THE INFLUENCE OF VISUAL SOURCES OF NUTRITION-ORIENTED INFORMATION ON YOUNG ADULTS' DIETING EFFORTS

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The goal of this study was to investigate visual sources of nutrition information relied upon by young adults, specifically college-aged students between 18-30, as this is an under-represented population within current academic literature. A sample of more than 700 18- to 30-year-old college students were surveyed regarding their use of nutrition-driven information, with specific questions regarding the participants' awareness and use of the Food and Drug Administration's standardized nutrition facts labels, as well as the use of smartphone applications for tracking one's food and beverage consumption on a regular basis. Using structural equation modeling, a statistically significant theoretical model was developed with regards to individuals finding greater long-term satisfaction in their dieting efforts if they tracked their consumption on a regular basis, with even greater significance being found through the aid of smartphone applications for recording consumption. An analysis of the content of three online diet and exercise-driven brands was also conducted to determine the currently optimal social media platform for nutrition information exchange, and to identify the type of diet-driven information that generates the greatest amount of engagement within an online network. Of the social media platforms analyzed, Instagram proved to be the most optimal for nutrition information-exchange, and that humorous and relevant content shared by dieting brands generated the greatest engagement within their online networks. These studies confirmed that formal visual sources of information, specifically the FDA's nutrition fact labels, are not regularly acknowledged nor implemented within
this population, but rather informal visual sources of information, such as content shared across social media channels and the use of smartphone applications, are heavily relied upon when dieting within the young adult population. These research implications are relevant and timely to academics, health professionals, and governmental entities, as they support the need for greater educational endeavors towards increasing the public's nutrition and food literacies, as well as provide an improved strategy for individuals who are dieting through a model for increased satisfaction in one's dieting efforts.
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CHAPTER 1
INTRODUCTION

This dissertation examined visual sources of nutrition-oriented information relied upon by young adults when dieting, specifically 18-30 year old college students, and analyzed both formal and informal sources of information through the implementation of three studies. Formal sources of visual information included the awareness and use of information included in the Food and Drug Administration's (FDA) standardized nutrition facts label panel, as seen on the majority of prepackaged food and beverage items produced and imported into the United States. Informal sources of visual information included the use of smartphone applications for tracking and recording one's food and beverage consumption on a regular basis, and it was through this analysis, paired with structural equation modeling, that a statistically significant model was developed for finding satisfaction in one's long-term dieting efforts. The last study also analyzed informal visual information sources, with results supporting that the social media platform Instagram is an optimal platform for online diet-driven brands to disseminate their content and engage with their networks of diet-minded participants, and that humorous and relevant content generates the greatest engagement within an online dieting network.

This dissertation is divided into the following sections: an introduction into the realm of nutrition information and the purpose and contributions of the study to the current body of research, the literature that created the foundation for the study, the methodology for investigating sources of visual nutrition information and the three
studies conducted for this investigation along with their results, and finally a summary of the results of the three studies, conclusions, and a plan for future research endeavors.

Problem Statement

We live in a perplexing era in the history of food, particularly with regard to one’s access to sources of nutrition information. Never before has there been such as great accessibility to food, but at the same time we are faced with the harrowing dilemma that food-related chronic illnesses now account for the leading causes of disease and death (CDC, 2018; Vidgen, 2016). As obesity rates continue to rise across the US, with almost 40% of the current population being considered obese and another 30% being considered overweight, healthy adults are no longer considered to be the norm, but rather the minority. While there are many factors that influence one’s physical wellbeing and weight status, inclusive of genetic predisposition and lifestyle, nutrition is believed to influence up to 80% of one’s degree of healthfulness (Myers, 2015).

If the majority of adults in America struggle with their weight, we can assume that the majority will also attempt to regain control of their weight through their eating habits, an action societally known as ‘dieting,’ with the primary goal being weight loss. While many individuals desire to complete a short-term diet or make a dramatic change in lifestyle to achieve greater health through their eating habits, the majority don’t see these efforts to completion due to a mix of the following factors: the lack of feeling in control over one’s food choices, misguided information pertaining to nutrition and one’s individual health needs, the perceived feeling of judgment by family and friends, a lack
of encouragement or social support, and not seeing the rewards of their efforts soon enough, leading to a feeling of 'burn out.'

It’s estimated that we make on average 200 food-related choices per day, and due to the repetitive nature of this action and the overwhelming amount of information encountered, we become dismissive to most of nutrition-oriented information (Wansink and Sobal, 2007). According to Rogers (1986, p.181), this state of an individual having too much information is defined as 'information overload,' in which communications cannot be processed due to the flood of inputs. These inputs are vast in format and are inclusive of all methods of communication. The majority of information regarding one's health, specifically nutrition, is visual in nature and comes in a wide variety of formats, including but not limited to traditional labels, such as the Food and Drug Administration’s (FDA) nutrition facts label panel implemented on prepackaged foods starting in the early 1990s, to today's mobile applications for smartphones that can be used to log one’s daily food and beverage consumption. When visiting the office of a physician or dietitian, pamphlets, posters, and literature are commonplace and often showcase the food pyramid, which is a representation of FDA's recommended number of servings per day of food by category, such as grains and starches versus fruits and vegetables. Icons and symbols are prevalent on packaging and menu boards, and can represent almost any of a food's features, from the exclusion of particular ingredients, such as gluten, dairy, or nuts, to a health endorsement, such as being considered 'heart healthy' or 'low fat.' To say “we eat with our eyes” isn’t that unreasonable of a statement, as foraging, being the implicit way that our brain is wired, is to visually
search for nutrient-dense foods, with additional preference being given to colorful pleasing items that induce hunger (Spence et. al, 2016).

Purpose of the Study

The purpose of this dissertation was to further understand the visual sources of information that are most heavily relied upon when a person desires to have a health-promoting “diet,” and we explicitly made the distinction that this term is not meant to be used solely as having a weight loss effort, but rather as the conscious and subconscious decisions made that form deeply-rooted habits and influence one’s food and beverage selections. We investigated the behaviors of individuals who self-reported that they believed they were overweight and had the desire to lose weight, as this represents a large part of the adult population in the United States, but we also compared their actions to individuals who believed that they were healthy at the time of the study and desired to maintain their current weight, as well as analyzed adults who desired to gain weight, in order to have a clear picture of the full spectrum of weight-related mindsets and how visual information might influence these choices. Formats of information for analysis included both ‘formal’ sources, such as seeking out the services of physicians, dietitians, and use of the mandated FDA nutrition facts labels for prepackaged products, as well as ‘informal’ sources, such as mobile applications used for tracking daily consumption, and content posted on social media platforms by diet and exercise brands, as we believe that younger generations, specifically millennials, place greater trust and give more attention towards these informal sources, as they are becoming increasingly interwoven with our daily activities and means of communication.
To test this assumption, we conducted three independent studies using qualitative and quantitative methodologies to investigate different formats of visual information that are heavily relied upon when individuals desire to make greater health-promoting dietary choices, and purposefully targeted young adults enrolled at a public university in the southwest to be included in our samples as this age is an overlooked population in the current body of nutrition-oriented literature. The studies included a content analysis of the posts published by 3 popular diet and or exercise-driven brands across the social media networking sites of Facebook, Instagram, and Twitter, the use of mobile applications for tracking daily consumption and their influence on one’s satisfaction with current weight efforts, and lastly, determining whether or not there was a preference for or against the recently made changes to the format of the FDA nutrition facts labels and their usage by college-aged young adults. The specific research questions asked in each study are seen below:

Specific Research Questions

Study 1: Determining Consumer Preference for the New Nutrition Facts Label Format Based on One’s Self-Reported Knowledge of Nutrition

1. Does one’s prior self-reported knowledge of nutrition significantly impact the preference for the current versus new nutrition facts label format, and what are these sources of information drawn upon to create this sense of knowledge?

2. Does the addition of new information and reformatting of the label truly influence the consumer in their search for nutrition-related information or does the consumer first need to have a knowledge of standardized nutrition measures and be in a health-conscious state-of-mind before viewing the label, in order to have the label fulfill its intended duty?

Study 2: Use of Dietary Tracking Devices Influences One’s Satisfaction In Current Weight Efforts
1. Do individuals who consistently pay attention to the items included within the nutrition facts label, which is an element of nutrition literacy, and record their consumption daily, find greater satisfaction in their ongoing weight efforts than those who do not record? If so, is this due to an increased feeling of control over their behaviors and a heightened awareness of their consumption?

2. Do individuals who use technological tools to record their consumption, specifically smartphone (mobile) applications, rather than traditional manual methods, such as a pen and paper or online calculator, report significantly greater levels of satisfaction due to the increased ease of use in recording items frequently?

Study 3: Determining the Most Engaging Content Shared by Dieting Brands on Social Media Platforms

1. What is the most engaging type of content published by diet and exercise brands to their Instagram networks?

2. Can 1 of the 3 social media platforms analyzed (Instagram, Facebook, and Twitter) be considered the superior platform for brands to publish their information and engage with a primarily online-driven network?

3. Does a photo’s degree of exposure, such as a transformation photo, correlate with the amount of engagement received to the post?

Study Limitations and Assumptions

A limitation of this study is that the participants in Studies 1 and 2 were confined to being students enrolled at a large public university in the southwestern region of the United States, as the results may differ from those of a different region. Also, the majority of the participants in the study were between the ages of 18-25, and while we believe that they adequately represent a collective mindset for the intended age group, it may be possible that these results are not reflective of the behaviors and views held by individuals of other age categories or demographics. Despite these limitations, this work provides a unique perspective in further understanding the preference of channels
for information exchange and dissemination held by this population with regard to nutrition.

The primary assumption in this study was that the participants answered all of the questions posed to them truthfully. All participants remained anonymous and any personally identifiable data were removed in order to facilitate an environment of comfort and honesty in response.

Study Contributions

This study determined that informal visual sources of information are given greater attention versus formal visual sources of information by young adults who are dieting or have a weight-related effort, with great amounts of trust being placed in the content shared through social media platforms by online brands and communities. The results also support that the action to track one’s daily food consumption, a behavior that brings greater awareness and accountability to one’s often subconscious dietary decisions, has a significant positive influence on one’s perceived self-control over dietary decisions, as well as a strong relationship to one’s overall satisfaction of weight-related efforts, whether it be to lose, gain, or maintain one’s weight. The majority of study participants reported not using the FDA’s nutrition facts label seen on prepackaged items, as many noted that they either didn’t understand how to read and apply the information contained within the label, or they associated referencing this information as an action that need only be taken when someone is “on a diet to lose weight,” rather than as a health-promoting habit.
Summary

This dissertation contributes to bodies of knowledge in the fields of information science, consumer behavior and marketing, and health and nutrition, by providing an analysis of the visual formats of information and channels most greatly relied upon by the young adult population, that contribute to their food and nutrition literacies and overall health.
Defining Health, Nutrition, and Food Literacies

To preface discussing the current use of nutrition-oriented information, it is first necessary to define terms that are often misused within the vocabulary associated with food-knowledge and consumption. The terms health literacy, nutrition literacy, and food literacy are incorrectly substituted for one another, often when being discussed outside of the realm of professional dietitians and nutritionists, therefore we believe it to be necessary to define these terms early on in the dissertation. The primary reason for the misuse of these terms is based on the fact that no real consensus exists as to the formal definitions and skills required of being considered literate within these domains (Truman, Lane, and Elliott, 2017; Palumbo, Annarumma, Adinolfi, Vezzosi, Troiano, Catinello, and Manna, 2017; Institute of Medicine, 2004; Nutbeam, 2008; Vidgen and Gallegos, 2014). It’s a gray area as to where to draw the line between skills needed solely for health literacy, versus those required of nutrition or food literacy. As food is the key variable in nutrition, and nutrition is a variable in one’s health, it would seem that health literacy creates a large umbrella, encompassing both food and nutrition literacy. If an individual does not have a working knowledge of food, then they cannot have a higher knowledge of nutrition, as this includes the effects of food on the human body. And if they don’t have a knowledge of nutrition, they can’t be considered wholly ‘health-literate,’ as nutrition is one of the top, if not the main variable in determining one’s health status. Chronic diseases currently account for 7 of the top 10 causes of death in the United States, of which the majority can be remedied if not entirely avoided by dietary
awareness and purposeful consumption behaviors (Center for Disease Control, 2009); some of the most common chronic diseases that have been scientifically proven to be preventable through nutrition include heart disease and stroke, cancer, Alzheimer's and dementia, obesity, arthritis, and oral conditions, such as mouth or throat diseases (CDC, 2009).

Per the US Institute of Medicine (2004), health literacy is “the degree to which individuals have the capacity to obtain, process and understand basic health information and services needed to make appropriate health decisions,” with recognition given to the great influence that one’s social interactions have on an individual’s skill set. The Institute of Medicine conceptualizes health literacy as having 4 sets of capabilities, inclusive of cultural knowledge, conceptual knowledge, numeracy, and communication skills, with these communication skills being inclusive of speaking, listening, writing, and reading (Nutbeam, 2008; Institute of Medicine, 2004). Per Nutbeam (2008), health literacy has 2 definitive concepts, as a clinical risk, such as lacking the literacy skills needed in managing one’s clinical care (the definition primarily espoused by the Institute of Medicine), or more positively as a personal asset, which is the sentiment of a large part of the public health sector. From the public health perspective, health literacy is considered a personal asset that can be built upon through context-specific health education and communication. This perspective also advocates that messaging should be purposefully targeted based on one’s age, context-specific health knowledge, and self-efficacy (Nutbeam, 2008).

The World Health Organization (WHO) has defined health literacy as being representative of both the cognitive and social skills that determine an individual's ability
to have access to, understand, and implement information needed in order to promote
and maintain good health; literacy implies the achievement of a particular level of
knowledge, skills, and confidence needed in order to improve one’s personal health
through lifestyle changes (WHO, 2007). This definition adopted by the WHO aligns itself
with the belief that health literacy empowers an individual to more fully participate in
society, inclusive of home, work, and community interactions, and that this heightened
sense of control is necessary in being able to make long-term changes. In order to
create a systematic definition representative of both the medical and public health
sectors, Sorensen, Van de Broucke, Fullam, Doyle, Pelikan, Slonska, and Brand (2012)
performed a literature review across 17 publications that gave specific definitions of
health literacy, inclusive of publications from the US, UK, Asia, and Australia, with the
condensed comprehensive definition of health literacy being that:

Health literacy is linked to literacy and entails people’s knowledge, motivation
and competences to access, understand, appraise, and apply health information
in order to make judgments and take decisions in everyday life concerning
healthcare, disease prevention and health promotion to maintain or improve
quality of life during the life course.

It’s difficult to measure health literacy, as the instrument must measure multiple
context-specific concepts, many of which are subjective, such as a self-reported level of
confidence in one’s knowledge of health-related matters or proof of having a particular
skill set, an example being numeracy and the ability to make choices based off of the
grams or percentages listed within the nutrition facts label. One’s ‘life course’ also
implies that one’s achievement of health literacy has the potential to change based on
one’s needs at a particular point in time. This idea that one's information needs change
depending on a particular time or stage of life is a crucial element within the needed
skillset of communication, as preferred communication channels differ based on one’s age and capabilities. A child may not yet be literate, therefore visual pictorial methods of communication may be better suited than textual, where as a senior citizen may have visual or auditory impairments and need increased font sizing on prepackaged items or prefer verbal instructions to written instructions.

In order to capture the big picture of one’s knowledge and understanding of health, measurements need to include questions pertaining to one’s knowledge of food and nutrition, whereby we segue to the need for defining food literacy and nutrition literacy. Of the 3 terms that we seek to define, nutrition literacy and food literacy are the two terms used the most synonymously with one another, again causing confusion due to inconsistencies in their use and presumed definitions, which vary greatly according to each source. The term 'food literacy' is still relatively new, with its introduction being in 1990 by the American Dietetics Association, as part of a government hearing in support of the information contained within nutrition labels (Vidgen, 2014). According to a literature review produced by Krause, Sommerhalder, Beer-Borst, and Abel (2016), food literacy is a higher-ordered competency than nutrition literacy. We would be remiss to define food literacy without first defining food, as a holistic definition of food has surprisingly only come about in the last few years. In 2014, just before the second International Congress on Nutrition, a group of advisors to the United Nations (UN) prepared the following definition:

It is our common understanding that food is the expression of values, cultures, social relations and people’s self--determination, and that the act of feeding oneself and others embodies our sovereignty, ownership and empowerment. When nourishing oneself and eating with one’s family, friends, and community, we reaffirm our cultural identities, our ownership over our life course and our human dignity. Nutrition is foundational for personal development and essential
to overall well-being. (Statement by the Public Interest Civil Society Organisations, Vidgen, 2015)

This definition acknowledges the multiple roles that food plays in both our individual lives, as well as its powerful influence over our perpetuation as a society. Vidgen and Gallegos (2014) eloquently define food literacy as the “scaffolding that empowers individuals, households, communities or nations to protect dietary quality through change and to strengthen dietary resilience over time,” and give great attention to the role that food security plays in one’s motivation to make health-promoting food choices. After holding interviews with 43 “experts,” consisting of both practitioners and researchers within the health, education and community sectors, as well as interviews with 37 individuals of diverse backgrounds to represent the public sector, these researchers deduced that there are eleven components to food literacy, and that they fall into the 4 constructs of planning and management, selection, preparation, and eating Table 2.1). Although this study was conducted in Brisbane, Australia, its findings can be applied to that of the American public due to the similar lifestyles between the two countries.

Table 2.1

*Vidgen and Gallegos’ 11 Components of Food Literacy*

<table>
<thead>
<tr>
<th>Domain</th>
<th>Component (food literacy is the ability to…)</th>
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<tbody>
<tr>
<td>Planning and Management</td>
<td>Prioritize time and money for food</td>
</tr>
<tr>
<td>Planning and Management</td>
<td>Plan food intake (formally and informally) so that food can be regularly accessed through some source, irrespective of changes in circumstances or environment</td>
</tr>
<tr>
<td>Planning and Management</td>
<td>Make feasible food decisions which balance food needs (nutrition, taste, hunger, etc.) with available resources (time, money, skills, equipment)</td>
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<tr>
<th>Domain</th>
<th>Component (food literacy is the ability to…)</th>
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<tbody>
<tr>
<td>Selection</td>
<td>Access food through multiple sources and know the advantages and disadvantages of these sources</td>
</tr>
<tr>
<td>Selection</td>
<td>Determine what is in a food product, where it came from, how to store it and use it</td>
</tr>
<tr>
<td>Selection</td>
<td>Judge the quality of food</td>
</tr>
<tr>
<td>Preparation</td>
<td>Make a good tasting meal from whatever is available, including the ability to prepare using commonly available food, efficiently use common pieces of kitchen equipment, and having a sufficient repertoire of skills to adapt recipes (written or unwritten) to experiment with food and ingredients</td>
</tr>
<tr>
<td>Preparation</td>
<td>Apply the basic principles of safe food hygiene and handling</td>
</tr>
<tr>
<td>Eating</td>
<td>Understand that food has an impact on personal wellbeing</td>
</tr>
<tr>
<td>Eating</td>
<td>Demonstrate self-awareness of the need to personally balance food intake. Includes knowing food to include for good health, food to restrict for good health, and appropriate portion sizes and frequency</td>
</tr>
<tr>
<td>Eating</td>
<td>Join in and eat in a social way</td>
</tr>
</tbody>
</table>

Source: Vidgen and Gallegos, 2015.

