The Effects of a Supermarket Tour on Improvement of Nutrition Knowledge and Eating Behavior

Elizabeth Hall  
*East Tennessee State University*

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Elizabeth Hall

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The Effects of a Supermarket Tour on Improvement of Nutrition Knowledge and Eating Behavior

A thesis

presented to

the faculty of the Department of Allied-Health Sciences

East Tennessee State University

In partial fulfillment

of the requirements for the degree

Master of Science in Clinical Nutrition

by

Elizabeth L. Hall

December 2017

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Keywords: Grocery store, tour, supermarket, nutrition education, shopping tour, health education, eating behaviors, group, dietary change
ABSTRACT

The Effects of a Supermarket Tour on Improvement of Nutrition Knowledge and Eating Behavior

by

Elizabeth L. Hall

The purpose of this study was to determine if participation in a supermarket tour improves nutrition knowledge and eating behavior in adult participants. Participants were recruited in communities surrounding Food City stores, a local supermarket. Prior to completing a standardized tour, participants completed a survey to assess nutrition knowledge and eating behavior. This survey was given to participants again three months later. A program evaluation was given one time at the end of the tour. Data analysis revealed no significant findings, other than the behavior-based question: “How many meals or snacks on most days included vegetables”. Vegetable consumption appeared to decrease. All participants who completed the program evaluation reported they learned something new as a result of the tour and were satisfied with the experience. These findings suggest that nutrition education provided in supermarkets is well-received by participants, but additional research with objective measures is needed.
ACKNOWLEDGEMENTS

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Third, thank you to the Food City corporate, marketing, and Healthy Initiatives teams for supporting me in my education and professional development. Your readiness and enthusiasm to invest in health promotion and research shows your commitment to creating a culture of wellness for your associates and customers. Thank you to the store managers for graciously working with me to schedule tours in store and for supporting our programs in your communities.

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CHAPTER 1
INTRODUCTION

The prevalence of overweight and obesity in the United States (U.S.) persists as a significant public health concern. The National Health and Nutrition Examination Survey (NHANES) data revealed that 35.0% of adult men and 40.4% of adult women in the U.S. are obese\(^1\) with childhood obesity remaining at 16.9%.\(^2\) Overweight and obesity rates correspond with patterns of excessive energy intake and decreased physical activity. Current reports show that physical activity declines with age: 42% of children ages 6–11 meet recommendations, whereas only 8% of adolescents and less than 5% of adults meet recommendations.\(^3\) The typical American diet is low in vegetables, fruits, dairy, and healthy oils, exceeds recommendations for total carbohydrate and protein foods, and is high in added sugars, saturated fats, and sodium.\(^4\) Both increased calorie consumption and decreased activity factors produce a disruption in energy balance and weight gain, leading to obesity and other complications.

The U.S. Department of Agriculture (USDA) and the U.S. Department of Health and Human Services (USDHHS) publishes the Dietary Guidelines for Americans every five years, most recently in 2015.\(^5\) While the goal is to provide specific nutrition recommendations for health promotion and disease prevention, the 2015-2020 Dietary Guidelines focus on eating patterns as a whole and how food and beverage choices over time can impact health. Key recommendations include balancing energy intake with energy expenditure, eating more beneficial nutrients from fruits, vegetables, whole grains, lean protein, and low-fat dairy, and limiting saturated and trans fats, added sugars, and sodium.\(^5\)

According to the NHANES survey, Americans’ eating patterns are not meeting the 2015-2020 Dietary Guidelines recommendations, specifically due to decreased intake of beneficial
nutrients and increased intake of harmful nutrients that should be limited. Dietary intakes also provide excess calories correlating with overweight and obesity. The USDA assessed the healthfulness of consumers’ grocery purchases and found that most consumers purchase less than desirable amounts of fruits, vegetables, and whole grains, while purchasing excess refined grains, fats, and added sugars. Grocery purchases vary based on demographic region, income, and ethnicity, but all subgroups in this study fell short of meeting the 2015-2020 Dietary Guidelines. Individuals in the Midwest and South, specifically, were more likely to make less than optimal purchasing decisions. McGee et al. studied the association between perceptions, behaviors, and ability to purchase healthful food in the Lower Mississippi Delta (LMD) by comparing surveys completed by food retailers with results from focus groups of consumers. They found that limited availability and perceived costs of healthful food in the LMD influenced purchasing behaviors. These findings suggest that attitudes and perceptions should be incorporated into intervention development to improve food choices in conjunction with increasing the availability of healthful food in this region.

Food retailers and healthcare providers are increasingly using supermarkets as an avenue for nutrition education to improve knowledge and/or alter food selection behaviors. The Food Marketing Institute (FMI) surveyed FMI members to provide a 2015 report on how food retailers are contributing to the health of customers. FMI found that 96% of retailers report that their companies are committed to expanding health and wellness programs in their stores. These findings suggest that the cross section of retail and healthcare is fertile ground for both community service and business growth. In a review of current literature, Gittelsohn, Rowan, and Gadhoke identified small-store interventions to determine their impact. They found that common store intervention strategies included increasing the availability of healthier foods,
particularly produce, point-of-purchase promotions such as shelf labels and posters, and community engagement. The researchers found that sales of healthy foods were improved when these foods were readily available and when interventions to improve consumer knowledge and dietary behaviors were utilized. This suggests that store interventions appear to be more successful when linked both to the availability of healthy foods and health communications designed to increase demand and consumption.\(^9\) Price-lowering modifications on healthier foods can directly increase purchases as well and could hold promise as a means to improve population diets.\(^10,\)\(^11\)

In FMI’s 2015 report on U.S. grocery shopper trends, virtually all retailers surveyed offered store tours and 85% of these tours were conducted by registered dietitians (RDs) on staff.\(^8,\)\(^12\) Partnerships between healthcare organizations and retailers can help dietitians reach wider audiences and deliver cost-effective nutrition programs.\(^12,\)\(^13\) Researchers have found that supermarket tours are growing in popularity as an avenue for nutrition education and may result in positive outcomes, but more research is needed to show whether these outcomes persist for longer than three months after the tour and whether there are common attributes of effective supermarket tours.\(^14,\)\(^15,\)\(^16,\)\(^17\) Most consumers report that supermarket tours would influence them to make appropriate dietary and lifestyle changes.\(^17\) Such tours can improve knowledge, attitudes, self-efficacy, intent to change, and actual food purchasing behaviors of participants.\(^18\) For this reason, the purpose of this study is to determine if participation in a supermarket tour leads to improvement in nutrition knowledge and self-reported eating behavior among adult participants three months following the tour.
CHAPTER 2
REVIEW OF LITERATURE

Epidemic of Overweight and Obesity

Overweight and Obesity: Prevalence in U.S. and Tennessee

The prevalence of overweight and obesity continues to rise in the U.S. and is highest in the Midwest and South. Body mass index (BMI), a general measure of body fatness from the individual’s weight and height, is often used to categorize disease risk.\textsuperscript{19} The BMI formula and categories are outlined in Table 1.

Table 1. Classification of Overweight and Obesity by BMI\textsuperscript{19,20}

<table>
<thead>
<tr>
<th>Category</th>
<th>BMI (kg/m\textsuperscript{2})</th>
<th>Obesity Class</th>
</tr>
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<tr>
<td>Underweight</td>
<td>&lt;18.5</td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>18.5 – 24.9</td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>25.0 – 29.9</td>
<td></td>
</tr>
<tr>
<td>Obesity</td>
<td>30.0 – 34.9</td>
<td>Class I</td>
</tr>
<tr>
<td></td>
<td>35.0 – 39.9</td>
<td>Class II</td>
</tr>
<tr>
<td>Extreme Obesity</td>
<td>40.0 +</td>
<td>Class III</td>
</tr>
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Formula: Weight (kg) / [Height (m)]\textsuperscript{2}

Significant increases in obesity prevalence began to show in NHANES data taken between 1988-1994; prior to 1988, there was little change since 1960.\textsuperscript{21,22} The prevalence continued to rise between 1999-2000 in men and women of all age groups.\textsuperscript{23} Obesity continued to increase for men in 2001-2004, but remained stable for women.\textsuperscript{24,25} Prevalence did not change significantly until 2005 through 2014\textsuperscript{26}, when data showed a significant increase in the overall obesity and Class III Obesity prevalence for women.\textsuperscript{1} Current age-adjusted prevalence of obesity in the U.S. is 37.7\% of adults with 7.7\% in the Class III Obesity category.\textsuperscript{1} Individuals in the Midwest and South tend to purchase less healthier foods and also show higher rates of obesity.
with Tennessee falling in 9th place for the highest obesity rate among states at a prevalence of 33.8% obesity and 68.7% overweight and obesity among adults.6,27

**Overweight and Obesity: Healthcare Costs, Morbidity, and Mortality**

The high percentage of obese individuals in the U.S. affects overall population health and healthcare costs as obesity increases risk for multiple chronic diseases such as heart disease, diabetes, and some types of cancer.28,29 Obese adults are at increased risk for overall mortality as well with a 20% higher risk for all-cause death or death related to cardiovascular disease.30,31,32,33,34,35 This increase in mortality risk advances death by 3.7 years for adults with Class II and Class III Obesity for all-cause death and 1.6 to 5.0 years for adults with Class I to Class III Obesity for deaths related to cardiovascular disease.30 The sustainability of the U.S. healthcare system is also of concern, as obese individuals spend more money on pharmaceuticals and related care.28,36 Therefore, obesity prevention strategies are of utmost importance.

