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Knowledge, Attitudes, and Beliefs about Food Additives and Obesity

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2019

Abstract

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MS, Long Island University, 2007

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Dissertation Submitted in Partial Fulfillment

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Doctor of Philosophy

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Abstract

Obesity is a chronic health problem that affects the health and wellbeing of its population. The purpose of this cross-sectional, descriptive study was to examine whether there is a relationship between individuals' knowledge, attitudes, and beliefs regarding food additives and obesity. The research questions concerned knowledge, attitudes, and beliefs participants had regarding food additives and obesity. The theoretical foundation for this study was the social learning theory. The participants for this study were recruited from a religious organization in central Florida via announcements in the church bulletin. The method of study was a survey using SurveyMonkey online website and the data analysis method was using SPSS software program. According to study results, on average, the level of knowledge regarding food additives and obesity was a score of 5 out of 7, and there was no difference in knowledge, attitudes, or beliefs among the study participants based on age, income, gender, education, or racial group. The linear regression model indicated that there was a statistically significant relationship between associate degree and knowledge; however, assumption testing revealed that there were issues of heteroscedasticity indicating that the results should be treated with caution. Social change implications based on the findings of this study include a need for additional education regarding the relationship between food additives and obesity, particularly among individuals with lower levels of education.

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Dedication

With great love and respect, I dedicate this body of work to my dear grandmother, Amanda Greaves, who never attained this level of education but had the insight to encourage me through my early childhood to reach for the stars in all and everything that I do. She might not have been successful this far as a child, but she had the skills, insight, and capabilities to do so, but was not afforded the opportunity. I cannot repay you for your encouragement, but this is my way of giving back to you for the successes that I have made in life. You will always be my inspiration and guidance.

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Chapter 1: Introduction to the Study

The purpose of this study was to examine consumers' knowledge, attitudes, and beliefs (KABs) regarding food additives and obesity. Tarnavolgyi (2003) stated that "consumers expressed a variety of concerns such as potential health effects that are related to food additives" (p. 196). Lofstedt (2008, 2009, as cited in Tarnayogyi, 2003) and Mosby (2009, as cited in Tarnayogyi, 2003) suggested that information campaigns might decrease concern about health and food additives. Communications aimed at allowing consumers to make informed decisions related to food additives should be designed and contain the central topics from risk-related perspectives, as well as from the consumers' viewpoints (Hansen, Holm, Robinson, & Sandoe, 2003).). The intent of this study was to define people's KAB regarding food additives and obesity. This study was initiated based on literature on the epidemiology of food additives and obesity. The focal points included economic problems of food additives and obesity, background of food additives and obesity, cost of treating obesity, origins of food additives, and the current state of obesity.

Obesity results in humanitarian and economic problems for the U.S. population (Brown, 2015). The National Institutes of Health (NIH, 2015) declared that obesity had become an epidemic in the United States. The Centers for Disease Control and Prevention (CDC, 2015), and the National Center for Health Statistics (2015) claimed that 36.5% of U.S. adults were obese. Based on the Office of the Surgeon General's *Vision for a Healthy and Fit Nation* (2010), each year, obesity contributes to 112,000 preventable deaths resulting from health conditions such as heart disease, stroke, Type 2 diabetes, and hypertension. Also, certain types of cancers are some of the leading causes

of preventable deaths (NIH, 2010; National Library of Medicine, 2010). Obesity has higher morbidity than mortality health problems such as diabetes, strokes, heart attacks, cardiac diseases, high blood pressure, retinopathy, kidney diseases, and amputation (Visscher & Seidell, 2001). Obesity aligns with higher mortality rates for cardiovascular disease and cancer (NIH, 2002; Obesity and Mortality, 1982).

The Food Research & Action Center (Hartline-Grafton, 2015) indicated that in the United States, 37.7% of adults are obese and 7.7% are severely obese. According to the National Center for Health Statistics (2009), obesity rates have more than doubled in adults and children since the 1970s. Flegal, Kruszon-Moran, Carroll, Frayer, and Ogden (2016) stated that "between 1994–1998 and 2007–2008, the prevalence of obesity increased in adults of all income and education levels". Obesity is widespread and continues to be a leading public health problem in the United States (Druce et al., 2005; Flegal et al., 2016; Hales, Carroll, Fryar, & Ogden, 2016; Robert Wood Johnson Foundation [RWJF], 2015).

Flegal et al., (2016) stated that "obesity affects some groups more than others." The American Hospital Association (2016) documented that 48.1% of non-Hispanic Blacks have the highest age-related rates of obesity, followed by Hispanics (42.5%), non-Hispanic White*s* (34.5%), and non-Hispanic Asians (11.7%). Disparities in obesity rates exist based on race/ethnicity, gender, age, geographic region, and socioeconomic status (SES; Flegal et al., 2016; Fryar, Carroll, & Ogden, 2012; Ogden et al., 2016; Skinner & Skelton, 2014).

Experts in the field of public health suggest that confronting the obesity epidemic in the United States will require medical care, research, and more education (The Obesity

Society, 2015). Because of the complexity and multiplicity of various forces that drive the obesity epidemic, the NIH (2015) stated that "it could not solve this public health problem". Acknowledging obesity as a chronic disease should raise awareness of the problem among the general public and impact policymaking at all levels (The Obesity Society, 2015). The epidemic of obesity is challenging; however, researchers have opportunities to help meet these challenges (NIH, 2015).

The purpose of this study was to assess the level and relationship between knowledge of food additives and attitudes and beliefs regarding the relationship between food additives and obesity. Study results may determine whether consumers' KAB regarding food additives, as obesity-influencing factors, contribute to obesity.

Background

Obesity is a public health priority in the United States. The rate of obesity in the world is a public health problem (World Health Organization [WHO], 2010). In 2015, the world housed 2.3 billion overweight people aged 15 years and older (WHO, 2015). The rate of obesity encompasses more than a third of the U.S. population (CDC, 2010; National Health and Nutrition Examination Survey, 2011, 2014). The obesity epidemic in the United States has proven difficult to reverse, with no large-scale successes in preventing obesity, based on statistics reported in previous studies (Mitchell, Catenacci, Wyatt, & Hill, 2011).

Being overweight and obese is considered a precursor to chronic diseases such as diabetes. Being overweight and obese are causes of other comorbidities (Chan & Woo, 2010). A relationship exists between obesity prevalence and SES, when measured based

on educational level or income (Ogden et al., 2016). Also, an association exists among poverty-income ratio, education levels, and obesity rates (Ogden et al., 2016).

In 2008, the estimated annual financial cost of obesity in the United States was $147 billion, and medical costs for people who were obese were $1,429 higher than those for people of normal weight (CDC, 2010). Other financial costs linked to obesity include low worker productivity and higher absenteeism, higher worker's compensation claims, and health and emergency safety costs (Chan & Woo, 2010). The Congressional Budget Office (CBO, 2010) reported that from 1987 through 2007, U.S. spending on obesity increased by nearly 80%, driven in part by the development and diffusion of new medical technology, higher costs in insurance coverage, an aging population, and rising insurance health coverage for health care services. Spending also grew among all weight categories; however, the CBO claimed that the rate of growth was much more rapid among people who are obese. Spending per adult on obesity-related diseases was high among the total amount of health care spending devoted to treating diseases (CBO, 2010).

Obesity link to more than 60 chronic diseases (Campaign to End Obesity [CEO], 2014). If obesity rates stay constant, by 2030, 51% of the U.S. population will be obese (CEO, 2014). In addition, in 41 states, obesity rates superseded 25% (CEO, 2014). As of 20 years ago, no U.S. state had an obesity rate above 15% (CEO, 2014). Consequently, the Trust for America's Health (TFAH, 2015) suggested the United States needs better policies to address obesity for a healthier country. Such policies include forming healthy communities in which people lead healthy lives by implementing small changes for people to gain access and buy affordable healthy foods and beverages (TFAH, 2015).

Being physically active can also lead to positive differences for obese people (RWJF, 2015; TFAH, 2015).

Problem Statement

Little is known about people's knowledge of food additives and their KAB regarding the relationship between KAB and obesity. Food additives are contributing factors to obesity (Simmons, Schlerzinger, & Corley, 2014). Bisphenol A, which is found in canned foods and pesticides, is largely unstudied regarding its overall effects on human metabolic homeostasis (Simmons et al., 2014). Yet, Bisphenol A dysregulates endocrine function and adipocyte function in the body (Simmons et al., 2014). Emulsifiers, which are additives in processed foods, are enablers in promoting obesity (Reardon, 2015).

Purpose of the Study

Although dietary guidelines have become science-based, a gap exists among scientific evidence, consumers' behaviors, and dietary lifestyles (Rowe et al., 2011; ScienceDaily, 2015). Therefore, the main purpose of this study was to examine consumers' KAB regarding the relationship between food additives and obesity. Another purpose of this study was to examine additional literature available on consumers' KAB regarding the relationship between food additives and obesity.

Research Questions

This section lists the research questions (RQs) and the corresponding hypotheses.

RQ1: What is the consumers' knowledge of food additives and their attitudes about food being related to obesity?

$H_0$1a: There is no statistically significant difference in knowledge of food additives by gender.

H_a1a: There is a statistically significant difference in knowledge of food additives by gender.

$H_0$1b: There is no statistically significant difference in attitudes regarding food additives by gender.

H_a1b: There is a statistically significant difference in attitudes regarding food additives by gender.

$H_0$1c: There is no statistically significant difference in knowledge of food additives by age.

H_a1c: There is a statistically significant difference in knowledge of food additives by age.

$H_0$1d: There is no statistically significant difference in attitudes regarding food additives by age.

H_a1d: There is a statistically significant difference in attitudes regarding food additives by age.

$H_0$1e: There is no statistically significant difference in knowledge of food additives by race.

H_a1e: There in a statistically significant difference in knowledge of food additives by race.

$H_0$1f: There is no statistically significant difference in attitudes regarding food additives by race.

H_a1f: There is a statistically significant difference in attitudes regarding food additives by race.

$H_0$1g: There is no statistically significant difference in knowledge of food additives by income.

H_a1g: There is a statistically significance difference in knowledge of food additives by income.

$H_0$1h: There is no statistically significant difference in attitudes regarding food additives by income.

*Ha*1h: There is a statistically significant difference in attitudes regarding food additives by income.

$H_0$1i: There is no statistically significant difference in knowledge of food additives by education.

H^a1i: There is a statistically significant difference in knowledge of food additives by education.

$H_0$1j: There is no statistically significant difference in attitudes regarding food additives by education.

H_a1j: There is a statistically significant difference in attitudes regarding food additives by education.

RQ2: Is there a relationship between consumers' knowledge about food additives and their attitudes about food additives related to obesity?

$H_0$2a: There is no statistically significant relationship between consumers' knowledge scores and attitude scores regarding the relationship between food additives and obesity.

*Ha*2a: There is statistically significant relationship between consumers' knowledge scores and attitude scores regarding the relationship between food additives and obesity.

RQ3: Is there a statistically significant relationship between consumers' knowledge of food additives and attitudes about food additives being related to obesity based on demographic characteristics?

$H_0$3a: There is no statistically significant relationship between knowledge scores and attitude scores about the relationship between food additives and obesity by racial/ethnic categories.

H_a3a: There is a statistically significant relationship between knowledge scores and attitude scores about the relationship between food additives and obesity by racial/ethnic categories.

$H_0$3b: There is no statistically significant relationship between knowledge scores and attitude scores about the relationship between food additives and obesity by age categories.

H_a3b: There is a statistically significant relationship between knowledge scores and attitude scores about the relationship between food additives and obesity by age categories.

$H_0$3c: There is no statistically significant relationship between knowledge scores and attitude scores regarding the relationship between food additives and obesity by gender.

H_a3c: There is a statistically significant relationship between knowledge scores and attitude scores regarding the relationship between food additives and obesity by gender.

$H_0$3d: There is no statistically significant relationship between knowledge scores and attitude scores about the relationship between food additives and obesity by education categories.

H_a3d: There is a statistically significant relationship between knowledge scores and attitude scores regarding the relationship between food additives and obesity by education categories.

$H_0$3e: There is no statistically significant relationship between knowledge scores and attitude scores regarding the relationship between food additives and obesity by income categories.

H_a3e: There is a statistically significant relationship between knowledge scores and attitude scores regarding the relationship between food additives and obesity by income categories.

Theoretical Framework

The study of the behaviorist model is a response to environmental factors that ultimately affect a person's behavior. Studies of cognitive models of internal behavior show that input from the environment impacts behavior (Bandura, 1977). Figure 1 indicates how the behaviorist model and the cognitive model function. However, long-term changes in health behavior involve multiple actions and adaptations over time (Prochaska & DiClemente, 1982). Consequently, for this study, I used the cognitive model of internal behavior as the basis for the theoretical framework.

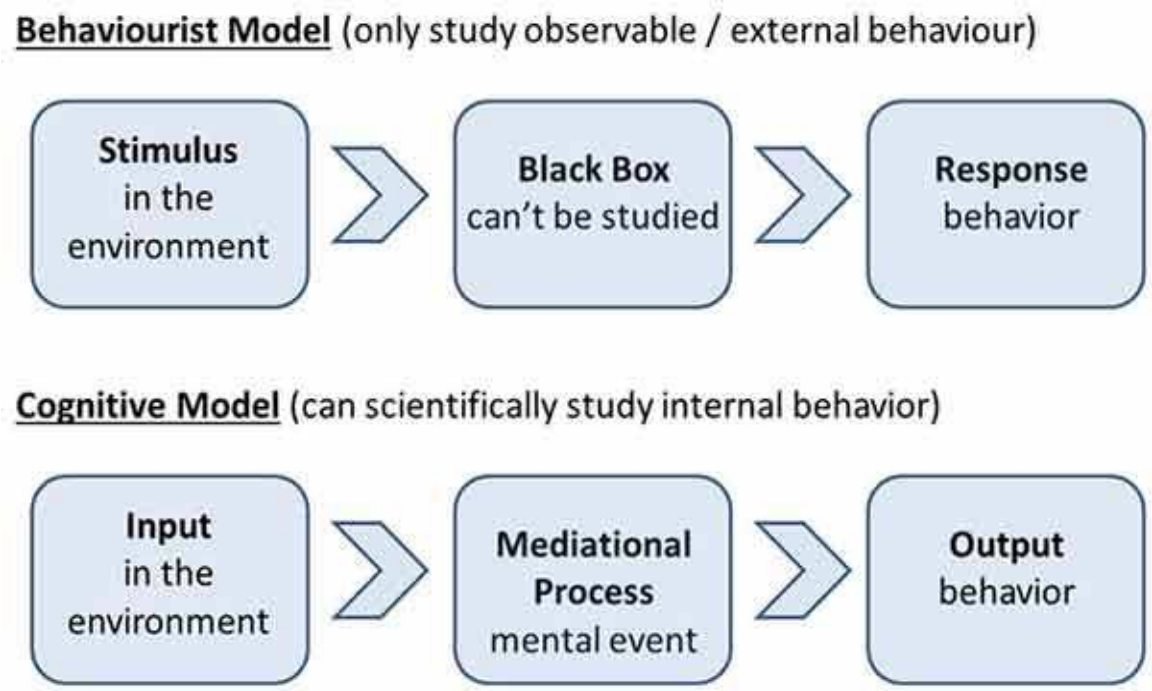

Figure 1. Albert Bandura 's (1977) social learning theory model.
Note: Adapted from "Bandura-Social Learning Theory," by S. A. McLeod, 2016, retrieved from www.simplypsycology.orgbandurs.html

The theoretical foundation for this study was Bandura's (1997) theory of social learning. In the theory of social learning, Bandura (1997) explained human behaviors with regard to how interactions occur among cognitive, behavioral, and environmental influences. Bandura (1977) emphasized the importance of social-learning theory (SLT) through observation, modeled behaviors, attitudes, and emotional reactions to others. Bandura (1973) explained that the component processes that underlie observational learning are attention and retention. The stages of SLT can be applied to understanding psychological disorders in the context of behavior modification.

The premise of SLT is that people learn not only through their experiences, but also by observing the actions of others, which results in a pattern of actions after following observation (Glanz, Rimer, & Lewis, 2002). A common example of social-learning situations is advertising products through product-marketing commercials on

television. Consumers may model their behavior to the behavior shown in the television commercial, which is to purchase the advertised product, regardless of knowledge of that product (Bandura, 1972).

The SLT may be incorporated into the transtheoretical model. However, the transtheoretical model integrated constructs from other theories into a comprehensive theory of change that applies to a variety of behaviors, population settings, policymaking settings, treatment settings, and prevention settings (Prochaska & DiClemente, 1982; Prochaske, DiClemente, & Norcross, 1992). The media also has an impact on what people eat and their attitudes about food (Macintyre, Reilly, & Eldridge, 1998). Several factors affect food choices and eating behavior.

People like to receive recognition, regarded as a predictor of health behavior change (Strecher, DeVellis, Becker, & Rosenstock, 1986). Strecher et al., (1986) focused on weight control and the relationship between health and behavior, and how to maintain change. People's attitudes about food and eating varies. According to SLT, people learn new behaviors by watching other people. The purpose of this study was to examine consumers' KABs about food additives and obesity. In the present study, I established a connection using the transtheoretical model of change (Prochaska & DiClemente, 1982) to demonstrate conceptualization as a process of behavioral change. The steps of behavioral changes that people take include those outlined in Figure 2.