The first construct, planning and management, includes both immediate needs as well as futuristic goals and expectations. Simply reading a new recipe in a food magazine does not constitute as this primary step but reading a recipe and deciding to make it in the near future, such as creating a dinner menu and adding the ingredients to the grocery shopping list, fulfills the action of planning for one’s consumption.

Management takes planning to a higher level of conscious action, as one must manage certain efforts in order to see their goals to fruition. For example, if an individual has the goal to lose weight, and believes that their dietary choices influence their weight status and effort, the sensible action would be to plan one’s dietary choices to meet the futuristic goal of weight loss. Management also includes immediate need-based factors, such as an individual with Diabetes preparing a grocery list, as their disease places
greater pressure on their skills of planning according to their dietary needs than an individual without Diabetes.

The second construct, selection, is inclusive of both futuristic and immediate efforts. The act of grocery shopping is a futuristic effort where items are chosen but most likely intended to be consumed at a later date, unlike reaching into the fridge and looking for a snack or selecting an item from a restaurant menu, which would be immediate or present efforts. The act of selection is complicated as many different variables influence the decision, including but not limited to one’s health goals, dietary needs (such as a food allergy), financial constraints (grocery budget), attention to and use of any included nutrition-driven information, current levels of hunger or stress, demographics (ethnicity, religion, fluency of the language used on the package, etc.), and the marketing efforts of the product manufacturer. We propose that selection is often a 2-point step, especially when grocery shopping, as an individual has an initial point of selection before the time of purchase, but will also have to select the item again before consumption, such as looking for a snack from the refrigerator. The step of selection includes a knowledge of food safety too, whereby the individual can discern between foods that have spoiled or are blemished, versus those that are still safe for consumption.

The next construct, preparation, also has many factors, but these are perhaps more limited according to the particular item to be consumed. Choosing to fry versus steam fish or only prepare the amount of servings of a prepackaged item to match the amount of people served, such as preparing 4 servings for 4 individuals rather than preparing the entire package which happens to include 6 servings, are preparatory
efforts. One’s method of preparation is foremost influenced by the confidence in a skill set needed for the preparation, such as choosing to microwave the item or even eat it raw if the idea of cooking via a stovetop or oven is too intimidating, followed by one’s preference for a method, such as choosing to fry vegetables in oil for a desired texture versus grill for an intended smoky flavor.

The last construct is for most individuals probably the most enjoyable, which is the act of eating. Eating is an emotionally-driven yet subconscious effort, and it is social to its core. When we gather together for celebrations it is customary for a wide range of foods to be served, anything from lite refreshments to lavish wedding feasts. When a friend is in a time of emotional distress, such as the death of a family member, the first thing we offer to do is to bring them a meal. To choose which item to eat, where and when to eat, how much of the item to eat, and whether or not to eat the item again are all aspects of this final construct of food literacy. All of the actions taken within these 4 constructs may seem overwhelming when laid out as a sequence of events, as these make up the 200+ food-related decisions that we make on an average day, but this is really just scratching the surface of the amount of effort needed in order to make health-promoting food choices. The application of food literacy transitions to the application of one’s nutrition literacy when any of the actions taken within these 4 constructs are made with the conscious knowledge and forethought that the foods consumed will have an effect on the body based on their nutritional makeup.

In another more recent literature review published by Krause, Sommerhalder, Beer-Borst, and Abel (2016), 19 articles were analyzed, and 13 clearly defined food literacy, with all of these focusing on an individual’s ability to not only obtain, process,
and understand basic information regarding food and nutrition, but they also considered the ability to apply this information as a critical competency. All of the articles that provided conceptual frameworks for food literacy included having practical knowledge and skills required to regulate food intake, inclusive of the skills needed for meal planning, food selection, and preparation. The majority of these publications emphasized an understanding of nutrition and one’s ability to both comprehend and make a judgment of the impact of food and nutrition on both one’s personal health and the health of the public. Many of the articles also credited food literacy as having the potential to increase greater self-determination, strengthen personal and public health and well-being, and to reduce health costs for diseases directly linked to poor nutrition, such as obesity and diabetes.

Only 6 of the 19 articles reviewed by Krause, Sommerhalder, Beer-Borst, and Abel (2016) included a clear definition of nutrition literacy, with commonalities in definitions revolving around an “individual’s cognitive capacities and strongly emphasized basic literacy and numeracy skills needed to understand and use information about nutrition.” These definitions were also closely associated with health literacy, as they all mentioned nutrition literacy as a specific component of health literacy. Only 1 article listed an individual having the ability to search for and apply nutrition information, the ability to communicate the information, and the ability to act upon this information in a broader social environment, such as addressing barriers to nutrition information in both an individual or societal level. There was also a consensus that this definition should include an individual's ability to evaluate the quality of nutrition information, as well as their willingness to improve the nutritional health of their families,
communities, and global movements. Only 2 of the articles mentioned specific
eamples of these skills, being the ability to interpret front label packaging, menu
labeling, and the ability to understand the basic concepts of nutrition.

According to other researchers within the field, nutrition literacy is defined as
one’s ability to not only have a knowledge of nutrition, but also the ability to apply this
information to oneself or someone else, based on individual dietary needs (Velardo,
2015; Vidgen and Gallegos, 2014). The concept of nutrition literacy must be considered
within a multifaceted context, inclusive of social, environmental, and cultural factors, as
one’s demographics significantly influence nutrition information-seeking behaviors, with
less educated and less health-conscious individuals typically having a lesser
understanding of nutrition and its application (Eldridge, Devine, Wethington, Aceves,
Phillips-Caesar, Wansink, and Charlson, 2016; Kim, Imai, and Mathews, 2017; Sharf,
Sela, Zentner, Shoob, Shai, and Stein-Zamir, 2012).

Velardo (2015) notes that there are at least two types of food literacy, inclusive of
having both a functional or ‘declarative’ knowledge, as well as a procedural or
‘interactive’ knowledge. Declarative knowledge means that someone is aware of the
facts and processes, but interactive knowledge takes this a step further to actually
knowing how to complete an act without assistance. Within the context of nutrition
literacy, an example of declarative knowledge would be that an individual understands
how to read and comprehend a nutrition facts label and can identify foods that are high
in carbohydrates, fats, or proteins, but interactive knowledge would include the
additional task of knowing how to create a well-balanced meal plan that includes health-
promoting levels of all three macronutrients for oneself or for someone else, taking into
consideration their different dietary needs. Interactive knowledge also encompasses skill development, inclusive of motivation and the feeling of being in control of these actions.

The Lens of Information Science

The field of information science (IS) provides multiple unique frameworks, theories, and models for investigating nutrition-oriented sources of information and information behaviors. Case (2012) emphasizes that it's difficult to draw generalizations about behaviors related to seeking and sharing information, as these vary so greatly across individuals, circumstances, and the objects of interest, as well as often take place within the minds of the individual and are not measurable until after a behavior has already taken place. He provides the following list of definitions for terms often used within the vocabulary of IS, which we adopt for clarity within this dissertation (Case, 2012, p.4-5).

- Information can be any difference you perceive, in your environment or within yourself. It is any aspect that you notice in the pattern of reality.

- An information need is a recognition that your knowledge is inadequate to satisfy a goal that you have.

- Information seeking is a conscious effort to acquire information in response to a need or gap in your knowledge.

- Information behavior encompasses information seeking as well as the totality of other unintentional or passive behaviors (such as glimpsing or encountering information), as well as purposive behaviors that do not involve seeking, such as actively avoiding information.

In 1976, Brenda Dervin published a list of ten “myths” about information and information seeking behaviors, of which many are relevant to our interest in nutrition-oriented information behaviors. In this seminal work she challenged the flawed beliefs
that more information is always better, that information can only be required through formal sources, functional units of information (such as books or television programs) always fit the needs of individuals, time and space (individual situations) can be ignored in addressing information seeking and use, and that people make easy, conflict-free connections between external information and their internal reality (Dervin, 1976; Case, 2012, p. 8-9). We address five of these historically flawed beliefs with examples that support the argument made by Dervin within the context of nutrition information behaviors.

Myth 1: More Information is Always Better

More information is not always better, as too much information can lead us to information overload and sometimes even avoidance, or the deliberate ignoring of inputs. Increasing the amount of information does not equate to an individual actually being more informed, as seen by our constant labeling of prepackaged food products that most individuals do not report referencing on a consistent basis. The problem is generally not a lack of information, but rather a lack of understanding how to select, interpret, and apply the information.

Myth 2: Functional Units of Information Always Fit the Needs of Individuals

Functional units of information, such as an organized system of resources (libraries, databases, books, programs, etc.), are not necessarily the most “functional” resources for every individual, but rather “responses, solutions, instructions, ideas, and friendships” (Case, 2012, p.9) are sometimes more appropriate. We know that eating
behaviors are greatly influenced by one’s social interactions, including one’s level of food literacy, whereby we support Dervin’s idea that information possibly void of being considered a ‘unit’ has a greater influence as a resource.

Myth 3: Information Can Only Be Acquired through Formal Sources

Formal sources of nutrition information are rarely used on a consistent basis, as informal sources are interwoven into our daily methods of communication. These sources include but are not limited to conversations with family and friends, posts seen through social media outlets, messages and reminders automated from wearable devices and applications, advertisements, food packaging, and media commercials. It takes a much greater amount of effort to consult with a formal information source on this subject matter, such as a physician or dietitian, and access to these sources is most often not immediate, with scheduling barriers often delaying accessibility for weeks or even months after the initial request is made for an appointment. And when these appointments take place, they are often rushed and unfamiliar terminology is used that overwhelms the information seeker due to a lack of materials being made available that meets the level of knowledge and self-efficacy of the user (Bohlen, Scoville, Shippee, May, and Montori, 2012).

Myth 4: Time and Space - Individual Situations - Can be Ignored in Addressing Information Seeking and Use

Time and space cannot be ignored, as an individual’s needs are usually influenced by the timeliness of gaining the desired information, which increases according to the criticalness of the need. If an individual has just been diagnosed with a
chronic disease, such as Type 2 Diabetes, the amount of time it takes for them to acquire and apply the information needed to combat their failing health is certainly a priority, whereas an individual who desires to learn more about more nutrient-dense vegetables to incorporate into their meals will not have the same sense of pressure in their search process.

Myth 5: People Make Easy, Conflict-Free Connections between External Information and Their Internal Reality

Lastly, people do not make easy, conflict-free connections between external information and their internal reality, although that would be the ideal situation. We do not live in an ordered universe, where logic outweighs emotion, as evidenced by the obesity epidemic. If we did consistently make these connections we would not be faced with the problem of chronic disease arising from poor choices in nutrients and overconsumption.

In more recent years, Dervin and her colleagues attempted to explain information behaviors through a theory of ‘sense-making’ (Dervin, 1983; Dervin, Foreman-Wernet, and Lauterbach, 2003), whereby sense-making emphasizes the feelings of the individual rather than cognitions. It implies that a state arises within the individual, leading to a gap that needs to be filled, and it’s filled with what we call ‘information.’ Questions are directed at making sense of a situation, with both the process for searching and receiving information, as well as the actual information obtained, shaping the user’s conceptualization of both the need and the fulfillment of the need (Case, 2002, p.85). Harter (1992) espouses that an individual’s “information need” is the same as describing their current “psychological state,” as the garnishment of one piece of
knowledge may then lead to a host of new questions or “needs,” which then changes the individual’s state.

Information needs are rarely fixed or long-term, as most of them can be filled. Information behaviors can be categorized as either repeated or novel, with repeated behaviors being programmed, and novel behaviors requiring conscious effort. For the majority of individuals, the effort of feeding oneself is a repeated effort, requiring little consciousness in its fulfillment, however when motivated to make a purposeful choice to choose and consume more health-promoting foods, possibly from having received “negative feedback” from their repeated efforts (such as physical discomfort, unintended weight gain, or the unease of learning of potential negative health outcomes), this new behavior can be categorized as novel or unprogrammed. All novel behaviors, if consistently repeated over time, will eventually become habitual and require little conscious effort in their completion (Case, 2002; Klein, 2009; Cyert, Simon, and Trow, 1956).

One’s interaction with the 'message' or how an individual chooses to interact with information changes depending on their current need, therefore this not a static or one-way relationship, but rather dynamic and subjective, and that individuals are often both senders as well as receivers of information (Case, 2012; Wilson, 1999; Johnson and Meischke, 1993). Per the classical communication model produced by Shannon (1949; see Figure 2.1), information is transferred to the receiver via a channel that contains a 'noise' source, and that noise can vary from one's physical surroundings that may actually be noisy, therefore distorting the message, or it can be seen as a nonphysical construct, such as misinterpreting the message based on one's perceived notions of a
topic. For example, if an individual does not know how to interpret and apply the recommended daily consumption values seen on the nutrition facts label in the form of a percentage, they might think that their consumption should be restricted to keep the total of each category or nutrient beneath 100% (such as 100% recommended daily vitamin C intake or 100% saturated fats), when in reality some of the percentages represent the minimum amount recommended for consumption while others represent the maximum. An individual's eyesight is also an example of noise, whereby someone with declining vision might be more inclined to misread or fail to acknowledge the list of ingredients listed in very small print on a packaged food item, therefore misconstruing the message that the sender intended the receiver to receive.

Figure 2.1. Shannon’s model of communication (Shannon, 1949).

Sources of Nutrition Information

A Brief History of America’s Quest for Nutrition Information

The quest for being knowledgeable about nutrition is nothing new, as the desire for health and longevity stands the test of time, and we see a marked increase in the American public's active search for information starting in the late 1800s, an era that coincides with the industrial revolution and increased transportation systems. Due partially to both improvements made to the canning processes and refrigerated railway
cars coming on the scene in 1879, Americans of all levels of income suddenly had access to foods that had beforehand been limited to one’s geographic surroundings. Per the general tenets of the studies of economics and marketing, if there is an increase in demand there is usually an increase in production, which leads to competition and the need for brand differentiation. At the turn of the century, aided by sweeping strides being made in mass media, manufacturers began the fight for consumers’ attention and their food budgets, with their primary communication channels being national newspapers and the top ladies’ magazines, including but not limited to The New York Times, Washington Post, Good Housekeeping, Parent, and McCall’s (Levenstein, 2012).

Scientists discovered “new nutrition,” or the idea that the human body is essentially a machine dependent on a combination of fats, proteins, and carbohydrates for its fuel, in the 1880s; they paired these discoveries with a new measurement for energy, also known as calories, meant to represent the amount of fuel needed based on one’s exertion on a daily basis. The discovery of vitamins came along shortly thereafter, in the 1910s, and while no one individual can take credit for the discovery of these invisible, tasteless, weightless elements contained within foods, Polish chemist Casimir Funk is credited with giving them the nickname of ‘vitamin,’ meant the conjure up thoughts of increased vitality if consumed. Due to the consumer’s inability to see or taste vitamins, and the lack of governmental regulation on making scientifically-supported health claims, American manufacturers had a heyday in labeling their foods as being rich in vitamins, which caused worry amongst the public that they had grave vitamin deficiencies, leading to increased consumption of items labeled as containing
vitamins, an era now known as “Vitamania” (Levenstein, 2012).

Females were particularly targeted by the media, and acted like sponges to the information being delivered through their monthly periodicals, not cognizant of the fact that manufacturers were constantly trying to have the last word on the subject matter of nutrition and its tie to healthfulness and prosperity, whereby making outlandish claims and instilling fear and doubt in the women as to their ability to be a good wife and mother. Societally women were being told that they must not only be a good companion to their husbands, but also apt housekeeper and doting mother to their children, with the responsibility of providing their family members with diets rich in vitamins, which is why the vast majority of the nutrition-driven advertisements had messaging directed towards the mother of the household.

One’s weight has always been closely tied to one’s consumption of food, but there’s long since been gender disparity concerning the balance of attention that women give to their weight versus men. In the early to mid 1950s, cookbooks started to give health and nutrition advice in tandem with the recipes, with many including a chart at the back of the book noting how much a woman should weigh depending on her height, and linking this desired weight to the amount of calories needed daily in order to maintain that weight. Not only were food and cookbook manufacturers making health-driven claims targeted to wives and mothers, but toy manufacturers also played a concerning role in the information being dispersed to little girls regarding their own nutrition needs, particularly as influencing their weight. Since the 1950s, the classic toy to give a little girl has been a Barbie doll, and with such great worldwide recognition of this character, most parents wouldn’t have concerns with their daughters playing and daydreaming
with such a toy. Although only sold for a few years, in 1965 the Barbie Slumber Party pack included not only Barbie’s slumber party pajamas, but also her scale and diet rulebook on how to lose weight. The scale was permanently set to 110 pounds, considered to be the ‘ideal’ weight for a young lady, and the diet book gave only one golden rule in order to lose weight, which was simply “Don’t Eat!”

Figure 2.2. 1960s Barbie doll weight loss.

Politicians were not immune to the craze of health claims either, as multiple presidential candidates used the American public’s fear for food safety, manufacturing processes, and nutrient deficiencies as items to be ‘fixed’ within their campaign platforms. It was at this same time, just after The Great Depression and before World War II that governmental nutrition experts started to warn of a ‘hidden hunger’ plaguing the majority of the nation, meaning vitamin deficiencies masked by healthy appearances, which were supposedly leading causes of death amongst children and young adults thought to be in good health (Levenstein, 2012). President Franklin Roosevelt’s concern for the high number of World War II draft rejections, supposedly due to a lack of needed vitamins in young men, led to a committee of nutritionists preparing a list of standards for 8 vitamins that were believed to combat ‘hidden hunger’ in the soldiers. These standards were the minimum amounts believed to be necessarily
consumed on a daily basis in order to maintain one’s health, known formerly as the ‘recommended daily allowances’ but presently called ‘dietary reference intake,’ and were presented by the surgeon general as the gold standard for Americans starting in 1941, being updated every 5 - 10 years, with the most recent update being in 2016 (Wikipedia, 2018).