**Overweight and Obesity: Treatment and Prevention Strategies**

Obesity prevention involves multiple factors relating to food intake and energy expenditure through physical activity.37 Most of these strategies address avoiding weight gain or maintaining weight loss of as little as 3% to 5% body weight which can benefit health and decrease risk of disease.28,37 Additional weight loss of 5% to 10% in six months provides further benefits including a protective cardiovascular effect and decreased need for medication management.28 Improving overall eating patterns provides vast implications for the prevention and treatment of obesity, but is complex as food intake is influenced by both internal and external factors.37,38,39 Multiple internal or biological factors are involved in food consumption such as the gut microbiome and neural and hormonal influences,38,39,40,41 but external factors are also of concern including environmental variables such as food availability and variety as well as
an individual’s knowledge of energy needs and portion size.\textsuperscript{37,39} Changing these environmental impacts can involve many approaches, but typically involve behavior change strategies, including nutrition education.\textsuperscript{37} Nutrition counseling is often provided in a hospital or other healthcare setting outside of the individual’s daily environment. The introduction of nutrition education in community based initiatives\textsuperscript{37}, such as a supermarket tour, may have a positive impact on purchasing patterns and improvement in nutrition knowledge and eating behavior.\textsuperscript{13,14,16,18}

\textit{2015-2020 Dietary Guidelines for Americans}

The Dietary Guidelines for Americans is jointly published every 5 years by the USDHHS and the U.S. Department of Agriculture (USDA) and contain a report on nutrition and dietary information and guidelines for the public.\textsuperscript{5} A key focus of the most recent 2015-2020 Dietary Guidelines is overall eating pattern and its impact on health and chronic disease. There are 5 overarching guidelines that support the goal of a non-rigid healthy eating pattern while recognizing that most individuals will need to make changes in order to meet them. The 5 guidelines include: (1) Follow a healthy eating pattern across the lifespan, (2) Focus on variety, nutrient density, and amount, (3) Limit calories from added sugars and saturated fats and reduce sodium intake, (4) Shift to healthier food and beverage choices, and (5) Support healthy eating patterns for all.\textsuperscript{5}

From these 5 guidelines, the 2015-2020 Dietary Guidelines for Americans also includes several key recommendations to help individuals shift to healthier eating patterns by eating more beneficial nutrients and less harmful nutrients.\textsuperscript{5} Key recommendations are to consume all foods and beverages in moderation according to the appropriate energy level. The recommendations also suggest eating:
A variety of vegetables from all of the subgroups—dark green, red and orange, legumes (beans and peas), starchy, and other; fruits, especially whole fruits; grains, at least half of which are whole grains, fat-free or low-fat dairy, including milk, yogurt, cheese, and/or fortified soy beverages; a variety of protein foods, including seafood, lean meats and poultry, eggs, legumes (beans and peas), and nuts, seeds, and soy products; and oils. Saturated and trans fats, added sugars, and sodium, on the other hand, should be limited, and in the case of trans fats, avoided entirely. Specific recommendations are given for these nutrients as they are of particular concern in the U.S. Individuals should consume less than 10% of total calories from added sugars, less than 10% of total calories from saturated fats, and less than 2300 milligrams (mg) of sodium per day. Alcohol intake is addressed as well and moderate intake is described as up to one drink per day for women and up to two drinks per day for men.

MyPlate: Building a Healthy Eating Style

MyPlate, the infographic replacing the Food Guide Pyramid, was released by the USDA in 2011 with a focus on “building a healthy eating style.” The MyPlate campaign compliments the USDA Dietary Guidelines by providing a visual reminder to plan meals focusing on “variety, amount, and nutrition.” Key themes of the Dietary Guidelines are consistently promoted by the MyPlate initiative such as the limitation of foods and beverages with saturated fat, sodium, and added sugars. Lastly, the importance of making small changes to build an overall healthy eating pattern is emphasized as well as supporting healthy eating on a larger scale through community-based efforts. The MyPlate “small starts” recommendations highlight the different sections of the plate. These recommendations include making half of the plate fruits and vegetables, making a quarter of the plate grains at least half of which are whole grains, making a quarter of the plate a variety of lean proteins, and switching to low-fat and fat-
free dairy. This initiative is meant to help consumers estimate portion sizes based on a 9-inch plate in a clear and basic way. The MyPlate graphic can be seen in Figure 1.

**Figure 1.** MyPlate Graphic. Reprinted according to USDA guidelines at ChooseMyPlate.gov

**MyPlate: Fruits and Vegetables Recommendations and Current Intakes**

MyPlate recommendations include making half of the plate fruits and vegetables at meals. One fruit serving includes 1 cup of fresh, canned, frozen, or dried fruit, 1 cup of 100% fruit juice, or ½ cup dried fruit. For adults, the total amount of fruit recommended per day varies from 1 ½ to 2 cups. Vegetables are organized into subgroups of dark-green vegetables, starchy vegetables, red and orange vegetables, beans and peas, and other vegetables. In general, one serving of vegetables includes 1 cup of raw or cooked vegetables, 1 cup of vegetable juice, or 2 cups of raw leafy greens. The total recommended amount of vegetables per day ranges from 3 ½ to 5 cups for adults. Overall, fruit and vegetable consumption is less than recommended in the U.S. with only 32.4% of adults consuming fruit at least two times per day and only 26.3% consuming vegetables at least three times per day. In Tennessee, only 30.6% and 24.3% of adults reported eating at least two servings of fruit per day and at least three servings of vegetables per day, respectively. Adequate fruit and vegetable consumption can help increase
satiety at meals, and reduce total energy density and overall intake, which may assist with weight management and promote overall health.\textsuperscript{48,49}

**MyPlate: Protein Recommendations and Current Intakes**

The MyPlate protein foods section includes meats, poultry, seafood, beans and peas, eggs, soy products, nuts, and seeds.\textsuperscript{50} Of the 5 to 6 ½ ounces needed daily for most adults, it is recommended that lean and low-fat protein choices are chosen more often with at least 8 ounces of seafood each week. Generally, one serving of protein is equivalent to 1 ounce of meat, poultry or fish, ¼ cup cooked beans, 1 egg, 1 tablespoon of nut butter, or ½ ounce of nuts or seeds. Utilizing preparation methods that do not add fat and sodium should also be considered.\textsuperscript{50} The amino acids from protein form the building blocks for bones, muscles, cartilage, skin, and blood as well as enzymes, hormones, and vitamins.\textsuperscript{51} Proteins also provide B vitamins, vitamin E, iron, zinc, and magnesium as well as energy.\textsuperscript{51} Data suggests that more than half of Americans exceed total daily protein needs.\textsuperscript{5}

**MyPlate: Dairy Recommendations and Current Intakes**

Dairy is served on the side of the MyPlate graphic and includes fat-free or low-fat milk, yogurt, and cheese.\textsuperscript{52} Foods such as cream cheese, cream, and butter are made from milk, but do not retain high amounts of calcium, therefore, are not considered appropriate for the dairy group. For most adults, 3 cups of dairy are recommended per day. One serving of dairy includes 1 cup of milk, yogurt, or milk alternative such as soymilk, 1 ½ ounces of natural cheese, or 2 ounces of processed cheese.\textsuperscript{52} In the United States, 67.4 to 88.8\% of children and 99.0 to 99.6\% of adults consume less than the recommended 2.5 to 3 servings of dairy per day.\textsuperscript{53} This can result in under-consumption of calcium, vitamin D, potassium and other micronutrients which could have
an impact on overall health.\textsuperscript{53} Dairy, especially yogurt, may also play a role in the prevention of Type 2 diabetes.\textsuperscript{54}

\textbf{MyPlate: Grains Recommendations and Current Intakes}

The grains section covers one fourth of the MyPlate graphic and includes foods made from wheat, rice, oats, corn, barley, or other cereal grains.\textsuperscript{55} Food sources of grains include bread, pasta, oatmeal, breakfast cereals, and tortillas and these sources can be further divided in two subgroups of whole grains and refined grains. For additional fiber, iron, and B vitamins, the recommendation is that at least half of grain servings come from whole grains, which are made from the entire grain kernel. Refined grains are further processed to remove the bran and the germ sections of the grain which lengthens shelf life but removes beneficial nutrients. The latter are often enriched with B vitamins, but fiber is not added back into the product. Adults should consume approximately 3 to 4 ounces of grains per day. Serving sizes vary, but typically 1 slice of bread, 1 cup of ready-to-eat cereal, or ½ cup of rice, pasta, or cooked cereal is considered 1 ounce or 1 serving.\textsuperscript{55} Adult consumption of whole grains has improved from 0.72 ounce equivalents per day in 2001 to 0.97 ounce equivalents per day in 2012, but total intake is still much less than recommended.\textsuperscript{6,56} Whole grain consumption is correlated with better nutrient intakes overall and healthier body weights among adults.\textsuperscript{56}

\textbf{MyPlate: Fats and Oils Recommendations and Current Intakes}

Fats and oils, while not considered a food group, are still included in the MyPlate campaign even though they are absent on the actual infographic.\textsuperscript{57} Oils are unsaturated fatty acids that are liquid at room temperature. They are found in plants and fish, and do not contain cholesterol. Saturated fats are solid at room temperature, are found primarily in animal sources, and contain cholesterol.\textsuperscript{57} The 2015-2020 Dietary Guidelines recommend no more than 10\% of
total calories from saturated fat.\textsuperscript{5} \textit{Trans} fats, or partially hydrogenated oils, are a type of unsaturated fat that have been artificially manufactured and are commonly found in processed foods such as margarine and baked goods. This type of fat is associated with increased risk of heart disease.\textsuperscript{57,58} Researchers conducting an epidemiological modeling study predicted that a total ban of \textit{trans} fatty acids could prevent 7,200 deaths from coronary heart disease in 2015-2020 and would contribute to healthcare cost savings of about $415 million.\textsuperscript{59} The typical American diet is excessive in fats, typically from animal-based sources.\textsuperscript{4,5,6}

\textbf{The Nutrition Facts Panel}

The Nutrition Facts Panel (NFP) and ingredient list can be used to further determine nutrient content of foods, especially sodium, added sugars, and \textit{trans} fatty acid content.\textsuperscript{50,57} The US National Labeling and Education Act of 1990 required that all packaged food contain a standardized nutrition label with information on the product’s serving size, servings per container, and amount of calories and other nutrients.\textsuperscript{60} While the NFP was developed to help consumers choose more nutritious foods, evidence suggests that the NFP’s complexity may produce less beneficial results than originally assumed and may not change purchasing behaviors of consumers who view the NFP.\textsuperscript{61,62}

\textbf{Nutrition Facts Panel: Sodium}

Sodium intake continues to rise in the U.S. with the increased consumption of processed and restaurant foods.\textsuperscript{4,5} The Dietary Approaches to Stop Hypertension (DASH) diet calls for dietary interventions including a reduction of sodium intake to levels below 2300 milligrams (mg) per day, which helps to lower blood pressure.\textsuperscript{49} The 2015-2020 Dietary Guidelines mirror the DASH recommendations of less than 2300 mg of sodium per day,\textsuperscript{5} while the American Heart Association (AHA) recommends less than 1500 mg of sodium per day.\textsuperscript{63} The NFP can be used to
identify high sodium foods such as processed meats, cheeses, and frozen and canned foods. Products with less than 140 mg are considered to be “low-sodium” while “reduced sodium” products must contain at least 25% less sodium than the original product. In 2011, the Food and Drug Administration (FDA) began a campaign to reduce sodium content in foods by issuing voluntary guidelines for sodium content of processed and restaurant foods in order to help food manufacturing companies gradually adjust to changes of sodium in foods. The typical American diet contains greater than 3400 mg of sodium, far exceeding the guidelines. Only 11% of U.S. adults actually meet sodium recommendations.

