lunch Special

Light and Fresh: Under 500 Calories

1. Sheet Grilled Chicken 
2. Sheet Baja-style Tacos
3. Sheet Grilled Shrimp

Crispy Tuna Bowl

Vegetarian Wrap with rice, beans, and cheese, served with tomatoes, sour cream, and guacamole. 

Crispy Chopped Salad

Roasted vegetables, rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Fiesta Plate

Mexican rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Tacos

Tortilla shells filled with rice, beans, guacamole, and pico de gallo. 

Mexican Grilled Chicken

Chicken breast grilled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Shrimp

Shrimp grilled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Tuna Salad

Tuna salad with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Burrito

Black bean and cheese burrito with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Quesadilla

Cheese quesadilla with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Enchilada

Cheese enchilada with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Burrito Bowl

Burrito bowl with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Pork Carnitas

Grilled pork with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Tuna

Grilled tuna with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Shrimp

Grilled shrimp with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Chicken

Grilled chicken with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Tacos

Tacos filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Quesadilla

Quesadilla filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Burrito

Burrito filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Enchilada

Enchilada filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican skillet with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Pork Carnitas

Grilled pork with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Tuna

Grilled tuna with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Shrimp

Grilled shrimp with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Chicken

Grilled chicken with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Tacos

Tacos filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Quesadilla

Quesadilla filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Burrito

Burrito filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Enchilada

Enchilada filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican skillet with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Pork Carnitas

Grilled pork with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Tuna

Grilled tuna with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Shrimp

Grilled shrimp with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Chicken

Grilled chicken with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Tacos

Tacos filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Quesadilla

Quesadilla filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Burrito

Burrito filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Enchilada

Enchilada filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican skillet with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Pork Carnitas

Grilled pork with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Tuna

Grilled tuna with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Shrimp

Grilled shrimp with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Chicken

Grilled chicken with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Tacos

Tacos filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Quesadilla

Quesadilla filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Burrito

Burrito filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Enchilada

Enchilada filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican skillet with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Pork Carnitas

Grilled pork with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Tuna

Grilled tuna with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Shrimp

Grilled shrimp with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Grilled Chicken

Grilled chicken with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Tacos

Tacos filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Quesadilla

Quesadilla filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Burrito

Burrito filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican Enchilada

Enchilada filled with rice, beans, guacamole, sour cream, and pico de gallo. 

Mexican skillet with rice, beans, guacamole, sour cream, and pico de gallo.
Appendix P: Modified Staging Instrument

Staging questions (after Curry et. al, 1992)

1. “I have never changed my eating habits to decrease the amount of Calories in my diet.”
   a. If YES, please go to question 2.
   b. If NO, “I am currently limiting the amount of Calories in my diet.”
      i. If NO, please go to question 2.
      ii. If YES, “I have been limiting the amount of Calories in my diet for…”
         Less than 30 days 1-6 months 7-12 months >1 year

2. “In the past month I have thought about changing what I eat to reduce the amount of Calories in my diet.”
   a. If NO, please exit the staging question
   b. If YES, “I am confident that I can reduce the amount of Calories in my diet in the next month.”
      Strongly Disagree Disagree Undecided Agree
      Strongly Agree

Staging Algorithm Scoring (after Curry et. al, 1992)