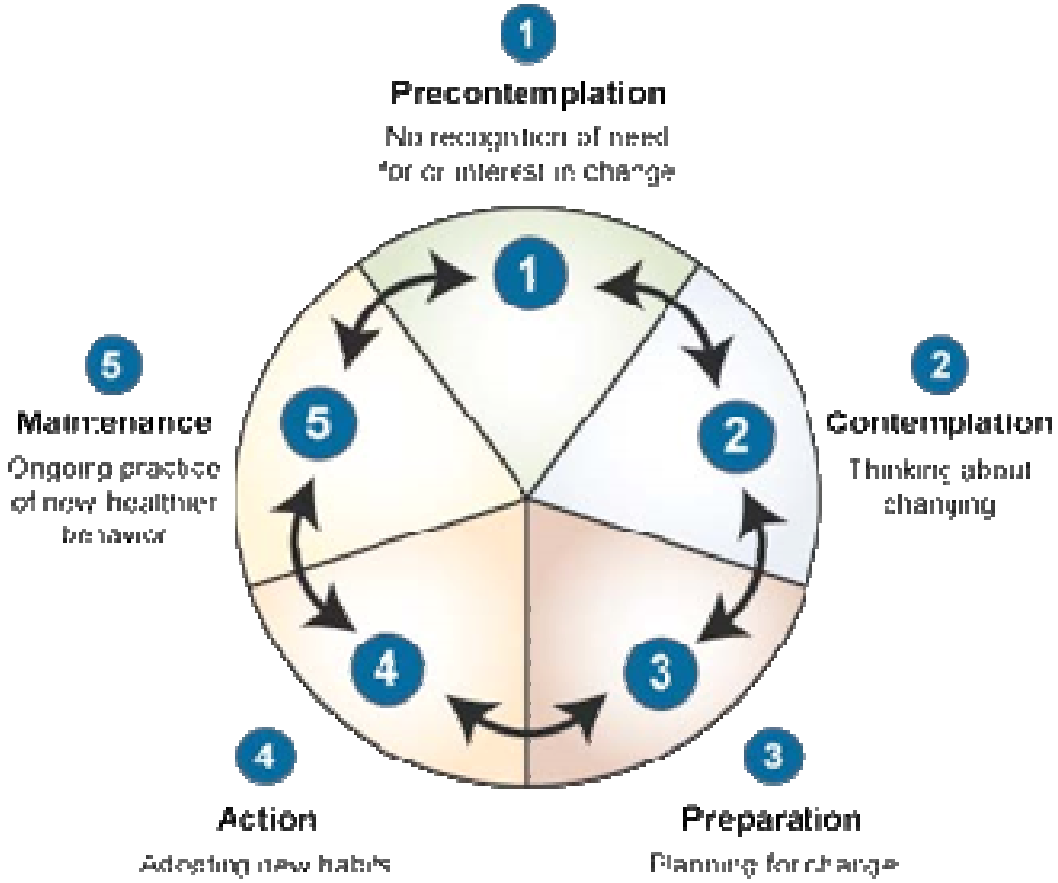

Figure 2. Transtheoretical pathway for behavioral changes.
Note. Adapted from "Transtheoretical Therapy: Toward a More Integrative Model of Change," by J. O. Prochaska and C. C. Di Clemente, 1982, *Psychotherapy: Theory, Research and Practice, 19,* 276–288. https://doi.org/10.1037/h0088437

A precontemplation mindset is a condition in which individuals are not ready for change, including the following:

- Contemplation or getting ready to change
- Preparing to change
- Taking action to change and maintaining that action
- Terminating, such that an individual is no longer tempted not to make changes

Nature of the Study

A quantitative, cross-sectional study was the method of choice. This study was carried out at one time point and over a short period to estimate what is known about food additives and obesity in a target population; the goal was to augment public health planning. The sample accrued from a section of the population to gain a better understanding of the risk factors between food additives and obesity and the outcomes and risk factors of obesity. The selection of this study was necessary for public health planning, understanding disease etiology, and generating a hypothesis. To obtain data for analysis, I used databases that contain information on the relationship between food additives and obesity. Other resources came from sites such as the Food and Drug Administration statistics (FDA), the NIH, the CDC, the Behavioral Risk Factor Surveillance System, and the Statistical Package for Social Science for Analysis of Data (SPSS).

Because the study was cross-sectional, it was not crititcal to determine the predictors and outcomes; predictors and outcomes cannot be on the same side of the equation. The dependent variable was attitudes about the relationship of food additives to obesity, and the independent variables were knowledge of food additives, age, sex, race/ethnicity, SES, and level of education. The purpose of this study was to determine if a relationship exists among people's KABs about food additives and obesity. Variables are useful tools to measure and help classify or predict certain factors in a given situation, to achieve the outcome of a study. The data accrued through a closed-ended questionnaire survey on the relationship of consumers' KABs about food additives and obesity. The data provided a momentary view of the patterns associated with obesity at a specific point

in time, and, according to Levin (2006), when the exposure occurred (whether it was before, after, or during the onset of a disease).

Operational Definitions

Age: The chronological age of the respondent based on the response to Question 3 in Appendix A.

Attitude, as defined by *Cambridge Dictionary* (2019) on-line: The way you feel about something or someone, or a particular feeling question or opinion.

Attitude about relationships between food additives and obesity: Measured by responses to Question 7 in Appendix A.

Education, as defined by Dictionary.com (2019), on-line: A degree. Level, or kind of schooling.

Education: Level of education completed based on respondents' responses to Question 4 in Appendix A.

Food additive: A food additive is any substance not normally consumed as food in and of itself, or any intentional addition to food for technological purposes that result in the food byproduct, thereby becoming a product of that food (Mepham, 2011).

Gender, as defined by *Oxford Dictionaries* (2019) online: Either of the two sexes (male and female).

Gender: Male or female responses based on response to Question 5 in Appendix A.

Knowledge about food additives: Measured by Question 6 in Appendix A.

Personal income: Based on respondents' responses to Question 1 in Appendix A.

Race, as defined by *The Free Dictionary* (2019): A group of people identified as distinct from other groups because of supposed physical or genetic traits shared by the same group.

Race and ethnicity: Based on respondents' response to race and ethnicity to Question 2 in Appendix A.

Assumptions

In this study, I assumed obesity could be caused by a variety of reasons, one causative agent being food additives. The obesity rate has evolved into an epidemic in the United States during the past 2.5 decades (U.S. Obesity Trends, 2019). In this study, I assumed the cause of obesity relates to food additives. People cannot assume anyone will make changes to their lifestyle. Health is a universally shared value, overweight or obese people are physically unfit and are at risk of higher levels of disease and early death (Lupton, 2014). I also assumed that the model or design of the SLT can guide the demonstration that people can make behavioral changes through the steps outlined in the SLT.

Obesity also poses a risk as a diet-related incommunicable disease (WHO, 2008). This condition is a precursor to many other chronic diseases, although researchers have not been able to show a link to consumers' knowledge regarding food additives (Rowe et al., 2011). Individuals lack appropriate information about health risks, and when they receive information, they may change their behaviors (Lupton, 2014). O'Neill and Sweetman (2013) wrote about the consequences of measurement error when estimating the impact of obesity on income. Their findings suggests that these errors cause the traditional lest squares to overestimate the relationship between BMI and income. (p. 1).

Scope and Delimitations

Other sources of data derived from population-based health survey statistics such as the CDC, the *National Journal of Obesity*, the Behavioral Risk Factor Surveillance System, the FDA, and the NIH. I used websites to obtain additional information on obesity. The scope of this study includes the limitations of the research. The data used for this research included the geographic location of Orlando, in the State of Florida, with a population of 12.6 million (U.S. Department of Health and Human Services, 2016) whose obesity rate ranks 35th in the State of Florida, TFAH, and the RWJF (2016). The theory used to interpret the data was Bandura's SLT (1977). In this study, I provide explanations for why certain data were excluded from this research (see Libguides, 2016).

This study was delimited to individuals 18 to 65 years of age and their KABs about food additives and obesity. The questionnaire included questions related to age, gender, race/ethnicity/culture, SES, level of education, and knowledge of food additives. A problem that can arise from a wide-scale survey is nonresponsiveness from participants.

Limitations

The limitations of this study were contingent on past and current data available regarding consumers' KABs of food additives and obesity, documented in databases by the U.S. Department of Agriculture (Nestle & Ludwig, 2010). Cross-sectional studies have limitations because researchers conduct them at one time point, over a short period, and they estimate the prevalence of the outcome of interest for a given population. Other limitations of this study were in the analysis of the data, the nature of self-reporting by

survey participants, the instruments used for the study, the sample size, and the time constraints of the study.

One disadvantage of a cross-sectional study is that the researcher may encounter difficulty when making causal inferences. Therefore, the situation being studied might provide differing results if another time frame had been chosen. Researchers may encounter the prevalence of incidence bias, also called Neyman bias, especially in cases of longer lasting diseases where risk factors that result in death are underrepresentated among diseases (Levin, 2006). In giving biased responses, people may be more likely to respond when they have a characteristic or set of characteristics. Bias may occur when the characteristics in question are in some way related to the probability of the outcome (Levin, 2006).

Significance of the Study

Currently, no other studies exist on consumers' KABs about food additives and obesity. Therefore, this study sets a new precedent for future studies. This study was rested on the responding participants' answers, thereby measuring people's KABs about obesity and food additives. A quantitative, cross-sectional study, using the appropriate set of questions, I was able to obtain people's attitudes regarding additives in foods. A survey of people's KABs on relationships between several factors is advantageous in engaging people's participation in a questionnaire. The answers participants selected on the questionnaire provide insight for future public health policy and public education for consumers.

Consumers lack information on what additional additives are incorporated into foods to make the taste of food more desirable (Kuchler & Golan, 2004). To advance the

SLT, Bandura (1977) suggested that human behavior regarding reciprocal interaction is shared among cogitative, behavioral, and environmental influences. The basic premise of SLT is that people learn, not only through their experiences, but also by observation and the actions of others (Glanz et al., 2002). The SLT was integrated with the transtheoretical model into a comprehensive form of theory, to implement stages of change through key constructs. This form of theory apply to a variety of behaviors, population settings, and policymaking settings (Prochaska & DiClemente, 1982; Prochaska et al., 1992). The positive social change for this study includes people becoming consumers who are more informed and who have more knowledge about the health risks of food additives and obesity. Through this information, people can make educated decisions that pertain to their diet, and thereby avoid obesity.

Improved socioeconomic conditions can lead to the elimination of the social stigma that comes with obesity or being classified as obese. Individuals who are obese may be able to maintain self-worth and dignity, thereby enabling individuals, communities, organizations, institutions, cultures, and societies to aim for healthy diets that promote additive-free foods.

Significance of the Theory

Individuals are more likely to adopt a modeled behavior if that behavior results in outcomes those individuals value. People are more likely to adopt a modeled behavior if the model is like the observer and the behavior has functional value (Bandura, 1977). Positive or negative reinforcement will have no impact if the reinforcement offered externally does not match the individual's needs (Edinyang, 2011, 2016). Reinforcement can be positive and negative and can result in change in a person's behavior (Edinyang,

2011; McLeod, 2016). Motivation is another factor that enables an individual to perform a desired behavior. According to the SLT, thought processes play a role in an individual deciding whether to imitate a behavior (Bandura, 1986).

Significance to Practice

Little was known about KAB. Study results may be used to educate consumers and to determine future research. Increased KAB may help achieve the goal of improved health through active participation and action. The global health community seems to have difficulty translating research into action or practice. To overcome this barrier, and encourage action, the present research will be published and available to the global community. Other steps to encourage action involve sending the results of the study to local officials, policymakers, and community leaders.

Obesity and being overweight are epidemics in the United States (CDC, 2010). Establishing a statistical relationship between consumers' KABs about food additives may establish health and nutrition education for people who are obese globally. Food-purchasing patterns have changed over the past 50 years (Boga & Binokay, 2010). The growing prevalence of overweight and obese individuals has propelled an upsurge in hypertension, which has joined infectious diseases as a health problem during the past decade (Hossain, Kawar, & El Nahas, 2007).

Significance to Social Change

A relationship between food additives and obesity has long been ignored, heralding the need to introduce changes to public health policies. No studies have described consumers' KABs and obesity. Although cosmetic suggestions have been introduced in the past about KAB, more work needs to be done. Because social change

refers to the alteration, over time, of behavior patterns, culture, and norms, researchers are looking for profound means to reverse health choices. Although food additives have been used for many years, the resulting social consequences on obesity requires further study. Based on findings from the present study, a need persists for additional consumer education regarding the relationship between food additives and obesity, particularly among individuals with low levels of education. Additional effort is required to bridge the gap among individuals through public policy and public health input. Social change may be achieved by strengthening the approach to educating people about food additives and their influence on obesity. Such educational enhancements will help people see the importance of being healthy, as well as address aspects of their lives they need to change. This study may start a conversation on how to be consistent with a vision of change toward healthier people.

Study results may help others reduce obesity locally, nationally, and internationally, thereby reducing the high costs associated with treatment. Many national governments face high costs to treat and care for clinically obese people. People with little higher education, low SES, and limited access to information on food additives require more information to help them and their families avoid chronic disease (such as obesity).

Summary and Transition

The rates of obesity have increased over the past 2 centuries, leading to a significant rise in funding for diagnosis and treatment of obesity by the U.S. Department of Health and Human Services. The focus of this study was on addressing the rise, funding, and treatment of obesity. The focus in Chapter 2 is on the introduction of past

studies on consumers' KABs about food additives and obesity. In Chapter 3, I present the research design. In Chapter 4, I discuss the method of study and the study findings. In Chapter 5, I address the recommendations for social change and the need for future research.

Chapter 2: Literature Review

Multiple theories have been proposed to explain the causes of obesity. In the literature review, the aim is to align the SLT to perform research concerning obesity; therefore, the literature review centers on three major themes: consumers' KABs concerning food additives and obesity. A relationship may exist between the consumption of foods with additives and obesity (Iacurci, 2015). Some of these additives are called emulsifiers and are added to processed foods to aid in texture and to extend the shelf life of these foods (Reardon, 2015).

Processed foods are not nutritious and can lead to an increase in dietary components that may need to be limited (Weaver et al., 2014). Consumers may lack understanding of how food products are produced and labeled. Products should be sold with information about perceived food risks, such as whether a product contains altered deoxyribonucleic acid (DNA), so the consumer can make an educated choice before purchasing the product (Weaver et al., 2014). In addition, health and environmental concerns link to food production and consumption (Cavaliere, Ricci, Solesin, & Banterle, 2015).

Literature-Search Strategy

In the literature-search strategy, I assessed sites that published literature about any relationship between obesity as a problem and an epidemic were accessed. I used predicator variables such as food culture, eating habits, physical activity, and culture of country of origin. I reviewed literature on the relationship between food additives and obesity. Further, I reviewed the literature on consumers' behavior based on their knowledge of food additives and social-indicator variables such as education, gender,

health status, age, physical activity, weight status, and sports drink consumption (Zytnick, Park, Onufrak, Kingsley, & Sherry, 2015).

I used the following journals and databases to search for peer-reviewed and pertinent articles: *Allied Health Source* (1998–2015), *American Journal of Clinical Nutrition* (1987–2015), *American Journal of Food Science and Nutrition Research* (2000–2015), *British Food Journal* (2014–2015), *CINAHL* (1998–2015), *Elsevier Ltd* (2004–2015), *International Journal of Obesity* (2003–2015), *Journal of Nutrition* (2012–2015), *Journal of Pharmacology & Pharmacotherapeutics* (2011–2015), *Lancet* (1998–2015), *Medline* (1998–2015*), National Kidney Foundation* (2006–2015), *National Center for Biotechnology Information* (1998–2015), *National Institute of Health* (2010–2015), *ProQuest Nursing* (1998–2015), *Science in the Public Interest* (1958–2015*), Springer Link* (2014–2015), *U.S. Food and Drug Administration* (1906–1979), *U.S. Department of Agriculture* (2015), and *Walden University Library Academic Search* (1998–2015).

I also sought literature using concepts relating to the study objective, methods, and problems including the terms *access to information on obesity; information on food additives and their relationship to obesity; consumer's knowledge, attitudes, and beliefs, about the relationship of food additives and obesity*; and *consumer's behavior based on knowledge of food additives*. I retrieved additional literature from the following databases:

- The FDA on food ingredients and additives relating to obesity.
- The National Health Nutrition Examination Surveys on ways to conduct surveys for obesity research.

- The NIH on past and current literature on chronic health diseases.
- *Journal of American College of Nutrition* on studies previously done on obesity reduction.

I established the theoretical foundation, discussed next, based on the literature review of the aforementioned journal articles on obesity and foods.

Theoretical Foundation

The theoretical base for this study was Bandura's (1977) SLT, used to explain human behavior as a continuous reciprocal interaction between cognitive, behavioral, and environmental influences. The basic premise of SLT is that people learn not only through their own experiences, but also through the observations and actions of others, and the results of those actions (Glanz et al., 2002). SLT can also be integrated with the transtheoretical model. The transtheoretical model includes key constructs from other theories into a comprehensive theory of change, which can be applied to a variety of behaviors, populations, settings, and policymaking settings (Prochaska & DiClemente, 1982; Prochaske et al., 1992).