Multiple acts of legislation were passed in the 1900s, including the Pure Food Act in 1906, and the Food, Drug, and Cosmetic Act in 1938, but it wasn’t until 1990 that the nutrition facts label was created, both as an informational source to the consumer but also as a method of legal compliance for manufacturers. The label includes a panel at the top, noting the nutrients and calories contained within the item by serving size (if there are multiple suggested servings in the package), and the ingredients listed by quantity from greatest to least at the bottom of the panel. Formally changed in 1997 to ‘Dietary Reference Intake’ by the Institute of Medicine, these guidelines seen in the bottom of the standardized FDA mandated nutrition facts labels serve as a blanket measurement meant for 97-98% of the American public considered to be in good health, but differ based on one’s age, gender, and personal health needs. The recommended intake amounts were formally updated in 2016 and are reflective of new scientifically supported information, drawing greater attention to Vitamins A and D, as a great percentage of the American public is currently considered deficient in these areas (Food and Drug Administration, 2016 a).

Nutrition Labels and Symbols

Mentioned briefly in the introduction, sources of nutrition-oriented information are
often visually-driven and include a wide array of items to be considered, from pamphlets and brochures to the size of the actual packaging of a product. In an effort to minimize the public's lack of nutrition literacy skills, visual symbols and icons have been added to packaging that note the healthfulness of the product, such as the trademarked American Heart Association's red heart icon, used to note that the item is “heart healthy” and that it is supposedly endorsed by the American Heart Association. In a study conducted by Boonme, Hanus, Prybutok, Peak and Ryan (2014), their results support that visual information has a significant role when selecting healthy foods in fast food restaurants, but can an icon or symbol represent all of the important information needed when making food selections? While the placement of the trademarked red heart icon next to particular menu items had a significant effect on food selection choices, there was no significant effect in consumers’ selections when based on information regarding calories or fat. The heart icon doesn’t fully represent all of the pieces of information needed when making informed decisions, as it's rather vague in what it actually represents, as noted by the American Heart Association’s Heart-Check website which says that “The Heart-Check program is not a dietary solution for any particular condition or disease. People with medical conditions or dietary restrictions should follow the advice of their healthcare professionals.” Most consumers are unaware that use of the heart icon is purchased on an annual basis by manufacturers or food service providers, and that the royalties are paid to the American Heart Association for use of the icon on their products, leaving us with the dismal reality that the presence of the icon next to a food item is a marketing tactic rather than a non-objective measure (American Heart Association, 2018).
Other manufacturers have imposed symbols in “stoplight” colors (red, yellow, and green) on the front of prepackaged items to represent the degree of healthfulness of the item, with green meaning the item is very healthy, yellow being that the item should be consumed in smaller quantities, and lastly that red items should be cautiously consumed or altogether avoided. The stoplight color scenario is a little better in being a nonobjective tool, as it represents a total of nutrients, or lack thereof, but simply referencing the colored icon (usually a large dot) still does not give a health-conscious individual all of the information that they need to make an informed decision. Per a study conducted by Sonnenberg, Gelsomin, Levy, Riis, Barraclough and Thorndike (2013), which measured the use of stoplight labels in a hospital cafeteria, subjects were significantly (p<.001) more likely to purchase healthier items if they noticed the stoplight labels during the point of search and selection than those did not notice the labels. However, as is the case with many surveys, these results are self-reported, which can be criticized unlike tools that monitor and record actual behaviors. Stoplight label usage has been suggested for items often consumed by children, such as prepackaged snacks or items in a vending machine, as one’s actual literacy may not be adequate at this age in determining healthful items when comparing across multiple items.

Nutrition facts labels are required to be included on all pre-packaged food and beverage items produced or imported into the United States, with greater amounts of information pertaining to recommended serving sizes, caloric values, and grams of sugar and fat taking the major focus of the recently updated changes made to the label format (Food and Drug Administration, 2016 b). The majority of adults in the United States report that they almost always reference the nutrition facts labels on pre-
packaged item before purchasing or consuming these items but we are skeptical of these claims due to the ever-rising rates of obesity and continued dependence on convenient, nutrient-poor foods that now stereotype the American lifestyle. The skill set required to use these labels includes literacy as well as numeracy, as both text as well as grams and percentages are used to represent the amount of nutrients contained within the specific item in relationship to the recommended daily amounts needed for minimal health.

In 2016, Congress passed a bill proposed by the FDA to have the standardized nutrition facts label updated, with an implementation deadline of July 2018, which as of late has been proposed to be pushed back to 2021 (Food and Drug Administration, 2018). The label has not been updated since it was introduced to the public in 1990. The two primary visual changes to the nutrition facts label format are the portion size and calories contained, and we can only speculate at this time as to whether or not manufacturers will choose to continue packaging items at their current quantity, in some situations with multiple servings now being considered 1 serving, or if this change in legislation will encourage manufacturers to package food and beverages into smaller, single-serving items to then be sold individually. There has been a great amount of pushback and commentary from large manufacturers, including but not limited to the American Beverage, Sugar, and Dairy Associations, who expect to be negatively impacted by these changes.

Research by Bleich and Wolfson (2015) shows that the majority of adults report their use or reference of nutrition information included on pre-packaged items (79%), as well fast food nutrition information sources (69%), such as menu boards, when made
available. Adults in this particular study were almost twice as likely to use this information if they were trying to lose weight as those who were not trying to lose weight, and Blacks/Hispanics (68%) were more likely to report using this information when compared to Whites (63%). This study speculates that perhaps the minorities reported referencing this information more frequently than the White participants due to the Hispanic and Black populations having a higher percentage of obese adults, but this is notable as prior studies have reported that nutrition label use is lower among groups from lower socioeconomic backgrounds.

Across all groups, the use of the nutrition facts label panel on pre-packaged foods (OR = 1.92) was higher than the reported use of the list of ingredients (OR= 1.39) or health claims (OR= 1.39), even though these pieces of information were simultaneously available on the same package as the panel. Across all races, women were more likely than men to use all of the nutrition-related information on pre-packaged items, and individuals who were considered to be more educated, having finished high school at minimum, used all of the different sources of information made available on the packages more than adults who had not finished high school. Lastly, a significant difference in label use and the preference of information source (nutrition facts label, ingredients list, or serving size) was not seen when analyzing across body weight category, such as an individual self-identifying as being slightly overweight vs. obese.

In a novel study conducted by Wolfson, Graham and Bleich (2017), participants reviewed the nutrition facts labels of 64 commonly seen pre-packaged food and beverage items, with half of the sample viewing the normal labels, and the other half viewing the labels with the additional variable of how many calories it would take to
“burn off” the item, if consumed. Eye-tracking devices were used to monitor the attention given to particular areas of the packaging, specifically areas containing nutrition-related information; only 20% of the participants referenced the nutrition facts labels and even less, 17%, referenced the modified labels containing physical activity-equivalent calorie information. Although such a minimal number of participants were measured to having actually referenced the nutrition-related information, the majority reported that they would appreciate seeing the amount of effort required to burn off the items if consumed, and that this would affect their purchasing and consumption behaviors.

Visual Aids for Nutrition Education

The amount of food on a plate or in a package increases intake and influences the norms for consumption behavior over time (Wansink & Sobal, 2007). Many visual aids exist for the purpose of assisting individuals in establishing greater health-promoting eating habits, attention being given to recommended portion sizes and daily servings, as to minimize over-consumption. One of the most common aids in portion education is the human hand, with the palm of the hand being the recommended size of a serving of animal protein, the thumb being an example of the recommended serving of cheese, and a fist representing 1 serving of vegetables (Figure 2.3). While easy to understand, this technique has been criticized due to its ‘1-size-fits-all’ approach.

Commonly seen objects are also used for helping to establish portion control habits, with a deck of cards being considered a good frame of reference for a 3 oz. serving of animal protein, a tennis ball equaling half a cup of pasta, 4 dice equaling a 1
oz. serving of cheese, and a baseball being the equivalent size to 1 cup of non-leafy vegetables.

![Serving sizes chart](image)

**Figure 2.3.** Serving sizes chart (Iowa WIC, 2007).

Another popular tool promoted by the USDA is MyPlate, or Choose MyPlate, which is a diagram resembling a dinner plate, and the recommended portions for the 5 food groups of fruits, grains, protein, vegetables, and dairy (Figure 2.4). This visual aid is part of a much larger effort to educate the American public in making greater health-promoting consumption choices, with a large emphasis being on eating a variety of items and having portion control. Their website offers resources targeted towards
specific consumers based on need, including age group as well as language, as well as a free mobile application used to log consumption daily (USDA, 2018).

![ChooseMyPlate example graphics (USDA, 2018).](image)

*Figure 2.4. ChooseMyPlate example graphics (USDA, 2018).*

Similar portion control tactics are the building blocks of currently popular diets, including Beach Body’s 21 Day Fix, which focuses on color-coded containers that are to be filled a certain amount of times per day with certain food groups (Beach Body, 2018; Figure 2.5). For example, the green vegetable container might need to be filled 4 times (and consumed), but items filling the yellow carbohydrate container is only supposed to be consumed twice in 1 day. Their motto is that you can eat any item as long as the portion fits in the designated container; this is a paid program and includes a 30-minute daily exercise routine, with each individual having a set number of containers to consume each day from each of the color/food groups, depending on their caloric needs and weight loss goals.
Figure 2.5. Beach Body food containers by food groups (Beach Body, 2018).

Mobile Applications for Nutrition Information

Another source of visual information are the applications and tools used through smartphones. With thousands of nutrition-oriented apps currently available within the Apple and Android app stores, the majority focus on assisting the user in tracking their daily consumption, provide the nutritional makeup of the item according to a selected
serving size, and usually have the user set a caloric threshold and weight goal in order to have customized daily consumption limits. In order to track one’s consumption, it is necessary to reference the nutrition facts label and or list of ingredients on prepackaged items, as these labels include the intended servings and portions per package, as well as trackable items, such as the number of calories and macronutrients; while whole foods such as a fruits and vegetables generally do not have a nutrition facts label attached to the item, that information is available although less easily accessible.

Studies support that individuals who have a prior knowledge of nutrition, desire to eat healthily, and have a weight loss effort, are more likely to use nutrition facts labels than those without this type of knowledge (Grunert, Wills, and Fernandez-Celemin, 2010). However, just referencing the information contained within the label is not enough (especially for individuals who wish to change their eating habits in order to lose, gain, or maintain their weight), as one is apt to forget every item that they’ve eaten that day unless they are consistently recording their consumption. The idea of recording everything that you eat for days on end sounds like an extremely mundane task, so much so that most people probably wouldn’t do it long enough for the action to become a habit, unless they found recording to be easily actionable, and believed that recording their consumption would make a significant difference to their health efforts. Many of the currently popular consumption tracking apps, such as MyFitnessPal, have the option for the user to connect with friends or anonymous users who are also using the app, with the ability to provide encouragement through in-app messages when weight loss milestones are achieved.

In a study conducted by Wharton, Johnston, Cunningham and Sterner (2014),
participants desiring to lose weight were assigned to 3 different groups for tracking consumption over an 8-week period; the groups included using the mobile application LoseIt!, traditional pen and paper/journal, or the memo function found on most smartphones. Those who used the mobile app were more likely to consistently track over the 8-week period, and with greater frequency, vs. both the pen and paper and memo groups that tracked less. Hutchesson, Rollo, Callister and Collins (2015) researched the accuracy of recording one’s caloric consumption when using a mobile application versus pen and paper or online calculator, as the number of calories consumed daily is often estimated rather than a concrete measurement. Their sample included young adult females with a mean age of 23 years, which is assumed to be a tech-savvy and weight-conscious population. Those that used smartphone apps to track their consumption were significantly more accurate in estimating the actual number of calories consumed, versus those who used online calculators or pen and paper methods, who underestimated their actual consumption by an average of 500+ calories per day. When surveyed, the majority said that they preferred using a smartphone to track, and found manual recording (pen and paper and online calculators) to be cumbersome and not socially acceptable when dining in a group (tracking via a phone was much less conspicuous).

Barriers to Nutrition Information

The cost of food is one of the first barriers mentioned when considering the difficulties in selecting and consuming healthy foods (Vigden & Gallegos, 2014). It’s easy to say “Yes! I will only purchase and eat health-promoting foods, as I know that
this is what’s best for my body and long-term health needs,” but realistically, like any other items for purchase, cost is one of the main variables considered when making a purchase in a scenario where finances are limited. When an individual has limited financial resources to purposefully allocate towards health-promoting eating behaviors, and lacks the knowledge and confidence to plan or cook healthy meals, they are at a greater risk of becoming obese and developing weight-related diseases. Per statistics published by the department of Health and Human Services (Health and Human Services: Facts and Figures, 2018), if a child is below the poverty level, they have a 45% chance of being considered overweight or obese, versus a child who lives in a household with an income at least 4x above the poverty level, who is only 22% likely to be overweight or obese. Literacy is directly linked to one's level of nutrition knowledge and application, with low literacy and poverty indicating low motivation for seeking nutrition information (Higgins and Barkley, 2004). When a particular segment of the population appears to be totally dismissive of information, they're labeled as being 'information impoverished,’ due to their ignorance.

Childers and Post (1975) define information poverty as a "culture" marked by three characteristics: (1) a low level of processing skills, marked by reading, language, hearing, or eyesight deficiencies; (2) social isolation in a subculture, leading to unawareness of information known to a larger public, reliance on humor and folklore, and dependence on entertainment-oriented information media like television; and (3) a tendency to feel fatalistic and helpless, which in turn reduces the likelihood of active information seeking. (Case, 2012, p. 114)

According to Breck, Cantor, Martines and Elbel (2014), individuals that identify as being females, are health conscious, have higher incomes, and are more educated are more likely to report referencing pre-packaged nutrition labels, and that these are groups which are generally at lower risk for obesity and the resulting comorbidities. The
possibility of an individual being considered to be in a state of nutrition-oriented information poverty within the US today is quite high due to circumstances that we consider to be very commonplace, such as being an immigrant or even a senior citizen. While an individual may be educated, if they're not confident in their literacy skills (perhaps they have a learning disability or their first language isn't English), their processing skills will be lower due to the communication barrier. The FDA requires that many specific items be listed within the nutrition facts label but there is no legislation or even encouragement for manufacturers to have bilingual labels on their packages. Social isolation is the norm for many senior citizens who either live by themselves, are house-bound, or reside in assisted living, where their information sources become limited in comparison to the general public. And lastly, children in the United States have an ever-growing dependency on information in the form of entertainment, making instant gratification and instant access the norm.

Parents often assume that their children are receiving nutrition information within the public school system, such as in conjunction with a physical education class, but many would be surprised to learn that this is not a required component of the current curriculum and that these standards vary greatly by state and jurisdiction. Teachers within the California public school system were surveyed as to whether or not they currently included nutrition education within their classrooms, with the majority reporting that no they did not touch on this subject matter as it was either unrelated to their assigned subject (such as mathematics, science, history etc.), or that they felt there was not enough time to address this topic. Teachers who identified as being Hispanic or Latino scored significantly lower on the section of the survey with regards to their own
knowledge of nutrition, and had a negative relationship to believing that nutrition should be a required component within the education system. When surveyed about their likelihood of teaching nutrition within the classroom, these same teachers reported that they would be much more open to the idea if they had designated budgets for nutrition resources and curricula, seconded by the need for leadership, commitment, support and direction by the school administrative system (Jones and Zidenberg-Cherr, 2015).

We would assume that medical professionals are equipped to be authoritative voices on this subject, but the average primary care physician receives less than 12 hours of education in medical school with regard to nutrition, and the majority of this limited amount of time is focused on learning how to spot nutrient deficiencies, such as scurvy (Myers, 2015). And while the majority of physicians believe all of their patients need dietary instruction and nutrition education, less than 40% report actually having these conversations with their patients, and that they’re usually less than 5 minutes long. When asked why this rate of instruction is so low, physicians gave the following ranked list of barriers: lack of time, patient noncompliance, inadequate teaching materials, lack of counseling training, lack of knowledge, inadequate reimbursement, and low physician confidence (Kushner, 1995).

Societal Influences on Nutrition Information

While the topics of nutrition information behaviors and combatting over-consumption might be relatively new in the grand scheme of the history of eating, there are pieces of literature available that are thousands of years old and provide consumption guidelines, being the Bible, Torah, and Quran. While written much more
recently, one of the books used in the Mormon religion, being *The Doctrine and Covenants*, also gives dietary admonishment to its members. The Hindu religion does not have a particular scripture that explicitly states to not eat animal products, but strongly discourages meat consumption as an element of purity, whereby a great number of Hindus practice a vegetarian lifestyle. Seventh Day Adventists also have dietary guidelines against eating meat. Embraced by religions that comprise the majority of the world’s population, these manuscripts each give their own instruction for dietary guidelines that are to be followed, some more strictly than others. Depending on the particular source, some of the items to be excluded from one’s diet include certain or all animal products, shellfish, alcohol, and caffeine; *The Doctrine and Covenants* admonishes against consuming ‘strong drinks,’ which the Mormon religion takes to mean items that can distort one’s control over the body, specifically alcohol and caffeine (Shatenstein and Ghadirian, 1998; Sabate, 2004; Dreher, 2001; Eliasi and Dwyer, 2002; Sun, 2013; Nath, Henderson, Coveney, and Ward, 2013; Ruby, Heine, Kamble, Cheng, and Waddar, 2013).

If an individual is an active participant within a religion that sets these strict dietary guidelines, they may be apt to disregard information regarding the nutritional content or benefits to be had of consuming food considered to be off-limits. Many of these religions also promote periods of fasting, being to abstain from food or drink, as a manifestation of atonement and as a sacrifice to draw one’s self closer to god. Although not a religion, recent literature supports that individuals who feel a greater ethical responsibility for animals and the planet have a more positive outlook on practicing an
animal-free dietary lifestyle, also known as vegetarianism and veganism (Fox and Ward, 2008; Povey, Wellens, and Conner, 2001).

The term ‘diet’ has historically meant the foods consumed by a particular society, with an understanding that food options were severely limited to what one could access in one’s own environment. However, over the last century the word has assumed a role of being societally associated with controlled efforts taken in order to achieve a particular health outcome, with the stereotypical assumption being weight loss. We see this change in the meaning of the word come about in the United States in the 19th century, post-industrial revolution, which would make sense as this period of time gave way to foods being made accessible that were historically limited to one’s geographic location (Caballero, 2007). Through Google’s Ngram Viewer, we can see the presence and trends of particular words in books over a set period of time. In the image seen below, for a date range of 1840 – 2018, we see the increased use of the following words: ‘diet,’ ‘weight loss,’ ‘fat,’ ‘vitamins,’ ‘nutrients,’ ‘sugar,’ and ‘carbohydrates.’

Figure 2.6. Google Ngram image of the use of particular ‘diet’ focused words since 1849.
The notion of participating in a branded dieting effort, such as Weight Watchers, is an even more recent change in behavior, with dramatic increase in use after World War II, which is also the same time period that preservatives began being added to increase the shelf-life of pre-packaged food items, making them ‘shelf-stable’ or able to sit at room temperature for long periods of time before consumption.