**Nutrition Facts Panel: Added Sugars**

Added sugars should be limited to less than 10% of total calories as recommended by the 2015-2020 Dietary Guidelines. The FDA proposed the addition of added sugars as a designation on the NFP, which could help consumers compare products while shopping. Whether or not this information will change purchasing patterns is unclear. Inclusion of added sugars, while informative, may confuse consumers. Laquatra et al. examined consumer knowledge, perception and use of the NFP (Figure 2). When asked whether the grams of added sugars were “included in” the grams of total sugars shown or “in addition to” the grams of total sugars shown, 52% who viewed the new NFP said the added sugars grams were “in addition to” the grams of total sugars shown, which caused them to overestimate the total grams of sugars in the product. Although the Institute of Medicine (IOM) has not set a Tolerable Upper Intake Level (UL) for added sugars, this dietary component is typically consumed in excess particularly due to sugary beverages and processed foods.
The 2015-2020 Dietary Guidelines recommends limiting saturated and trans fats, although it does not give a specific recommendation for trans fats as it does for saturated fats.\(^5\)

The FDA first proposed a change in NFP labeling in regards to trans fats in 1999 which also regulated the use of voluntary “trans fat free” (TFF) claims on products.\(^6,7\) In 2003, the FDA issued a final rule that took effect in 2006 mandating that the NFP include a separate line designating trans fats and withdrew its previous proposal for voluntary TFF claims.\(^6,8\)\(^9\) The FDA addressed trans fats again in 2015, mandating that partially hydrogenated oils, primarily found in trans fats in processed foods, be removed from all products by 2018.\(^70\) It has been estimated that this total ban of trans fats can have significant implications for overall health and prevented mortality, especially in regards to cardiovascular disease.\(^58,59,70\)

**Ingredient Lists**

The ingredient list is typically located below the NFP near the food manufacturer’s brand or name and is also regulated by the FDA.\(^71\) The ingredient list shows the common or usual name
of ingredients found in a food product and is arranged in descending order by weight. In other words, the ingredient that makes up most of the product will be the first ingredient listed.\textsuperscript{71} The ingredient list can be a valuable tool for consumers interested in limiting nutrients such as \textit{trans} fats or partially hydrogenated oils and added sugars and increasing beneficial nutrients such as whole grains.\textsuperscript{5,50,55,71}

\textbf{Theory of Planned Behavior}

\textbf{Theory of Planned Behavior: Theoretical Framework}

In order to prompt the American public to make the shifts needed to achieve eating patterns that better align with the 2015-2020 Dietary Guidelines\textsuperscript{5}, a theoretical basis for intervention strategies should be considered.\textsuperscript{72} One theory proposed, specifically in regards to supermarket tours, is the Theory of Planned Behavior (TPB).\textsuperscript{14,18} This theory, also called the Theory of Reasoned Action, was first hypothesized in 1967 and later modified in 1980 by Fishbein and Ajzen.\textsuperscript{73,74} They suggested that changed behavior is the result of changing beliefs. Individuals exposed to information that will change their beliefs will most likely change their behavior.\textsuperscript{75} According to the TPB, consumers make decisions about their behavior by “identifying, measuring, and combining beliefs” that are relevant to themselves or to a group of which they are a part.\textsuperscript{76} Use of the TPB in nutrition education proposes that attitudes and subjective norms link intentional behaviors to behavioral and normative beliefs.\textsuperscript{77,78,79} In other words, a person’s intention to perform a behavior provides the largest influence on behavior.\textsuperscript{74} Attitudes, which are defined as “positive or negative evaluation of the behavior”, subjective norms defined as the “perceived social pressure to perform the behavior”, and perception of behavioral control defined as “perceived control over performing the behavior”, influence intentions and have a direct effect on behavior.\textsuperscript{74,76,80} The TPB is outlined in Figure 3.
Figure 3. Theory of Planned Behavior

Theory of Planned Behavior: Implications for Health-Related Behaviors

Although the TPB has been used for behavior change, especially in regards to health-related outcomes, additional research and consideration of complimentary theories is needed. Criticism of the adequacy of the theory to predict health-related behaviors include the model being too static and not taking cognitions, behavioral conditioning and emotional influences into account. Another criticism is that the TPB is only effective for certain types of behavior change, but not as effective for others. Several researchers suggested that the TPB is beneficial, specifically related to long-term food and beverage intake, and in clinical practice areas. The Smart Shoppers Tour conducted in 1995-1996 is one of the only supermarket tour studies to mention a theoretical framework. The TPB was used in the design of the Smart Shoppers Tour to address the participants’ attitudes and knowledge of healthier foods and thereby influence their intent to purchase healthier foods, ultimately changing purchasing behavior and patterns.
Supermarkets as Healthcare Destinations

Supermarkets serve as fertile ground for nutrition education and partnerships with healthcare organizations. The Food Marketing Institute (FMI) is an organization that advocates for its members in the food retail industry “through programs in public affairs, food safety, research, education, and industry relations”. FMI conducts research on shopping patterns and trends. The retail environment allows for a frequent consumer touch point, with customers averaging 1.6 trips to the grocery store per week. The CDC reports that Americans average 300.8 visits to a physician’s office per 100 persons per year, or about 3 visits per person per year. With Americans frequenting supermarkets far more than physician’s offices, the retail space is a practical and convenient arena to reach consumers with nutrition messaging in the same environment where food decisions are made.

Many supermarkets are already developing programs to meet the health and nutrition needs of their customers. The 2015 Report on Contributions to Health and Wellness included data on how FMI members contributed to the health of customers. Ninety-six percent of retailers reported that their companies are committed to expanding health and wellness programs in their stores. Among other interventions, virtually all retailers surveyed offered store tours and 85% of these tours were conducted by registered dietitians (RDs) on staff. Considering Americans spent 5.5% of their disposable income on food to be prepared at home in 2014 and 64.9% of this expenditure was at supermarkets, these findings suggest that the intersection of retail and healthcare has a potential benefit for both public health concerns and business growth.

In a review of two FMI reports in 2007, Aase found several implications for supermarket trends in a variety of RD practice areas. RDs have the opportunity to act as consumer affairs and marketing specialists, author store nutrition and food safety policies and programs, develop
products, recipes, meal solutions, and newsletters, answer customer questions via hotline or e-mail, work with pharmacists to roll out health programs, and coordinate store tours, tastings, cooking classes, and health fairs. These activities suggest that there are opportunities for RDs to play a role in supermarket trends in the retail space and through partnerships with healthcare organizations and community groups.12

Supermarkets as Healthcare Destinations: Intervention Strategies

In a review of current literature in 2012, Gittelsohn, Rowan, and Gadhoke identified grocery store interventions in order to determine their impact on consumer health and wellness.9 They found that common store intervention strategies included increasing the availability of healthier foods, particularly produce, point-of-purchase promotions including shelf labels and posters, and community engagement. Less common strategies included business training and nutrition education. The researchers also found significant effects for increased availability of healthy foods, improved sales of healthy foods, and improved consumer knowledge and dietary behaviors. This suggests that store interventions appear to be linked to the increased provision of both healthy foods (supply) and health communications designed to increase consumption (demand).9

As previously mentioned, strategies to improve healthful purchases among consumers have often included price reductions.10,11 In 2015, Ball, McNaughton, and Le, et al. studied female primary shoppers in four intervention groups: a price-reduction group receiving a 20% discount on target items, a skills-based group receiving health education newsletters and access to an online support form to assist with behavior change; a price-reduction-plus-skills-based group who received both interventions; and a control group who did not receive an intervention.11 They found that price reduction–alone and price reduction–plus–skill-building
participants purchased more fruit than did controls. Relative to controls, in the price-reduction group, total vegetable consumption increased by 233 grams (gm) per week (3.1 servings or 15% more than at baseline), and fruit purchases increased by 364 gm per week (2.4 servings; 35% more than at baseline). Increases were not maintained 6 months after the intervention. Price reduction–alone participants showed a tendency for a slight increase in fruit consumption ($P = 0.09$) that was maintained longer-term ($P = 0.014$). These findings suggest that price-lowering modifications may directly increase produce purchases.\textsuperscript{11}

This supported Mhurchu, Blakely, Jiang, Eyles, and Rodgers’ study in 2010 of participants in one of four intervention groups: a group with price discounts on healthier foods, a group with tailored nutrition education promoting the purchase of healthier foods, a combination group with price discounts and tailored nutrition education and a control group.\textsuperscript{10} At six months, they found that more individuals (20.02\%) in the price discount groups purchased healthier foods with lower saturated fat content than individuals in groups with no discount on healthier foods. Likewise, more individuals receiving tailored nutrition education (20.09\%) purchased healthier foods than individuals with no education. However, those who received price discounts bought significantly more predefined healthier foods overall at six months (11\% more; mean difference: 0.79 kilograms (kg) per week) and twelve months (5\% more; mean difference: 0.38 kg per week) than individuals in other groups. Therefore, tailored nutrition education did not significantly affect nutrients purchased, but the significant and sustained effect of discounts on food purchases suggests that pricing strategies hold promise as a means to improve population diets, especially in combination with nutrition education.\textsuperscript{10}

**Supermarkets as Healthcare Destinations: Supermarket Tours**

One area of particular interest in the interplay between retail supermarkets and nutrition
education by RDs is the supermarket tour, as it addresses the disconnect between provided education in clinical settings and performance of the actual behavior in the individual’s daily environment. In 2011, McGee, Johnson, and Yadrick, et al. studied the agreement between perceptions, behaviors, and ability to purchase healthful food in the Lower Mississippi Delta (LMD) by comparing surveys completed by retailers with focus groups of consumers. They found that limited availability and perceived costs of healthful food influenced purchasing behaviors, even though the food stores survey showed that a majority (> 85%) of supermarkets had selected vegetables, breads, and cereals perceived as healthful. This suggests that attitudes and perceptions should be incorporated into intervention development to improve food choices. A supermarket tour could address attitudes and perceptions by providing education in the actual environment where individuals make most of their choices about food.

Carson and Hedl studied pre- and post- tour knowledge and attitudes as well as skill, subjective norms, self-efficacy, intent to purchase healthier foods, and healthful purchasing behaviors of participants. They found that when pre- and post-tour data were compared, knowledge and skill increased, attitudes regarding purchasing healthy foods on a limited income improved, and intent to purchase healthy foods increased. Self-reports and a home food inventory implied improved food purchasing. This suggests effective supermarket nutrition tours may result in improvements in tour participants’ knowledge, attitudes, self-efficacy, intent to change, and actual food purchasing behaviors.