The intent of this research was to measure people's knowledge of food additives and their KABs about the relationship between food additives and obesity. In the United States, certain factors affect food choices including taste, cost, nutrition, convenience, and weight concerns (Glanz et al., 2002). When it comes to consumers' KABs in areas of food safety and nutrition, understanding of consumers' attitudes has been poorly researched (Gibney, 2004). People need to understand how the public perceives their diets; new perceptions could be helpful in designing and implementing healthy-eating initiatives for consumers (Gibney, 2004).

Overview

Researchers have conducted studies on obesity as a preventable chronic disease; however, further research is needed to investigate the relationship between people's KABs about food additives and their relationship to obesity. In 2010, more than 2.3 billion individuals, aged 15 years and older, were overweight (Chan & Woo, 2010), and by 2015, the world housed 700 million obese people. Obesity is a chronic problem (Chan & Woo, 2010) and was declared a public health challenge in the United States in 2010 (Office of the Surgeon General, 2010). In the United States, 112,000 preventable deaths occur yearly due to obesity (Office of the Surgeon General, 2010). Obese adults are at an increased risk for many health conditions, including high blood pressure, high cholesterol, Type 2 diabetes complications, coronary heart disease, and stroke (Office of the Surgeon General, 2010).

The prevalence of obesity in the United States has increased threefold among children, and it is in the double digits among adults (National Center for Health Statistics, 2016). This increase can be attributed to changes in the environment and behaviors in people who are susceptible to chronic diseases (Kaplan, Spittel, and David, 2015). Several factors can be attributed to these changes, such as high caloric, good tasting, and inexpensive foods that are widely available and heavily advertised (Office of the Surgeon General, 2010). Currently, children drink more sugar-sweetened beverages than they did in the past (Office of the Surgeon General, 2010). However, dietary changes are not completely responsible for the epidemic (Office of the Surgeon General, 2010).

Consequences of Obesity

Obesity is predominantly a social and environmental disease (Hu, 2008). Obesity is a risk factor for diet-related, incommunicable diseases (WHO, 2008). Visscher and Seidell (2001) stated, "an increase in the prevalence of obesity, will potentially lead to an increase in the number of years, which these individuals will suffer from obesity-related morbidity and disability" (p. 355). Among obesity-contributing factors are food additives. Simmons et al., (2014) claimed that Bisphenol A, which can be found in canned foods and pesticides, is unstudied as to its overall effects on human metabolic homeostasis. Emulsifiers are additives in processed food and baked goods that aid in texture and extend product shelf life (Reardon, 2015). The emulsifiers added during food processing are also considered enablers in promoting obesity. Diabetes is the most expensive public health consequence of obesity (Visscher & Seidell, 2001). Other health-related conditions such as respiratory issues, cancers, coronary heart disease, stroke, Type 2 diabetes, musculoskeletal, and work disability could develop from being obese (Visscher & Seidell, 2001).

Relationship of Food Additives to Obesity

The Australian news media laid out a discourse and beliefs related to food risks. Stories about the risks associated with food often received high levels of attention in the news media (Lupton, 2005). Over a period of 14 months, the news media in Sydney, Australia, reported on food risks for consumers in three metropolitan newspaper articles (Lupton, 2005). The news media in Sydney, Australia, reported on the relationship between food intake and obesity. Lupton (2005) claimed that individuals have a personal responsibility to avoid foods that make them susceptible to becoming overweight. Lupton

(2010) stated that foods prepared outside the home are more dangerous than foods prepared in the home. Several chemicals are added to processed food and the majority of additives are dangerous to consumer health (Mepham, 2011). Approximately 200 food additives have caused increased risks to long-term harm (Millstone & Lang, 2008).

The European Commission (2012) defined food additives as "any substance not normally consumed as a food or the intentional addition of which a food for technological purpose results in one or by its byproduct that becomes directly or indirectly a component of such food" (p. 1). The FDA (1906) stated that when a food is considered to be adulterated, it can bear or contain no poisonous or deleterious substances make it injurious to a person's health; but, in cases where the substance is not an added substance, the food is not considered adulterated under this clause if the quantity of such substance does not ordinarily render it injurious to health. Although the FDA did not define the term "added," it is generally understood to mean a substance not present in its natural state (Whiley, 1906).

Food additives are an essential element of the commercial success of junk food, which is often responsible, in part, for public health concerns on the increasing incidences of obesity (Mepham, 2011). Yahia, Achkar, Abdallah, and Rizk (2008) compared eating habits and obesity among Lebanese university students and concluded that Lebanon had experienced a nutritional transition in food choices, and the typical Mediterranean diet had developed into a fast-food pattern. The fast-food market affects the dietary habits of young adults (Yahia et al., 2008). Yahia et al., further explained that students' weight status and eating habits would help health educators develop proper nutrition-related programs that promote healthy food choices and good eating habits.

Food additives can be divided into three main types: cosmetics, preservatives, and processing aids (Tuormaa, 1994).

Food producers are using increasing amounts of food additives. Some food additives have been linked to childhood disorders. For example, food additives have been attributed to behavioral issues (Office of the Surgeon General, 2010). The Office of the Surgeon General (2010) highlighted their vision for a fit and healthy nation that shows that food additives pose a public health challenge. At any stage of life, an increase in consumption of excess calories from fats and added sugars in dense foods, such as fast food, is likely to cause obesity, due to higher calories rather than providing nutrients that are needed for health.

Beverages that are sugar sweetened, such as sodas, contribute to excess caloric intake and can displace nutritious foods in the diet. The body may not compensate for the calories consumed with these beverages (Office of the Surgeon General, 2010). Tandel (2011) showed that sugar is considered an inseparable part of foods consumed by people; however, too much sugar is not healthy. Artificial sweeteners or artificial products continue to attract consumers. Tandel classified sugar substitutes (i.e., artificial sweeteners) as food additives that duplicate the effect of sugar taste but have less food energy. Artificial sweeteners can cause weight gain. The energy imbalance between calories consumed and calories expended due to increased fat consumption, saturated fats, and excessive consumption of sugary foods is a leading cause of obesity in the Indian population (Tandel, 2011).

Application of low-calorie sweeteners (LCS) in foods and beverages has increased over the past 35 years (Anderson, Foreyt, Sigman-Grant, & Allison, 2012).

During this time, the characteristics of the U.S. diet have changed. These changes include variations in fat and carbohydrate content and composition, new dietary patterns due to changing lifestyles, and attitudes toward food. During this same period, the prevalence of obesity and being overweight has increased from approximately 30 to 70% of adults in the United States (Anderson et al., 2012). Because the majority of studies aimed at identifying associations between LCS and these outcomes rest on observational data, it is difficult to design and evaluate data (Anderson et al., 2012).

LCS may cause weight gain because it is a function of energy balance. Drewnowski and Bellisle (2007) stated, "Intense sweeteners are not appetite suppressants. The ultimate effects will depend on their integration within a reduced calorie diet" (p. 10). It is necessary to total the effects of energy. Ignoring these facts diverts attention from developing solutions to the problem of obesity. Bellisle and Drew also pointed out that many users of LCS products are overweight or obese.

A multifactorial relationship exists between individuals and their environment regarding food choices and health behaviors (Anderson et al., 2012). He et al., (2011) examined the consumption of monosodium glutamate (MSG) in relationship to incidences of excess weight in Chinese adults. From 1991 to 2006, data accrued from 10,095 healthy individuals from the Chinese population. He et al. assessed diets that included MSG and other condiment usage with a weight inventory in combination with 24-hour recalls. MSG, which is a flavor enhancer, has been in use for more than 100 years in home food preparations as well as in commercially processed foods (He et al., 2011). MSG has become one of the most widely used food additives globally (He et al., 2011). MSG can be found in processed foods but can also be hidden on ingredient labels

and listed under other names. Concerns emerged about MSG as a risk factor for obesity because researchers suggested a possible link between MSG and being overweight and obese (He et al., 2011). The Generally Recognized as Safe (FDA, 1979) Committee reported a mean daily intake of MSG per capita of 550mg/dl in the United States in 1979. He et al. found an average intake of 580mg/dl for the general population and 4.68 mg/dl for extreme users. The MSG/obesity link relates to an energy balance by disrupting the hypothalamic signaling cascade of leptin action (He et al., 2011). The consumption of MSG positively and longitudinally aligned with overweight development in healthy Chinese adults (He et al., 2011).

History of Food Additives

The practice of adding chemicals to foods originated thousands of years ago, and included the use of flavors, spices, preservatives, and ripening agents. This pattern of addition of chemicals to foods has changed during the course of history. Phase 1 of food additives began about 1820; this addition of chemicals to foods was not a significant problem because people procured food personally from friends or from small businesses (Fennema, 1987). These modes involved a measure of personal accountability. At the turn of the 1900s, Phase II of the history of food additives or intentional food adulteration in the United States and several countries of the world increased in frequency (Fennema, 1987). Several reasons caused this change including the following:

- Increased centralization of food processing and distribution, along with a corresponding decline in personal accountability

- The rise of analytical chemistry that allowed purveyors of foods to replace food with less effective empirical approaches based on new scientific knowledge about the composition and properties of food
- Inadequate control of government regulations (Fennema, 1987).

In the early 1800s, public concern about food quality and supply increased (Fennema, 1987). Concern emerged in England by Accum's (Kreklau, 1820) publication on the subject of food adulteration. The third phase of intentional adulteration of food remained a problem until about the 1920s, at which time food regulatory pressures and effective analysis reduced the frequency of food additives (Fennema, 1987). Since then, the safety of food supply has improved; however, in the 1950s, Phase IV, new problems emerged as foods containing legal chemical additives become increasingly prevalent; the use of highly processed foods increased to the point of comprising a predominant portion of the diet in industrialized countries. The contamination of some foods with the by-products of industrial activities became more common (Fennema, 1987). Many individuals believed that the authorized practices of food additives used in the United States since the 1950s have not posed a significant threat to public health (Fennema, 1987). However, the U.S. FDA unintentionally heightened this level of apprehension when it removed cyclamates and a few dyes from its list of allowable substances. The Good Housekeeping Institute (1985) claimed consumers were apprehensive about chemicals added to foods, and efforts are being made to market natural foods that are relatively free of chemicals, to cater to the desires of consumers who have reservations about food additives.

In addition, urbanization has led to separating areas designated for food production from primary sites of consumption, which has led to the use of preservatives to avoid excessive food spoilage (Fennema, 1987). It is important to monitor food additives to ensure the safety of the food supply and to make improvements when warranted. This course of action can also include assessing the amounts of food additives consumed. The intake of the amount of food additives by individuals in the U.S. population is not available, as this information is difficult to obtain (Fennema, 1987).

Consumers have become increasingly cautious about food safety (Kaptan & Kayisoglu, 2015). Some consumers fear the inclusion of additives to foods (Aoki, Shen, & Saijo, 2010). The majority of food-safety incidents were caused by illegal activities, especially the illegal use of chemical additives (Qiang, Wen, Jing, & Yue, 2011). The illegal use of food additives has been the primary cause for warnings against Chinese food exports to the United States, Japan, and Korea (Zou, 2010). It is necessary to factor in changing lifestyles such as ready-to-eat and conventional foods, domestic food production and preservation, and the mark up of foodstuff produced by the industry (Kaptan & Kayisoglu, 2015). Food contains thousands of food additives and the U.S. Department of Agriculture (2015) maintains a list of over 3,000 ingredients in its food-additives database.

Food-purchasing patterns have changed over the past 50 years. Many families use packaged and processed foods because of their convenience, portability, and ability to stay fresh (Mepham, 2011). Food additives are not natural nutrition for humans because the human body is not meant to be exposed to the degree of chemicals and food additives that are currently in use (Boga & Binokay, 2010). Boga and Binokay (2010) suggested it

is important for everyone to be aware of the types of chemicals and food additives they are consuming.

Consumers amplify their risk when a food or technology in familiar foods or home preparations is unknown (Grunert, 2005). Emerton and Choi (2008) stated that the benefit of using food additives balances the negligible insecurities related to the potential health implications of regular food-additive consumption. Brockman and Beeren (2011) mentioned that although consumers were aware of the benefits additives could deliver, the automatic assumption that additives were bad remained, and consumers felt that additives should be reduced in foods. People with lower levels of education are more likely to purchase food with additives that follow government standards than those with higher levels of education (Brockman & Beeren, 2011). Consumers with lower levels of education may be more trusting of government institutions in regulating food additives. Therefore, to reduce the public's food scares, strengthening government regulation or communication through government authorities may have a positive impact (Wu, Zhong, Shan, & Qin, 2013). Most consumers recognize additives on food labels, affecting their decision to buy the food. Many consumers believe that control programs on additives are insufficient, and they lack information about these activities (Wu et al., 2013). Altu and Elmaci (1995) showed that consumer education about programs controlling food additives was necessary. Participants' suspicion of food additives approved by the government derived from insufficient information, and a misunderstanding of food additives, as well as a lack of clarity on risks (Shim et al., 2011). Consumers' attitudes have been shown to influence and predict behavior (Wilcock, Pun, Khanona, & Aung, 2004).

Lee, Park, Wi, and Ahn (2014) suggested ways that consumers can be made aware of food additives through consumer education. Lee et al., deduced that consumers lack accurate knowledge of food additives and show apprehension toward these additives. Consumer experience, education, and knowledge also influence the use of food additives (Lee et al., 2014). Consequently, if consumers are educated properly, they can develop an awareness of food additives. Although great emphasis for literature articles selected for this study greatly emphasized people's KABs about food additives and obesity, such literature was very limited because no single study presented the parameters tested in the present study. Extant research considered attitudes and consumer perceptions of the risks and benefits of additives in food, such as the Zhong, Wu, Chen, Huang, and Hu (2018) study titled, "Effects of Food Additive-Information on Consumer' Willingness to Accept Food With Additives." Grujic, Grujic, Petrovic, and Gajic (2013b) published a study entitled, "Knowledge of Food Quality and Additives and its Impact on Food Preference," based on a previous 2003 study published by Tarnavolgyi regarding an analysis of consumers' attitudes toward food additives using a focus-group survey. Grujic et al., (2013b) recommended that actions be taken on young consumers' education as a contribution to protecting the health, safety, economic, and legal interests of consumers and society.

Consumers' Behavior Based on Knowledge of Food Additives

It was apparent that publications on consumer KAB were few, calling for the present study. However, Bearth, Cousins, and Siegrist (2014) highlighted three challenges to consumers' perceptions of artificial food additives, based on acceptance, risk, and benefit perception:

- Acceptance of artificial food colors was lower than acceptance of sweeteners.
- Risk and benefit perception influenced acceptance of both food additives.
- Risk perception was influenced by knowledge and trust in regulators.
- Awareness and knowledge of the regulation of food additives. (Bearth et al., 2014, highlights)

Increased consumer knowledge and awareness about healthy nutrition may foster a demand for healthy food products, which could influence marketing trends (Office of the Surgeon General, 2010).

Conclusion

In this chapter, I introduced the problem of obesity and the applied theory used to define obesity and people's behavior. In the literature review, a connection emerged between people's KABs about food additives and obesity. The themes of this study include defining obesity as a problem and an epidemic. Obesity is an epidemic for public health based on financial costs, as well as comorbidity associated with obesity. What is not known is the extent of consumers' knowledge regarding the role food additives may play in obesity. The present study attempted to fill this gap in the literature. In Chapter 3, I present the methodology for this study.

Chapter 3: Research Method

The research methods used to test the research questions are the focus of this chapter, emphasizing the type of study, analysis, sample used, and data collection methods. This was a quantitative study, and the data analysis was nonexperimental. The data-analysis plan included coding, entry, and checking the data, and the use of the SPSS software tool to perform the statistical analysis.

The purpose of this study was to examine consumers' KABs regarding food additives and obesity. A gap exists in the literature regarding consumers' knowledge of food additives and their relationship to obesity (Rowe et al., 2011). Although dietary guidelines have become science based, and a gap also exists between scientific evidence and consumers' behavior and dietary lifestyles (Rowe et al., 2011). The intent of this study was to define consumers' KABs regarding food additives and obesity. The research methods used to test the research questions are the focus of this chapter.

Research Design

I conducted a nonexperimental research study using a cross-sectional approach with a descriptive design (see Appendix A). I distributed a survey across a population through the selected church parish to reach an acceptable number of participants. The survey queried participants regarding their KABs concerning food additives and obesity (see Appendix B). Study results provide a better understanding of consumers' underlying views on food additives and obesity, and whether the statistics can validate a relationship between food additives and obesity. The independent variable assessed was knowledge of food additives, and the dependent variable being assessed was knowledge regarding food

additives and some attitudes and beliefs as a cause of obesity. The covariates were age, gender, race/ethnicity, and SES.