We see a marked trend in women moving out of the role of homemaker after World Wars I and II, whereby needing access to food items that could be quickly prepared in their absence. Between the 1920s - 1960s, marketers gave birth to a host of much loved fictitious characters including Betty Crocker by General Mills in 1921, Tony the Tiger by Kellogg’s Frosted Flakes in 1951, and Little Debbie by McKee Foods in the 1960s, in order to sell their pre-packaged items (Levenstein, 2012). These characters promoted messages, often aimed at children through print advertisements and TV commercials, that their products promote a healthy and balanced meal. Per Case (2012), “the marketing of products attempts to minimize the effort a consumer expends to search for information,” which is a sobering statement when we take this into consideration when evaluating all of the advertisements we see regarding food. If this statement is true, it’s not the manufacturer’s intention to best-inform the potential consumer, but rather give them only enough information that they will decide to choose their product and end their comparison against other brands and alternative products.

The Need for Social Support

A great amount of research is available showing that one’s demographics and home life play a large role in an individual’s motivation for seeking nutrition information,
as well as influences their likelihood of being in poor health and having diseases related
to poor nutrition, with many studies focusing primarily on obese adults who have a
desire to lose weight. Norms are created within groups and societies, therefore if the
norm within a group is to not give attention to the nutritional composition of one’s food
choices, or to be overweight, it is considered acceptable within the group. In 2007, a
study was published that had followed 12,067 individuals in a large social network for 32
years, from 1971-2003, and the results were shocking. If person A and person B were
close friends, and person A gained weight to then be considered obese, person B’s
chances of becoming obese increased by 57%. Neighbors or family members within the
same household didn’t have this influence on an individual’s propensity to gain weight,
but close friends did, and a if an individual’s best friend became obese, the chance of
the other individual becoming obese was even more shocking, with an increase of
171%, even if they lived hundreds of miles away. The same effect seemed to take place
when individuals lose weight, but as the majority of individuals were gaining weight over
the course of their adulthood, cases of weight loss were minimal in comparison. The
results of the study concluded that as obesity becomes the norm around you, obesity
may not look so bad after all (Christakis and Fowler, 2007).

Research by Pagoto et., al (2014) has shown that adults who are considered
obese (BMI = 30+) cite their family as being the most negative and judgmental group
when trying to elicit social support for their weight loss attempts. These inner-circle
individuals seemed to promote more negative, stigmatizing feedback than less familiar
networks, such as friends, coworkers, and loose social connections. Perhaps this is
because obesity is often common in families, and that these obese family members are
also doubtful of their own ability to lose weight, therefore less encouraging of these efforts; if a mother is obese, her children are significantly more likely to also be obese as they create habits based on watching her health choices, per Strauss and Knight (1999). Research by Hwang et al. (2010) has shown that participants of online weight loss groups report greatly appreciating the anonymity, convenience, and positive interactions within these online communities as characteristics that are unique to Internet-mediated support, which are lacking when compared to traditional F2F weight loss support systems. In the same study, when reviewing the content posted within the group forum, as well as after having surveyed the group participants, the major semantic themes of both sets of data (forum content and surveys) were encouragement and motivation, as well as an appreciation for increased access to relevant information and shared experiences; sub-themes included testimonials, recognition and praise of another’s efforts, asking for or holding someone accountable to their weight loss goal, friendly competition, and humor.

The aforementioned study conducted by Pagoto et al. (2014) focused on the preference in platform, either Twitter or Facebook, by participants who had an active presence on both sites while completing their weight loss program. Participants reported having a much closer relationship with their connections on Facebook, knowing over 80% of their network, as this network was comprised primarily of close friends and family members. The opposite ratio however was reported for the Twitter networks, as participants estimated that they only had close ties to 20% of their network on this social media platform, which was used primarily to make connections based on one’s personal interests. Overweight individuals who participated in the study found greater non-
judgmental support from their Twitter network when posting about their dieting efforts, versus their Facebook network, and reported increased positive social influences and decreased negative social influences, when compared to their in-person relationships. They also reported that greater, more frequent engagement within their online social networks, specifically with others who were also trying to lose weight, had a positive relationship to greater weight loss, which findings also support a prior study conducted by Webber, Tate, and Bowling (2008), which revealed that more frequent program utilization is associated with greater weight loss.

In a similar study by Turner-McGrievy and Tate (2013), they specifically analyzed the type of social support exchanged by participants who used Twitter to engage in online weight loss efforts. The results show that the supportive content shared on Twitter was primarily comprised of informational text related to health and dieting efforts (75% of content), followed by teaching, such as giving instruction, and status updates. Status updates were seen as a statement of one’s efforts, such as exhibiting self-restraint from indulging in dessert at a party or having just completed a gym workout. While participants didn’t blatantly say that they posted status updates in order to receive positive reinforcement and support for their efforts, that can be surmised as their subconscious reasoning. The results of this study support that greater engagement through Twitter was associated with greater immediate and sustained weight loss.

Anonymity, one of the main reasons given for choosing an online versus F2F dieting program, is a perceived level of ownership over one’s identity, such as creating a secondary Instagram profile that doesn’t have any pictures of one’s face or the individual’s name, whereby making the user feel as if their true identity isn’t tied to the
profile. Privacy on the other hand is a more technical term, such as having a publically searching profile versus a ‘private’ profile, where only confirmed network followers have access to view posted content. Christopherson (2007) goes to great lengths to detail the difference between privacy and anonymity, as many confuse the two, and includes that perceived anonymity provides multiple functions in relation to privacy, including moments of catharsis and a feeling of autonomy. Catharsis is achieved when one is able to express thoughts and feelings in an unhindered manner and can only be brought about when one no longer fears sharing specific information. Online weight loss bloggers often exhibit extreme levels of catharsis, whether on a social media platform or their own website, and have become known for these unhindered expressions, recanting all of their experiences related to their dieting efforts, inclusive of all of the foods they’ve consumed on a daily basis and the resulting effects on their body, such having clearer skin when eliminating particular food groups, or pain and discomfort after having consumed particular items.

Autonomy however involves the ability for one to test new behaviors without the fear of social consequences, such as being ridiculed for the content that one chooses to post. An example of this would include participants posting transformation photos of themselves, which usually include at minimum a pre and post photo showing the results of their dieting efforts. These photos are generally quite revealing in that the participant is often wearing a swimsuit or underwear in order to best represent the true physical changes that have taken place. In the majority of social circles this would be considered anywhere from inappropriate to very odd behavior, but within the online dieting community the posting of this type of photo is not only accepted, it’s encouraged in
order to have group members believe that the participant posting the photo is truly the same individual in both of the pre and post program photos. With increased access to photo-editing software, it is often an issue of debate in online conversations and forums as to whether or not a photo has been altered if the participant appears to have had a dramatic change in body physique, with this type of communication be considered negative feedback to a post because the group members viewing the post do not believe that it’s authentic and a real representation.

Two pertinent theories stemming from the practice of psychology that are heavily relied upon in the literature are the deindividuation and SIDE theories (Zimbardo, 1969; Lea and Spears, 1991; Christopherson, 2007), which both hold the view that as an individual joins and becomes closely knit into a group of people, they feel more comfortable engaging in behaviors that are considered to be norms within the group. This increased level of comfort also promotes a reduction of inner restraints and control, as the individual no longer fears being singled out and criticized for their behavior, as they are exhibiting behaviors condoned by the group.

Construction of One’s ‘Real Self’ When Dieting

Another reason that weight loss is such a difficult subject for many people to approach in freely discussing with their peers and close networks, is that our bodies are a representation of who we are and who we think that we should be (Leipamaa-Leskinen, 2011). This concept is not new, as marketers and psychologists have researched and published on the idea of the real self versus the extended self for many decades, but the digital realm adds a new level of complexity (Belk, 2013). Research by
Leipamaa-Leskinen (2011), which analyzed public online diaries of individuals who were dieting in order to determine the meaning and ties between one’s body and one’s identity, showed that there are three themes related to the meaning of one’s body when dieting and that these are very culturally driven: the first being towards having a better body, the ashamed body (dissatisfaction), and lastly being back in control of one’s body.

The idea of control has a moral undertone, and in western culture we often use moral verbiage when discussing our consumption habits, whether dieting or not, such as using the words “good” or “bad,” “cheat” and “reward” when referencing eating and drinking. Leipamaa-Leskinen (2011) also noted that when participants weighed themselves, whether in a F2F program or to post to an online platform, it became a moment of truth that to some extent tested their perceived goodness as humans, or was a measurement of their ability to manage and control themselves. Mycroft (2008) even goes as far as to say that women in particular view their excessive body fat as an indicator of moral weakness, which is further instilled by the focus that we put on females needing to be thin, as seen in dominating western cultures and media (Farrell, 2011). A study by Mycroft (2008), analyzed a group of women in Great Britain that met weekly for a F2F weight loss accountability program, and her results showed that it was impossible for both the group dieting participants as well as the group leaders to separate their dieting efforts from their moral goodness through the verbiage that they used, and that both sets of participants seemed to believe that one’s ability to successfully diet in order to lose weight is both a morally sanctionable matter as well as a representation of one’s satisfaction with oneself.
Regarding one’s ability to represent oneself, Perloff’s transactional model of social media and body image hypothesizes a process by which social media participation or content referenced via social media platforms, may increase or decrease one’s body satisfaction (Perloff, 2009; Andsager, 2014). Perloff’s model speculates that this influence is due to one’s ability to engage in exchanging diverse representations of oneself, such as posting a transformation photo that may receive positive feedback from some group members but negative suspicious feedback from others. Social media as a medium of exchange is also unique in that the representations of oneself, often in the form of photos called ‘selfies,’ is content that is both produced and shared by the individuals themselves, giving total ownership to 1 individual. O’Connor (2014) notes that “the selfie is not just a self-portrait, as it is an image of oneself by oneself and published by oneself.” The representation of oneself is a somewhat emotional and vulnerable activity, as the components of a photograph, especially if the individual lacks their normal amount of clothing within the photo, are closely tied to one’s life and how the individual desires for others to view their photo.

O’Connor writes that the selfie “[it] becomes the field of present reality and largely dissolves the boundary between the subject and the object… the selfie straddles, stretches and even dissolves the boundary between the subjective and the collective, the public and the private,” (O’Connor, 2014). Leipamaa-Leskinen (2011) takes a relativist point of view on the subject and believes that reality is created between individuals, and that the meaning of one’s identity, with regards to their body, is constructed through social interactions, whether in person or online. To some dieters,
these interactions are positive and give individual the encouragement of the ability to create a totally “new me.”

The behavior of creating an authentic self in an online environment is much more challenging than creating an authentic self in-person, as we have conditioned ourselves to be skeptical of information that is shared online, due to the issues that arise of verification and validity. Christopherson (2007) purposefully titled their research related to online behaviors to include “On the Internet, Nobody Knows You’re a Dog,” as an example that social behaviors are easily modified online due to the lack of physical boundaries and parameters that are present when one shares information in person. As many individuals purposefully diet in order to change their outward appearance, content that represents this change, such as a photograph, should be used as the most efficient exchange of information.

Leggatt-Cook and Chamberlain (2012) analyzed the blogs of 10 individuals, all of which were authored by females and created for the purpose of gaining support and accountability in their weight loss efforts. This research revealed that the bloggers most successful in creating a representation of themselves, that is what was perceived to be authentic by their network and readership, used a variety of content on their website, such as photos, videos, recipes and textual accounts. Progress photos of the individual that showed gradual changes to their body over time, along with pictures of their weight when on a scale, were perceived to have the greatest authenticity and received the greatest amount of social support and engagement in comparison to the other content formats (Leggatt-Cook & Chamberlain, 2012). The content analysis also supported the idea that the bloggers who had the greatest level of catharsis and shared the most
vulnerable content, gained a greater amount of support from their networks than the other bloggers who seemed to keep their posts rather demure and polished; a sense of humor and a tone of being candid and frank seemed to elicit greater engagement too. In order to maintain their level of readership and visitors to their site, the bloggers needed to post with a certain level of frequency, for some it was daily, for others it was just once a week, in order to maintain consistency.
CHAPTER 3

METHODOLOGY

Development of Three Studies

In order to investigate the primary visual sources of information referenced when millennials seek to have a healthy diet or make a change in lifestyle, perhaps to control their weight, we proposed 3 research studies, using both quantitative and qualitative methods to provide triangulation of the results, as well as to give a more inclusive view of the problem that we currently face in trying to solve the obesity epidemic. The first study analyzed young adults’ use of the FDA’s nutrition facts labels seeks to determine whether or not there is significance in preference for the new label format, which is to be implemented by all manufacturers by 2021, versus the current label format that was introduced in 1990, when looking at items such as one’s self-reported weight or weight effort. A textual analysis is also performed on the comments collected from the young adult participants, to provide support and reasoning for the amount of attention given to the labels as well as their use of aids in tracking their own consumption. The second study analyzes the action of recording one’s consumption on a regular basis and its effect on an individual’s long term weight effort satisfaction. Particular interest is paid to the use of aids, such as smartphones and applications used to record consumption, and whether or not these are reported to be superior methods of recording when compared to traditional methods, such as using a pen and paper to manually record consumption. And lastly, the third study analyzes visual content shared by 3 diet-driven brands that are solely operated in online environments, that freely share the majority of the
information intended for their network users through the social media platforms of Facebook, Twitter, and Instagram.

Study 1: Determining Consumer Preference for the New Nutrition Facts Label Format Based on One’s Self-Reported Knowledge of Nutrition

Introduction

On May 20, 2016, the US Food and Drug Administration (FDA) announced that the nutrition facts label for all packaged foods and beverages would be updated to reflect more accurate and helpful dietary information, with a final implementation deadline of July 2021 for manufacturers (Food and Drug Administration, 2016 a; Food and Drug Administration, 2018). The primary purpose of the new nutrition facts label format is to better assist the American public in their efforts to make healthier decisions and to feel that they are in control of their purchases and consumption, as over 1 in 3 adults are currently considered to be obese, and the healthcare costs associated with obesity currently amount to $147 billion annually (Finkelstein, Trogdon and Cohen, 2009). The new labels will give added information regarding the macro nutrients contained (the grams of fat, carbohydrate, and protein), draw attention to the calories, and include a serving size that is reflective of normal consumption amounts for pre-packaged items that are often over-consumed.

Items that are often over-consumed are commonly packaged to contain multiple servings, such as a bag of chips or pint of ice cream, and the recommended serving size is rarely followed, although the consumer guestimates that they’ve only consumed the recommended amount. Per the new label format, for packages that contain 1-2 servings, manufacturers will be required to label the package as 1 serving size, with the
calories and nutrients reflecting the single consumption amount, as people typically consume the entire quantity of these items in one sitting (Food and Drug Administration, 2016b). For products that contain more than 1 serving but could reasonably be consumed in one sitting, such as a small can of fruit or medium frozen pizza, manufacturers must include a dual-column label format, where the “per serving,” meaning 1 serving, and corresponding calories and nutrients are shown next to the “per package” consumption amounts.

The two most noticeably different areas of the panel relate to the amount of calories and grams of added sugar contained within the manufactured items. The caloric count will be made to be the most prominent piece of information on the label panel, centered at the top of the panel in a large bold black font, and added sugars must now be disclosed beneath the line for total sugars, which falls within the section for carbohydrates. Changes have also been made to the section pertaining to vitamins, and as many Americans are deficient in Vitamin D, this item has specifically been added to the label. This research is extremely timely and relevant, as the vast majority of manufacturers of pre-packaged food and beverage items in the United States must implement the new format before July 2021, with an estimate cost of $2.3 Billion to the food manufacturing industry (Manager of Food Labeling Services, AIB International). The original implementation deadline was July 2018, but this was extended in order to assist in manufacturers minimizing the associated costs.

While studies have been conducted pertaining to the attention given to specific areas of the nutrition facts label on pre-packaged items (Wolfson, Graham and Bleich, 2017), as well as the difference seen in label use between adults who are attempting to
lose weight versus those who are not (Bleich and Wolfson, 2015), we sought to analyze the preference for the current versus new nutrition facts label format based on consumers' self-reported knowledge of nutrition and their nutrition-oriented behaviors, such as recording their calories consumed on a daily basis. Young adults, specifically those between ages 18-25 who move away from home and attend college, are at great risk for developing poor consumption habits due partially to this volatile period of life. We investigated some of the reasons given by college-aged young adults for their attention or lack thereof given for using the FDA-regulated nutrition facts labels seen on all prepackaged food and beverage products in the US. It’s was our assumption that the majority of young adults do not pay attention to the labels because they don’t understand how to comprehend the labels and apply the information when making dietary decisions.

Study Questions

In this study we proposed to answer the following questions:

1. Does one’s prior self-reported knowledge of nutrition significantly impact the preference for the current versus new nutrition facts label format, and what are these sources of information drawn upon to create this sense of knowledge?

2. Does the addition of new information and reformatting of the label truly influence the consumer in their search for nutrition-related information or does the consumer first need to have a knowledge of standardized nutrition measures and be in a health-conscious state-of-mind before viewing the label, in order to have the label fulfill its intended duty?

Literature Review

The majority of adults in the United States report that they almost always
reference the nutrition facts labels on pre-packaged items before purchasing or consuming these items but we are skeptical of these claims due to the ever-rising rates of obesity and continued dependence on convenient, nutrient-poor foods that now stereotype the American lifestyle. Research by Bleich and Wolfson (2015) shows that the majority of adults report using or referencing nutrition information included on pre-packaged items (79%), as well fast food nutrition information sources (69%), such as menu boards, when made available. Adults in this particular study were almost twice as likely to use this information if they were trying to lose weight as opposed to those who were not trying to lose weight, and Blacks/ Hispanics (68%) were more likely to report using this information when compared to Whites (63%).

This study speculated that perhaps the minorities reported referencing this information more frequently than the White participants due to the Hispanic and Black populations having a higher percentage of obese adults. This statistic is notable as prior studies have reported that nutrition label use is lower amongst minorities and groups from lower socioeconomic backgrounds. Across all groups, the use of the nutrition facts label panel on pre-packaged foods (OR = 1.92) was higher than the reported use of the list of ingredients (OR= 1.39) or health claims (OR= 1.39), even though these pieces of information were simultaneously available on the same package as the panel. Across all races, women were more likely than men to use all of the nutrition-related information on pre-packaged items, and individuals who were considered to be more educated, having finished high school at minimum, used all of the different sources of information made available on the packages more than adults who had not finished high school. Lastly, a significant difference in label use and the preference of information source
(nutrition facts label, ingredients list, or serving size) was not seen when analyzing across body weight category, such as an individual self-identifying as being slightly overweight vs. obese.