In 2007, Baic and Thompson provided eight store tours for participants interested in heart health and surveyed the participants for post-tour satisfaction and self-reported changes in nutrition knowledge. They also evaluated a subgroup of participants one month after the tour to assess long-term satisfaction and knowledge improvement. They found that 98% of store tour
participants reported finding the tour very interesting, 2% found it fairly interesting, 75% felt they had learned a lot of new information, and 25% felt that they had learned something. The one-month follow-up revealed that 80% felt it was easier to follow a healthy diet after the tour and emphasized that both the written resource and meeting other people on the tour were very useful. This study suggests that supermarket tours may be a popular, cost-effective, and efficient nutrition education intervention for clients interested in heart health.\(^\text{16}\)

In the Hunting for Whole Grains tour, Lafferty, Marquart, and Reicks studied groups of students and students with parents to determine improved ability to choose whole grains and increased knowledge of whole grain products after a supermarket tour.\(^\text{97}\) They found that students had higher knowledge scores after the store tour compared to before regarding whole-grain and refined-grain terms (\(P < .005\)) and areas in a store where whole-grain products could be found (\(P < .004\)). Parents also improved their ability to identify whole-grain foods (\(P < .003\)) and had a greater intention to purchase whole-grain foods their child requested. They also indicated a greater likelihood of being able to find whole-grain foods that their family liked. This suggests that supermarket tours may be a valuable educational method to help adults and children practice identifying and selecting whole-grain foods in the context where purchasing decisions were made.\(^\text{97}\)

The Kids Shop Smart Tour (KSST), a grocery store tour initiative in Canada, was evaluated by Smith and Kalina in 2004 to determine the effectiveness of the program in changing children’s attitudes toward trying and eating new foods and recognition of the four food groups found in Canada’s Food Guide to Healthy Eating (CFGHE).\(^\text{13}\) The quantitative data did not reflect that the store tour program increased the children’s willingness to try new foods or eat a variety of food; however, qualitative data revealed that children may be more willing to try new
foods and have greater knowledge and interest in the CFGHE. Of the teacher’s surveyed, 97% reported that the program helped them meet curriculum requirements and 95% would recommend it to other teachers. This suggests that targeting children with programs to promote healthy eating habits for life may be a worthwhile endeavor for both students and teachers. These types of programs can also help RDs move beyond conventional modes of education and health promotion to reach wider audiences and deliver cost-effective nutrition programs in the supermarket environment.13

Supermarket tours may be a beneficial form of nutrition education for clinical practitioners as well.98 In 2003, Kahn, O’Sullivan, and Vannatta studied groups of medical students attending a live grocery store tour, a virtual tour in a single 2-hour session, and a virtual tour in 30-minute sessions for 4 days. They found that, for the entire sample, students knew 3.7 (SD=1.4) nutrition items at baseline, which increased modestly to 4.4 (SD=1.4) after the store tour program. Students were initially confident (Mean=3.7, SD=0.6) and enthusiastic (mean=4.0, SD=0.6) and sustained those levels post intervention (confidence: Mean=4.2, SD=.5; enthusiasm: Mean=4.2, SD=0.6). The live tour had the strongest endorsement with 82% of students in the live group giving it the highest ranking. This suggests that a virtual supermarket tour is effective at improving knowledge, engaging, and providing information that students may use for themselves and their patients; single-session live teaching is most well received.98

While studies show that supermarket tours tend to be positively received by consumers and produce beneficial outcomes, additional research is needed in order to determine degree and long-term influence of these improvements in behavior change. In 2003, Sadler, Fine, Richards, and Read studied subjective and objective changes in knowledge and purchase patterns of consumers participating in a grocery store tour.17 They found that almost all the consumers
(99%) reported that a grocery store tour would be instrumental, at least to some degree, in influencing them to make appropriate dietary and lifestyle changes. These data were subjective, and as they were collected immediately after the tour, undoubtedly included a strong element of optimistic bias, reflecting enthusiastic expectations for making dietary and lifestyle changes. These findings suggest that a more comprehensive pre-tour evaluation should be used to assess current attitudes towards diet changes and follow-up evaluations should be provided over a longer time-scale.¹⁷

A literature review conducted by Escaron, Meinen, Nitzke, and Martinez-Donate in 2013 attempted to synthesize the evidence on supermarket interventions to promote healthful food choices, including store tours.¹⁵ The researchers found 33 interventions in 58 articles in which 7 strategies were used alone or in combinations. The most frequently used strategy was a combination of point-of-purchase and promotion and advertising. Three approaches showed sufficient evidence, 4 showed insufficient evidence, and none showed strong evidence, suggesting that more rigorous testing of interventions aimed at improving food and beverage choices in food stores, including their effect on diet and health outcomes is needed.¹⁵

In regards to supermarket tours specifically, Nikolaus, Muzaffar, and Nickols-Richardson conducted a review of literature published between January 1984 and April 2015 to evaluate evidence of grocery store tours as effective nutrition education programs.¹⁴ They found that grocery store tours are increasingly used as an avenue for nutrition education to improve knowledge and/or alter food selection behaviors and may result in positive outcomes, but it is unknown whether these outcomes persist for longer than three months after the tour and whether there are common attributes of effective grocery store tours. For this reason, findings suggests that more rigorous studies with uniform methodology in study design and outcome measures are
needed to confirm the effectiveness of supermarket tours.\textsuperscript{14}

Therefore, the purpose of this research is to compliment the limited body of literature regarding the longer-term effectiveness of supermarket tours as a method of nutrition education among adults. The objective of this study was to determine if participation in a supermarket tour improves nutrition knowledge and initiate self-reported changes in eating behavior in adult participants three months after tour completion.
CHAPTER 3

METHODS

Study Design

Participants were recruited in the communities surrounding Food City stores. Food City is a mid-size supermarket chain with approximately 134 store locations in Tennessee, Virginia, Kentucky, and northern Georgia. Food City has an established Healthy Initiatives program which provides a convenient arena for reaching customers through health and wellness efforts. In this mixed-methods study, participants completed a survey prior to the standardized supermarket tour to assess current nutrition knowledge and eating behavior patterns (Appendix A). The same survey was given to participants three months after the tour to gauge retention of nutrition knowledge and actual changes made to eating behavior (Appendix B). An evaluation survey measuring satisfaction with the tour was given one time at the end of the supermarket tour (Appendix C). Data was collected from the pre- and post-surveys and program evaluations.

Supermarket Tour Description

The Food City Registered Dietitian (RD), who is also the principal investigator of this research study, conducted the supermarket tour, which followed a standardized process according to educational objectives. The Food City RD began the tour with a short 10 to 15 minute introduction including housekeeping and tour logistics as well as a brief overview of MyPlate. The group then followed the RD to the following sections of the supermarket: produce department, meat department, dairy case, bread aisle, baking aisle (to discuss fats and oils), the snack foods aisle, and the frozen foods aisle. As store layouts vary, the order of sections visited depended on the layout of the host store. Topics covered in each section of the store tour can be found in Appendix D. Educational objectives for the store tour included the following:
1. Participants will be able to plan balanced meals according to MyPlate recommendations.

2. Participants will identify healthier options and recommended foods from each food group and section of the supermarket.

Participants also received a handout highlighting important information covered during the tour. Door prizes and coupon incentives were provided as well when available. In order to encourage completion of the post-tour surveys three months after the tour, participants who completed the survey received a coupon for five dollars off their next grocery purchase at Food City.

**Study Population**

Participants were recruited through marketing initiatives such as in-store signage, posters, and bag stuffers and online promotion via website and social media. Posters and/or flyers were also distributed at various community organizations and the campus of East Tennessee State University (ETSU).

**Inclusion/Exclusion Criteria**

Supermarket tour participants were male and female and met the following inclusion criteria: (1) 18 years of age or older, and (2) able to read and speak English. Exclusion criteria include (1) less than 18 years of age, and (2) unable to read or speak English.

**Research Questions**

RQ1: After participating in a supermarket tour, will there be improvement in participants’ nutrition knowledge?

1) After three months, participants will be able to plan a balanced meal using MyPlate and the following recommendations:

   a. Choose a variety of fruits and vegetables that fill half the plate.
b. Choose lower fat protein sources such as fish, chicken, and lean meats.

c. Choose low-fat dairy such as 1% or skim milk, low-fat milk alternatives, and low-fat or fat-free yogurt.

d. Make half of grains consumed whole grains.

e. Understand the difference between using unsaturated fats versus saturated and trans fats in food preparation.

RQ2: After participating in a supermarket tour, will there be improvement in participants’ eating behavior as measured via self-report?

1) After three months, participants will have consumed balanced meals based on MyPlate and the following recommendations:

a. Increased amount and variety of fruits and vegetables.

b. Chose more lean protein sources.

c. Chose lower fat dairy products.

d. Consumed more whole grains.

e. Prepared foods with unsaturated fats instead of saturated or trans fats.

Institutional Review Board

Institutional Review Board (IRB) approval was obtained for this study from the ETSU Office for the Protection of Human Research Subjects IRB.

Variable Selection

The pre-tour survey included demographic information (age, gender, socioeconomic status, ethnicity), self-reported height and weight and current health status, grocery shopping patterns, and interest in nutrition topics and health promotion. The pre-tour survey also included questions to assess current nutrition knowledge and eating behaviors. The same nutrition
knowledge and behavioral questions were included on the post-tour survey given to participants three months after the tour.

**Dependent Variables**

- Improvement in nutrition knowledge and ability to:
  1. Plan a balanced meal using MyPlate and the following recommendations:
     a. Choose a variety of fruits and vegetables that fill half the plate.
     b. Choose lower fat proteins such as fish, chicken, and lean meats.
     c. Choose low-fat dairy such as milk, milk alternatives, and yogurt.
     d. Make half of grains consumed whole grains.
     e. Understand the difference between using unsaturated fats versus saturated and *trans* fats in food preparation.

- Improvement in eating behavior as measured by increased incidence of:
  1. Consuming balanced meals based on MyPlate and the following recommendations:
     a. Increased amount and variety of fruits and vegetables.
     b. Chose more lean protein sources.
     c. Chose lower fat dairy products.
     d. Consumed more whole grains.
     e. Prepared foods with unsaturated fats instead of saturated or *trans* fats.