I conducted this study from a quantitative perspective. In the parameters of the quantitative method, researchers measure how people think. Quantitative researchers examine individuals at the primary level. Quantitative researchers also measure elements and determine how concepts relate to one another. Using this method, I followed previous quantitative designs of postpositive worldviews, as outlined by Creswell (2009). I used quantitative research methods in this study because they enabled me to reach a broader and more diverse audience. I used closed-end survey questions to decrease the need for interpretation of the answers. I used the Internet for distribution of the survey through the SurveyMonkey survey engine. I formatted the questions with a draft and modified to meet the criteria for an online survey format.

Methodology

The descriptive research methodology used in this study was intended to describe consumers' KABs about food additives and obesity. Researchers commonly apply surveys to a research methodology designed to collect data from a specific population, or a sample from that population, using a questionnaire as the survey instrument. In this descriptive methodology, I was able to determine a relationship between two or more variables using statistical analysis of the data. Although correlational research is sometimes referenced as descriptive, I manipulated no variables in the study. I obtained data from individuals about themselves: their ethnic background, gender, age, and sex. Researchers use sample surveys as tools to collect and analyze information from selected

individuals. Researchers accept surveys as a tool to conduct and apply the basic social science research methodology (Rossi, Wright, & Anderson, 1983).

Population

The participants from the congregation of The Church of the Ascension in Orlando, Florida, volunteered for the study by responding to an announcement in the church's weekly bulletin, requesting participation in the survey (see Appendix C). After that initial announcement, the church administrator uploaded the link to the questionnaire onto the church webpage, located on the SurveyMonkey webpage, enabling church members to access the questionnaire (see Appendix D). The choice of this population and the type of sampling from these participants was based on assessing church members as individuals of diverse SES backgrounds, races, and age groups. Participants had to be 18-years old or older to participate in the survey. The purpose of the study was to examine consumers' KABs about food additives and the relationship to obesity. Sample-size determination was based on a 15% effect size for correct responses regarding knowledge of food additives. Based on this effect size and comparisons between male and female responses, the G-Power sample-size calculator estimated a need for 343 completed surveys. Assuming an 85% response rate, I needed a total sample size of 404.

Sampling and Sampling Procedures

The survey participants for this study took part in a SurveyMonkey survey online. The designated questionnaire was available to those who self-selected for the study. The intent was to retrieve data from participants in the Orlando, Florida, area. Although participation was voluntary, it was still necessary to receive permission from the Walden University Institutional Review Board (IRB) prior to solicitation.

The study method for this study was a cross-sectional survey of participants using voluntary sampling. Survey participants were volunteers, and I analyzed data accruing from all participants. The method of administration was a link provided to SurveyMonkey, which is a web-based survey tool. The study design depended on the number of questions in the questionnaire and how SurveyMonkey relayed the responses to me (see Appendix E).

After receiving permission from the IRB at Walden University, #07-19-18-0190947, I provided a link to the questionnaire and invited participants to complete the survey. After the questionnaires were completed, I obtained them from SurveyMonkey for administration. The sample size needed was 404 to obtain an adequate size for reporting a relationship between consumers' KABs concerning food additives and obesity. The data collected from the completed surveys were then tabulated, and the results reported.

Instrument and Operationalization of Constructs

For this study, I used a nonexperimental design. The instrument was a questionnaire, administered online through SurveyMonkey. To demonstrate validity, the information that was collected required careful selection to measure each variable. Validity demonstrates the conclusions, inferences, or propositions of a study. Cook and Campbell (1979) defined validity as the "best available approximation to the truth or falsity of a given inference, proposition or conclusion" (p. 1). However, each type of validity in the study might highlight a different aspect of the relationship between the survey and my outcome, which was the observed outcome of people participating in the survey.

Here, I list research questions and their corresponding hypotheses.

RQ1: What is the consumers' knowledge of food additives and their attitudes about food being related to obesity?

$H_0$1a: There is no statistically significant difference in knowledge of food additives by gender.

H_a1a: There is a statistically significant difference in knowledge of food additives by gender.

$H_0$1b: There is no statistically significant difference in attitudes regarding food additives by gender.

H_a1b: There is a statistically significant difference in attitudes regarding food additives by gender.

$H_0$1c: There is no statistically significant difference in knowledge of food additives by age.

H_a1c: There is a statistically significant difference in knowledge of food additives by age.

$H_0$1d: There is no statistically significant difference in attitudes regarding food additives by age.

H_a1d: There is a statistically significant difference in attitudes regarding food additives by age.

$H_0$1e: There is no statistically significant difference in knowledge of food additives by race.

H_a1e: There in a statistically significant difference in knowledge of food additives by race.

$H_0$1f: There is no statistically significant difference in attitudes regarding food additives by race.

H_a1f: There is a statistically significant difference in attitudes regarding food additives by race.

$H_0$1g: There is no statistically significant difference in knowledge of food additives by income.

H_a1g: There is a statistically significance difference in knowledge of food additives by income.

$H_0$1h: There is no statistically significant difference in attitudes regarding food additives by income.

*Ha*1h: There is a statistically significant difference in attitudes regarding food additives by income.

$H_0$1i: There is no statistically significant difference in knowledge of food additives by education.

H^a1i: There is a statistically significant difference in knowledge of food additives by education.

$H_0$1j: There is no statistically significant difference in attitudes regarding food additives by education.

H_a1j: There is a statistically significant difference in attitudes regarding food additives by education.

RQ2: Is there a relationship between consumers' knowledge about food additives and their attitudes about food additives related to obesity?

$H_0$2a: There is no statistically significant relationship between consumers' knowledge scores and attitude scores regarding the relationship between food additives and obesity.

*Ha*2a: There is statistically significant relationship between consumers' knowledge scores and attitude scores regarding the relationship between food additives and obesity.

RQ3: Is there a statistically significant relationship between consumers' knowledge of food additives and attitudes about food additives being related to obesity based on demographic characteristics?

$H_0$3a: There is no statistically significant relationship between knowledge scores and attitude scores about the relationship between food additives and obesity by racial/ethnic categories.

H_a3a: There is a statistically significant relationship between knowledge scores and attitude scores about the relationship between food additives and obesity by racial/ethnic categories.

$H_0$3b: There is no statistically significant relationship between knowledge scores and attitude scores about the relationship between food additives and obesity by age categories.

H_a3b: There is a statistically significant relationship between knowledge scores and attitude scores about the relationship between food additives and obesity by age categories.

$H_0$3c: There is no statistically significant relationship between knowledge scores and attitude scores regarding the relationship between food additives and obesity by gender.

H_a3c: There is a statistically significant relationship between knowledge scores and attitude scores regarding the relationship between food additives and obesity by gender.

$H_0$3d: There is no statistically significant relationship between knowledge scores and attitude scores about the relationship between food additives and obesity by education categories.

H_a3d: There is a statistically significant relationship between knowledge scores and attitude scores regarding the relationship between food additives and obesity by education categories.

$H_0$3e: There is no statistically significant relationship between knowledge scores and attitude scores regarding the relationship between food additives and obesity by income categories.

H_a3e: There is a statistically significant relationship between knowledge scores and attitude scores regarding the relationship between food additives and obesity by income categories.

Data-Analysis Plan

The data-analysis plan included coding, entry, and checking the data. I used SPSS software as a tool to perform the data-set analysis for the present study (see Appendix F). The SPSS statistical analysis package allowed me to import or enter data from this package (see Appendix G). The variables had a unique title and level of measurement.

The measurement level of a variable is important because it determines the type of analysis that can be undertaken. Study variables were categorical and ordinal, analyzed with chi-square tests. I used an alpha level of .05 to determine statistical significance. When participants had completed the survey questionnaire, the next step in the process was the data analysis. The purpose of these choices for the study is that researchers can then make generalizations from a sample, along with inferences about the characteristics or attitudes of this population (Babbie, 1990). Using SPSS, researchers can select any appropriate independent variable with three or more levels, and any appropriate dependent variable. I conducted chi-square analysis with control-variable grouping, such as gender and age, to test for independence between variables such as knowledge of food additives and attitudes regarding the relationship between food additives and obesity. Additionally, I performed ordinal logistic regression analysis to assess the relationship between various independent variables such as gender, age, income, and knowledge about food additives and the dependent variable, attitudes regarding the relationship between food additives and obesity.

Threats to Validity

External Validity

External validity is threatened when investigators draw incorrect inferences from sample data to other persons, other settings, and past or future situations. Because this study took place in central Florida in a specific organization, study findings are not generalizable to people in other settings. The methods of subject selection and study setting limit the findings to the study subjects. Therefore, only through the replication of

results through repeated studies in other settings and populations will it be possible to bolster the generalization of the initial findings (Hutt, Hummel, & Kaeck, 2001).

Internal Validity

Threats to internal validity tend to be limited to experimental studies. Internal validity refers to whether the researcher can conclude that the independent variable produced the differences observed in the dependent variable (Hutt et al., 2001). This was a cross-sectional study, and the comparison of individuals between the ages of 18 and 65 years offers the risk that behavioral differences have nothing to do with age, but rather with educational, cultural, and nutritional/health habits that can be characterized by living conditions that differ by generation. Because this study was a cross-sectional study, the study had no such threats to internal validity (see Web Center for Social Research Methods, 2006).

Construct Validity

For this study, the construct validity included adequate definitions and measures. Construct validity is the degree to which inferences made from the study can be generalized to the concepts underlying the outcome of the study. In the present study, it was necessary to define the concepts of the study before undertaking measures. The use of one independent variable limited the breadth of the study, as this reduced evidence that the measurement is a valid one. In this study, the inference of hypothesis guessing is where participants base their behavior on what they think the study is about. Because consumers' attitudes are a composite of their beliefs and feelings and their behavioral intentions toward food additives and obesity, I viewed these components together; these components are highly interdependent and represent forces that influence how consumers

react to the concept of the relationship between food additives and obesity. Because consumers hold many beliefs, it is difficult to ascertain individual beliefs. Consumer attitudes influence and predict behavior (Wilcock et al., 2004). To achieve the goal of this study, I used the multiattribute approach, also known as the Fishbein model, to summarize overarching attitudes into one score, using the applicable equation (Perner, 2018). Therefore, the outcome of this is study is not due solely to the survey, but to participants' responses to the questions on the questionnaire.

Ethical Procedures

Because this study was nonexperimental, it prompted fewer ethical considerations. I addressed the issue of informed consent as participants gave their consent by agreeing to complete the questionnaire. Documentation on the questionnaire indicated that the data were being collected for research purposes only. The protocol was a detailed description of what was done and how it was accomplished. It was my responsibility to communicate all necessary and relevant information to participants and to ensure the results of the study aligned with IRB policies at Walden University.

Summary

The purpose of this chapter was to describe the research methodology, which had a nonexperimental, cross-sectional, descriptive approach. The sample selection was voluntary from the Church of Ascension Orlando, Florida. I used a survey questionnaire that outlined a series of questions to be answered by the participants. I asked participants to answer the questions as truthfully as possible and to submit answer sheets for tabulation. The statistical instrumentation of the collected data was SPSS.

With the SPSS statistical tools of measurement, I plotted the measurement of the data using the chi-square test. Researchers commonly use a chi-square statistic to test independence between variables that are nominal or ordinal, thereby assessing whether a relationship exists between the variables of interest. The null hypothesis from the chi-square test was that no relationship exists on the categorical variables in population, as they are independent (see Statistical Solutions, 2017). I performed statistical analysis on the sample group data to obtain understanding of the population, such as the distribution of age and gender.

Chapter 4: Results

The purpose of this research was to study people's KABs about food additives and obesity in the Orlando, Florida, area. The research questions inquired about (a) differences in consumers' knowledge of food additives and attitudes about food being related to obesity, among demographic factors, (b) the relationship between consumers' knowledge of food additives and their attitudes about food additives being related to obesity, and (c) how demographics affected the relationship between consumers' knowledge of food additives and their attitudes about food additives being related to obesity. This chapter is organized into two main sections: data collection and results. In the data-collection section, I describe the data-collection procedures and timeframe and report the descriptive statistics to characterize the sample. In the results section, I present the analyses used to answer the research questions. Finally, a summary concludes the chapter.

Data Collection

To address the study's purpose, I administered an online survey to members of a church in Orlando, Florida. I uploaded a link to the survey, hosted by SurveyMonkey, to the church's e-contact online newsletter and the church's weekly bulletin from August 24, 2018 through September 30, 2018. As recruitment occurred through newsletters and bulletins, and not through direct contact of individuals, it was not possible to calculate the actual response and recruitment rates. A total of 69 responses were obtained. Of these 69 responses, I removed two that were missing large amounts of data from the dataset. I check for outliers using Mahalanobis distances; one outlier emerged. However, this outlier was found on a score from a participant who was Black, and as only two Black

participants took part in the survey, removal of this participant would have resulted in too few Black participants in the dataset, rendering an analysis of knowledge or attitudes regarding food additives unavailable. Accordingly, I retained the outlier. A total of 67 participants were included in the final dataset.

Descriptive Statistics

I calculated descriptive statistics to describe the sample. Most participants had a before-tax household income of $75,000 to $99,999 (*n* = 15, 22%). Caucasians were the largest racial or ethnic group represented in the sample (*n* = 64, 96%). The majority of participants were aged 55 and older (*n* = 37, 55%). The largest grouping of participants had earned a graduate or professional degree (*n* = 29, 43%). Finally, the majority of participants were female (*n* = 52, 78%).

The population consisted of members of a church in Orlando, Florida. This population had diverse SES backgrounds, race, and age groups. However, the majority of churchgoers were White, female, above the age of 55, and educated. Specific information regarding the exact demographic breakdown of the population at the church was not provided; thus, it is not possible to comprehensively conclude that the sample was representative of the population. Table 1 presents the full frequencies and percentages of these demographic variables.

Table 1

Frequency Table for Demographic Variables

Variable	*n*	*%*
Before-tax household income		
Less than $25,000	2	2.99
$25,000 to $34,999	2	2.99
$35,000 to $49,999	4	5.97
$50,000 to 74,999	4	5.97
$75,000 to $99,999	15	22.39
$100.000 to $149,999	10	14.93
$150,000 to 199,999	9	13.43
$200,000 or more	8	11.94
I prefer not to answer	13	19.40
Missing	0	0.00
Racial or ethnic group		
White or Caucasian	64	95.52
Black or African American	2	2.99
Other	1	1.49
Missing	0	0.00
Age		
25–34	3	4.48
35–44	16	23.88
45–54	11	16.42
55 and over	37	55.22
Missing	0	0.00
Education		
High school graduate including equivalency	1	1.49
Some college, no degree	6	8.96
Associates degree	5	7.46
Bachelor’s degree	24	35.82
Ph.D.	1	1.49
Graduate or professional degree	29	43.28
Missing	1	1.49
Gender		
Female	52	77.61
Male	15	22.39
Missing	0	0.00

I calculated summary statistics for knowledge and attitude: the two composite scores created to represent participants' knowledge of food additives and participants' attitudes toward food additives being related to obesity. I created the composite score of knowledge by summing participants' correct responses to questions about whether a substance was a food additive. I created the attitude score by averaging participants' responses related to their views on how food additives related to obesity. On average, participants scored 5.21 out of a possible 7.00 (*SD* = 1.41) in knowledge. On average, participants scored 3.27 (*SD* = 0.66) of a possible 5.00 in attitude.

I also calculated skewness and kurtosis, shown in Table 2. A skew greater than 2.00 in absolute value or kurtosis greater than 3.00 in absolute value indicates deviation from a normal distribution (Westfall & Henning, 2013). Scores were within normal limits for skew and kurtosis. Figures 3 and 4 present histograms of knowledge and attitude, respectively. These histograms also indicate that the variables generally followed a normal distribution with minor deviations. Table 2 presents the summary statistics.

Table 2

Summary Statistics Table for Knowledge and Attitude

Variable	Minimum	Maximum	*M*	*SD*	Skewness	Kurtosis
Knowledge	2.00	7.00	5.21	1.41	-0.34	-1.05
Attitude	1.00	4.50	3.27	0.66	-1.26	2.61

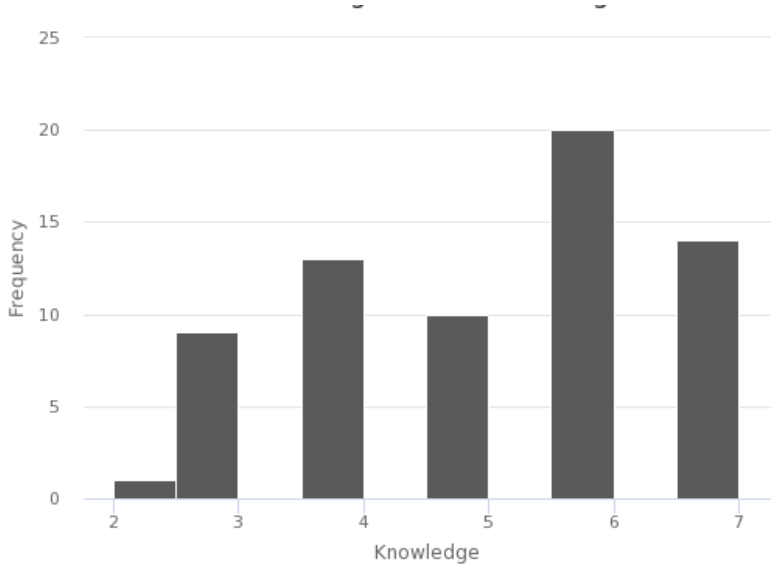

Figure 3. Histogram of knowledge scores.