It is widely accepted that one’s demographics play a large part in nutrition information-seeking behaviors, with less educated individuals having a lesser understanding of nutrition and its application, a measurement now known as ‘health literacy’ (Velardo, 2015). Nutrition literacy must be considered within a complex context, inclusive of social, environmental, and cultural factors. Velardo (2015) explains that the information approach to health literacy is often criticized, as there are at least two types of nutrition literacy, inclusive of having a functional or ‘declarative’ knowledge, and procedural or ‘interactive’ knowledge. Declarative knowledge means that someone is aware of the facts and processes, but interactive knowledge takes this a step further to actually knowing how to do something. Within the context of nutrition literacy, declarative knowledge might mean that an individual can identify foods that are high in carbohydrate, but interactive knowledge would include knowing how to create a well-balanced meal. Interactive knowledge also encompasses skill development, inclusive of motivation and the feeling of being in control of these actions. Studies support that individuals who have a prior knowledge of nutrition, desire to eat healthily, and have a weight loss effort are more likely to use prepackaged food nutrition labels than those without a reported knowledge, desire to eat more healthily, or a weight related effort (Grunert, Wills, and Fernandez-Celemin, 2010).

Vidgen and Gallegos (2014) have formulated the definition of food literacy to be the “scaffolding that empowers individuals, households, communities or nations to
protect dietary quality through change and to strengthen dietary resilience over time.”

Per their study that included interviews with 43 “experts,” which consisted of practitioners and researchers within the health, education and community sectors, as well as interviews with 37 individuals of diverse backgrounds to represent the public sector, these researchers deduced that there are eleven components to food literacy and that they fall into the constructs of planning and management, selection, preparation, and eating. Although this study was conducted in Brisbane, Australia, its findings can be applied to that of the American public due to the similar lifestyles between the two countries.

The cost of food is one of the first barriers mentioned when considering the difficulties in selecting and consuming healthy foods. According to Breck, Cantor, Martines and Elbel (2014), individuals that identify as being female, are health conscious, have higher incomes, and are more educated are more likely to report referencing pre-packaged nutrition labels, and that these are groups which are generally at lower risk for obesity and the resulting comorbidities. Hence, when an individual has limited financial resources to purposefully allocate towards healthy eating behaviors, and lacks the knowledge and confidence to plan healthy meals, they are at a greater risk of becoming obese and developing weight-related diseases.

In an effort to minimize the lack of literacy skills, visual symbols and icons have occasionally been added to packaging that note the healthfulness of the product, such as a heart icon, while others have imposed “stoplight” colors (red, yellow, and green) for the degree of healthfulness of the item. In a study conducted by Boonme, Hanus, Prybutok, Peak and Ryan (2014), the data showed that visual information has a
significant role when selecting healthy foods in fast food restaurants. The placement of a heart icon next to the menu item had a significant effect on food selection choices, but no significant effect was seen in consumers’ selections when based on information regarding calories or fat.

In a stoplight color scenario, a red symbol would signify that the item is not healthy and lacks needed nutrients, yellow means that it’s not a great choice but that there are some nutrients to be gained, and green symbolizes that this food is a good choice and contains needed nutrients. Per a study conducted by Sonnenberg, Gelsomin, Levy, Riis, Barraclough and Thorndike (2013), which measured the use of stop light labels in a hospital cafeteria, subjects were significantly (p<.001) more likely to purchase healthier items if they noticed the stop light labels during the point of search and selection than those did not notice the labels. As is the case with many surveys, these results are self-reported, which can be criticized unlike studies which employ tools to monitor and record actual behaviors.

In a novel study conducted by Wolfson, Graham and Bleich (2017), participants reviewed the nutrition facts labels of 64 commonly seen pre-packaged food and beverage items, with half of the sample viewing the normal labels, and the other half viewing the labels with the additional variable of how much effort it would take to “burn off” the item if consumed, such as needing to ride a bicycle for an hour. Eye-tracking devices were used to monitor the attention given to particular areas of the packaging, specifically areas containing nutrition-related information; only 20% of the participants referenced the nutrition facts labels and even less, 17%, referenced the modified labels containing physical activity-equivalent calorie information. Although such a minimal
amount of participants were measured to having actually referenced the nutrition-related information, the majority reported that they would appreciate seeing the amount of effort required to burn off the items if consumed, and that this would affect their purchasing and consumption behaviors.

Regarding portion size when snacking, single-serving packages have been shown to reduce consumption by 25%, according to Wansink (2012). The amount of food on a plate or in a package increases intake and influences the norms for consumption behavior over time. People may count their calories on a daily basis, but often underestimate the actual amount of calories that they’ve consumed. The two primary visual changes to the nutrition facts label format are the portion size and calories contained, and we can only speculate at this time as to whether or not manufacturers will choose to continue packaging items at their current quantity, in some situations with multiple servings now being considered 1 serving, or if this change in legislation will encourage manufacturers to package food and beverages into smaller, single-serving items to then be sold individually. There has been a great amount of pushback and commentary from large manufacturers, including but not limited to the Sugar and Dairy Associations, who expect to be negatively impacted by these changes.

While the majority of adults (approximately 80%) report referencing the nutrition facts label before purchasing and consuming prepackaged items, only 20% actually do so. Referencing this information is considered a healthful habit that one should adopt early in life and employ on a daily basis, but so few Americans actually pay attention to the standardized nutritional content included on all prepackaged food and beverages, which is one of the leading reasons given for our current obesity epidemic. It was our
desire that this study contribute to the body of knowledge relating to obesity-linked behaviors, specifically in young adults who attend college, as this period of life is paramount for purposefully establishing health-focused habits that will determine one’s longevity. The following study was carried out in order for us to better understand the attitudes of the young adult population, as it has been overlooked in the majority of the literature.

Methodology

The data for this study were collected via a survey that was distributed at a large public university in Texas, with 495 student participants, in the spring of 2017. Upon IRB approval the survey was made available online through the platform Qualtrics, and students were solicited based on the cooperation of their course instructor to disseminate the survey link and give extra credit point for participation. In order to maintain anonymity, students were not required to disclose any personally identifying information within the survey itself, but upon completion of the survey were directed to another short form via a hyperlink where they recorded their name and course number in order to receive the participation incentive. After cleaning the data to only include participants who answered all of the questions and finished the survey in a timely manner, the sample was reduced to 453. Per standards held when running thorough statistical analyses, it is recommended to have at minimum 3-5 respondents for every question included in a survey, and as our survey had almost 100 questions, we met the targeted sample of participants (Hair, Black, Babin, and Anderson, 2010).
The statistical methods chosen to test our assumptions within the context of consumer behavior included SPSS to run logistic regression and to perform Chi-square tests, as well as SmartPLS to perform factor analysis for each of the measured constructs and to build a model for significance using partial least squares. We also collected free-form textual responses, a qualitative measure, which provided triangulation for the quantitative components of our research.

Many questions pertaining to demographics were presented in the survey, as the desire to lose weight amongst young adults has often been associated with gender, with females being more likely than males to report the desire to lose weight at a younger age. Our sample included 59.8% females ($n = 271$) and 40.2% males ($n = 182$). As individuals age, their risk of gaining weight increases (Nelson, Story, Larson, Neumark-Sztainer, 2008), therefore we assumed that an older adult would be more likely than a young adult to desire to lose weight, and that this encourages one to pay more attention to their food consumption behaviors and tracking efforts. The ages of participants ranged from 18-57 years, with 75% of the sample being between the ages of 18-24. In order to perform logistic regression, age was grouped into the following three categories: 18-24 years, 25-30 years, and 31+ years. The majority of the sample self-identified as being White (46.4%), followed by Black/African American (20.8%), Hispanic/ Latino (16.8%), and Asian (12.8%); the rest of the sample accounted for less than 4% of the participants and included Native Americans, Pacific Islanders, and others.

We purposefully recruited students who were currently enrolled in an introductory nutrition course in order to measure whether or not someone’s prior knowledge of
nutrition significantly influences their preference for a particular label format. Over 60% of the total participants reported either having taken or were currently enrolled in a college-level nutrition course, with 44% of the being currently enrolled in the recruited nutrition course.

![Figure 3.1](image)

**Figure 3.1.** A model for the theory of planned behavior (Ajzen, 1985), plus the construct of knowledge.

Using constructs from the theory of planned behavior (Ajzen, 1985) as a framework for our research, with the additional construct of Knowledge, we measured consumer preference for the current nutrition facts label format, compared to the FDA-approved but not yet implemented new nutrition facts label format, to determine the significance of one’s prior knowledge and current nutrition-related behaviors on this preference. This theory by Ajzen is considered to be formative seminal information in the fields of psychology, marketing and consumer behavior, and includes the constructs of one’s attitude towards the behavior, subjective norms, perceived behavioral control,
and behavior intention as independent variables on the dependent variable of a measured behavior. We extended this model to include the construct of knowledge, inclusive of both formal and informal sources of information, and place this construct at the beginning of the model, as it was our assumption that knowledge is foundational in the rest of the constructs having significance on the outcome (Figure 3.1).

The knowledge construct included questions relating to the participant’s reliance on formal and informal information sources regarding nutrition, considering both past or current enrollment in a college level nutrition course or status of being a nutrition or kinesiology major as formal information sources, with informal sources including but not limited to reliance on family and friends, and nutrition influencers such as bloggers or media (magazines, books, podcasts) as informal sources. Participants also self-reported their level of comprehension of the information contained in the currently used nutrition facts label on pre-packaged food and beverage items on a 5 point scale.

When measuring one’s attitude to the behavior, questions were asked pertaining to one’s self-reported current weight status as well as one’s current weight effort (trying to lose weight versus maintain weight). When analyzing subjective norms, participants responded to questions relating to the perceived expectations felt by their social circles, both physical and virtual, to consume or to not consume pre-packaged manufactured food and beverage items. Previous literature supports that many individuals feel negative judgment by their close family and friends when dieting or making nutrition-driven food consumption choices, instead preferring to ask those with whom they are less acquainted for information (Pagoto et. al, 2013).
Perceived behavioral control was measured through questions that asked the participant of their current efforts to measure their consumption on a daily basis, inclusive of measuring calories and or macro nutrients, and whether or not they believed that they are in control of these behaviors. The demographics collected were of particular importance in this construct, as we believed that some individuals did all of the grocery shopping in their household, while others perhaps did very little, instead often relying on the judgment of their partner to make the purchasing decisions, which would affect one’s level of purchasing control. The construct of behavior intention was measured through a series of questions that asked the participant if they currently purchased pre-packaged items containing a nutrition facts label and if they intended to purchase items containing this label in the near future.

Lastly, the behavior construct was measured through participants choosing between the current nutrition facts label format and the new label format for commonly purchased items that were specifically mentioned by the FDA as items that individuals often over consume (Food and Drug Administration, 2016 a). Pictures of 10 commonly recognized pre-packaged food and beverage items that contained multiple servings in each package were presented alongside their current and soon to be implemented nutrition facts labels and included the following: pint of ice cream, small bag of chips containing multiple servings, frozen pizza, 14 oz. can of fruit, bottle of 100% orange juice, 20 oz. bottle of full-calorie soda, small bag of crackers, single package containing 2 pastries, single package containing 2 Hot Pockets, and a single package containing 2 cookies. With the exception of the 2 beverages, which only included 1 current label and 1 new label format, the remaining 8 products offered 1 current label and 2 new format
labels, as the manufacturers of these items will have the option of the dual label format, which would include the information for both a single serving as well as the information for consuming the whole package. Figures 3.2 to 3.6 show 5 of the 10 items chosen.

\[\text{Figure 3.2. Example of nutrition facts label options for a pint of ice cream.}\]

\[\text{Figure 3.3. Example of nutrition facts label options for a small bag of chips.}\]
Figure 3.4. Example of nutrition facts label options for a can of fruit.

Figure 3.5. Example of nutrition facts label options for bottle of soda pop.
Results

The majority of the participants in our study reported wanting to lose weight (62%) but only 47% reported currently trying to lose weight when asked to select their current weight effort; the options given for current weight effort included: lose weight (47%), not currently trying to do anything to weight (19%), maintain weight (15.5%), gain weight (13.2%), and does not place an importance on weight (5.3%). Both gender and age were significant demographic variables ($p < .000$) when measuring if someone wanted to lose weight, with 46.7% of the males and 72.3% of the females reporting that they wanted to lose weight. However, when measuring their current weight effort, although the variable of gender is still significant ($p < .000$), only 34.6% of males and 55.4% of females reported currently trying to lose weight.

In order to perform logistic regression, participants were grouped by age to form 3 groups, and age was considered to be a significant variable ($p < .000$). For the first
age group (ages 18-24), 35.5% of the participants self-identified as being slightly to very overweight, followed by 43% of the second age group (ages 25-29) self-identifying as these weights, and lastly 64.8% of the participants in the third group (ages 30+), reported being slightly to very overweight.

Less than 12% of participants reported tracking their daily consumption of the items listed on a nutrition facts label panel, and less than 5% reported tracking the macro nutrients in foods, specifically grams of fat, protein, carbohydrate, sugar, and added sugar, all of which are items that the FDA has required be included in the new label formatting. Of the participants who did report tracking their consumption, most of them reported tracking their daily calories, but not the daily amounts of macronutrients consumed. Interestingly, many of the participants who did not report tracking their calories or macronutrients on a daily basis reported that they often did not understand the information contained on the label and that this confusion discouraged them from referencing the label or list of ingredients before purchasing or consuming.

When asked to select between the current nutrition facts label format and the new format for the 10 items aforementioned, and cross-tabulated by the variable of one’s current weight effort, the only label selections that were statistically significant (p<.000) when performing a chi-square test, were the bottles of 100% orange juice and a 20 oz. bottle of full-calorie soda. Individuals who were currently trying to lose weight preferred the new label format for the bottle of 100% orange juice and the new label format for the bottle of full-calorie soda, which showed the serving size being the entire bottle versus the traditional label format, which represents multiple servings.

To analyze the data by model construct, we performed factor analysis using
SmartPLS, which showed the significance of each question asked within each factor (construct), and the factor’s significance to one another and the outcome construct, which in this context was the behavior of label format preference. In order to be included in the analysis, each question must have at minimum a value of .5, and the relationship value between each of the factors (constructs) must have loaded at 1.96 at minimum, in order to be significant. The questions that met the minimum value are seen in Table 3.1, however the only factors that met the 1.96 inner-relationship minimum were the constructs of knowledge and perceived behavioral control, which supports the literature that one must have a working knowledge in order to feel that they are in control of these behaviors. All of the questions that loaded above >.5 in the construct of perceived behavioral control related to the daily tracking habits of the participants, inclusive of tracking calories, macro nutrients, sugar, added sugar, fat, and saturated fat. The only macro nutrient that did not load on the factor was that of tracking grams of protein daily, and perhaps this is because protein doesn’t currently have a negative social context, unlike sugar and fat, which many people fear over-consuming.

The overall model strength for the theory of planned behavior plus the construct of knowledge, was measured at R-sq= .01, which means that the behaviors reported by participants, inclusive of their weight effort, tracking efforts, sources of knowledge, and perceived social norms, which are widely accepted ideas within the community as being indicators of health knowledge, food literacy, and motivation, are not good indicators of whether or not someone would be more inclined to use the new label format in their future purchasing and consumption efforts when aligned in this order. See Figures 3.7 and 3.8.
Table 3.1

*SmartPLS Question Loadings Output by Construct (> 0.5)*

<table>
<thead>
<tr>
<th>Question</th>
<th>Perceived Behavioral Control</th>
<th>Intention</th>
<th>Attitude Towards Behavior</th>
<th>Subjective Norms</th>
<th>Knowledge</th>
<th>Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Track calories daily</td>
<td>0.79</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2  Track macro nutrients daily</td>
<td>0.92</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3  Track grams of carbohydrates</td>
<td>0.90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4  Track grams of sugar</td>
<td>0.91</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>5  Track grams of added sugars</td>
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<td></td>
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</tr>
<tr>
<td>6  Track grams of fat</td>
<td>0.93</td>
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</tr>
<tr>
<td>7  Track grams of saturated fat</td>
<td>0.92</td>
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<td></td>
</tr>
<tr>
<td>8  Intend to purchase and consume items with NFL this week</td>
<td></td>
<td>0.89</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>9  Intend to purchase and consume items with NFL this month</td>
<td></td>
<td>0.88</td>
<td></td>
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<tr>
<td>10 Intend to purchase and consume items with NFL now</td>
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<td>0.78</td>
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<tr>
<td>11 Currently purchase items with NFL</td>
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<td>12 Currently consume items with NFL</td>
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<td>0.81</td>
<td></td>
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<tr>
<td>13 Believe that foods impact weight effort</td>
<td></td>
<td></td>
<td></td>
<td>0.88</td>
<td></td>
<td></td>
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<tr>
<td>14 Believe that foods impact weight status</td>
<td></td>
<td></td>
<td></td>
<td>0.80</td>
<td></td>
<td></td>
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<tr>
<td>15 Current weight effort</td>
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<td></td>
<td></td>
<td>0.57</td>
<td></td>
<td></td>
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<tr>
<td>16 Acquaintances expectation</td>
<td></td>
<td></td>
<td></td>
<td>0.70</td>
<td></td>
<td></td>
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<tr>
<td>17 Physicians, dieticians expectation</td>
<td></td>
<td></td>
<td></td>
<td>0.73</td>
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<td></td>
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<tr>
<td>18 F2F diet/ exercise groups expectation</td>
<td></td>
<td></td>
<td></td>
<td>0.83</td>
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</tbody>
</table>

*(table continues)*
<table>
<thead>
<tr>
<th>Question</th>
<th>Perceived Behavioral Control</th>
<th>Intention</th>
<th>Attitude Towards Behavior</th>
<th>Subjective Norms</th>
<th>Knowledge</th>
<th>Behavior</th>
</tr>
</thead>
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<tr>
<td>19 Online diet/ exercise groups expectation</td>
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<td></td>
<td></td>
<td>0.84</td>
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<tr>
<td>20 Family and close friends judgment</td>
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<td></td>
<td></td>
<td>0.63</td>
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<tr>
<td>21 Acquaintances judgment</td>
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<td></td>
<td></td>
<td>0.74</td>
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<td></td>
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<tr>
<td>22 Physicians, dieticians judgment</td>
<td></td>
<td></td>
<td></td>
<td>0.76</td>
<td></td>
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<td>23 Online diet/ exercise groups judgment</td>
<td></td>
<td></td>
<td></td>
<td>0.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 Physicians, dieticians info</td>
<td></td>
<td></td>
<td></td>
<td>0.67</td>
<td></td>
<td></td>
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<tr>
<td>25 Nutrition influencers info</td>
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<td></td>
<td></td>
<td>0.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26 Online Nutrition influencers info</td>
<td></td>
<td></td>
<td></td>
<td>0.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27 F&amp;B Brands' packaging info</td>
<td></td>
<td></td>
<td></td>
<td>0.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28 Advertisements by F&amp;B brands</td>
<td></td>
<td></td>
<td></td>
<td>0.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29 F2F diet/ exercise groups info</td>
<td></td>
<td></td>
<td></td>
<td>0.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 Online diet/ exercise groups info</td>
<td></td>
<td></td>
<td></td>
<td>0.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31 20 oz. soda</td>
<td></td>
<td></td>
<td></td>
<td>0.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32 Chips</td>
<td></td>
<td></td>
<td></td>
<td>0.79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33 Crackers</td>
<td></td>
<td></td>
<td></td>
<td>0.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34 100% orange juice</td>
<td></td>
<td></td>
<td></td>
<td>0.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35 Fruit</td>
<td></td>
<td></td>
<td></td>
<td>0.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36 Pizza</td>
<td></td>
<td></td>
<td></td>
<td>0.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37 Ice Cream</td>
<td></td>
<td></td>
<td></td>
<td>0.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38 Hot Pockets</td>
<td></td>
<td></td>
<td></td>
<td>0.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39 Cookies</td>
<td></td>
<td></td>
<td></td>
<td>0.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 Pop Tarts</td>
<td></td>
<td></td>
<td></td>
<td>0.85</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Formal sources of information do not appear to have a great impact on young adults’ search of nutrition-related information, as none of the questions asked relating to one’s formal knowledge of nutrition met the .5 value minimum, inclusive of whether or not the participant had taken or was currently taking a college-level nutrition course,
self-identified as being a nutrition or kinesiology major, or believed that they had an average or above average knowledge of nutrition. The questions pertaining to one’s reading and comprehension of the nutrition facts label and list of ingredients were also not high enough to be considered significant in the construct of knowledge, within the context of the label format preference. It is notable that when a chi-square test was performed on the variables individually, participants who reported being satisfied with their current weight efforts were significantly more likely to track their calories and macro nutrients on a daily basis than those who were unsatisfied. The same group that reported satisfaction with their current efforts was also significantly more likely to report the use of applications, specifically mobile applications, to assist them in their daily tracking efforts, followed by online tools, and lastly manually tracking their efforts with a pen and paper, which all fall under the construct of perceived behavioral control.