**Independent Variable**

- Supermarket tour

**Covariate Variables**

- Age
• Gender (Male or Female)
• Socioeconomic status
• Ethnicity
• BMI (calculated by self-reported height and weight)
• Self-reported current health status
• Shopping patterns
• Interest in nutrition and health promotion

Data Analysis

The current study aimed to determine if participation in a supermarket tour improves nutrition knowledge and initiates self-reported changes in eating behavior in adult participants three months after tour completion in order to assess the effectiveness of supermarket tours as a means of nutrition education. Also of interest, is if certain demographic characteristics influence participation in a supermarket tour and if an interest in health and nutrition played a role in tour participation.

Data analysis was conducted using IBM Statistical Package for Social Sciences (SPSS), Version 23. A series of paired samples t-tests were run to assess changes in nutrition knowledge and behavior modification. A confidence level of 95% (α < 0.05) was used for the analysis.
CHAPTER 4

RESULTS AND DISCUSSION

Participant Demographics

Of the 103 participants who attended a supermarket tour and completed the pre-tour survey, 71.8% (n=74) were female, 17.5% (n=18) were male, and 10.7% (n=11) declined to respond. The majority of participants identified ethnicity as White/Caucasian (88.3%, n=91), followed by Black or African American at 4.9% (n=5), Hispanic or Latino at 1.9% (n=2), American Indian or Alaskan Native at 1.9% (n=2), Asian or Pacific Islander at 1.0% (n=1), and “Other” at 1.0% (n=1). One percent of participants (n=1) declined to identify an ethnicity. Of the 103 participants, 33.0% (n=34) were 18-25 years of age, 11.7% (n=12) were 26-35 years of age, 7.8% (n=8) were 36-45 years of age, 11.7% (n=12) were 46-55 years of age, 16.5% (n=17) were 56-65 years of age, 13.6% (n=14) were 66-75 years of age, and 5.8% (n=6) were 76 years of age or older. In regards to income, 12.6% (n=13) of the participants reported an annual income of less than $20,000, 29.1% (n=30) reported $20,001-$40,000, 12.6% (n=13) reported $40,001-$60,000, 8.7% (n=9) reported $60,001-$80,000, 4.9% (n=5) reported $80,001-$100,000, and 10.7% (n=11) reported more than $100,000. Six participants declined to report annual income. Demographics for all participants are reported in Table 2.
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Regarding location, the majority of participants attended a tour in Kingsport, TN (35.0%, n=36), following by Johnson City, TN (16.5%, n=17), Weber City, VA (13.6%, n=14), Sevierville / Gatlinburg, TN (9.7%, n=10), Bristol, TN (8.7%, n=9), Chattanooga, TN (7.8%, n=8), and Knoxville, TN (3.9%, n=4). Five participants (4.9%) did not report a location of the store tour (Figure 4).

![Location of Supermarket Tour](image)

**Figure 4.** Location of Supermarket Tour

When questioned about BMI classification, 1 participant selected underweight, 56.3% (n=58) selected healthy weight, 37.9% (n=39) selected overweight, and 4.9% (n=5) selected obese (Figure 5).
Twenty-four participants completed the post-tour survey, yielding a response rate of 23.3%. Of the 24 participants who completed the post-tour survey, 75.0% (n=18) were female, 16.7% (n=4) were male, and 8.3% (n=2) declined to respond. Regarding ethnicity, 83.3% (n=20) were White/Caucasian, 8.3% (n=2) were Black or African American, 4.2% (n=1) were American Indian or Alaskan Native, and 4.2% (n=1) did not identify ethnicity. Of the participants who completed the post-tour survey, 25.0% (n=6) were 18-25 years of age, 8.3% (n=2) were 26-35, 4.2% (n=1) were 46-55, 29.2% (n=7) were 56-65 years of age, 20.8% (n=5) were 66-75 years of age, and 4.2% (n=1) were 76 years of age or older. In regards to income, 20.8% (n=5) of the participants reported an annual income of less than $20,000, 37.5% (n=9) reported $20,001-$40,000, 25.0% (n=6) reported $40,001-$60,000, 8.3% (n=2) reported $80,001-$100,000, and 4.2% (n=1) reported more than $100,000. One participant (4.2%) declined to choose an income bracket. Demographics of participants who completed the post-tour survey can be found in Table 3.

Figure 5. Participant Classification of BMI
Table 3. Demographics of Participants who Completed the Post-Tour Survey (n=24)

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<td>American Indian or Alaskan Native</td>
<td>1</td>
<td>4.2%</td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Black or African American</td>
<td>2</td>
<td>8.3%</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
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<td>0.0%</td>
</tr>
<tr>
<td>White / Caucasian</td>
<td>20</td>
<td>83.3%</td>
</tr>
<tr>
<td>Other</td>
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<td>0.0%</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>4.2%</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-25</td>
<td>6</td>
<td>25.0%</td>
</tr>
<tr>
<td>26-35</td>
<td>2</td>
<td>8.3%</td>
</tr>
<tr>
<td>36-45</td>
<td>2</td>
<td>8.3%</td>
</tr>
<tr>
<td>46-55</td>
<td>1</td>
<td>4.2%</td>
</tr>
<tr>
<td>56-65</td>
<td>7</td>
<td>29.2%</td>
</tr>
<tr>
<td>66-75</td>
<td>5</td>
<td>20.8%</td>
</tr>
<tr>
<td>76 or older</td>
<td>1</td>
<td>4.2%</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $20,000</td>
<td>5</td>
<td>20.8%</td>
</tr>
<tr>
<td>$20,001-$40,000</td>
<td>9</td>
<td>37.5%</td>
</tr>
<tr>
<td>$40,001-$60,000</td>
<td>6</td>
<td>25.0%</td>
</tr>
<tr>
<td>$60,001-$80,000</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>$80,001-$100,000</td>
<td>2</td>
<td>8.3%</td>
</tr>
<tr>
<td>More than $100,000</td>
<td>1</td>
<td>4.2%</td>
</tr>
<tr>
<td>Missing</td>
<td>6</td>
<td>4.2%</td>
</tr>
</tbody>
</table>
Research Questions

RQ1: After participating in a supermarket tour, will there be improvement in participants’ nutrition knowledge?

The responses to survey questions 14 through 20 (Appendix A) pertained to this research question. Responses to each question were dummy coded to indicate correct (coded as “1”) or incorrect (coded as “0”) responses, with a total possible score of 7 points. A total score was then calculated based on the number of correct responses. A paired-samples t-test was conducted to evaluate whether participants’ mean total score on the pre-tour survey questions (M=4.36, SD=1.38), differed from participants’ mean total score on the post-tour survey questions (M=4.63, SD=1.34). The test was not significant, t(18)=.960, p=.350, 95%CI: -.84 – .31. Table 4 shows the paired samples t-test for knowledge scores.

| Table 4. Knowledge Paired Samples T-Test |
|-----------------|-----------------|----------------|
| Pre-Tour Survey | n=19, Mean ± SD 4.368 ± 1.382 | p-value .350 |
| Post-Tour Survey| n=19, Mean ± SD 4.631 ± 1.342 |                  |

*p-value ≤ .05 = significance

RQ2: After participating in a supermarket tour, will there be improvement in participants’ eating behavior as measured via self-report?

The responses to survey questions 21 through 27 (Appendix A) pertained to this research question. A paired-samples t-test was conducted on each question pair to determine whether the mean of participants’ responses to the individual question on the pre-tour survey differed from the mean of participants’ responses to the individual question on the post-tour survey. With the exception of question 23, no pairs were significant. Participants’ mean scores decreased or
stayed the same on the post-tour survey. The researcher expected an alternate outcome— that participants’ mean scores would increase showing an improvement in behavior.

The test was significant for question 23, \( t(21)=3.25, p=.004, 95\% CI: .147 – .671 \).

Question 23 states, “How many meals or snacks on most days included vegetables.” Participants were instructed to answer the question based on their eating behaviors over the past month.

Participants reported eating more vegetables on the pre-tour survey (\( M=2.77, SD=.528 \)) than on the post-tour survey (\( M=2.36, SD=.581 \)), indicating that vegetable consumption may have decreased significantly three months after the store tour. This outcome was not intended, as one of the goals of this study was to increase vegetable consumption after the supermarket tour.

Table 5 reports the results of the paired samples t-test for each question.

<table>
<thead>
<tr>
<th>Question</th>
<th>n</th>
<th>Mean + SD</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q21</td>
<td>24</td>
<td>Pre: 2.67 ± 0.637, Post: 2.67 ± 0.482</td>
<td>1.000</td>
</tr>
<tr>
<td>Q22</td>
<td>22</td>
<td>Pre: 2.41 ± 0.666, Post: 2.36 ± 0.581</td>
<td>.747</td>
</tr>
<tr>
<td>Q23</td>
<td>22</td>
<td>Pre: 2.77 ± 0.528, Post: 2.36 ± 0.581</td>
<td>.004</td>
</tr>
<tr>
<td>Q24</td>
<td>22</td>
<td>Pre: 2.32 ± 0.894, Post: 2.23 ± 0.685</td>
<td>.605</td>
</tr>
<tr>
<td>Q25</td>
<td>21</td>
<td>Pre: 1.95 ± 0.669, Post: 1.86 ± 0.573</td>
<td>.540</td>
</tr>
<tr>
<td>Q26</td>
<td>22</td>
<td>Pre: 2.23 ± 0.752, Post: 2.18 ± 0.588</td>
<td>.715</td>
</tr>
<tr>
<td>Q27</td>
<td>22</td>
<td>Pre: 1.91 ± 0.526, Post: 1.86 ± 0.710</td>
<td>.771</td>
</tr>
</tbody>
</table>

*p-value \( \leq .05 = \) significance

*1=0, 2=1 to 2, 3=3-4, 4=5-6

Other Findings

More than half of participants who attended the supermarket tour and completed the pre-tour survey reported always doing most of the shopping for their household (54.4%, \( n=56 \)). Of the remaining participants, 14.6% (\( n=15 \)) reported doing most of the shopping “very often.”
19.4% (n=20) reported doing most of the shopping “sometimes,” 10.7% (n=11) reported “rarely” doing most of the shopping, and 1.0% (n=1) reported “never” doing most of the shopping (Figure 6).

**Figure 6. How Often Participants Do Most of Shopping for Household**

Four questions on the pre-tour and post-tour surveys (Appendix A) were formatted in a Likert-type format (questions 10 through 13) and were treated as interval data to determine participants’ interest in nutrition and health, confidence in their ability to choose healthy foods, familiarity with the MyPlate graphic, and motivation level to make a change in nutrition or health-related behaviors. More than half (54.4%, n=56) of the original 103 participants who attended the supermarket tour and completed the pre-tour survey reported being “very interested” in nutrition and health promotion, followed by 25.2% (n=26) who reported being “moderately interested”, 12.6% (n=13) who reported being “neutral”, 5.8% (n=6) who reported being “slightly interested”, and 1 participant reported being “not at all interested” (Figure 7).