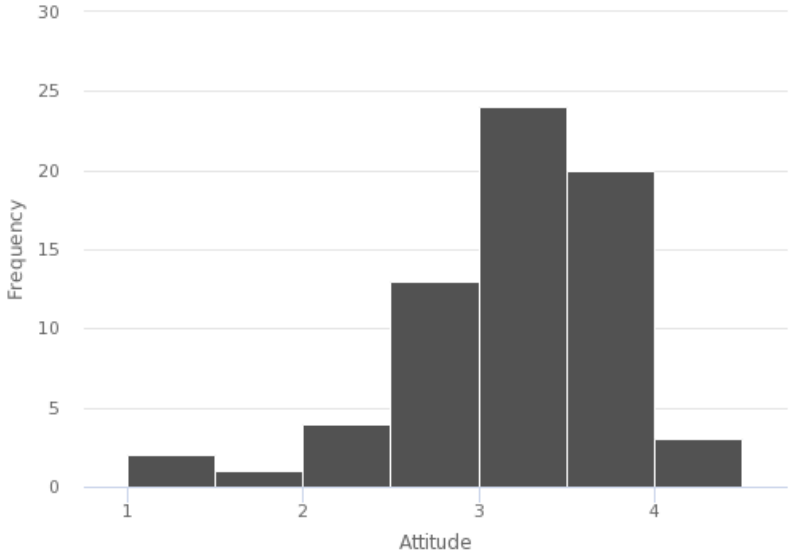

Figure 4. Histogram of attitude scores.

Results

To address Research Question 1, I conducted a series of ANOVAs. The ANOVA is the appropriate analysis when the research aim is to assess differences in a continuous dependent variable among levels of a categorical independent variable (Field, 2013). To address Research Question 2, I conducted a Spearman correlation. The Spearman

correlation is the appropriate analysis to conduct when the research aim is to assess the bivariate relationship between two continuous variables and when the distributional assumptions of the Pearson correlation are not met (Field, 2013). I conducted a series of regressions to assess Research Question 3. The regression analysis is the appropriate analysis to conduct when the research aim is to assess the relationship between categorical or continuous independent (predictor) variables and a single continuous dependent variable (Field, 2013). I present the results of each analysis below, organized by research question and hypothesis.

Research Question 1

RQ1: What are consumers' knowledge of food additives and attitudes about food additives being related to obesity?

To answer this research question, I conducted a series of ANOVAs to determine if differences emerged in knowledge and attitudes among demographic groups. To have adequate group sizes, I recoded income into the following categories: $34,999 or less ($n$ = 4); $35,000 to $49,999 ($n$ = 4); $50,000 to 74,999 ($n$ = 4); $75,000 to $99,999 ($n$ = 15); $100.000 to $149,999 ($n$ = 10); $150,000 to $199,999 ($n$ = 9); $200,000 or more ($n$ = 8). race into the following categories: White or Caucasian (n = 64), Black or African American, and other (n = 3). I recoded education into the following categories: high school graduate or some college no degree (n = 7), associate degree (n = 5), bachelor's degree (n = 24), and graduate and professional degree or PhD (n = 30). Before each ANOVA, I assessed the assumption of normality and homoscedasticity. Following assumption testing, I present each ANOVA in the next sections, organized by hypothesis.

Assumption testing. I assessed normality through a series of Shapiro–Wilk tests, presented in Tables 3 through 7. The assumption of normality is met if the Shapiro–Wilk test is not significant (Field, 2013). Statistical tests of normality can be sensitive to sample size and flag even minor deviations of normality (Field, 2013). Where the statistical tests of normality indicated normality could not be assumed, I conducted an examination of skew and kurtosis values (see Tables 3 through 7). Skew values below an absolute value of 2.00 and kurtosis values below an absolute value of 3.00 indicate that any deviations from normality are within a range not likely to cause issues with the analysis (Westfall & Henning, 2013). All variables with Shapiro–Wilk tests that were significant had skew and kurtosis values within the acceptable limit, indicating that I could assume normality for all analyses. I conducted homogeneity of variances using Levene's test. Levene's test was not significant for each variable, indicating I could assume homogeneity of variances (as in Field, 2013). Table 8 presents the results of the Levene's test.

Hypothesis 1a. The null hypothesis regarding gender and knowledge was that no statistically significant difference would emerge in knowledge of food additives when compared by gender. The corresponding alternate hypothesis was that a statistically significant difference in knowledge of food additives would emerge by gender. To assess these hypotheses, I conducted an ANOVA with a dependent variable of knowledge and an independent variable of gender. Assumption testing for this analysis appears in the section titled assumption testing.

Table 3

Shapiro–Wilk Test Results by Income Level

Income	Dependent variable	*W*	*p*	Skew	Kurtosis
$34,999 or less	Knowledge	0.73	.024	0.00	-2.00
	Attitude	0.92	.519		
$35,000 to $49,999	Knowledge	0.86	.272		
	Attitude	0.80	.100		
$50,000 to 74,999	Knowledge	0.94	.683		
	Attitude	0.91	.492		
$75,000 to $99,999	Knowledge	0.84	.013	-0.98	-0.07
	Attitude	0.95	.549		
$100.000 to $149,999	Knowledge	0.93	.436		
	Attitude	0.87	.090		
$150,000 to 199,999	Knowledge	0.89	.180		
	Attitude	0.88	.176		
$200,000 or more	Knowledge	0.90	.273		
	Attitude	0.89	.230		

Table 4

Shapiro–Wilk Test Results by Racial Group

Race or ethnicity	Dependent variable	*W*	*p*	Skew	Kurtosis
White or Caucasian	Knowledge	0.90	< .001	-0.39	-0.96
	Attitude	0.89	< .001	-1.44	2.99
Black or African American and other	Knowledge	0.92	.463		
	Attitude	0.93	.497		

Table 5

Shapiro–Wilk Test Results by Age Group

Age	Dependent variable	*W*	*p*	Skew	Kurtosis
25–34	Knowledge	0.96	.637		
	Attitude	0.98	.702		
35–44	Knowledge	0.83	.007	-0.92	-0.18
	Attitude	0.82	.005	-1.71	2.99
45–54	Knowledge	0.76	.003	-0.40	-1.58
	Attitude	0.96	.710		
55 and Over	Knowledge	0.89	.001	-0.02	-1.29
	Attitude	0.91	.005	-1.30	3.84

Table 6

Shapiro–Wilk Test Results by Education Level

Education	Dependent variable	*W*	*p*	Skew	Kurtosis
High School Graduate or Some College No Degree	Knowledge	0.82	.064		
	Attitude	0.72	.006	-0.71	-0.51
Associate Degree	Knowledge	0.88	.314		
	Attitude	0.93	.605		
Bachelor's Degree	Knowledge	0.89	.014	-0.61	-0.54
	Attitude	0.96	.445		
Graduate and Professional Degree or PhD	Knowledge	0.86	.001	-0.11	-1.45
	Attitude	0.90	.008	-1.35	2.60

Table 7

Shapiro–Wilk Test Results by Gender

Gender	Dependent variable	*W*	*p*	Skew	Kurtosis
Female	Knowledge	0.91	< .001	-0.19	-1.11
	Attitude	0.90	< .001	-1.31	2.54
Male	Knowledge	0.82	.007		
	Attitude	0.97	.820		

Table 8

Levene's Test Results

Variable	Dependent variable	*F*	*p*
Income	Knowledge	0.47	.824
	Attitude	0.59	.740
Race	Knowledge	0.06	.801
	Attitude	0.38	.538
Age	Knowledge	0.57	.636
	Attitude	0.17	.917
Education	Knowledge	1.07	.370
	Attitude	0.09	.966
Gender	Knowledge	1.56	.217
	Attitude	0.51	.480

The results of the ANOVA were not significant, F (1, 65) = 2.75, p = .102. This result indicates that no significant differences in knowledge emerged between genders (see Table 9). In Table 10, I present the means and standard deviations. I could not reject null Hypothesis 1a.

Table 9

Analysis of Variance Table for Knowledge by Gender

Term	*SS*	*df*	*F*	*p*	η_p^2
Gender	5.31	1	2.75	.102	0.04
Residuals	125.76	65			

Table 10

Mean, Standard Deviation, and Sample Size for Knowledge by Gender

Combination	*M*	*SD*	*n*
Female	5.06	1.41	52
Male	5.73	1.33	15

Hypothesis 1b. The null hypothesis regarding gender and attitude was that no statistically significant difference in attitudes about food additives would emerge when compared by gender. The corresponding alternate hypothesis was that a statistically significant difference in attitudes about food additives would emerge when compared by gender. To assess these hypotheses, I conducted an ANOVA with a dependent variable of attitude and an independent variable of gender. Assumption testing for this analysis can be found in the section titled assumption testing.

The results of the ANOVA were not significant, F (1, 65) = 0.09, p = .762. This result indicates that no significant differences emerged in attitude between genders (see Table 11). The means and standard deviations appear in Table 12. I could not reject Null Hypothesis 1b.

Table 11

Analysis of Variance Table for Attitude by Gender

Term	*SS*	*df*	*F*	*p*	η_p^2
Gender	0.04	1	0.09	.762	0.00
Residuals	28.29	65			

Table 12

Mean, Standard Deviation, and Sample Size for Attitude by Gender

Combination	*M*	*SD*	*n*
Female	3.26	0.69	52
Male	3.32	0.52	15

Hypothesis 1c. The null hypothesis regarding age group and knowledge, Hoc, was that no statistically significant difference would emerge in knowledge of food additives by age. The corresponding alternate hypothesis, Ha1c, was that a statistically significant difference would emerge in knowledge of food additives by age. To assess these hypotheses, I conducted an ANOVA with a dependent variable of knowledge and an independent variable of age group. Assumption testing for this analysis can be found in the section titled assumption testing.

The results of the ANOVA were not significant, F (3, 63) = 1.08, p = .362. This shows that no significant difference in knowledge emerged based on age group (see Table 13). The means and standard deviations appear in Table 14. I could not reject Null Hypothesis 1c.

Table 13

Analysis of Variance Table for Knowledge by Age Group

Term	*SS*	*df*	*F*	*p*	η_p^2
Age group	6.44	3	1.08	.362	0.05
Residuals	124.64	63			

Table 14

Mean, Standard Deviation, and Sample Size for Knowledge by Age Group

Age	*M*	*SD*	*n*
25–34	5.33	1.53	3
35–44	5.62	1.31	16
45–54	4.64	1.63	11
55 and over	5.19	1.37	37

Hypothesis 1d. The null hypothesis regarding age group and attitude, Ho1 was that no statistically significant difference would emerge in attitudes regarding food additives by age. The corresponding alternate hypothesis, Ha1d, was that a statistically significant difference would emerge in attitudes toward food additives by age. To assess these hypotheses, I conducted an ANOVA with an independent variable of age group and a dependent variable of attitude. Assumption testing for this analysis can be found in the section titled assumption testing.

The results of the ANOVA were not significant, F (3, 63) = 0.18, p = .909. This result indicates that no significant differences emerged in attitudes based on age group (see Table 15). The means and standard deviations appear in Table 16. I could not reject Null Hypothesis 1d.

Table 15

Analysis of Variance Table for Attitude by Age Group

Term	*SS*	*df*	*F*	*p*	η_p^2
Age	0.24	3	0.18	.909	0.01
Residuals	28.09	63			

Table 16

Mean, Standard Deviation, and Sample Size for Attitude by Age Group

Age	*M*	*SD*	*n*
25–34	3.00	0.70	3
35–44	3.26	0.76	16
45–54	3.30	0.72	11
55 and over	3.29	0.61	37

Hypothesis 1e. The null hypothesis regarding race and knowledge, Ho1e was that no statistically significant difference would emerge in knowledge of food additives by race. The corresponding alternate hypothesis, Ha1e was that a statistically significant difference would emerge in knowledge of food additives by race. To assess these hypotheses, I conducted an ANOVA with an independent variable of race and a dependent variable of knowledge. Assumption testing for this analysis can be found in the section titled assumption testing.

The results of the ANOVA were not significant, F (1, 65) = 0.46, p = .499. This result indicates that no significant differences emerged in knowledge based on race (see Table 17). The means and standard deviations appear in Table 18. I could not reject Null Hypothesis 1e.

Table 17

Analysis of Variance Table for Knowledge by Race

Term	*SS*	*df*	*F*	*p*	η_p^2
Race	0.92	1	0.46	.499	0.01
Residuals	130.15	65			

Table 18

Mean, Standard Deviation, and Sample Size for Knowledge by Race

Race	*M*	*SD*	*n*
White or Caucasian	5.23	1.39	64
Black, African American or Other	4.67	2.08	3

Hypothesis 1f. The null hypothesis regarding race and attitude, Ho1f, was that no statistically significant difference would emerge in attitudes regarding food additives by race. The corresponding alternate hypothesis, Ha1f, was that a statistically significant difference would emerge in attitudes regarding food additives by race. To assess these hypotheses, I conducted an ANOVA with an independent variable of race and a dependent variable of attitudes. Assumption testing for this analysis can be found in the section titled assumption testing.

The results of the ANOVA were not significant, F (1, 65) = 1.41, p = .240. This result indicates that no significant differences emerged in attitudes among races (see Table 19). The means and standard deviations appear in Table 20. I could not reject Null Hypothesis 1f.

Table 19

Analysis of Variance Table for Attitude by Race

Term	*SS*	*df*	*F*	*p*	η_p^2
Race	0.60	1	1.41	.240	0.02
Residuals	27.73	65			

Table 20

Mean, Standard Deviation, and Sample Size for Attitude by Race

Combination	*M*	*SD*	*n*
White Caucasian	3.25	0.64	64
Black African American or Other	3.71	0.97	3

Hypothesis 1g. The null hypothesis regarding income group and knowledge, Ho1g was that no statistically significant difference would emerge in knowledge of food additives by income. The corresponding alternate hypothesis, Ha1g, was that a statistically significant difference would emerge in knowledge of food additives by income. To assess these hypotheses, I conducted an ANOVA with an independent variable of income group and a dependent variable of knowledge. Assumption testing for this analysis can be found in the section titled assumption testing.

The results of the ANOVA were not significant, F (6, 47) = 0.90, p = .506. This result indicates that the differences in knowledge among the levels of income group were not significant (see Table 21). The means and standard deviations appear in Table 22. I could not reject Null Hypothesis 1g.

Table 21

Analysis of Variance Table for Knowledge by Income Group

Term	*SS*	*df*	*F*	*p*	η_p^2
Income	10.48	6	0.90	.506	0.10
Residuals	91.67	47			

Table 22

Mean, Standard Deviation, and Sample Size for Knowledge by Income Group

Income	*M*	*SD*	*n*
$34,999 or less	5.50	1.73	4
$35,000 to $49,999	5.25	0.96	4
$50,000 to 74,999	6.00	0.82	4
$75,000 to $99,999	5.40	1.50	15
$100.000 to $149,999	4.70	1.25	10
$150,000 to 199,999	4.56	1.51	9
$200,000 or more	5.50	1.41	8

Hypothesis 1h. The null hypothesis regarding income group and attitudes, Ho1h, was that no statistically significant difference would emerge in attitudes regarding food additives by income. The corresponding alternate hypothesis, Ha1h, was that a statistically significant difference would emerge in attitudes regarding food additives by income. To assess these hypotheses, I conducted an ANOVA with an independent variable of income group and a dependent variable of attitude. Assumption testing for this analysis can be found in the section titled assumption testing.

The results of the ANOVA were not significant, F (6, 47) = 1.76, p = .129. This result indicates that the differences in attitudes among the levels of income were not

significant (see Table 23). The means and standard deviations appear in Table 24. I could not reject Null Hypothesis 1g.

Table 23

Analysis of Variance Table for Attitude by Income

Term	*SS*	*df*	*F*	*p*	η_p^2
Income	3.71	6	1.76	.129	0.18
Residuals	16.53	47			

Table 24

Mean, Standard Deviation, and Sample Size for Attitude by Income

Income	*M*	*SD*	*n*
$34,999 or less	3.78	0.58	4
$35,000 to $49,999	3.53	0.40	4
$50,000 to 74,999	3.75	0.53	4
$75,000 to $99,999	3.17	0.57	15
$100.000 to $149,999	3.27	0.44	10
$150,000 to 199,999	3.44	0.50	9
$200,000 or more	2.90	0.91	8

Hypothesis 1i. The null hypothesis regarding education and knowledge, Ho1i, was that no statistically significant difference would emerge in knowledge of food additives by education. The corresponding alternate hypothesis, Ha1i, was that a statistically significant difference would emerge in knowledge of food additives by education. Assumption testing for this analysis can be found in the section titled assumption testing.

The results of the ANOVA were not significant, F (3, 62) = 0.69, p = .564. This result indicates that the differences in knowledge among the levels of education were not

significant (see Table 25). The means and standard deviations appear in Table 26. I could not reject Null Hypothesis 1i.