Conclusion

The results of this study present the phenomenon that although the majority of the participants surveyed reported that they read labels before purchasing pre-packaged items, the majority do not apply the measurements and standards to their daily consumption behaviors, such as tracking grams of sugar or total calories consumed, which is the premise for implementing the new FDA mandated nutrition facts label. The majority also reported that the information contained on the label does not always influence their consumption of the item, and that they do not consider brands and manufacturers of pre-packaged food and beverage items as primary sources of nutrition-related information. The textual responses collected support these findings, as
many participants said that they believed manufacturers are not trust-worthy in their health claims and that they believed manufacturers purposefully try to confuse consumers in using confusing measurements in the labels and scientific language in the list of ingredients. When applying chi-square tests and factor analysis, there was no overall significance in preference for the current versus new nutrition facts label formats.

This study supports the validity noted in prior studies and literature, which emphasizes the need for knowledge and the daily application of this information within the context of food literacy. Participants reported not understanding the information included in the nutrition facts label, which in turn does not encourage them to track their consumption efforts and base their purchases and consumption behaviors on the measurements contained within the labels, as they pertain to nutrition. As such little variance was seen in preference for the current versus new label format, we do not believe that the mandated reformatting of the label is a strong enough influencer to actually impact consumers’ behaviors towards adopting a more health-conscious lifestyle, but rather a tool that may be applied if the consumer has first learned about the standards included within the label, and believes that they are in control of these efforts, as exhibited through daily application.

Regarding future research efforts, we found it intriguing that female participants were 3x more likely than males to report being concerned that they had an undiagnosed food allergy or intolerance, but the percentages were the same across both genders of participants who had already been diagnosed with an allergy or intolerance. This leads us to question whether or not this is a topic of discussion more widely acceptable amongst the female gender, and if so, why aren’t males questioning this area of health
at the same rate? We were also encouraged to see a tie between participants who reported recording their consumption and having greater levels of satisfaction in their ongoing weight efforts, as well as the use of technological aids for recording, such as smartphones and mobile applications, as this is an area of research that still has untapped potential as technology advances.

Study 2: Use of Dietary Tracking Devices Influences One’s Satisfaction in Current Weight Efforts

Introduction

As obesity rates rise across the US, with almost 40% of the current population falling into the category of “obese,” it prompts us to investigate the nutrition literacy and food and beverage consumption behaviors exhibited by individuals who seek to have a weight effort, specifically those who report satisfaction with their weight efforts. As opposed to a goal, which is finite in nature, an effort is ongoing and not limited to a time period or specific moment of achievement, whereby the action is considered to be complete. It is this ongoing weight-related behavior, whether it is to lose, gain, or maintain one’s body weight, which we proposed to research.

It’s estimated that we make over 200+ food-related choices per day (Wansink and Sobal, 2007), but as eating is often a mindless and highly emotion-driven behavior (Kemp, Bui, and Grier, 2013; Kidwell, Hasford, and Hardesty, 2015), we are apt to forget each of the items and the quantities that are consumed on a daily basis. We proposed that individuals who consistently pay attention to the items included within the nutrition facts label, which is an element of nutrition literacy, and record their consumption daily, will be more satisfied in their ongoing weight efforts than those who
do not record, due to an increased feeling of control over their behaviors and a heightened awareness of their consumption. We also proposed that individuals who use technological tools to record their consumption, specifically mobile applications, rather than traditional manual methods, such as a pen and paper or online calculator, will report significantly greater levels of satisfaction due to the increased ease of use in recording items frequently, as well as the ability to quickly reference one’s historical consumption data.

Literature Review

The concept of recording one’s food consumption in the form of a food diary is not a new or novel idea, in fact it’s often one of the elementary instructions given by a physician or dietitian to their patient when the patient has a food-related health concern, such as wanting to lose weight or the awareness of a possible food allergy or sensitivity. It’s impossible to change a behavior if an individual isn’t aware of the scope and magnitude of their current behaviors, and consumption is a prime example, as eating is often a mindless activity for many people. This is clearly a struggle for Americans as a whole as our national levels of obesity continue to rise each year for both children as well as adults. The action of an individual becoming aware of their decisions and habits is the first step to be taken in order to change any behavior for an intended outcome, but they also need to have self-efficacy and the belief that they’re in control of these behaviors in order to see the change to fruition.

The norm in western cultures is to eat many times throughout the day, with the belief that most individuals need to eat at least 3 meals per day in order to sustain
adequate levels of energy, and it’s commonplace to have a snack or two as well. If this
is the case, by the end of the week the average person has had 21-35 moments of
consumption, whether they are snacks or full meals, but most likely can’t even
remember what they had for breakfast that same day. As it’s estimated that we make
over 200 food-related decisions everyday (Wansink & Sobal, 2007), unless we have a
record of what we’ve chosen to consume, most people will forget and either under or
overestimate their consumption, leading to dissatisfaction in their weight effort if their
intention is to have a change in their weight. Not all food diaries are for weight loss, for
some people they might be used for weight gain or to ensure that an individual
consumes a certain amount of a needed nutrient, but as weight loss is such a common
desire, the majority of the literature available today is concerned with the recording-
behaviors of individuals who have a weight loss goal.

Like many activities that once required physical items in order to complete, the
traditional idea of “journaling,” or recording via a pen and paper, has been expanded to
include technologically driven devices and aids, specifically computers, tablets, and
smartphones. Within these devices users are offered an array of recording options, from
text-based programs such as Microsoft Word and Excel, to mobile applications available
for download. Many diet and exercise programs offer their own online calorie calculators
or web journals as elements of their programs too, giving users instant access to
information regarding recipes and nutrients no matter their location. Pertaining to the
popularity of a particular format for recording consumption, Wharton, Johnston,
Cunningham, and Sterner (2014) conducted a study where participants desiring to lose
weight were assigned to 3 different groups for tracking their consumption over an 8-
week period. The groups included using the mobile application LoseIt!, the traditional pen and paper/journaling method, or the memo function found on most smartphones. Those who used the mobile app LoseIt! were significantly more likely to consistently track over the 8-week period, and with greater frequency, vs. both the pen and paper and memo groups that tracked less often.

Hutchesson, Rollo, Callister and Collins (2015) researched the accuracy of recording one’s caloric consumption when using a mobile application versus using a pen and paper method or an online calculator, as the number of calories consumed daily is often estimated rather than being a concrete measurement. Their sample included young adult females with a mean age of 23 years, who were assumed to be a tech-savvy and weight-conscious population. Those that used smartphone apps to track their consumption were significantly more accurate in estimating the actual number of calories consumed, versus those who used online calculators or pen and paper methods, who underestimated their actual consumption by an average of 500+ calories per day. When surveyed, the majority said that they preferred using a smartphone to track, and found manual recording (pen and paper and online calculators) to be cumbersome and not socially acceptable when dining in a group (tracking via a phone was much less conspicuous).

Almost all of the top applications (app/apps) used for recording one’s consumption have increased their ease of use in recent years, offering users bar code scanners in which to quickly add a prepackaged item to their meal, as well as extensive lists of commonly consumed items, in both generic and branded formats. Many restaurants with a national presence have popular menu items integrated within these
apps, making it even easier for an individual to record their consumption when dining away from home. The free app, MyFitnessPal, is currently one of the most popular apps to download for consumption recording and tracking; it has the added features of allowing users to create recipes and meals within the app, and as this information is stored as part of a user’s profile they can select these previously stored items, such as a meal that they commonly eat at home, and in 1 click add it to their daily food diary. This app allows for customization, and a caloric threshold is set based on a user’s self-reported level of physical activity and weight desires, with the option of having reminders pushed to the user’s smartphone to log their daily activities. This app also has social integrations, offering users the option to connect with friends who also use the app, and encourages users to give support to one another in their goal achievements, such as logging their meals for the day to reaching their goal weight.

The use of this app for recording one’s consumption does not replace the need for nutrition literacy, but rather encourages app users to take a deeper look at the nutritional makeup of the items that they select and add to their daily food diaries, as a message will appear within the app if an item is added that exceeds the user’s set daily consumption amounts, such as having a surplus of grams of saturated fat. These messages might encourage users to either rethink the consumption of the item or to at least consider a different serving size in order to stay within the daily limits.

While studies to date have focused on short-term use of different methods for recording one’s consumption and the accuracy of a particular format for recording, the literature is lacking with regards to understanding the significance of consumption recoding behaviors on an individual’s long-term satisfaction with their weight.
Referencing fundamental concepts from psychology, including the items of perceived behavioral control and attitudes held towards a specific behavior from the theory of planned behavior (Ajzen, 1985), paired with constructs stemming from the disciplines of knowledge management and information processing, including Chaiken’s Heuristic-Systemic model (1989), we built a model to investigate the strength of the relationship between one’s daily applied knowledge of nutrition, tracking behaviors, and weight effort satisfaction.

Study Questions

The questions that we answered through the proposed model are as follows:

1. Is there a significant positive relationship between one’s action to record food and beverage consumption daily, to being more satisfied in one’s current weight effort than someone who doesn’t record their consumption?

2. Does tracking these behaviors via technological tools, specifically mobile applications, lead to greater satisfaction in one’s current efforts than more traditional time-intensive methods, such as using a pen and paper or online calculator?

Methodology

The proposed framework tested the relationships between one’s perceived level of knowledge regarding nutrition, an application of the knowledge as shown by paying attention to the caloric and macronutrient information contained within nutrition facts labels on a frequent basis, and the action of tracking one’s food consumption on a daily basis, as strong influencers of one’s perceived behavioral control over one’s current weight, as well as overall satisfaction in their current weight efforts. The concepts theorized by the theory of planned behavior (Ajzen, 1985) are considered to be
formative seminal information in the fields of psychology, marketing and consumer behavior, and are inclusive of one’s attitude held towards a behavior as well as perceived behavioral control. The heuristic-systemic model (Chaiken, 1989) incorporates concepts of items being given either high or low amounts of attention, with low being associated with heuristics, and high attention being associated with a systemic process, which we propose to be the action of tracking one’s consumption on a daily basis, as this is an effort requiring high involvement. Items that require high amounts of involvement in the beginning in order to master the item, such as a process or routine, are more apt to become habits in the long-term than items requiring lower amounts of attention or involvement (Duhigg, 2012).

We use the influence of and attention given to nutrition facts labels as measurements for the concepts of knowledge acquisition and knowledge application, as these include both levels of declarative and interactive nutrition literacy knowledge. The concept of recording one’s food consumption, frequency of recording, and preferred recording method is measured through the use of a pen and paper, online calculator, or mobile application. Perceived behavioral control, or the feeling that one is in control over their weight effort is measured by one’s self-reported level of knowledge of nutrition (below average, average, above average, etc.), paired with the belief that the individual is in control of their purchases and consumption, and that their food consumption impacts their current weight. According to Ajzen’s theory of planned behavior (1985), it is one’s confidence in being able to complete an action or the belief that one is in control over the action that most greatly influences any planned future behaviors; if an individual does not believe that they’re in control of what they eat, that their knowledge
of nutrition is not adequate, or that their weight is affected by their consumption, they will be highly unlikely to report satisfaction in their weight-related efforts. Lastly, the concept of one’s attitude towards their weight effort, or the degree of satisfaction, is measured by one’s self-reported current effort satisfaction paired with the belief that their current weight status (being overweight, underweight, the right weight, etc.) is impacted by their consumption.

We purposefully did not include the words “diet” or “goal” within the questions presented, as we did not want to limit the participants with verbiage that could be considered leading. The word ‘diet’ has an association of desiring weight loss, and ‘goal’ associates with a finite amount of time in which one changes a behavior, such as the amount of time necessary to lose 20 pounds. As we are interested in long-term behaviors that could potentially form habits, we believe that the word ‘effort’ is more appropriately used when asking about the amount of energy and attention associated with a behavior, such as always referencing nutrition facts labels before purchasing or consuming and tracking consumption on a daily basis. Further support is that the action of maintaining one’s weight does not have an end in sight, as it’s a lifelong effort that must still be made even when an individual is at their desired weight.

We surveyed 771 adults in the spring and summer of 2017 at a large public university in the southwest, with 80% of the sample being between the ages of 18-25, having a mean age of 23 years. The survey was administered online via Qualtrics, all responses remained anonymous, and the participants were given extra credit for their efforts. The majority of these participants were undergraduate students, followed by master’s students and PhD students. After cleaning the data to eliminate incomplete
entries, the total sample was reduced to 645 participants. Scaled questions were asked regarding one’s self-reported level of knowledge of nutrition, attitudes held towards the use of nutrition facts labels, their current weight status and effort, and one’s current consumption behaviors, and daily consumption and exercise tracking behaviors, in addition to open-text responses for increased triangulation.

While student samples have been criticized as of late, we purposefully sampled undergraduate students, as this is considered a neglected population within research relating to nutrition-driven measures. Early adulthood, the stage where an individual often moves away from their parents and must learn to take care of themselves in many new aspects, including but not limited to finding employment, planning meals, and cooking for themselves, is also the same time period when many people will enroll in undergraduate coursework. Finding the balance between all of these new areas of responsibility is challenging to many young adults, and making healthy food choices is often not highly prioritized, with twice the number of students being considered overweight after their first year of college as the amount who entered the year prior; if 10% of the incoming freshman class were considered overweight, that percentage will double a year later to 20% (Nelson, Story, Larson, Neumark-Sztainer, and Lytle, 2008).

Results

To test the model, we performed logistic regression and factor analysis using SPSS and SmartPLS, and determined that one’s demographics, specifically gender and age, are significant to one’s current weight status and effort ($p = .000$), with females being almost twice as likely to self-report being overweight, and that as one ages, they
are more likely to report being overweight as well as currently trying to lose weight. To test the proposed model, we evaluated the validity of the constructs as well as the relationships between items and sequence of items by using partial least squares, with an R-sq of .324. The strength of the relationships between constructs is detailed in Figure 3.9, and the R-sq value model sequence is detailed in Figure 3.10.

*Figure 3.9. Relationship between constructs of the tested model.*

*Figure 3.10. R-sq = .324 for the tested model.*
Table 3.2

*Factor Loadings by Construct for the Tested Model*

<table>
<thead>
<tr>
<th>Construct</th>
<th>Items</th>
<th>Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>Nutrition facts label information influences decision to purchase the item</td>
<td>0.902</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Nutrition facts label information influences decision to consume the item</td>
<td>0.873</td>
</tr>
<tr>
<td>Applied knowledge</td>
<td>Reads nutrition facts labels on products</td>
<td>0.672</td>
</tr>
<tr>
<td>Applied knowledge</td>
<td>Understands nutrition facts labels on products</td>
<td>0.559</td>
</tr>
<tr>
<td>Applied knowledge</td>
<td>Reads the list of ingredients on products</td>
<td>0.643</td>
</tr>
<tr>
<td>Applied knowledge</td>
<td>Understands the list of ingredients on products</td>
<td>0.576</td>
</tr>
<tr>
<td>Applied knowledge</td>
<td>Tracks calories</td>
<td>0.779</td>
</tr>
<tr>
<td>Applied knowledge</td>
<td>Tracks macronutrients</td>
<td>0.890</td>
</tr>
<tr>
<td>Applied knowledge</td>
<td>Tracks grams of sugar</td>
<td>0.866</td>
</tr>
<tr>
<td>Applied knowledge</td>
<td>Tracks grams of added sugar</td>
<td>0.863</td>
</tr>
<tr>
<td>Applied knowledge</td>
<td>Tracks grams of carbohydrate</td>
<td>0.872</td>
</tr>
<tr>
<td>Applied knowledge</td>
<td>Tracks grams of fat</td>
<td>0.901</td>
</tr>
<tr>
<td>Tracking behavior</td>
<td>Track nutrition with a pen and paper</td>
<td>0.768</td>
</tr>
<tr>
<td>Tracking behavior</td>
<td>Track nutrition with an online calculation tool</td>
<td>0.864</td>
</tr>
<tr>
<td>Tracking behavior</td>
<td>Track nutrition with a mobile application</td>
<td>0.600</td>
</tr>
<tr>
<td>Tracking behavior</td>
<td>Appreciate being reminded to track nutrition and consumption on a daily basis</td>
<td>0.515</td>
</tr>
<tr>
<td>Perceived behavioral control</td>
<td>Has an average understanding of nutrition</td>
<td>0.570</td>
</tr>
<tr>
<td>Perceived behavioral control</td>
<td>Feels in control of food and beverage purchases and consumption</td>
<td>0.548</td>
</tr>
<tr>
<td>Behavioral control</td>
<td>Current weight efforts are impacted by food and beverage purchases and consumption</td>
<td>0.812</td>
</tr>
<tr>
<td>Attitude/ weight effort satisfaction</td>
<td>Level of satisfaction in current weight efforts</td>
<td>0.375</td>
</tr>
<tr>
<td>Attitude/ weight effort satisfaction</td>
<td>Belief that current weight status is impacted by food and beverage purchases and consumption</td>
<td>0.928</td>
</tr>
</tbody>
</table>
Our results supported that individuals who read and comprehend nutrition facts labels, and choose to be influenced by the information contained within the label, specifically paying attention to particular macronutrients, such as grams of fat or carbohydrate, feel significantly more in control of their consumption behaviors than individuals who do not give attention to this information. They are also significantly more likely to be satisfied with their current weight efforts, whether it is to lose weight, gain weight, or maintain their weight, as they have a higher level of perceived control over the behavior than that of the individuals who do not report paying attention to the information contained within nutrition facts labels.