Regarding confidence level in choosing healthy foods at the supermarket, 24.3% (n=25) reported being “very confident,” 50.5% (n=52) “moderately confident,” 14.6% (n=15) “neutral,” 8.7% (n=9) “slightly confident,” and 1.9% (n=2) “not at all confident” (Figure 8). Familiarity with the
MyPlate graphic yielded even results across the scale with 28.2% (n=29) indicating they were “very familiar” with the graphic, 26.2% (n=27) were “moderately familiar,” 11.7% (n=12) were “neutral”, 12.6% (n=13) were “slightly familiar,” and 21.4% (n=22) were “not at all familiar” (Figure 9). Finally, the majority of participants were either “very motivated” (43.7%, n=45) or “moderately motivated” (36.9%, n=38) to make a change in a nutrition or health-related behavior, followed by 15.5% (n=16) who were “neutral,” 3.9% (n=4) who were “slightly motivated.” No participants reported they were “not at all motivated” (Figure 10).

**Figure 7.** Participant Interest in Nutrition and Health Promotion
**Figure 8.** Participant Confidence in Ability to Choose Healthy Foods at the Supermarket

**Figure 9.** Participant Familiarity with MyPlate Graphic
Figure 10. Participant Motivation to Make a Change in a Health or Nutrition-Related Behavior

These findings are helpful in understanding the customer demographic more likely to attend a supermarket tour based on current interest level in health and nutrition and confidence in making healthy decisions in the supermarket. The survey determined participant’s familiarity with MyPlate in order to gauge current knowledge of the graphic prior to the store tour. Participants were asked about their motivation level in order to determine their likelihood to make a lasting and successful change. This data could also help to identify participants at a certain motivation level in which a supermarket tour would be most effective.

For participants who completed the post-tour survey, a paired-samples t-test was conducted on questions 10 through 13 to determine whether the mean of participants’ responses to the individual question on the pre-tour survey differed from the mean of participants’ responses to the individual question on the post-tour survey. The tests were not significant i.e. participants’ interest in nutrition and health promotion (t(23)=.492, p=.627), confidence in choosing healthy foods (t(23)=.296, p=.770), familiarity with the MyPlate graphic (t(23)=.591,
p=.560), and motivation to change a nutrition or health-related behavior (t(23)=−.624, p=.539).

Table 6 shows the results of the paired samples t-test for each question.

**Table 6. Participant Interest, Confidence, Familiarity, and Motivation Paired Samples T-Test**

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Mean + SD</th>
<th>p-value</th>
</tr>
</thead>
</table>
| Q10 | 24 | Pre: 4.54 ± .159  
Post: 4.46 ± .170 | .627 |
| Q11 | 24 | Pre: 4.13 ± .174  
Post: 4.08 ± .225 | .770 |
| Q12 | 23 | Pre: 3.83 ± .279  
Post: 3.96 ± .247 | .560 |
| Q13 | 24 | Pre: 4.29 ± .153  
Post: 4.38 ± .179 | .539 |

*p-value ≤ .05 = significance

*a=Not at All Interested, 2=Slightly Interested, 3=Neutral, 4=Moderately Interested, 5=Very Interested

Of the 103 participants, 77 completed the program evaluation. The results of the satisfaction survey were overwhelmingly positive. Of the 77 participants who completed the program evaluation, 88.3% (n=68) reported being “very satisfied” with the store tour. The remaining 11.7% (n=9) reported being “moderately satisfied” with the store tour. All participants (100%, n=77) reported learning something new as a result of the store tour. Almost all participants (90.9%, n=70) reported they would be interested in attending another store tour in the future (Table 7).

Participants provided comments on the program evaluation as well. These comments could be generalized into six categories or themes. The first theme focused on appreciation for the tour experience and the RD providing the tour. Comments included that the tour was “very informative” and “worthwhile,” “everyone should do a grocery store tour,” and “the information was presented in ways that are easy to remember.” The second theme that emerged centered on label reading and how to find specific nutrients in foods such as protein, B12, sodium, added sugars, and unsaturated fat. Participants reported learning about “foods that contain unsaturated
fat besides cooking oils,” “how to find the amount of added sugars,” and how to find “low-sodium broths and sauces.” The third theme focused on participants’ interest to try new or alternative foods as a result of the store tour. Participants reported they learned “it is better to get plain yogurt,” “how to make hummus,” “how to choose cheeses,” and “how to cut a mango.” The fourth theme related to general healthy eating and meal planning. Participants commented that they “learned how to eat healthier and still eat what I like,” “I learned about portion sizes,” “I really appreciated the detailed nutrient facts and healthy cooking tips…they will definitely be in my mind as I create grocery lists,” and “it (the tour) helped me learn a lot about the store and eating healthier together.” The fifth theme focused on advertising methods, store programming, and shelf placement. Participants commented that they learned about “the numbering system at Food City stores…that was helpful in identifying the best foods,” “that organic foods have a purple label,” “store brands vs. name brands and shelf placements,” and “where to find gluten-free items in all areas of the store.” Lastly, participants provided suggestions for future tours. Comments included “provide lists of recommended healthy or better foods in each category,” “allow participants to share their favorite choices for discussion/critique,” and “possibly include a cooking demo.” A list of the program evaluation comments can be found in Appendix E.
Table 7. Program Evaluation Results (n=77)

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learned Something New as a Result of the Tour</td>
<td>77</td>
<td>100%</td>
</tr>
<tr>
<td>Participant Satisfaction with Tour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all satisfied</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Slightly Satisfied</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Neutral</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Moderately Satisfied</td>
<td>9</td>
<td>11.7%</td>
</tr>
<tr>
<td>Very Satisfied</td>
<td>68</td>
<td>88.3%</td>
</tr>
<tr>
<td>Interest in Attending Future Tours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>70</td>
<td>90.9%</td>
</tr>
<tr>
<td>No</td>
<td>6</td>
<td>7.8%</td>
</tr>
<tr>
<td>No Answer</td>
<td>1</td>
<td>1.3%</td>
</tr>
</tbody>
</table>

**Discussion**

Despite a non-significant improvement in nutrition knowledge and self-reported eating behavior three months after the supermarket tour, all participants who completed the program evaluation (100%, n=77) reported they learned something new as a result of the supermarket tour and were either moderately satisfied (11.7%) or very satisfied (88.3%) with the experience. In addition, out of the 77 participants who completed the program evaluation, almost all participants (90.91%, n=70) reported they would be interested in attending another tour in the future. These findings are consistent with previous literature that portrays supermarket tours as a generally popular form of nutrition education.16,17,18, 97,98
Supermarket tours were free for participants and for the host supermarket, making the tours a cost-effective form of nutrition education and community outreach. After conducting supermarket tours of varying group sizes, the researcher determined that an ideal group size was 8 to 12 participants, which is consistent with previous literature. The supermarket tours ranged in length from 45 minutes to 1 hour and 15 minutes depending on the number of questions and group size. One nutrition professional providing education to 8 to 12 people in this amount of time is efficient and more cost-effective than individual nutrition counseling as well.
CHAPTER 5

CONCLUSION

Limitations

This study had limitations, including the fact that participants who attended the supermarket tour were predominantly White/Caucasian with the majority in the 18-25 age range. Most tours were held at Food City stores near universities, which could explain why the majority of participants came from this age group. The younger demographic could also explain the lower income level reported. Therefore, these results are not generalizable to a larger, more diverse population of individuals of varying socioeconomic status.

In addition, the small sample size, specifically of those who completed the post-tour survey, was a limitation. The researcher also relied on self-reporting for changes in eating behavior. The inaccuracy of self-reporting and poor recall of foods consumed over the past month could have skewed the results. The avenue of communication could have also been a limitation with the younger demographic in the survey sample. Alternative communication methods such as text messaging may have been more readily received and increased the response rate.

An additional limitation was that each supermarket tour was not strictly standardized. Although a supermarket tour outline and script was followed, participants were permitted to ask questions which occasionally involved specific products and health or nutrition-related topics related to the individual. These unique questions could have changed the focus of the tour overall and therefore altered the outcome of the participants’ knowledge and recall.
Future Research

According to the current study’s findings, supermarket tours are an efficient and cost-effective form of nutrition education and are well liked by participants. Additional research is needed to determine if supermarket tours produce improvements in nutrition knowledge and sustainable changes in eating behavior.

The current study recruited participants from the community and provided minor incentives in the form of door prizes and a store coupon, but a more segmented group, perhaps a group connected to an outpatient clinic or disease-related support group may have greater incentive to retain information and accountability to change behavior. Therefore, partnerships between retail establishments and healthcare institutions could be advantageous to producing effective supermarket tours.

Future research could also examine whether disease-specific tours are better received and produce more significant changes in nutrition knowledge and eating behavior than general tours focusing on healthy eating. Individuals who attend disease-specific tours are probably more likely to be invested in the tour and retain the information since they are affected by the disease state personally. Participants could also be assessed on their readiness for change prior to the tour in order to determine the effectiveness of a supermarket tour as a nutrition intervention.

Additional research using more objective measures of behavior change would be helpful to determine the effectiveness of supermarket tours. For example, participants who are attending a supermarket tour as a part of a clinical support group or outpatient program could be asked by the healthcare provider to keep a food diary either on paper or through an online record-keeping program such as MyFitnessPal for the months prior to and after the store tour, which would provide more accurate recall of foods consumed. There is also an opportunity to track purchase
patterns of participants who attended the supermarket tour through the retailer, which would provide a more direct impact and return on investment for both the nutrition educator and the retail establishment.

Researchers could also study whether or not a supermarket tour is more effective as an intervention when it is a part of a larger, more encompassing nutrition program. Supermarket tours could be coupled with sampling events, cooking demonstrations, or other in-store programs as well. Retailers who invest in wellness-focused loyalty programming for their customers and provide more frequent reiteration of nutrition and health information through a variety of interventions could see an increase in retention and sustainable changes in participant behavior.
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APPENDICES

Appendix A

Pre-Tour Survey

The Effects of a Supermarket Tour on Improvement of Nutrition Knowledge and Eating Behavior

Dear Participant,

My name is Elizabeth Hall and I am a graduate student at East Tennessee State University (ETSU) in the Master of Science in Clinical Nutrition program. My research is titled “The Effects of a Supermarket Tour on Improvement of Nutrition Knowledge and Eating Behavior.” The purpose of this study is to determine if participation in a supermarket tour improves nutrition knowledge and instigates self-reported changes in eating behavior three months after tour completion.