Table 25

Analysis of Variance Table for Knowledge by Education

Term	*SS*	*df*	*F*	*p*	η_p^2
Education	4.16	3	0.69	.564	0.03
Residuals	125.43	62			

Table 26

Mean, Standard Deviation, and Sample Size for Knowledge by Education

Education	*M*	*SD*	*n*
High school graduate or some college no degree	5.71	1.38	7
Associates degree	5.80	0.84	5
Bachelor's degree	5.17	1.37	24
Graduate and professional degree or PhD	5.07	1.53	30

Hypothesis 1j.10. The null hypothesis regarding education and attitude, Ho1j, was that no statistically significant difference would emerge in attitudes regarding food additives by education. The corresponding alternate hypothesis, Ha1j, was that a statistically significant difference would emerge in attitudes regarding food additives by education. To assess these hypotheses, I conducted an ANOVA with an independent variable of education and a dependent variable of attitude. Assumption testing for this analysis can be found in the section titled assumption testing.

The results of the ANOVA were not significant, F (3, 62) = 2.05, p = .116. This result indicates that the differences in attitudes among the levels of education were not

significant (see Table 27). The means and standard deviations appear in Table 28. I could not reject Null hypothesis 1j.

Table 27

Analysis of Variance Table for Attitude by Education

Term	*SS*	*df*	*F*	*p*	η_p^2
Education	2.51	3	2.05	.116	0.09
Residuals	25.28	62			

Table 28

Mean, Standard Deviation, and Sample Size for Attitude by Education

Education	*M*	*SD*	*n*
High school graduate or some college no degree	3.12	0.98	7
Associates degree	3.73	0.69	5
Bachelor's degree	3.41	0.52	24
Graduate and professional degree or PhD	3.10	0.63	30

Summary of Analyses for Research Question 1. Research Question 1: What are consumers' knowledge of food additives and the attitudes about food additives being related to obesity? To answer this research question, I conducted a series of ANOVAs with the independent variables of gender, race, age group, income group, and education, and the dependent variables of knowledge and attitude. Results of the analyses indicated no differences between genders, races, age groups, income groups, or educational backgrounds with regards to consumers' attitudes toward food additives being related to obesity.

Research Question 2

RQ2: Is there a relationship between consumers' knowledge about food additives and their attitudes about food additives being related to obesity?

Ho 2a: There is no statistically significant relationship between consumers' knowledge scores and attitude scores about the relationship of food additives to obesity.

Ha 2b. There is a statistically significant relationship between consumers' knowledge scores and about the relationship of food additives to obesity.

To answer this research question and assess these hypotheses, I performed a Spearman correlation between knowledge and attitude. The Spearman correlation is the nonparametric version of the Pearson correlation that researchers prefer in situations where distributional assumptions are not met (Field, 2013). The data did not meet the assumption of homoscedasticity or linearity (see Figure 5), indicating that the Spearman correlation should be used. The results of the Spearman correlation indicated no significant correlations emerged between knowledge and attitude, $r_s = 0.24$, $p = .050$. I could not reject Null Hypothesis 2a.

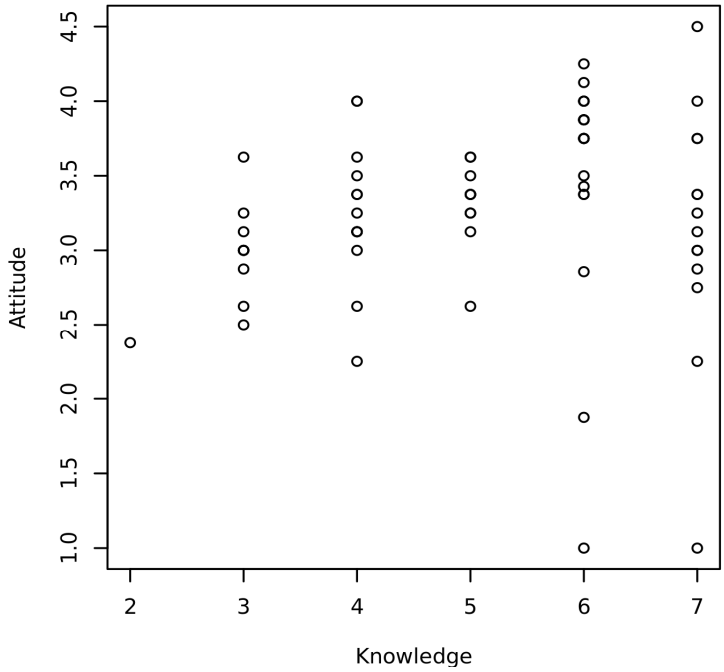

Figure 5. Scatterplot between knowledge and attitude.

Research Question 3

RQ3: Is there a statistically significant relationship between consumers' knowledge of food additives and attitudes about food related to obesity based on demographic characteristics?

To answer this research question, I performed a series of multiple linear regressions with the predictor variables of knowledge, respective demographic variables, and an interaction term between the two. The dependent variable for each analysis was attitude. Prior to interpreting each regression, the normality and homoscedasticity of each regression analysis. In the next section, I present assumption testing and interpretation, organized by hypothesis.

For categorical variables with more than two groups, I dummy coded the categories. For age group, I dummy coded the categories of age group into three variables (35–44, 45–54, and 55 and over) with age group 25–34 as the reference category. For

education, I dummy coded the categories of education into three variables (associate's degree, bachelor's degree, and graduate and professional degree or PhD) with high school graduate or some college no degree as the reference category. For income, I dummy coded the categories of income group into six variables ($34,999 or less, $35,000 to $49,999, $50,000 to 74,999, $100.000 to $149,999, $150,000 to 199,999, $200,000 or more) with $75,000 to $99,999 as the reference category.

Hypothesis 3a. The null hypothesis regarding race, knowledge, and attitude scores, Ho. 3a, was that no statistically significant relationship would emerge between knowledge scores and attitude scores about the relationship of food additives to obesity by racial/ethnic categories. The corresponding alternate hypothesis, Ha.3a, was that a statistically significant relationship would emerge between knowledge scores and attitude scores about the relationship of food additives and obesity by racial/ethnic categories. I conducted a regression analysis to determine whether race and knowledge significantly predicted attitude. Prior to interpreting the results of this regression, I assessed the assumptions of the regression analysis were assessed.

I evaluated normality using a Q-Q scatterplot. The assumption is met if the data points generally follow the diagonal line. The assumption was not met (see Figure 6). I evaluated homoscedasticity through a scatterplot of the residuals. The assumption is met if the data points are generally randomly distributed with no severe curvature (Field, 2013). The assumption was not met (see Figure 7) results should be treated with caution. The results of the linear regression model were not significant, F (3,63) = 1.86, p = .145, R^2 = 0.08. The p value of .145 indicated that race and knowledge did not explain a significant proportion of variation in attitude. the overall model was not significant, I did

not further examine the individual predictors. Table 29 summarizes the results of the regression model.

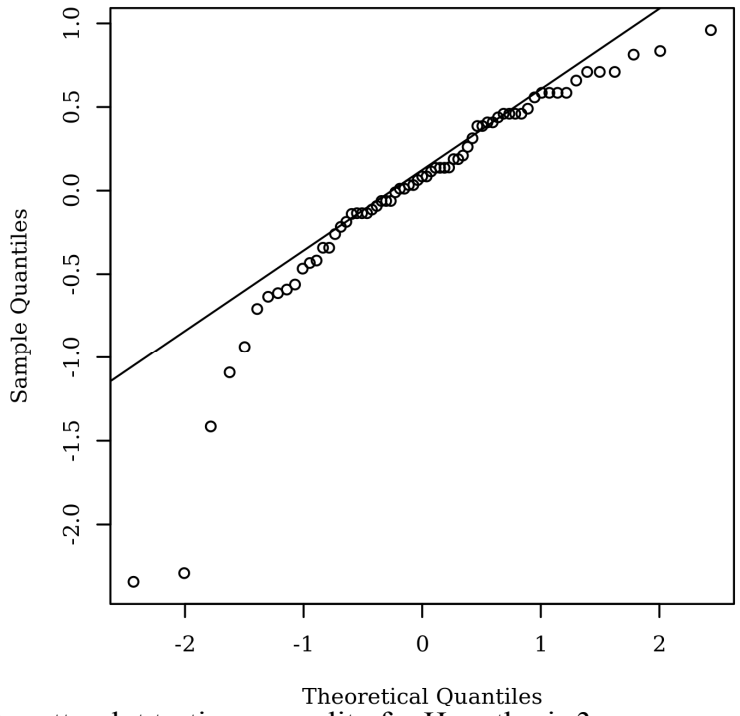

Figure 6. Q-Q scatterplot testing normality for Hypothesis 3a.

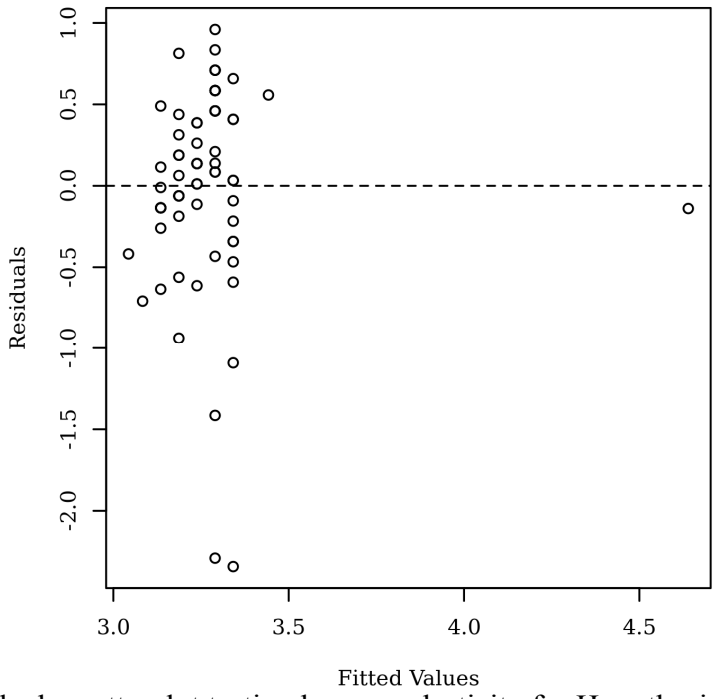

Figure 7. Residuals scatterplot testing homoscedasticity for Hypothesis 3a.

Table 29

Results for Linear Regression with Race, Knowledge, and Race x Knowledge Predicting Attitude

Variable	*B*	*SE*	95% CI	β	*t*	*p*
(Intercept)	2.98	0.32	[2.35, 3.61]	0.00	9.44	< .001
Race (ref: White or Caucasian)						
Black, African American or Other	-1.13	1.13	[-3.39, 1.12]	-0.36	-1.00	.319
Knowledge	0.05	0.06	[-0.06, 0.17]	0.11	0.89	.379
Black, African American or Other x Knowledge	0.35	0.23	[-0.10, 0.80]	0.55	1.54	.129

Hypothesis 3b. The null hypothesis regarding age group, knowledge, and attitude, Ho.3b, was that no statistically significant relationship would emerge between knowledge scores and attitude scores regarding the relationship between food additives

and obesity by age categories. The corresponding alternate hypothesis, Ha.3b, was that a statistically significant relationship would emerge between knowledge scores and attitude scores about the relationship between food additives and obesity by age categories. I conducted a regression analysis with knowledge and age predicting attitude.

Prior to interpreting the results of this regression, I assessed the assumptions of the regression analysis. The assumption of normality was not met (see Figure 8). The assumption of homoscedasticity was not met (see Figure 9). Results should be treated with caution.

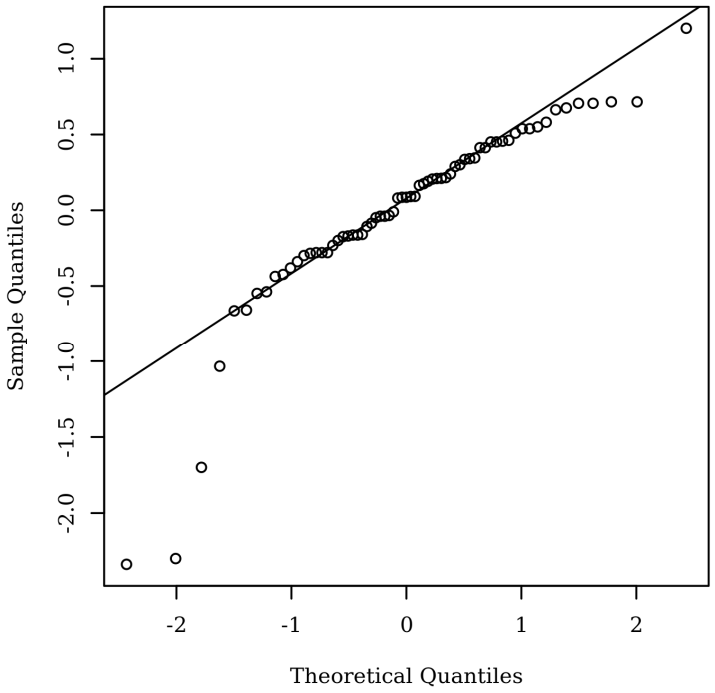

Figure 8. Q-Q scatterplot testing normality for Hypothesis 3b.

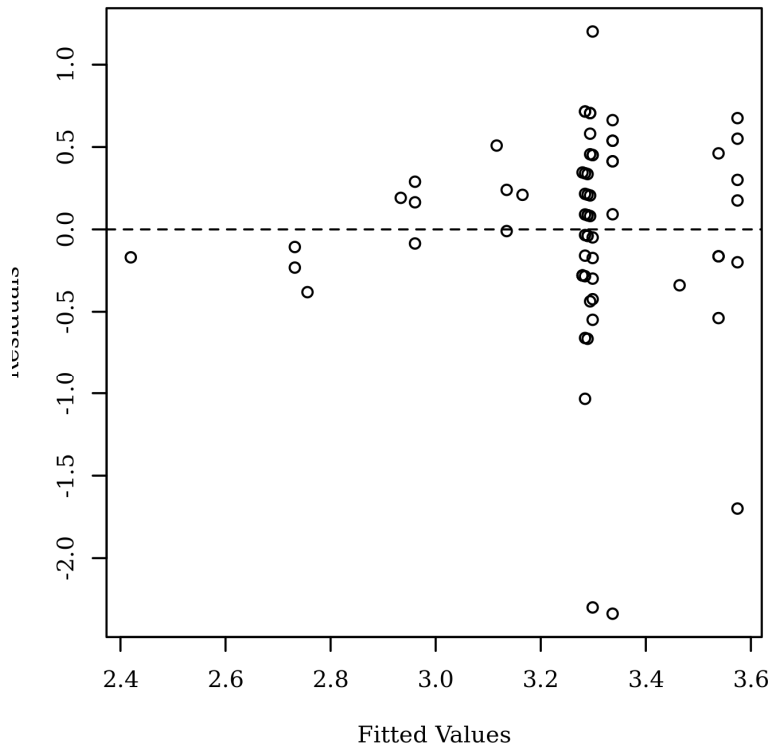

Figure 9. Residuals scatterplot testing homoscedasticity for Hypothesis 3.

The results of the linear regression model were not significant, F (7,59) = 0.99, p = .450, R^2 = 0.10. The p value of .450 indicated that age group and knowledge did not explain a significant proportion of variation in attitude. Because the overall model was not significant, I did not further examine the individual predictors. Table 30 summarizes the results of the regression model.

Hypothesis 3c. The null hypothesis regarding gender, knowledge, and attitude, Ho.3c, was that no statistically significant relationship would emerge between knowledge scores and attitude scores regarding the relationship between food additives and obesity and gender. The corresponding alternate hypothesis, Ha.3c, was that a statistically significant relationship would emerge between knowledge scores and attitude scores regarding the relationship between food additives and obesity by gender. I conducted a regression analysis with knowledge and gender predicting attitude.

Table 30

Results for Linear Regression With Age Group, Knowledge, and Age x Knowledge Predicting Attitude

Variable	*B*	*SE*	95% CI	β	*t*	*p*
(Intercept)	4.86	1.66	[1.53, 8.18]	0.00	2.92	.005
Age Group (ref: 25–34)						
35–44	-2.73	1.82	[-6.38, 0.91]	-1.79	-1.50	.139
45–54	-2.51	1.77	[-6.06, 1.04]	-1.43	-1.41	.163
55 and over	-1.59	1.72	[-5.03, 1.84]	-1.22	-0.93	.357
Knowledge	-0.35	0.30	[-0.96, 0.26]	-0.75	-1.15	.256
35–44 x Knowledge	0.55	0.33	[-0.11, 1.21]	2.09	1.67	.101
45–54 x Knowledge	0.55	0.33	[-0.11, 1.21]	1.56	1.68	.098
55 and over x Knowledge	0.35	0.31	[-0.27, 0.98]	1.50	1.13	.265

Prior to interpreting the results of this regression, I assessed the assumptions of the regression analysis. The assumption of normality was not met (see Figure 10). The assumption of homoscedasticity was not met (see Figure 11). Results should be treated with caution.

The results of the linear regression model were not significant, F (3,63) = 0.47, p = .705, R^2 = 0.02. The p value of .705 indicates that gender and knowledge did not explain a significant proportion of variation in attitude. Because the overall model was not significant, I did not further examine the individual predictors. Table 31 summarizes the results of the regression model.