Regarding the recording of consumption on a regular basis, the options included writing down one’s consumption using the traditional pen and paper method, the use of online calculators or tools, or the use of a mobile application. The frequency of recording was also measured, including the options of never, sometimes, and always record. Individuals who reported using either the pen and paper method or a mobile application (p=.000) had significant satisfaction in their weight efforts, but those who reported using an online calculator/ tool did not; while online calculators can be helpful for calculating the nutrients of a recipe, these are not historic or collective in nature, meaning that unless an individual purposefully saves the information, it is difficult to reference at a future date.

Consumption-driven mobile applications have continued to improve at the same rate as other mobile applications, with items such as barcode scanners making the effort of recording significantly more user-friendly and efficient than writing down and calculating one’s consumption manually. They can also offer the user prompts and
reminders to log their meals each day, keeping this action at the forefront of one’s mind, with the potential to establish a habit in the long-term. Participants in our study were asked if there were any mobile applications or wearable devices that they currently used in tracking their food consumption and or exercise, and if so to list the brands or device models. It was pertinent to our study to inquire as to exercise-driven apps or wearable devices as many of these items offer users the ability to track food consumption and energy exertion within the same device, such as the Fitbit which is a wearable bracelet set to track one’s heart rate and exertion throughout the day, but if the user has downloaded the Fitbit app to their smartphone, they can also record their consumption through the app and sync the two databases to work as one. After cleaning the responses to exclude non-relevant answers, 651 items were coded, and 460 of these responses included reference to a particular app or wearable device that they used either on a regular basis or had previously used. Textual analysis is somewhat subjective in nature, even if the researcher desires to remain unbiased in their queries, because they must first determine the question that they want to answer before adding parameters to the analysis, such as start or stop words, hierarchical coding schemes, etc. It’s for this reason that we used the outputs of multiple tools, being Nvivo and Microsoft Excel, with results including cluster analysis, semantic analysis, and frequency of terms. In order to minimize coding bias, a random selection of responses was coded for inter-reliability, with an 88% consensus between the coders.

When asked “When tracking your nutrition and food consumption what applications, websites, or tools do you find to be useful?,” 163 responses included reference to an app, 47 to a wearable device, and 34 to a website. Although minimal,
there were 9 responses that referenced recording their consumption via a particular program, such as Weight Watchers, and 4 responses that mentioned social support in controlling their consumption, such as having an accountability partner. When asked “In tracking your exercise efforts, what applications, websites, or tools do you find to be useful?,” there were 112 references to apps, 138 to wearable devices, and 19 references to websites. Regarding specific branded programs and social support, only 4 brands were mentioned for tracking their exercise efforts, and 9 responses referenced social support.

The most frequently referenced app for tracking food consumption was MyFitnessPal, and the most popular apps and wearable devices that often have correlating apps that sync information to one’s smartphone were the Nike Running App, Nike watch, FitBit, and Apple watch. A notable amount of responses included a few if not all of these items for tracking, with many participants saying that they used the MyFitnessPal app for recording their food and used a wearable, such as a FitBit or Apple Watch, for recording their exercise activities. When a response included a list of items that the participant found to be useful, such as a website, app, and wearable device, the item considered to be given primary attention out of the multiples listed received the designated code. None of the participants listed cost as a barrier to tracking their consumption or exercise efforts, and a few mentioned that they would be much more apt to track consistently if there was 1 app or device available in which to track everything, inclusive of food consumption, exercise, and sleep habits. Far fewer participants listed the barrier of lacking time in tracking their exercise efforts, and no participants mentioned not understanding how to read the information delivered to them.
through the app or device, but multiple responses were recorded regarding the lack of time available to track all of their food consumption throughout the day.

Conclusion

We believe that the scope of this research is broad, as the results of this study are needed in order to combat the increasing obesity epidemic, the results are timely, and can be applied to a large population. We place a great emphasis on one’s use of technology for recording behaviors via mobile applications, therefore the breadth is limited to individuals who are comfortable using smartphones and applications. While it’s assumed that our sample of young adults are all tech-savvy and comfortable using these items, the same results may not be found in that of an elderly population. We purposefully measured attitudes held by young adults attending college, therefore the results may not be reflective of other age groups or populations due to the specificity of the sample. The limitations of the research concern the structure of the collected data, mainly that it’s self-reported by the participants. For example, one’s self-reported BMI is most likely to be skewed, therefore we omitted it as a question in our survey, whereby we don’t have a clear way of determining someone’s actual weight status, and must solely rely on the self-reported answers. Gender was found to be a confounding variable, with young women being almost twice as inclined to say that they needed to lose weight versus young men who reported wanting to gain weight, a possible issue of body image being an influencer on consumption tracking and frequency, which we intend to investigate in future studies.

We found it promising that many of the young adult participants in this study
reported already being familiar with and or using an application or wearable device for
tracking their nutrition and exercise efforts, and that the reported barriers of time,
associated cost, and difficulty were minimal. Based on the results of this study we
believe that the young adult population is receptive to being more aggressively informed
of proactive nutrition behaviors and that the inclusion of technical aids to bring greater
awareness to their efforts can assist in developing long term habits for greater health.

Study 3: Determining the Most Engaging Content Shared by Dieting Brands on Social
Media Platforms

Introduction

Studies conducted of users engaging in groups on the popular social media
platforms of Facebook and Twitter, under the context of dieting to lose weight, have
produced notable results, including the type of most frequently shared content between
users, but research has not yet been adequately published in relation to the social
media site Instagram. Nor has a study been performed pertaining to the content shared
by program owners, inclusive of examining the type of content that elicits the greatest
amount of engagement from their online social networks, and whether or not there is a
particular social media platform best suited for publishing content to participants of diet
and exercise programs.

For this study, we were interested in the messaging and format of brand-
produced content that generates the greatest engagement from their networks, across
multiple social media platforms, as businesses must tailor their posts and share relevant
and enticing information in order to have consumers continue using their products/
services. Engagement with the brand is an integral part of the customer journey, and
this relationship can only be sustained if the consumer believes that the brand offers something that they want (Sashi, 2012; Hollebeek, 2011).

The literature supports that online diet programs offer individuals many benefits that are not available in a face-to-face environment (F2F), such as convenience, 24-hour support and communication, and an increased network of like-minded individuals who seek and share relevant information. Many of these programs have a strong social media presence and desire to engage with their participants in an open online community atmosphere, rather than the traditional F2F environment, whereby providing different levels of anonymity and options for engagement depending on the chosen social media platform.

While studies conducted of users engaging in diet-oriented groups on the platforms of Facebook and Twitter have produced notable results, research has not yet been published pertaining to the social media platform Instagram, which is primarily visually driven. Nor has a study been performed pertaining to the content shared by diet-oriented brands, and which type of content gains the greatest amount of engagement when posted to their own online communities. We sought to investigate whether or not there is a particular social media platform best suited for publishing content to individuals who are participating in an online-driven dieting program, and what type of content currently elicits the greatest engagement when posted by a dieting brand to their own network of diet participants.

Literature Review

Diet management has become a highly commoditized industry, as more than 1 in
every 3 adults in the United States is considered to be overweight and or obese, a statistic that has grown dramatically in the last 30 years and without intervention will continue to rise (CDC, 2017). As one’s weight is often a sensitive topic, especially for an individual who dislikes their current weight status, this type of information (eating habits, exercise, current weight versus goal weight, etc.) is not freely shared by many individuals to their close network of peers, as the participants of dieting programs have reported that it is this close inner-circle comprised of family and friends that they feel the most shame and judgment from in their current weight status (Kulik, Ennett, Ward, Bowling, Fisher & Tate, 2015).

Partially due to this sensitivity of the topic, the traditional face-to-face (F2F) weigh-in accountability model made popular by the brand Weight Watchers, is now being challenged by online dieting communities, negating the idea that accountability and success in one’s dieting efforts are only achievable when individuals share information in-person. Participants of many weight loss-oriented studies, inclusive of bloggers who are very public about their efforts as well as individuals who prefer to maintain an air of anonymity, have attributed the social support system of their dieting community as the variable that most greatly aided them in the success of their weight loss endeavors. At the same time, participants who were not successful in achieving their weight loss goals also said that it was the social support system, or lack thereof, that made them unsuccessful in their efforts; participants could not separate their failed attempt from the lack of social support, and used this as their excuse, instead of a lack of personal control or determination (Faw, 2014; Webber, Tate, and Bowling, 2008; Leggat-Cook and Chamberlain, 2012).
The ability to share information is closely tied to one’s perception of social support, as information-sharing behavior is defined as the “interpersonal exchange that can make an individual feel either loved, esteemed, accepted, valued or motivated” (Ballantine and Stephenson, 2011). We can see these exchanges in every realm of life, from personal to professional endeavors, as these actions almost always hinge on the recognition or acknowledgement of an action taken, in this case sharing a personal piece of information. Due to the sensitive nature of disclosing one’s health, specifically weight, it is possible that some individuals believe that the revelation of their weight will elicit judgment and ridicule amongst their peers, and this is not a far-fetched idea as we idolize thin physiques and even “fat-shame” in our current western cultures (Farrell, 2011). The fear of publically announcing a desire for change in body type, specifically to lose weight, and then failing to do so, is a great enough fear that many individuals mentally give up before ever starting a weight loss endeavor. This is extremely unfortunate, as research has shown that those with a social support system (grouped participants versus single participants) lose more weight than those who attempt to complete a weight loss program alone (Ballantine & Stephenson, 2011).

The classic F2F Weight Watcher’s model is founded on a participant’s open vulnerability and transparency within a group of like-minded peers, inclusive of divulging food diaries and conducting a weekly weigh-in within the group on a regular basis. While many have found success through participating in this style of program, some having even described it as being therapeutic and spiritual (Ballantine & Stephenson, 2011), the premise of initially being vulnerable in recanting one’s weight challenges in a F2F environment with strangers, is not an attractive model to other individuals.
If an individual does desire to lose weight, but at the same time fears the perceived judgment of family and friends as being the support system in this endeavor, they may be more inclined to participate in an online weight loss program, due to the heightened state of anonymity. This was the main reason stated by participants who chose an online weight loss program over a F2F weight loss program, when surveyed in a study conducted by Pagoto et., al (2014). While failing to complete an online weight loss program is still highly probable, as this is a very difficult endeavor for many individuals and it’s estimated that we make over 200 food-related decisions each day (Wansink and Sobal, 2007), one’s level of autonomy is increased in the online environment as one’s failure does not have to be publicly revealed, whereby giving the participant greater control of their representation to the fellow group members. This representation is both as a participating member as well as the representation of their actual physical outward changes in physique over time.

The ability to extract data from social media content continues to reach unprecedented heights, as we now have the tools to download 10,000+ posts at once, giving the hope of discovering both trends and anomalies in the exchanges between individuals as well as collective groups in this virtual environment. The potential to drilldown through the mass amounts of data to pinpoint conversations and exchanges related specifically to individuals who are dieting or who seek diet-related information is also possible, especially with the additional feature of hashtagging, that’s made available on the currently most popular platforms of Facebook, Twitter, and Instagram.

While many studies have been conducted pertaining to the information exchanged in weight loss efforts across closed (chat rooms and private forums) and
open (social media sites) platforms, including the social media sites Twitter and Facebook (Turner-McGrievy and Tate, 2013; Ballantine & Stephenson, 2014; Pagoto et al., 2014; Webber et al., 2008; Hwang et al., 2010; Leggatt-Cook and Chamberlain, 2012), research is lacking when analyzing these exchanges across the social media site Instagram. Instagram offers a combination of the best features offered by Facebook and Twitter and has the greatest visual emphasis for content when drawing a comparison between the 3 platforms. On Instagram a user must upload a photo or video as the visual component of their post, with the option to include text and or hashtags. The use of hashtags gives the content creator the ability to purposefully place their post within a particular online conversation through the application of tagged text, inclusive of singular words or phrases, and gives the viewer of the post the ability to search for content related to the tagged topic. This feature not only enables one to draw upon a much wider audience than their own personal network, but also connects the content creator to a network of like-minded individuals who are also posting on the same topic.

One current limitation of Twitter, in comparison to Facebook and Instagram, is its 140-character maximum, inclusive of hashtags as well as text or a url. Users of Twitter must be much more concise in their exchanges, as the text functionality is so limited, unlike the other 2 platforms which offer 500+ character maximums, encouraging more lengthy and thoughtful content and multiple hashtags to be used per post.

Additional features that foster feelings of safety and anonymity can be found when users utilize Instagram for social exchanges, as an individual can create a profile that they perceive does not include any personally identifying information, a combination of both technical and social anonymity. This perceived anonymity minimizes the risk that
an adverse reaction that has the potential to elicit shame or judgment from the group could be connected to them as an individual, such as posting that they did not meet their goal weight for a set period of time or that they lacked self-control in their food choices. Instagram users also have the ability to create multiple profiles, each with varying degrees of exposure and anonymity, such as a personal account that they use to connect with friends and family members, and a diet-oriented account that they use to connect with others who are also dieting.

One’s body is often a visual manifestation of one’s health, not always an accurate representation of whether or not someone is actually “healthy,” but is one of the main sources of information that is used in determining one’s level of healthfulness or need for change in health habits. Instagram offers users the ability to post pictures of their changing bodies, often tagged as transformation photos, but without having to use their real name being tied to their account, whereby offering users a greater degree of anonymity. It is speculated that over time, as users become more comfortable participating within the group, and have confirmed that their posts will garnish positive support from their network, that their degree of anonymity is lessened, such as adding their actual name to their account or posting pictures of their entire body including their face.

We proposed that the same is true of content produced and posted by the brands of dieting programs to social media platforms, that the greater the transparency and vulnerability of the post, the greater the amount of engagement from the network of followers. We also proposed that when the same diet-related content is posted across
Facebook, Twitter, and Instagram, that the content posted to Instagram will receive the greatest amount of engagement in comparison to the other two platforms.

Study Questions

We asked the following questions:

1. What is the most engaging type of content published by diet and exercise brands to their Instagram networks?

2. Can 1 of these 3 social media platforms be considered the superior platform for brands to publish their information and engage with a primarily online-driven network?

3. Does a photo’s degree of exposure, such as a transformation photo, correlate with the amount of engagement received to the post?

Methodology

Relying on the deindividuation and SIDE theories (Zimbardo, 1969; Lea and Spears, 1991), we proposed that the brands that share the most visually-driven content that depicts a real representation of their program and program participants (such as transformation photos), will elicit the greatest amount of engagement to their posts. We also proposed that the content shared on Instagram will generate the greatest positive engagement when compared to the same content posted on the other two platforms, as this platform offers increased anonymity and autonomy to its users, while being visually driven in its content exchange.

We selected 3 online diet-oriented programs and analyzed the content that they posted across the popular social media platforms, Facebook, Twitter, and Instagram, for a 30-day period, being January 1st – 30th, 2016. The program selection process included the following criteria: that each of the brands have an active presence on each of the
sites mentioned prior, as well as did not have a formal F2F component to their program, whereby conducting the majority of their marketing and exchange in an online environment. The programs needed to be notable, such as having been mentioned in the media in the last year, as to verify their market reach and popularity in the United States. They must have publicly viewable profiles, therefore brands that operate closed forums were eliminated from the options as we would be limited in our analysis if not all of the content that they produced was visible in our data collection process. For example, Beach Body is a 21-day eating regiment that is primarily geared towards women, but one must be added to their closed Facebook group in order to have access to all of the content posted by the brand, which would negate our search criteria.

We specifically chose the brands, Kayla Itsines Bikini Body Guide (BBG) and Jim Stoppani (JS), as they are named after their founders and are primarily geared to either females (BBG) or males (JS), to be compared against each other as well as against the brand Whole30 (Whole30), as it markets itself to all genders; we are curious to see if the content that they post is remarkably different in its tone and levels of engagement based on targeted gender (Kayla Itsines BBG, 2018; Jim Stoppani, 2018; Whole30, 2018). BBG is a 12 week exercise program with an optional food plan to incorporate, compared to JS which is a 12 week program designed around dietary supplements and achieving certain macronutrient ratios, with optional but recommended exercise components. Whole30 is a 30 day clean eating program designed to help people feel in control of their eating behaviors through a new found love for healthy foods that are 100% free of ingredients that cause internal inflammation, including all dairy, grains, added sugars, soy, legumes, and alcohol. Whole30 in particular places great emphasis
on participants not weighing themselves during the 30 day period as to not be derailed from their efforts if they don’t see their weight changing as rapidly as they desire, and instead encourage making a list of 'non-scale victories,' noted in posts with the hashtag of #NSV. While the majority of Whole30 participants who complete the 30-day program do report losing weight, Whole30 says that this is not the primary purpose but an added benefit of learning how to eat in this new, healthier manner. Whole30 also provides a list of recommended actions to take for successfully completing their program without being derailed, as the program rules state that you must restart the 30 days if you knowingly ‘cheat’ and choose to eat an item containing any of the off-limits ingredients. They encourage participants to create a food journal, have a weekly menu and meal prep according to it, pair up with a friend for accountability and support (even if they’re not physically present), and even create secondary social media profiles for the purpose of posting content related to the program. While many of the participants of the BBG and JS programs also have secondary profiles, created for the purpose of sharing exercise or diet-driven content, neither of these two brands have taken such a strong stance in encouraging their participants’ online engagement in order to be successful.

At the time of data collection, we were not aware of a tool with the capability of collecting all of the desired information we needed from each of the platforms when downloading posts, therefore this was a manual, labor-intensive process to ensure that all of the text, visual elements, and engagement levels of each post were captured. We purposefully chose January 1st as the start date, as this is an annual kickoff for Whole30 participants, and a time of year when many individuals attempt a new diet; weight loss is the number 1 New Year’s resolution in the United States, followed by improved overall
health and exercise. The data were collected by taking screenshots of the posts and was then coded using Excel by a 3-member team, each coding each 3 of the programs content, in order to facilitate a blind-coding process; in the case that codes were not unanimously agreed upon, the majority code was given. The amount of engagement was recorded, and included the elements of likes, shares, comments, and retweets, and compared to the rest of the posts collected within the 30-day timeframe to determine the popularity and relatable-nature of the content to its intended audience. The number of followers on each platform for each program was also recorded, as to create a ratio for network engagement, such as 500 likes on a post, compared to a network following of 100,000 individuals, therefore an engagement percentage of .05%.