Prior to participating in the supermarket tour, you will be asked a series of questions about nutrition content of foods and your current eating patterns. You will also be given a satisfaction survey immediately after the tour. This is your pre-tour survey to complete and return. This pre-tour survey should take approximately 15 minutes. You will also receive a post-tour survey to complete and return three months following completion of the store tour. When I receive the post-tour survey, I will mail you the Food City coupon for $5 off your next purchase.

There are no foreseeable risks to participating in this study. The possible benefits of your participation in this research study are that you may gain knowledge of MyPlate and healthy eating and may become aware of your current eating patterns. These benefits could improve eating behaviors to further promote health. There is an ID number written on your post-tour survey in order to keep the surveys confidential.

Your participation in this research experiment is voluntary. You may choose not to participate. If you decide to participate in this research study, you can change your mind and quit at any time. Failure to complete the survey will not affect your participation in the supermarket tour or the possible benefits as a result of the tour. You may quit by contacting Elizabeth Hall at hallel1@etsu.edu or Dr. Michelle Lee at 423.439.7524 or leeml2@etsu.edu. You will be told immediately if any of the results of the study should reasonably be expected to make you change your mind about continuing to participate.

If you have any questions, problems, or research-related medical problems at any time, you may contact Elizabeth Hall at hallel1@etsu.edu or Dr. Michelle Lee at 423.439.7524 or leeml2@etsu.edu. You may also call the Chairperson of the ETSU Institutional Review Board at 423.439.6054 for any questions you may have about your rights as a research participant. If you have any questions or concerns about the research and want to talk to someone independent of the research team or you can’t reach the study staff, you may call an IRB Coordinator at 423.439.6055 or 423.439.6002.

Sincerely,
Elizabeth Hall, RDN, LDN
ETSU Graduate Student

By completing this survey, you agree to the following:
• You have read the above information
• You voluntarily agree to participate
• You are at least 18 years of age or older

1. Location (City / State) of Store Tour: ________________________________

2. Gender: Male / Female

3. Ethnicity:
   ___ American Indian or Alaskan Native
   ___ Asian or Pacific Islander
   ___ Black or African American
   ___ Hispanic or Latino
   ___ White / Caucasian
   ___ Other: ______________

4. What is your age?
   ___ 18 – 25
   ___ 26 – 35
   ___ 36 – 45
   ___ 46 – 55
   ___ 56 – 65
   ___ 66 – 75
   ___ 76 or older

5. Select your household annual income:
   ___ Less than $20,000
   ___ $20,001 to $40,000
   ___ $40,001 to $60,000
   ___ $60,001 to $80,000
   ___ $80,001 to $100,000
   ___ More than $100,000

6. Weight: ______________

7. Height: ______________

8. In which BMI category do you classify yourself?
   ___ Underweight
   ___ Normal Weight
   ___ Overweight
   ___ Obese

9. Do you do most of the shopping for your household?
   ___ Never
   ___ Rarely
Sometimes
Very often
Always

10. On a scale of 1 to 5, which describes your interest in nutrition and health promotion?
   ___ 1 (Not at all interested)
   ___ 2 (Slightly interested)
   ___ 3 (Neutral)
   ___ 4 (Moderately interested)
   ___ 5 (Very interested)

11. How confident are you in your ability to choose healthy foods at the supermarket?
   ___ 1 (Not at all confident)
   ___ 2 (Slightly confident)
   ___ 3 (Neutral)
   ___ 4 (Moderately confident)
   ___ 5 (Very confident)

12. How familiar are you with the MyPlate graphic?
   ___ 1 (Not at all familiar)
   ___ 2 (Slightly familiar)
   ___ 3 (Neutral)
   ___ 4 (Moderately familiar)
   ___ 5 (Very familiar)

13. How motivated are you to make a change in a nutrition or health-related behavior?
   ___ 1 (Not at all motivated)
   ___ 2 (Slightly motivated)
   ___ 3 (Neutral)
   ___ 4 (Moderately motivated)
   ___ 5 (Very motivated)

14. Which of the following food groups is NOT found on the MyPlate graphic?
   ___ Grains
   ___ Protein
   ___ Fruit
   ___ Vegetables
   ___ Dairy
   ___ Fats and Oils

15. The MyPlate graphic is based on a plate that measures:
   ___ 6 inches
   ___ 9 inches
   ___ 12 inches
   ___ 15 inches
16. How many daily servings of fruits and vegetables are typically recommended for the average adult?
   ___ 2 servings
   ___ 3 servings
   ___ 4 servings
   ___ 5 servings

17. Which of the following would be considered the leanest source of protein?
   ___ Chicken with the skin on
   ___ Red meat with visible fat
   ___ Fried fish
   ___ Ground turkey

18. Which of the following is considered a low-fat milk choice?
   ___ Whole milk
   ___ 2% milk
   ___ 1% milk
   ___ Full-fat buttermilk

19. Which of the following grain servings would have the most fiber?
   ___ Multigrain bread
   ___ Plain bagel
   ___ 100% whole wheat pasta
   ___ White rice

20. Which of the following foods is made up of mostly unsaturated fats?
   ___ Butter
   ___ Canola oil
   ___ Bacon grease
   ___ Lard

Please answer the following questions based on your eating behaviors over the past month.

21. How many meals on most days included at least three different food groups?
   ___ 0
   ___ 1 to 2
   ___ 3 to 4
   ___ 5 to 6

22. How many meals or snacks on most days included fruit?
   ___ 0
   ___ 1 to 2
   ___ 3 to 4
   ___ 5 to 6
23. How many meals or snacks on most days included vegetables?
   ___ 0
   ___ 1 to 2
   ___ 3 to 4
   ___ 5 to 6

24. How many meals or snacks on most days included lean protein? (skinless chicken breast, seafood, lean meat, beans prepared without adding fat)?
   ___ 0
   ___ 1 to 2
   ___ 3 to 4
   ___ 5 to 6

25. How many meals or snacks on most days included low-fat dairy? (1%, skim, low-fat / fat-free yogurt, low-fat cheese)?
   ___ 0
   ___ 1 to 2
   ___ 3 to 4
   ___ 5 to 6

26. How many meals or snacks on most days included whole grains? (100% whole wheat bread, brown rice, whole grain cereals or pasta etc.)
   ___ 0
   ___ 1 to 2
   ___ 3 to 4
   ___ 5 to 6

27. How many meals or snacks on most days did you use oil for cooking?
   ___ 0
   ___ 1 to 2
   ___ 3 to 4
   ___ 5 to 6
Appendix B

Post-Tour Survey

The Effects of a Supermarket Tour on Improvement of Nutrition Knowledge and Eating Behavior

Dear Participant,

My name is Elizabeth Hall and I am a graduate student at East Tennessee State University (ETSU) in the Master of Science in Clinical Nutrition program. My research is titled “The Effects of a Supermarket Tour on Improvement of Nutrition Knowledge and Eating Behavior.” The purpose of this study is to determine if participation in a supermarket tour improves nutrition knowledge and instigates self-reported changes in eating behavior three months after tour completion.

This is your post-tour survey to complete and return. This post-tour survey should take approximately 15 minutes. Please return the survey in the attached stamped self-addressed envelope. Once I receive the post-tour survey I will mail you the Food City coupon for $5 off your next purchase.

There are no foreseeable risks to participating in this study. The possible benefits of your participation in this research study are that you may gain knowledge of MyPlate and healthy eating and may become aware of your current eating patterns. These benefits could improve eating behaviors to further promote health. There is an ID number written on your post-tour survey in order to keep the surveys confidential.

Your participation in this research experiment is voluntary. You may choose not to participate. If you decide to participate in this research study, you can change your mind and quit at any time. Failure to complete the survey will not affect your participation in the supermarket tour or the possible benefits as a result of the tour. You may quit by contacting Elizabeth Hall at hallel1@etsu.edu or Dr. Michelle Lee at 423.439.7524 or leeml2@etsu.edu. You will be told immediately if any of the results of the study should reasonably be expected to make you change your mind about continuing to participate.

If you have any questions, problems, or research-related medical problems at any time, you may contact Elizabeth Hall at hallel1@etsu.edu or Dr. Michelle Lee at 423.439.7524 or leeml2@etsu.edu. You may also call the Chairperson of the ETSU Institutional Review Board at 423.439.6054 for any questions you may have about your rights as a research participant. If you have any questions or concerns about the research and want to talk to someone independent of the research team or you can’t reach the study staff, you may call an IRB Coordinator at 423.439.6055 or 423.439.6002.

Sincerely,
Elizabeth Hall, RDN, LDN
ETSU Graduate Student

By completing this survey, you agree to the following:

- You have read the above information
- You voluntarily agree to participate
- You are at least 18 years of age or older
1. Location (City/State) of Store Tour: ________________________________

2. Gender: Male / Female

3. Ethnicity:
   ___ American Indian or Alaskan Native
   ___ Asian or Pacific Islander
   ___ Black or African American
   ___ Hispanic or Latino
   ___ White / Caucasian
   ___ Other: __________________

4. What is your age?
   ___ 18 – 25
   ___ 26 – 35
   ___ 36 – 45
   ___ 46 – 55
   ___ 56 – 65
   ___ 66 – 75
   ___ 76 or older

5. Select your household annual income:
   ___ Less than $20,000
   ___ $20,001 to $40,000
   ___ $40,001 to $60,000
   ___ $60,001 to $80,000
   ___ $80,001 to $100,000
   ___ More than $100,000

6. Weight: _____________

7. Height: _______________

8. In which BMI category do you classify yourself?
   ___ Underweight
   ___ Normal Weight
   ___ Overweight
   ___ Obese

9. Do you do most of the shopping for your household?
   ___ Never
   ___ Rarely
   ___ Sometimes
   ___ Very often
   ___ Always
10. On a scale of 1 to 5, which describes your interest in nutrition and health promotion?
   ___ 1 (Not at all interested)
   ___ 2 (Slightly interested)
   ___ 3 (Neutral)
   ___ 4 (Moderately interested)
   ___ 5 (Very interested)

11. How confident are you in your ability to choose healthy foods at the supermarket?
    ___ 1 (Not at all confident)
    ___ 2 (Slightly confident)
    ___ 3 (Neutral)
    ___ 4 (Moderately confident)
    ___ 5 (Very confident)

12. How familiar are you with the MyPlate graphic?
    ___ 1 (Not at all familiar)
    ___ 2 (Slightly familiar)
    ___ 3 (Neutral)
    ___ 4 (Moderately familiar)
    ___ 5 (Very familiar)

13. How motivated are you to make a change in a nutrition or health-related behavior?
    ___ 1 (Not at all motivated)
    ___ 2 (Slightly motivated)
    ___ 3 (Neutral)
    ___ 4 (Moderately motivated)
    ___ 5 (Very motivated)

14. Which of the following food groups is NOT found on the MyPlate graphic?
    ___ Grains
    ___ Protein
    ___ Fruit
    ___ Vegetables
    ___ Dairy
    ___ Fats and Oils

15. The MyPlate graphic is based on a plate that measures:
    ___ 6 inches
    ___ 9 inches
    ___ 12 inches
    ___ 15 inches

16. How many daily servings of fruits and vegetables are typically recommended for the average adult?
    ___ 2 servings
    ___ 3 servings
17. Which of the following would be considered the leanest source of protein?
___ Chicken with the skin on
___ Red meat with visible fat
___ Fried fish
___ Ground turkey

18. Which of the following is considered a low-fat milk choice?
___ Whole milk
___ 2% milk
___ 1% milk
___ Full-fat buttermilk

19. Which of the following grain servings would have the most fiber?
___ Multigrain bread
___ Plain bagel
___ 100% whole wheat pasta
___ White rice

20. Which of the following foods is made up of mostly unsaturated fats?
___ Butter
___ Canola oil
___ Bacon grease
___ Lard

Please answer the following questions based on your eating behaviors over the past month.