<table>
<thead>
<tr>
<th>Stage</th>
<th>Question(s)</th>
<th>Answer(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-contemplation</td>
<td>1a</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>Contemplation</td>
<td>1a</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>1a</td>
<td>2</td>
</tr>
<tr>
<td>----------------</td>
<td>--------</td>
<td>-------</td>
</tr>
<tr>
<td>Preparation</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Maintenance</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>2b</td>
<td>Undecided, disagree or strongly disagree</td>
<td></td>
</tr>
</tbody>
</table>
## Appendix Q: Dummy Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Types</th>
<th>Levels</th>
<th>Dummy Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Nominal</td>
<td>Male</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Female</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other</td>
<td>3</td>
</tr>
<tr>
<td>Race</td>
<td>Nominal</td>
<td>Asian/Pacific Islander</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Black or African American</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hispanic or Latino</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Multiracial</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Native American or American Indian</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>White</td>
<td>6</td>
</tr>
<tr>
<td>Education</td>
<td>Ordinal</td>
<td>High school or equivalent</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Some college credit, no degree</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vocational training/technical school</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Associate degree</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bachelor’s degree</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Master’s degree</td>
<td>6</td>
</tr>
<tr>
<td>Weight Status</td>
<td>Ordinal</td>
<td>Underweight</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Normal</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overweight</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Obesity</td>
<td>4</td>
</tr>
<tr>
<td>Stage of Change</td>
<td>Ordinal</td>
<td>Pre-contemplation</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contemplation</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Preparation</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Action</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maintenance</td>
<td>5</td>
</tr>
<tr>
<td>Menu Type</td>
<td>Nominal</td>
<td>Urban Mexican Control Menu</td>
<td>1</td>
</tr>
<tr>
<td>Menu</td>
<td>Choices</td>
<td>Binary/ Nominal</td>
<td>Higher-than-600-Calorie choice</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>------------------</td>
<td>---------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Urban Mexican First and Last</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban Mexican Light and Fresh</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban Mexican Sweet Spot</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian Fusion Control Menu</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian Fusion First and Last</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian Fusion Light and Fresh</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian Fusion Sweet Spot</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>California Café Control Menu</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>California Café First and Last</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>California Café Light and Fresh</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>California Café Sweet Spot</td>
<td>12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
References


of Advertising, 26, 61-73.


130


Retrieved from
http://generationy.typepad.com/petersheahan/generation_y_buying_patterns/


U.S. Census Bureau (2012a). *Annual estimates of the resident population by sex, age, race, and Hispanic origin for the United States and States: April 1, 2010 to July 1, 2012.*
Retrieved from
http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk


U.S. Census Bureau (2012c). *Interim population projections in the US.* Retrieved from

U.S. Centers for Disease Control and Prevention (2011). *Youth risk behavior surveillance*
133

system: 2011 national overview. Retrieved from

from http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/

system: 2011 national overview. Retrieved from

U.S. Food and Drug Administration (2010). Guidance for industry: Questions and answers
regarding the effect of Section 4205 of the Patient Protection and Affordable Care
Act of 2010 on State and Local Menu and Vending Machine Labeling Laws.
Retrieved from
http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInfo-
rmation/LabelingNutrition/ucm223408.htm

U.S. Food and Drug Administration (2014). FDA finalized menu and vending machine
calorie labeling rules. Retrieved from
http://www.fda.gov/newsevents/newsroom/pressannouncements/ucm423952.htm

Vallis, M., Rossi, S., Ruggiero, L., Edwards, L., Greene, G., Rossi, J.S., Jones, H.,

von Keitz, B. (1988). Eye movement research: Do consumers use information they are


Curriculum Vitae

Yuan Tian

Email: tian@unlv.nevada.edu
Tel: 702-686-1380

Local Address:
1055 E Flamingo Rd, 619, Las Vegas, NV 89119

Academic Background

**University of Nevada, Las Vegas**
*Las Vegas, NV*
*William F. Harrah College of Hotel Administration*
Concentrate: MS in Hotel Administration
Aug 2013 – present

**Ohio State University**
*Columbus, OH*
*Fisher College of Business*
Major: Operations Management, BSBA (in Dean’s List)
Degree Conferred Date: Jun 10, 2012 / Cum Laude Honor
Sep 2010 - Jun 2012

**Qingdao University**
*Qingdao, China*
*International College*
Major: International Economy and Trade (credits were transferred to OSU)
First class scholarship in Spring 2009
Secondary scholarships in Spring 2010 and Autumn 2009
Sep 2008 - Jul 2010

Involvements & Honors

**University of Nevada, Las Vegas**
Post Presentation in 20th Annual Graduate Education & Graduate Student Research Conference in Hospitality and Tourism
Guest speaker in UNLV FAB 370 Nutrition in Food Science Class
Jan 2015
April 2015

**Ohio State University**
Member of Buckeye Operations Management Society
Secretary in International Business Students Association
Sep 2011 – Jun 2012
Jan 2011 – Oct 2011

**Qingdao University**
VP in Public Relations and Alumni Association
Honored as ‘Excellent students’ Leader’ In Nov 2009
Sep 2009 – Jul 2010

Skills

**Language**
- English (fluent);
- Korean (intermediate);
- Mandarin (native);

**IT**
- Dreamweaver, Flash
- Microsoft Office
- SPSS, R
- Meeting Matrix
- Opera System, LMS system