Our study utilized both quantitative and qualitative methodologies, through the use of text analysis, photo/video analysis, and numeric measurements, in order to have a greater knowledge of this realm of online exchange. The multiple perspectives and methodologies taken to analyzing this data provided triangulation and increased support for our findings. The coding scheme (Table 3.3) was built to incorporate the functionality and platform formats, as well as to measure the 5 types of social support researched by Turner-McGrievy and Tate (2013).

Table 3.3

Coding Scheme

<table>
<thead>
<tr>
<th>Code</th>
<th>Description/Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Visual Content</td>
</tr>
<tr>
<td>A1</td>
<td>Self (‘selfies’)</td>
</tr>
<tr>
<td>A2</td>
<td>Transformation (before and after)</td>
</tr>
<tr>
<td>A3</td>
<td>Food-focused</td>
</tr>
</tbody>
</table>

*(table continues)*
<table>
<thead>
<tr>
<th>Code</th>
<th>Description/Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>A4</td>
<td>Exercise-focused</td>
</tr>
<tr>
<td>A5</td>
<td>Textual</td>
</tr>
<tr>
<td>A6</td>
<td>Product Promotion (endorsements/ advertisements)</td>
</tr>
<tr>
<td>A7</td>
<td>Cartoons or drawings</td>
</tr>
<tr>
<td>A8</td>
<td>All others</td>
</tr>
</tbody>
</table>

Textual Content

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>Informational</td>
</tr>
<tr>
<td>B2</td>
<td>Humorous</td>
</tr>
<tr>
<td>B3</td>
<td>Call for response</td>
</tr>
<tr>
<td>B4</td>
<td>Encouragement</td>
</tr>
<tr>
<td>B5</td>
<td>Product Promotion (endorsement/ advertisement)</td>
</tr>
<tr>
<td>B6</td>
<td>Hashtags included #</td>
</tr>
<tr>
<td>B7</td>
<td>Users tagged @</td>
</tr>
</tbody>
</table>

Degree of Exposure

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Low (example: food photos tagged with the user who made the recipe)</td>
</tr>
<tr>
<td>C2</td>
<td>Medium (example: fully clothed user tagged, their personal story)</td>
</tr>
<tr>
<td>C3</td>
<td>High (example: bikini photos, transformation photos)</td>
</tr>
</tbody>
</table>

5 Types of Social Support*

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
<td>Informational</td>
</tr>
<tr>
<td>D2</td>
<td>Tangible</td>
</tr>
<tr>
<td>D3</td>
<td>Esteem</td>
</tr>
<tr>
<td>D4</td>
<td>Network</td>
</tr>
<tr>
<td>D5</td>
<td>Emotional</td>
</tr>
</tbody>
</table>

Engagement Metrics

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>Number of likes</td>
</tr>
<tr>
<td>E2</td>
<td>Number of comments</td>
</tr>
<tr>
<td>E3</td>
<td>Number of shares/ retweets</td>
</tr>
<tr>
<td>E4</td>
<td>Number of views</td>
</tr>
</tbody>
</table>

*Turnery-McGrievy & Tate’s (2013)

Results

Our results supported the original assumption that content shared on Instagram
elicits greater network engagement than when the same content is shared on Facebook or Twitter, and we believed that this is in part due to the visual elements of the platform and the increased anonymity of network participants. Approximately 2,000 published posts were collected over the 30-day period of January 1-30, 2016, and 926 posts were coded after eliminating items that were just textual; we did analyze some purely textual posts on Twitter in order to analyze the content of similar posts to the other 2 platforms but these were not included in the items coded (Table 3.4). In order for a post to be included it needed a visual element, as this is a required feature of Instagram, being either a picture or video, with optional text. The 926 total posts included 296 posts on Instagram (BBG = 152, Whole30 = 76, JS = 77), 298 posts on Facebook (BBG = 165, Whole30 = 56, JS = 77), and 332 posts on Twitter (BBG = 138, Whole30 = 113, JS = 81). The brand Jim Stoppani posted over 1200 tweets via Twitter, but as time was a limitation we only coded the tweets for this program that contained a photo in addition to text (Table 3.6). Many of the posts for all three of the programs contained multiple variables from each section of code, however the primary focus was chosen and coded for each; for example: A1 ‘Selfies’ posted by JS and BBG also had an exercising element, but the selfie was the primary visual focus.

It was determined that the greatest amount of network engagement for all three programs was found on the platform Instagram, when creating a ratio for the amount of engagement for each coded post, specifically the number of likes, divided by the number of network users. When the same content was posted across all 3 platforms, Instagram had the greatest amount of engagement for each of the 3 programs, when compared to Facebook and Twitter.
Table 3.4

*Number of Items Coded according to the First 4 Variables of the Coding Scheme, minus Engagement Metrics*

<table>
<thead>
<tr>
<th>Code</th>
<th>Description/Examples</th>
<th># Posts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Instagram Visual Content</strong></td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td>Self (‘selfies’)</td>
<td>81</td>
</tr>
<tr>
<td>A2</td>
<td>Transformation (before and after)</td>
<td>50</td>
</tr>
<tr>
<td>A3</td>
<td>Food-focused</td>
<td>55</td>
</tr>
<tr>
<td>A4</td>
<td>Exercise-focused</td>
<td>18</td>
</tr>
<tr>
<td>A5</td>
<td>Textual</td>
<td>34</td>
</tr>
<tr>
<td>A6</td>
<td>Product Promotion (endorsements/ advertisements)</td>
<td>13</td>
</tr>
<tr>
<td>A7</td>
<td>Cartoons or drawings</td>
<td>5</td>
</tr>
<tr>
<td>A8</td>
<td>All others</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td><strong>Instagram Textual Content</strong></td>
<td></td>
</tr>
<tr>
<td>B1</td>
<td>Informational</td>
<td>63</td>
</tr>
<tr>
<td>B2</td>
<td>Humorous</td>
<td>73</td>
</tr>
<tr>
<td>B3</td>
<td>Call for response</td>
<td>20</td>
</tr>
<tr>
<td>B4</td>
<td>Encouragement</td>
<td>31</td>
</tr>
<tr>
<td>B5</td>
<td>Product Promotion (endorsement/ advertisement)</td>
<td>54</td>
</tr>
<tr>
<td>B6</td>
<td>Hashtags included #</td>
<td>3</td>
</tr>
<tr>
<td>B7</td>
<td>Users tagged @</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td><strong>Instagram Degree of Exposure</strong></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>Low (example: food photos tagged with the user who made the recipe)</td>
<td>133</td>
</tr>
<tr>
<td>C2</td>
<td>Medium (example: fully clothed user tagged, their personal story)</td>
<td>99</td>
</tr>
<tr>
<td>C3</td>
<td>High (example: bikini photos, transformation photos)</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td><strong>Instagram 5 Types of Social Support</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>296</td>
</tr>
<tr>
<td>D1</td>
<td>Informational</td>
<td>98</td>
</tr>
<tr>
<td>D2</td>
<td>Tangible</td>
<td>0</td>
</tr>
<tr>
<td>D3</td>
<td>Esteem</td>
<td>120</td>
</tr>
<tr>
<td>D4</td>
<td>Network</td>
<td>51</td>
</tr>
<tr>
<td>D5</td>
<td>Emotional</td>
<td>27</td>
</tr>
</tbody>
</table>

*Turner-McGrievy & Tage, 2013*
### Table 3.5

**Example of Content Posted across Platforms by the Brand Kayla Itsines BBG**

<table>
<thead>
<tr>
<th>Kayla Itsines BBG</th>
<th>Platform</th>
<th>Likes</th>
<th>Comments</th>
<th>Retweet/Shares</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Facebook</td>
<td>3.6k</td>
<td>35</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Instagram</td>
<td>54.5k</td>
<td>699</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can’t get enough of AVOCADO at the moment! I have been adding it to my lunch salad everyday. 🥒</td>
<td></td>
<td>165</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>

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### Table 3.6

**Example of Content Posted across Platforms by the Brand Jim Stoppani**

<table>
<thead>
<tr>
<th>Jim Stoppani</th>
<th>Platform</th>
<th>Likes</th>
<th>Comments</th>
<th>Retweet/Shares</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Facebook</td>
<td>314</td>
<td>23</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Instagram</td>
<td>818</td>
<td>37</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Twitter</td>
<td>34</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>
Table 3.7

Example of Content Posted across Platforms by the Brand Whole30

<table>
<thead>
<tr>
<th>Whole30</th>
<th>Platform</th>
<th>Likes</th>
<th>Comments</th>
<th>Retweet/Shares</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Facebook</td>
<td>607</td>
<td>14</td>
<td>106</td>
</tr>
<tr>
<td></td>
<td>Instagram</td>
<td>1846</td>
<td>75</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Twitter</td>
<td>29</td>
<td>N/A</td>
<td>9</td>
</tr>
</tbody>
</table>

The type of content that had the greatest amount of likes and comments across all three programs were humorous posts that had little to do with the programs.
themselves, but were instead lighthearted and found to be relatable and relevant to followers within the network. While the selfie and transformation photos elicited great amounts of engagement from the networks of all three of the programs, this category of content was second in generating the most engagement.

Figure 3.11. Content posted by the brand Whole30 (2018).

Figure 3.12. Content posted by the brand Kayla Itsines BBG (2018).
We noticed that some of the Whole30 posts that received remarkably lower amounts of engagement in the form of likes were very context-specific, an example being their post regarding the safety of completing the program while breastfeeding. This post received 412 likes but had over 190 comments, most of which were network users tagging other users who they believed would find the post relevant, giving it a 2.16:1 likes-to-comments ratio. This ratio was also not the norm, as most of the other Whole30 posts analyzed had a 20:1 or greater ratio, leading us to believe that while a context-specific post might not be widely received across the network, it may drive richer engagement (such as tagging a friend in the comments section) from a targeted group of network users.
Limitations

We were not aware of a tool that existed at the time of data collection that could download, analyze, and code the content that we aimed to record, therefore this coding was somewhat subjective and manual as screenshots were taken in order to record the content of each post that included a photo or video. One’s perception of the degree of exposure of a photo was somewhat varied, which we experienced in our initial coding, therefore all of the content was coded by 3 individuals, and when a coding scheme was in question, the majority vote was given for the assigned code, minimizing internal bias.

Some of the platforms’ features made it difficult to download historic data (Twitter), and we had no way of knowing how much of the engagement reported for each post was generated within the first 24 hours of the posting. As Facebook now owns Instagram, per recent platform changes, the algorithm for content being pushed to
one’s newsfeed gives preference to accounts frequently viewed rather than the newsfeed acting as a chronological timeline. Lastly, we couldn’t know how many people saw a post, with the exception of videos, therefore we based our engagement ratios off of recorded actions, such as likes or comments, but with the knowledge that the content ‘lurkers’ have the potential to greatly increase network activity.

Conclusion

Social media platforms offer users instant access to information and networks of like-minded peers, a benefit not often afforded for individuals who seek to complete a diet or exercise program in the traditional face-to-face (F2F) environment. We analyzed the content shared by 3 online-driven diet or exercise brands across the popular social media platforms of Facebook, Twitter, and Instagram, in order to determine the most engaging type of content posted over a 30-day period, as well as the most suitable platform to post to from the brand’s perspective. Across all 3 programs, when the same content was posted to the 3 social media platforms analyzed, the content posted to Instagram had the greatest amount of network engagement. The type of content that received the greatest amount of engagement in the form of likes and comments were humorous posts that were often lighthearted and found to be widely relatable, followed by transformation photos that highlighted a program user’s physical ‘transformation’ (usually as seen through apparent weight loss and increased muscle tone and definition) after having completed the program.

As brands must curate and tailor their content to be relevant to their intended network users, it’s important that they focus their efforts to posting content that will be
not only positively received but that encourages communication and engagement between the brand and their consumers. We would encourage diet or exercise-oriented brands to consider the visual nature of Instagram and allocate greater attention to this platform as a means for network engagement and information exchange when comparing their efforts to Facebook and Twitter.
CHAPTER 4

RESULTS

The results of these 3 studies present the phenomenon that although the majority of the participants surveyed report that they read the label before purchasing a pre-packaged item, the majority do not apply the measurements and standards to their daily consumption behaviors, which is supported by the results found in the analysis of open-ended questions regarding one’s use of such information. The majority also reported that the information contained on the label does not always influence their consumption of the item, that they find the percentages and amounts confusing or misleading, and that they do not consider brands and manufacturers of pre-packaged food and beverage items as primary sources of nutrition-related information.

The overall results support the validity noted in prior studies and literature, which emphasizes the need for knowledge and the daily application of this information within the context of food literacy. In Study 1, participants reported not always understanding the information included in the nutrition facts label, which in turn did not encourage them to track their efforts or report basing their purchases and consumption behaviors on the measures contained within the label pertaining to nutrition. The information included in the standardized nutrition facts label can only influence the consumer if they first believe that they have the ability to understand the label, and that this information should be given attention on a frequent basis, as exhibited through daily consumption tracking, rather than as a measure only taken when an individual realizes that they’re in a state of poor health and that it’s time to make a change. Standardized nutrition facts labels can
be helpful tools that may be applied if the consumer has first learned about the standards included within the label, and believes that they are in control of these efforts.

The use of technological dietary aids for tracking food and beverage consumption, specifically smartphone applications, can greatly assist individuals in their consumption awareness efforts, providing greater efficiency, accessibility, and ease of use than traditional tracking methods, as seen in Study 2. To be in control of one’s weight is not a finite behavior but rather an effort that must continuously be made, especially as one’s nutritional needs change according to one’s health at a particular point in time. Our results support that individuals who use dietary tracking aids, including manually writing down one’s consumption via a pen and paper, use of online calculators, and use of mobile applications, report greater long-term satisfaction in their ongoing weight efforts than individuals who do not implement a method for tracking their consumption. While all 3 of the mentioned efforts to track consumption provided greater satisfaction than not tracking, use of a mobile application to track consumption was linked to significantly greater satisfaction than the use of a pen and paper or online calculator.

Lastly, as seen in Study 3, the amount and type of social support that one receives in a dieting effort is considered to be one of the most important factors in an individual’s ability to stay the course of a dieting program, with many participants being drawn towards online social network sites for these communities, as these platforms offer varying degrees of anonymity and autonomy not before afforded in face-to-face accountability settings. The research results supported our original assumption that Instagram is the preferred social media platform for diet-driven brands to post their
content to when desiring to engage with their networks, versus the platforms of Facebook and Twitter, as greater network engagement was measured on Instagram when the same content was posted to all 3 sites. Across all 3 brands analyzed, content that was humorous and could be considered relevant to the majority of individuals within their Instagram networks received the greatest amount of engagement through the form of likes and comments.
CHAPTER 5
CONCLUSION, LIMITATIONS, AND FUTURE RESEARCH

The result of this dissertation is that having a working knowledge of nutrition labels, including giving attention to the measurements contained within the label as well as an understanding of the list of ingredients, and how to apply this information to one’s daily dietary choices, are paramount behaviors in having a feeling of control over one’s consumption and ultimately one’s weight efforts. Our studies do not lead us to believe that there is 1 perfect diet or a long-lost secret piece of information linked to having optimal health, but rather suggest that a combination of food-focused efforts should be taken for increased success in one’s dieting efforts.

The results of this dissertation serve as support that informal visual sources of nutrition-oriented information continue to increase in their prevalence and power over the young adult population, with many of the hundreds of study participants that we surveyed reporting that they rarely consult traditional or formal information sources when having health concerns. We cannot over emphasize the need for increased nutrition literacy, especially for young adults who show increased reliance on informal sources of nutrition-driven information, as the ability to decipher between healthful and harmful information to then be applied to one’s dietary decisions can have long-lasting effects.

We do not believe that formal and informal sources of nutrition information have to work in siloed environments, but rather urge the formal sources, such as physicians and dietitians to incorporate credible informal information sources into their patients’ health strategies, such as particular social media accounts or a specific dietary
application for recording and tracking consumption, as these are the channels and platforms that the young adult population is already familiar with using on a regular basis. We would also strongly urge informal information sources, such as the brands and owners of social media accounts that post dieting advice to be aware of the impact of the information that they choose to share, and if they do not have the scientific knowledge or credentials to be giving dieting advice, to encourage their network followers to also seek out guidance from healthcare professionals.

We are encouraged that the Food and Drug Administration is taking the initiative to update the standardized nutrition facts label format to be more realistic in its representations that reflect average consumption behaviors, as we believe that this change is long overdue. However we do not believe that this initiative alone will make a significant impact on the consumption behaviors and subsequent health of adults in the United States, as this would seem to be one of the last steps to be taken in a long list of needed efforts, with the first being to educate individuals of all ages as to the importance that food plays on one’s health, followed by learning how to read and apply the information contained within the nutrition facts label. We would also hope to see future labels that contain bilingual text, and perhaps even instructions on the package on how to decipher the label measurements, as the current labels cater to the assumption that the consumer is a native English-speaker who is already familiar with the measurement system used within the United States.

Possible imitations to this study include the sample selected for Studies 1 and 2, as all of the participants were recruited from 1 southwestern public university, therefore the results may not extend themselves based on one’s demographics, such as young
adults who are not enrolled in college coursework, or who live in a different area of the country. A limitation of Study 3, which analyzed social media content, was that there are so many popular diet brands that could have been taken into consideration for analysis, but due to time limitations and the manual nature of collecting and coding the data, only 3 brands were selected. The analysis included a comparison across the platforms of Facebook, Instagram, and Twitter, due to their publically accessible functionality and historical timelines, making data collection feasible, but there are many other currently popular social media platforms that could also be analyzed as well. Also, our goal of this research was not to only analyze individuals with weight loss efforts, but as this desire currently applies to such a great number of adults within the United States, the 3 individual studies all included themes of weight loss, which may not be extendable results to individuals who are not trying to lose weight or do not have a weight-related effort.

Future research plans for this dissertation include the publishing of results, as well as extending these analyses to further investigating the age gender disparities noted within the research, particularly regarding the differences noticed between males and females being concerned that they have a food allergy or intolerance, as this is intriguing and makes us question why females are more concerned than males, even though their actual diagnoses rate was the same, and if this is a topic of conversation that women are more comfortable discussing. The textual responses collected by study participants that reported a lack of label usage based on the belief that paying attention to food labels is only a necessary action to take if an individual is overweight, rather than as a health-promoting habit, also prompts curiosity.
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American Heart Association. (2018). *How the Heart-Check food certification program works*. Retrieved from: http://www.heart.org/HEARTORG/HealthyLiving/HealthyEating/HeartSmartShopping/Heart-Check-Mark_UCM_300133_Article.jsp#.W1dnu0tZbKA