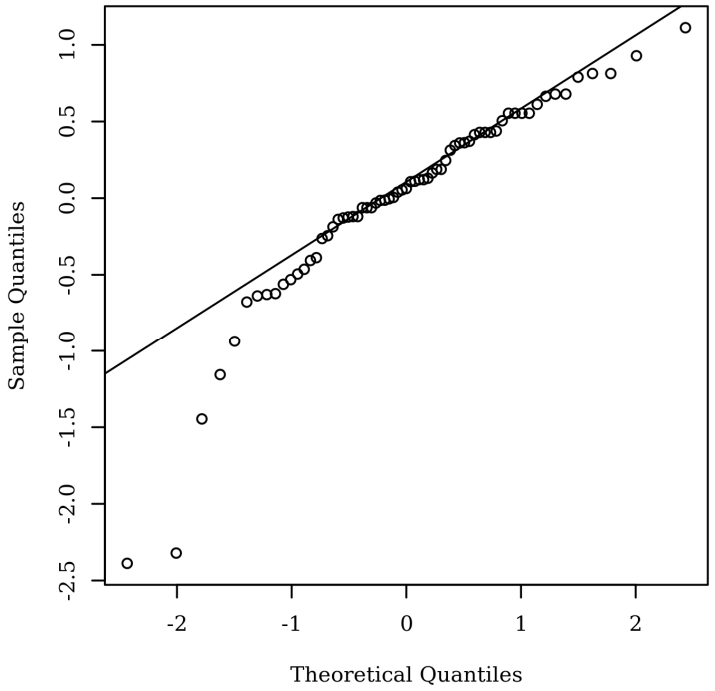

Figure 10. Q-Q scatterplot testing normality for Hypothesis 3c.

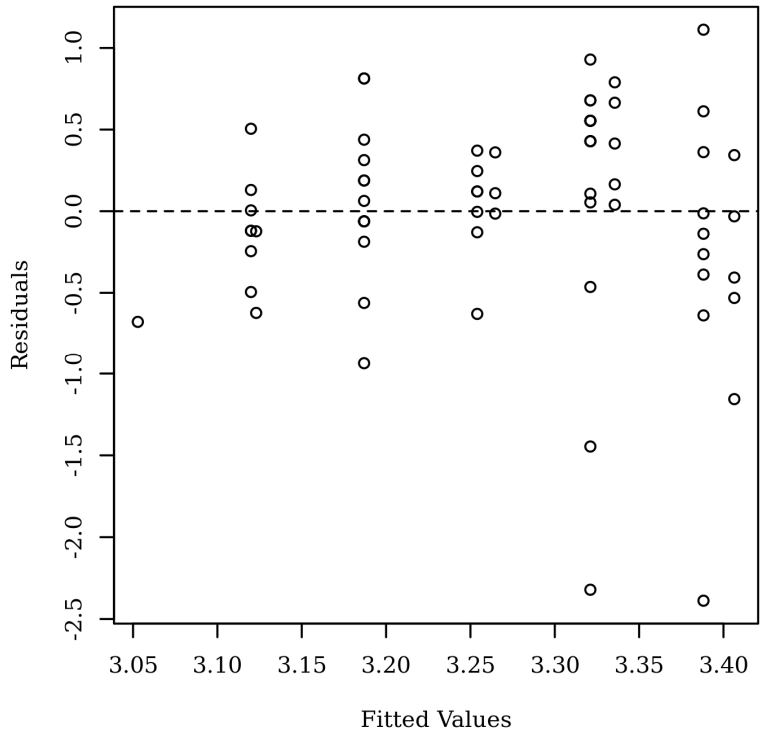

Figure 11. Residuals scatterplot testing homoscedasticity for Hypothesis 3c.

Table 31

Results for Linear Regression With Gender, Knowledge, and Gender x Knowledge Predicting Attitude

Variable	*B*	*SE*	95% CI	β	*t*	*p*
(Intercept)	2.92	0.35	[2.23, 3.61]	0.00	8.42	< .001
Gender (ref: Female)						
Male	-0.01	0.85	[-1.71, 1.70]	-0.01	-0.01	.992
Knowledge	0.07	0.07	[-0.06, 0.20]	0.14	1.02	.314
Male x Knowledge	0.00	0.15	[-0.29, 0.30]	0.01	0.03	.980

Hypothesis 3d. The null hypothesis regarding education, knowledge, and attitude, Ho.3d, was that no statistically significant relationship would emerge between knowledge scores and attitude scores regarding the relationship between food additives and obesity by education categories. The corresponding alternate hypothesis, Ha.3d, was that a statistically significant relationship would emerge between knowledge scores and attitude scores regarding the relationship between food additives and obesity by education categories. I conducted a regression analysis with knowledge and education predicting attitude.

Prior to interpreting the results of this regression, I assessed the assumptions of the regression. The assumption of normality was not met (see Figure 12). The assumption of homoscedasticity was not met (see Figure 13). Results should be treated with caution.

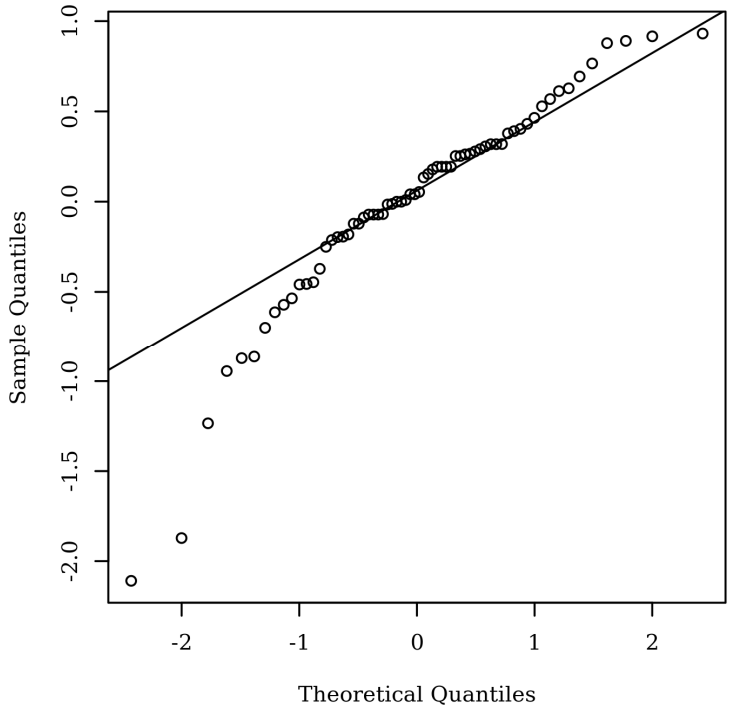

Figure 12. Q-Q scatterplot testing normality for Hypothesis 3d.

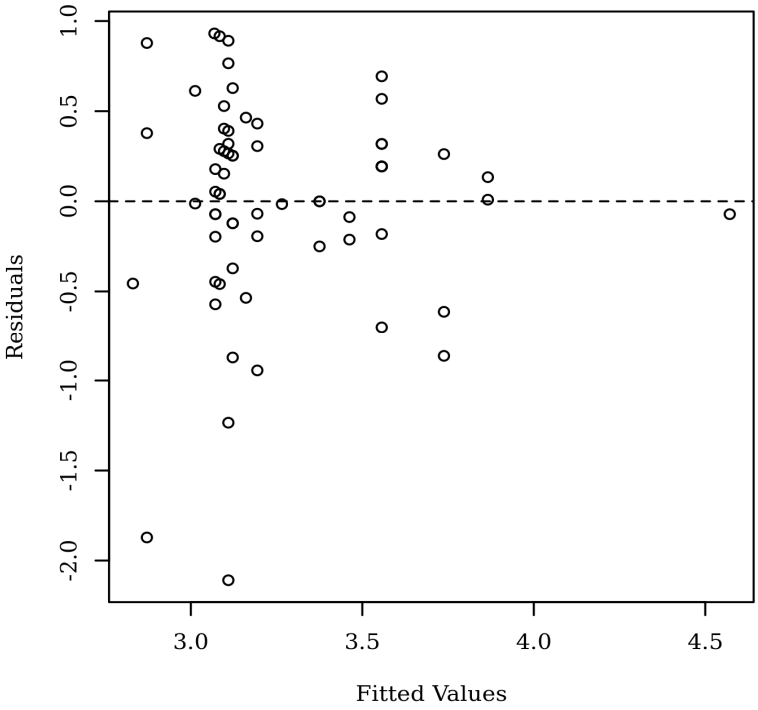

Figure 13. Residuals scatterplot testing homoscedasticity for Hypothesis 3.

The results of the linear regression model were significant, F (7,58) = 2.18, p = .050, R^2 = 0.21. This result indicates that approximately 21% of the variance in attitude is explainable by education and knowledge. However, assumption testing revealed issues of heteroscedasticity, indicating that results of the model are not trustworthy. Table 32 summarizes the results of the regression model.

Table 32

Results for Linear Regression With Education, Knowledge, and Education x Knowledge Predicting Attitude

Variable	*B*	*SE*	95% CI	β	*t*	*p*
(Intercept)	4.25	1.07	[2.11, 6.39]	0.00	3.98	< .001
Education (ref: High School Graduate or Some College No Degree)						
Associate's degree	-4.62	2.40	[-9.43, 0.19]	-1.88	-1.92	.060
Bachelor's degree	-1.78	1.18	[-4.14, 0.58]	-1.32	-1.51	.136
Graduate and professional degree or PhD	-1.22	1.14	[-3.49, 1.06]	-0.93	-1.07	.289
Knowledge	-0.20	0.18	[-0.56, 0.17]	-0.43	-1.08	.284
Associates degree x Knowledge	0.90	0.41	[0.08, 1.72]	2.15	2.20	.032
Bachelor's degree x Knowledge	0.38	0.20	[-0.03, 0.79]	1.52	1.85	.070
Graduate and professional degree or PhD x Knowledge	0.21	0.20	[-0.18, 0.60]	0.88	1.06	.292

Hypothesis 3e. The null hypothesis regarding income group, knowledge, and attitude, Ho.3e, was that no statistically significant relationship would emerge between knowledge scores and attitude scores regarding the relationship between food additives and obesity by income categories. The corresponding alternate hypothesis, Ha.3e, was that a statistically significant relationship would emerge between knowledge scores and attitude scores regarding the relationship between food additives and obesity by income categories. I conducted a regression analysis with knowledge and income predicting attitude.

Prior to interpreting the results of this regression, I assessed the assumptions of the regression analysis. The assumption of normality was met (see Figure 14). The assumption of homoscedasticity was not met (see Figure 15). Results should be treated with caution.

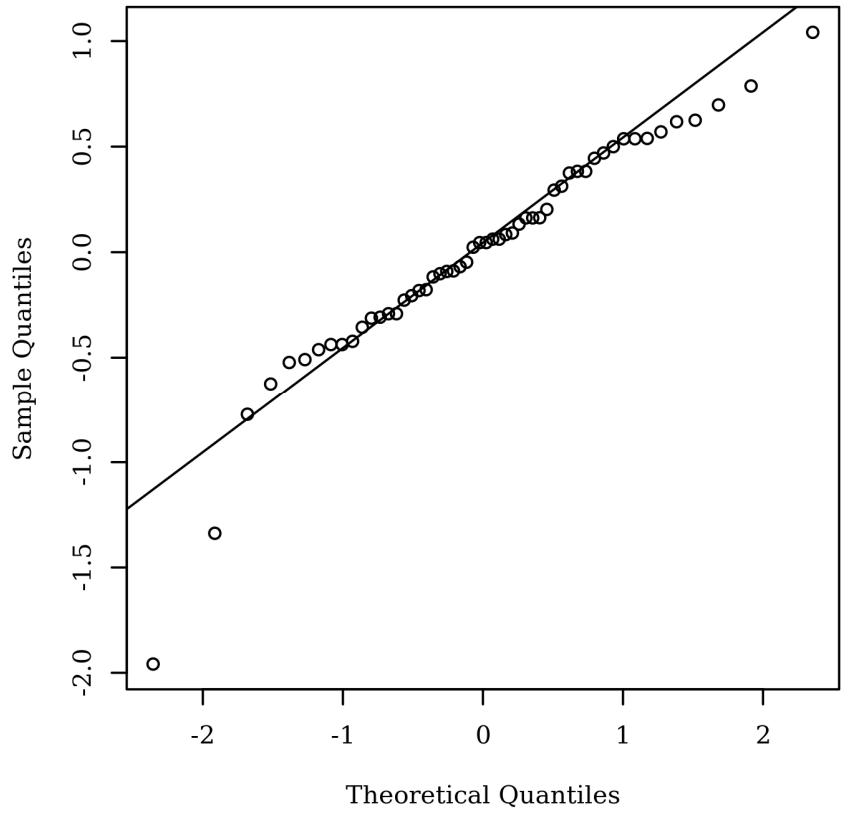

Figure 14. Q-Q scatterplot testing normality for Hypothesis 3e.

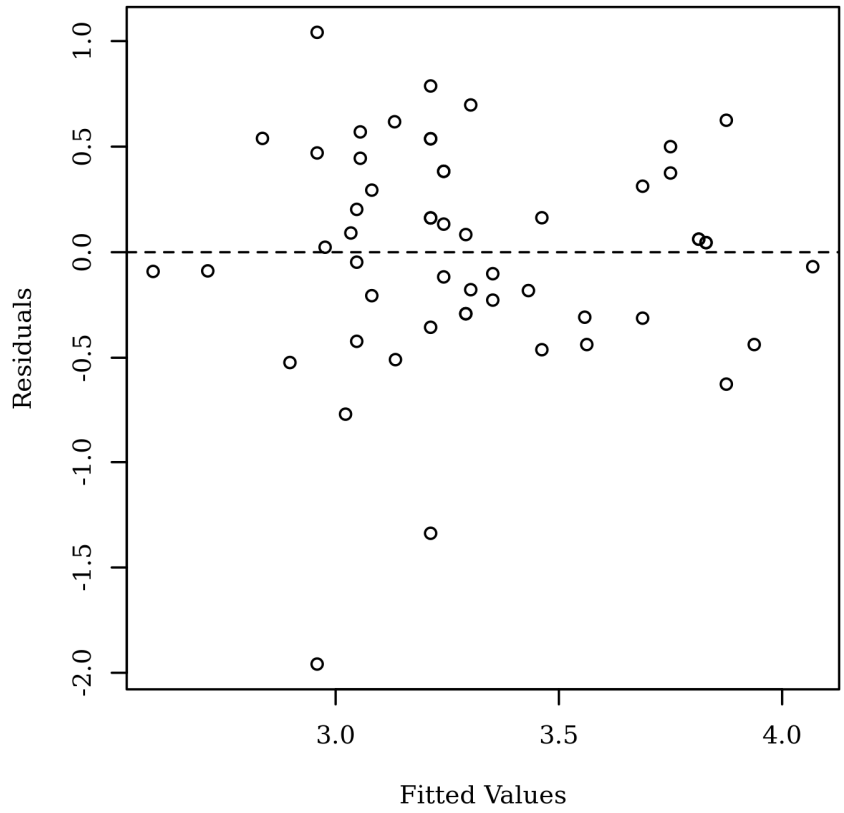

Figure 15. Residuals scatterplot testing homoscedasticity for Hypothesis 3e.

The results of the linear regression model were not significant, F (13,40) = 1.30, p = .253, R^2 = 0.30. The p value of .253 indicates that income and knowledge did not explain a significant proportion of variation in attitude. Because the overall model was not significant, I did not further examine the individual predictors. Table 33 summarizes the results of the regression model.

Table 33

Results for Linear Regression With Income Group, Knowledge, and Income x Knowledge Predicting Attitude

Variable	*B*	*SE*	95% CI	β	*t*	*p*
(Intercept)	2.74	0.59	[1.54, 3.94]	0.00	4.62	< .001
Income Group (ref: $75,000 to $99,999)						
$34,999 or less	0.70	1.28	[-1.89, 3.28]	0.30	0.55	.589
$35,000 to $49,999	-1.30	2.00	[-5.34, 2.75]	-0.55	-0.65	.521
$50,000 to 74,999	2.13	2.62	[-3.15, 7.42]	0.91	0.82	.419
$100.000 to $149,999	1.05	0.97	[-0.91, 3.02]	0.67	1.08	.286
$150,000 to 199,999	-0.46	0.89	[-2.26, 1.34]	-0.28	-0.51	.610
$200,000 or more	-0.52	1.08	[-2.70, 1.66]	-0.30	-0.48	.635
Knowledge	0.08	0.11	[-0.14, 0.29]	0.18	0.74	.462
$34,999 or less x Knowledge	-0.02	0.23	[-0.47, 0.44]	-0.04	-0.07	.943
$35,000 to $49,999 x Knowledge	0.32	0.37	[-0.44, 1.08]	0.73	0.85	.400
$50,000 to 74,999 x Knowledge	-0.27	0.43	[-1.14, 0.61]	-0.69	-0.61	.544
$100.000 to $149,999 x Knowledge	-0.19	0.19	[-0.57, 0.20]	-0.58	-0.99	.329
$150,000 to 199,999 x Knowledge	0.18	0.18	[-0.18, 0.53]	0.52	1.01	.320
$200,000 or more x Knowledge	0.04	0.19	[-0.34, 0.43]	0.14	0.23	.821

Summary

The overall findings regarding the level of knowledge on food additives, attitudes and beliefs, and their relationship to obesity are interpreted as follows. A statistically significant difference emerged in knowledge of food additives by income and education using an ANOVA method of testing.

Results for Research Question 1 indicated that I could reject none of the null hypotheses associated with the question. No significant differences in knowledge or attitude emerged, based on age, income, gender, education, or racial group. The results for Research Question 2 indicated that I could not reject the null hypothesis. No

significant correlation emerged between knowledge and attitude. The results for Research Question 3 indicated that I could not reject the null hypotheses. No significant interaction between knowledge and any of the demographic variables emerged when predicting attitude. A significant interaction did emerge between only one level of education and knowledge; however, assumption testing for this model revealed issues of heteroscedasticity, indicating that results should be treated with caution.

In the next chapter, I discuss the in relation to the extant literature. I also discuss the strengths and weaknesses of this study. Finally, I provide the implications of these findings and recommendations for future research.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this research was to study people's KABs about food additives and obesity and their KABs regarding relationship between food additives and obesity in Orlando, Florida. I chose to conduct a survey to measure peoples' KABs about food additives and obesity. The research questions asked about (a) differences in consumers' knowledge of food additives and attitudes about food being related to obesity between demographic factors, (b) the relationship between consumers' knowledge of food additives and their attitudes related to obesity, and (c) how demographics affected the relationship between consumers' knowledge of food additives and their attitudes about food additives being related to obesity.

Another concept used for this study was to explain the aspects necessary to describe scientific processes using six interrelated principles, not necessarily in the same form of inquiry. Such fundamental principles conceptual (theoretical) understanding, which constitutes empirically testable and reputable hypotheses using observational methods linked to theory. Such a format enables other scientists to verify the accuracy of a study and recognize the importance of replication and generalization (National Academies of Sciences, Engineering, and Medicine, 2019). However, it is unlikely that any one study would possess all these qualities (National Academies of Sciences, Engineering, and Medicine, 2019). This study was descriptive in nature, describing consumers' KABs about food additives and obesity. The study was formatted in the following way:

- Posed significant questions that can be investigated empirically
- Linked research to relevant theory

- Used methods that permitted direct investigation of the questions
- Provided a coherent and explicit chain of reasoning
- Replicated and generalized across studies
- Disclosed research to encourage professional scrutiny and critique

For Research Question 1, I could not reject the null hypotheses associated with the question and no significant differences emerged in knowledge or attitudes based on age, income, gender, education, or race. The results for Research Question 2 indicated that I could not reject the null hypothesis. No significant correlation emerged between knowledge and attitude. The results for Research Question 3 indicated that I could not reject the null hypothesis. No significant relationship emerged between knowledge and any demographic variables when predicting attitude. A significant relationship emerged between one level of education and knowledge; however, assumption testing particularly of this ANOVA analysis showed no difference; this model revealed issues of heteroscedasticity, indicating the results should be treated with caution.

Interpretation of the Findings

Research Question 1 asked, What are consumers' knowledge of food additives and attitudes about food being related to obesity? I found no significant interaction in knowledge or attitudes based on age, income, gender, education, or race. I used the SLT to explain human behavior as continuous reciprocal interactions between cognition, behavior, and environment. I used specific response options such as yes/no or Likert-type items through SurveyMonkey, an online data-gathering method, and used open coding to analyze the data.

Research Question 2 asked the following: Is there a relationship between consumers' knowledge about food additives and their attitudes about food additive related to obesity? No significant correlation emerged between knowledge and attitude. Kaplan and Kayisoglu (2015) claimed that consumers are increasingly cautious about food safety. Some consumers fear the addition of additives to food (Aoki et al., 2010). Additionally, some consumers do not perceive food additives the same way (Bearth et al., 2014).

Research Question 3 asked the following: Is there a statistically significant relationship between consumers' knowledge of food additives and about food related to obesity based on demographic characteristics? No significant interaction emerged between knowledge and any of the demographic variables when predicting attitude. A significant interaction emerged between only one level of education and knowledge; however, assumption testing for this model revealed issues of heteroscedasticity, indicating results should be treated with caution.

Limitations of the Study

Like all studies, the present study had limitations. According to Saunders, Lewis, and Thornhill (2009), research methods serve as the backbone of a study. However, the main purpose of quantitative research is the quantification of data that represents the population from which it was drawn, by measuring the views and responses of the sample population. Younus (2014) stated that "every research methodology consists of two broad phases, namely planning and execution" (see Saunders et al., 2009). Simon (2011) further stated that "within these two phases, there likely would be limitations, which are beyond the researchers' control". Limitations were evident in the present study, as the sample

population size fell in the limitations, due to nonresponses from certain age groups and ethnicities (see Chetty, 2016). Limitations included self-reporting by participants of the study and sample size. The survey questionnaire targeted 400 participants, but the response rate was 69 participants. This marginal sample size was due to people's lack of interest in participating, or people feeling their participation would not have any effect on the study. Quantitative studies are problematic when they have too large a sample size and low participant response. Self-reporting introduces the possibility of subjectivity and may not be as accurate as objective measures. Also, despite numerous announcements posted regarding the survey in the church's bulletin and on its website, responses from participants aged 18–24 and 25–34 were minimal. Therefore, the sample did not equitably represent all age groups. Additionally, African American participants were underrepresented, as responses from this population were low. I had no control over these factors. Because of unequal representation of age groups and ethnicity, the findings may not be generalized to other populations.

Recommendations for Further Research

Recommendations for future research include a larger, diverse population sample. This research sample lacked individuals from the age groups 18–24 and 25–34 and lacked people of certain cultural demographic backgrounds, which may have compromised this study. Because I used a descriptive with cross-sectional approach, future studies should use qualitative or longitudinal approaches, considering that previous literature and studies yielded different perspectives on the relationship between food additives and obesity.

Further recommendations include additional literature reviews, different data-collection methods, different statistical analyses, different sets of statistical variables to produce different outcomes, and a more diverse population. Research with the statistical data sets in the present study offered insight into consumers' KABs regarding food additives and whether KAB may be a causative agent for obesity from a qualitative perspective. Further research needs to be conducted to answer the gaps in literature.

Implications

The focus of this study was to test consumers' KABs about food additives and obesity. From a statistical analysis point of view, this focus was well documented in the data set write up, presented in the methods study section of this dissertation. I presented the data with the responses from participants. It was evident in the interpretations that although income and higher levels of education were not a significant factor in the results of certain age groups, education among lower age-group participants played a role in their KABs regarding food additives and obesity.

Findings from the present study suggested that the need to elaborate on this study is vital. If consumers are in an educational or financially lower SES, they can escape obesity. Because the consumers in this study had higher educational levels, they were more likely to purchase foods that are healthy by virtue of educational status and financial resources. However, some people may not be cognizant that food additives can link to obesity. It is, therefore, necessary to improve consumer education and information through workshops and community participation. The Office of Public Health must demonstrate the dangers of food additives and obesity by informing, educating, and training the public. Waiting for manufacturers to offer that support is futile; the public

must oversee its own health destiny. The goal of this study was to bring awareness regarding food additives and obesity to the forefront. A critical need exists for cost reduction and mortality rates related to obesity. If obesity is not reduced or eliminated in future years, it will rank as the leading mortality cause, surpassing cancer and diabetes.

Conclusions

Limited publications describe a relationship between food additives and obesity. When young consumers are educated, they may better protect their own health, safety, and economic and legal interests and those of society (Grujic et al., 2013a). The intent of this study was to better understand consumers' KABs regarding food additives and obesity. Public health must make changes, advising those who are obese about their ability to change their lifestyle to avoid obesity-enhancing foods. Ralph Waldo Emerson wrote, "Do not go where the path may lead, go instead where there is no path and leave a trail." Social change must start with local, community, state, and federal public health advocates, moving consumers from a mindset of comfort to initiating changes. Although invoking the behaviorist model is a response to environmental factors that ultimately affect a person's behavior, use of the cognitive model of internal behavior guided the theoretical framework of this study. The goal of this study was to effect social change by informing people of the association between their obesity and the additives in the foods they eat.

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Appendix A: Survey Questionnaire

Consumers' knowledge, attitude, and beliefs about food additives and obesity

Voluntary Information

This information is being requested in accordance with federal regulations. The information is voluntary and will not be used for any other purpose save only for research study.

Question 1.

What was your total household income before taxes during the past 12 months?

- o Less than $25,000
- o $25,000 to $34,999
- o $35,000 to $49,999
- o $50,000 to 74,999
- o $75,000 to $99,999
- o $100.000 to $149,999
- o $150,000 to 199,999
- o $200,000 or more
- o I prefer not to answer

Question 2.

Racial or Ethnic Group

☐ American Indian/Alaskan	☐ Asian/Pacific Islander	☐ Black/African American
☐ Hispanic/Latino	☐ White/Caucasian	☐ Other

Question 3.

What is your age?

- o 18–24
- o 25–34
- o 35–44
- o 45–54
- o 55 and over
- o I prefer not to answer

Question 4.

What is the highest degree or level of education you have completed?

- Less than high school
- High school graduate (including equivalency)
- Some college, no degree
- Associate's degree
- Bachelor's degree
- Ph.D.
- Graduate or professional degree
- I prefer not to answer

Question 5.

Gender

What is your gender?

- Female
- Male
- I prefer not to answer

Question 6.

Do you have any knowledge that the following are food additives? Please respond to the subsequent statements.

Bisphenol A is a food additive.

- Yes
- No

Artificial sweetener is a food additive.

- Yes

- No

Monosodium Glutamate (MSG) is a food additive.

- Yes
- No

Emulsifiers are food additives.

- Yes
- No

Low caloric sweetener is a food additive.

- Yes
- No

Food whitener benzoyl peroxide is a food additive.

- Yes
- No

Food whitener calcium peroxide is a food additive.

- Yes
- No

Question 7.

What is your attitude towards the following statements? Please respond to the following statements.

Bisphenol A is a food additive that contributes to obesity.

1 – strongly agree

2 – somewhat agree

3 – neutral/no opinion

4 – somewhat disagree

5 – strongly disagree

Food coloring is a food additive that contributes to obesity.

1 – strongly agree

2- somewhat agree

3 – neutral/no opinion

4 – somewhat disagree

5 – strongly disagree

Artificial sweetener is a food additive that contributes to obesity.

1 – strongly agree

2 – somewhat agree

3 – neutral/no opinion

4 – somewhat disagree

5 – strongly disagree

Monosodium Glutamate (MSG) is a food additive that contributes to obesity.

1 – strongly agree

2 – somewhat agree

3 – neutral/no opinion

4 – somewhat disagree

5 – strongly disagree

Emulsifiers are food additives that contribute to obesity.

1 – strongly agree

2 – somewhat agree

3 – neutral/no opinion

4 – somewhat disagree

5 – strongly disagree

Low caloric sweetener is a food additive that contributes to obesity.

1 – strongly agree

2 – somewhat agree

3 – neutral/no opinion

4 – somewhat disagree

5 – strongly disagree

Food whitener benzoyl peroxide is a food additive that contributes to obesity.

1 – strongly agree

2 – somewhat agree

3 – neutral/no opinion

4 – somewhat disagree

5 – strongly disagree

Food whitener calcium peroxide is food additive that contributes to obesity.

1 – strongly agree

2 – somewhat agree

3 – neutral/no opinion

4 – somewhat disagree

5 – strongly disagree

Appendix B: Recruiting of Participants Letter

Dear Reverend James Sorvillo D.D.

My name is Lorna Ingram. I am developing a research proposal for my doctoral dissertation at Walden University, School of Health. I am requesting your permission to invite members of your parish to participate in my study by completing an online survey. I am not requesting email addresses, phone numbers, mailing addresses or personally identifying information about the members of the parish. Instead, I would like you to email my letter of invitation to complete the online survey, on my behalf, to all of the members of your congregation.

My survey does not ask for any personally identifying information; the study participants' identity will be completely anonymous. I am not asking you to send this letter of invitation now. I must first obtain official approvals from my university and your organization. The intent of this email is to request your permission to invite members of your parish to complete my survey. Once I have all the appropriate permission letters, then I will forward to you the actual letter of invitation and ask you to email the letter on my behalf at that time. In addition, I would be happy to provide any further information you may require making a decision.

Thank you for your time.
Sincerely,
Lorna Ingram

Appendix C: Acceptance Letter

Episcopal Church of the Ascension

December 7, 2017

Lorna Ingram

RE: Doctoral Study Survey Approval

Dear Lorna,

It is with pleasure that I write to inform you that our governing body, called the Vestry, has approved you to invite members of the Church of the Ascension to aid you in your research survey. This approval took place during the regular meeting of our Vestry on July 25, 2016 and is noted in the minutes.

We hope that this will help you accomplish your goals as your work on your doctoral dissertation. As someone who completed their doctoral process this year, I fully understand the challenges ahead as well as the thrill of the accomplishment it brings.

Please let us know how we can assist you in the future. In the meantime, you remain in our prayers for a successful completion of this project.

God's peace and grace,

Rector, The Episcopal Church of the Ascension

Appendix D: Invitation Participants for Research Study

INVITATION
PARTICIPANTS FOR RESEARCH STUDY

My name is Lorna Ingram, I am developing a research proposal for my doctoral dissertation at Walden University School of Health. I am placing an announcement in the Church of Ascension weekly bulletin to invite members of your congregation to participate in my study by completing an on-line survey. I am not requesting email addresses, phone numbers, mailing addresses, or personally identifying information about the members of your congregation nor is my survey.
However, before this invitation can progress further, I must first obtain official approvals from my university. Once I have all the appropriate permission letters, then I will forward the actual survey to the administrator of the church to be uploaded to the church's website for your participation.

Thank you for your time.

Lorna Ingram

Appendix E: Pilot Study

A pilot study, which did not result in any changes to the questionnaire, was completed. Information regarding the characteristics of the people who participated in the pilot study is provided below:

Pilot Sample Information

The following pilot survey questionnaire was administered to team members at Orlando Health Clinical Laboratory Blood Bank on January 2nd, 2018. Instructions were given on how to complete the survey. The number of participants was seven, they ranged in ages from 18- 54 with one participant preferring not to give their age, the group included six females and one male of various disciplines, job titles, and job description in the organization.

Job titles included:

One from Administration.

One Senior Laboratory Technologist.

Four Laboratory Technologist.

One Clerical Support Staff

Appendix F: Data Analysis Plan

Analysis Plan

- Data cleaning
    - You should inspect the data for missing values and statistical outliers (using Mahalanobis distance measures). You should also determine whether you need to reverse code any scale items such that all values are interpreted the same way (i.e., high scores = stronger attitudes).
- Descriptive analysis
    - Demographic data
- Report the frequencies and the modal category or group
    - Knowledge
- Report the frequencies and the modal category or group
- Create an overall knowledge score by counting the number of correct answers each person achieved
- Report the minimum, maximum, median, mean, and standard deviation for the overall knowledge score
    - Attitudes
- Report the minimum, maximum, median, mean, and standard deviation for each scale item
- Create an overall attitudes variable by taking the average across all attitude's items.
- Report the minimum, maximum, median, mean, and standard deviation for the overall knowledge score

- Inferential analysis
    - Test of assumptions
- Normality: you should create histograms for the overall knowledge and overall attitudes variables to determine if they are normally distributed and run the Shapiro-Wilk test to determine if the distributions don't differ from a normal distribution.
- If this assumption is violated, you will have to use a non-parametric equivalent to the one-way ANOVA (i.e., Kruskal-Wallis) to answer research question 1. Use Spearman rank order to answer research question 2
- If the assumption is met, proceed with checking the second assumption of one-way ANOVA to answer research question 1 and Pearson's r to answer research question 2
- Homogeneity of Variance
- Use the Levene's F test to determine whether the variance across groups is comparable. If this assumption is met, proceed with conducting a one way-ANOVA to test hypotheses.
    - Tests of Hypotheses
- To answer all questions related to research question 1, perform a one-way ANOVA to determine whether knowledge and attitudes differ across demographic groups.
- If you get a statistically significant results, report the means for each group and perform a post-hoc analyses to determine the significant differences among all groups.

- To answer the hypotheses related to research question 2, perform a Pearson's r.
- Report the correlation coefficient that ranges between -1 and +1. The higher the value, the stronger the relationship between knowledge and attitudes.

Data analysis prepared by stars@dissertation-editor.com

Appendix G: Statistical Analysis Plan

Research Question 1: Series of ANOVAs
Categorical independent variables (demographics), continuous dependent variables (knowledge and attitude)

Research Question 2: Correlation
Two continuous variables (knowledge and attitude)

Research Question 3: Series of Linear Regressions with Interaction Term
Continuous and categorical independent variables (knowledge and demographics), interaction term between knowledge and demographic variable, continuous dependent variable (attitude)

Interaction term is necessary to answer the "relationship between knowledge and attitude by demographic category" question

The Likert-type scale can be considered and used as true continuous according to Norman (2010), Gail and Artino (2013), Johnson and Creech (1983), Zumbo and Zimmerman (1993), and de Winter and Dodou (2012).

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