21. How many meals on most days included at least three different food groups?
___ 0
___ 1 to 2
___ 3 to 4
___ 5 to 6

22. How many meals or snacks on most days included fruit?
___ 0
___ 1 to 2
___ 3 to 4
___ 5 to 6

23. How many meals or snacks on most days included vegetables?
___ 0
___ 1 to 2
___ 3 to 4
___ 5 to 6
24. How many meals or snacks on most days included lean protein? (skinless chicken breast, seafood, lean meat, beans prepared without adding fat)?
   __ 0
   __ 1 to 2
   __ 3 to 4
   __ 5 to 6

25. How many meals or snacks on most days included low-fat dairy? (1%, skim, low-fat / fat-free yogurt, low-fat cheese)?
   __ 0
   __ 1 to 2
   __ 3 to 4
   __ 5 to 6

26. How many meals or snacks on most days included whole grains? (100% whole wheat bread, brown rice, whole grain cereals or pasta etc.)
   __ 0
   __ 1 to 2
   __ 3 to 4
   __ 5 to 6

27. How many meals or snacks on most days did you use oil for cooking?
   __ 0
   __ 1 to 2
   __ 3 to 4
   __ 5 to 6
Appendix C

Program Evaluation

1. What is something new that you have learned today as a result of this tour?

2. How would you describe your overall satisfaction with this store tour?
   - 1 (Not at all satisfied)
   - 2 (Slightly satisfied)
   - 3 (Neutral)
   - 4 (Moderately satisfied)
   - 5 (Very satisfied)

3. Would you be interested in attending future store tours?

4. Do you have any suggestions or comments?
Appendix D

Supermarket Tour Outline

Introduction

Greet participants and explain logistics and plan for the tour. Provide information on restrooms and other housekeeping items. Provide pre-tour survey. Note: Each section addresses a component of the research questions and is designated in parentheses next to the section heading.

MyPlate (RQ1-1, RQ2-1)

MyPlate is the infographic that replaced the Food Guide Pyramid. It was released by the USDA in 2011 with a focus on “building a healthy eating style”.\textsuperscript{42,43} Provide a poster for participants to view.

- The MyPlate campaign compliments the USDA Dietary Guidelines by providing a visual reminder to plan meals focusing on “variety, amount, and nutrition”. This initiative can help consumers to estimate portion sizes based on a nine inch plate in a clear and basic way.\textsuperscript{42,43,44}

- Within each section of the plate, there are opportunities to choose more nutritious options. For example, the Dietary Guidelines also recommend limiting foods and beverages with saturated and \textit{trans} fat, sodium, and added sugars, which can be found in multiple sections of MyPlate.

- The MyPlate “small starts” recommendations highlight the different sections of the plate and include:
  
  1. Making half of the plate fruits and vegetables, or two or more servings per meal.\textsuperscript{42}
2. Making a quarter of the plate grains at least half of which are whole grains, or at least one serving per meal. 42
3. Making a quarter of the plate a variety of lean proteins, or at least one serving per meal. 42
4. Switching to low-fat and fat-free dairy, or at least one serving per meal. 42
5. Oils chosen more frequently than saturated fats and used in moderation. 57

Produce Department (RQ1-1a, RQ2-1a)

- Review the recommended daily servings for fruits and vegetables, 1 ½ - 2 cups per day and 3 ½ - 5 cups per day, respectively, for adults. 45, 46
- Use the “rainbow of color concept” to teach health benefits and key nutrients and phytochemicals of colored fruits and vegetables. 5
- Buying produce in season for peak nutrition and lower prices.
- Introduce clients to unusual fruits and vegetables and other store programs assist in buying affordable produce (Pick 5 Program).
- Discuss differences in organic and regular produce: organic is a statement of production, not nutrient content. 100
  - Certified or USDA organic: grown and processed according to strict standards with third-party inspections or the USDA to verify organic quality. 100
  - There is insufficient evidence pertaining to organic foods being more or less nutritious than regular foods. 101
- Promote all varieties of fruits and vegetables including canned, frozen, and dried while cautioning about added sugars and sodium. 5
- Explain choosing level of ripeness depending on when the produce will be eaten.
Meat / Seafood Department & Processed Meats (RQ1-1b, RQ2-1b)

Meat:

- Review daily recommended amounts of meat, poultry, and seafood, 5 to 6 ½ ounces needed for most adults. One serving is typically 3 to 4 ounces or the size of the palm of the hand and as thick as a deck of cards.
- Explain the nutritional value of protein as the building block for muscles, bone, skin, and blood, provision of vitamins, minerals, and energy and the consequences of eating too much saturated fat.
- Show how to select and prepare leaner cuts of meat and poultry.
- Give tips on reading labels to identify fat percentage and explain how to use this knowledge to select ground meat and turkey (less than 10 grams of fat in 3.5 ounces is considered a lean choice).
- Show a one-pound cut of meat and ask clients how many can be served with that amount of meat.

Seafood:

- Show an example of a fatty and non-fatty fish and review importance of omega-3 fatty acids.

Processed Meats:

- Advise clients about the high content of nitrates/nitrites and sodium in processed meats and the association of high sodium intake and hypertension.
Dairy Case (RQ1-1c, 1e, RQ2-1c, 1e)

Milk:

- Discuss the nutritional value and health benefits of dairy products for bone health and in prevention of depression and Type 2 Diabetes.\(^{52,53,54}\)
- Review recommended daily servings of dairy products.\(^{53}\)
- Compare a variety of milk, yogurt and cheese products focusing on calcium, calories, fat and sugar content. Remind clients that milk producers receive product from the same source - no difference with store brand.
- Explain different types of milk like soy, lactose free, etc. and when these types of milks may be needed.

Yogurt:

- Compare two or three yogurt brands for fat, sugar, high fructose corn syrup, artificial colors and sweeteners, presence of “live” and Active cultures, etc.
- Discuss probiotics and health implications.\(^{102}\)
- Point out the nutritional value of different types of yogurts such as nonfat, Greek, plain, flavored, “light”, etc.

Cheese:

- Discuss the differences between regular and pasteurized processed cheese. Allow clients to read labels and report the amount of fat, protein and calcium.
- Point out the difference in nutritional value of the cheeses and ingredients.
- Recommend purchasing the block instead of pre-shredded for less additives and fat.
- Provide cooking, storing, and preparation tips using reduced-fat cheese such as:
- Reduced-fat cheeses are more heat-sensitive and melt best when given longer time to cook at lower temperatures.
- If microwaving, use a low setting and rotate and stir frequently. Cover food to retain moisture.
- Add cheese after heating the food, which will help the cheese to melt without over-cooking it.
- Serve at room temperature for more flavor and a softer texture.
- Store in the refrigerator wrapped in foil or in a plastic bag. Remove as much air as possible.

Butter / Margarine:

- Discuss that butter / margarine are not considered dairy products even though it is in the dairy section of the store.\(^{52}\)
- Identify margarines that are lower in hydrogenated fat and trans fat. Explain the health consequences of excessive consumption of trans fat.
- Compare fat, saturated fat, trans fat, calorie content and ingredients. Margarines that are solid at room temperature are higher in saturated and trans fat than tub margarines with soft or liquid consistency. Point out the association to heart disease and cancer.

Bread Aisle (RQ1-1d, RQ2-1d)

- Assist clients in picking up whole grain breads; look for those with no more than 1 gram fat, and no less than 3 grams of fiber. Make sure to point out the number of servings and look for breads that have one gram or more of fiber per slice.
- Read the ingredient list to ensure 100% whole wheat or 100% whole grain is the first ingredient.
• Such expressions as “wheat flour” usually refer to refined white flour with lower fiber, vitamin and mineral content. Be aware that brown bread may be made with white flour and caramel coloring unless the label specifies 100% whole-wheat and is the first ingredient in the ingredient list. Also check the Nutrition Facts Panel for sodium content.

Baking Aisle (Fats and Oils) (RQ1-1e, RQ2-1e)

• Select cooking oils that are high in monounsaturated fats and explain the benefits of a diet high in unsaturated fats.  

• Display food labels for olive, canola, corn and vegetable oil side by side with labels facing front: Show amounts of mono- and polyunsaturated and choose the healthiest oil based on the monounsaturated fat content.

Snack foods Aisle

• Use the Nutrition Facts Panel and ingredients to determine fat and sugar content and identify healthy snacks.

• Look at bags of several snack chips (ex. Cheetos, Fritos, regular and baked tortilla chips or pretzels) and have clients identify better choices.

• Discuss microwave popcorn with butter and/or trans fat. Describe ways to make popcorn from scratch at home using popcorn kernels (hot air popcorn popper, on stove top with a small amount of oil, in microwave, etc.) to save on calories and added fat.

• Point out basic “trail mix” ingredients and discuss healthier ingredients. Describe ways to make “trail mix” at home from cereal, raisins, nuts, etc. Note that nuts are high in monounsaturated fat and can be a great snack when used in moderation.

Frozen Foods (RQ1-1a, RQ2-1a)

• Provide ideas on how to incorporate convenience foods into balanced meals.
• Discuss how to incorporate frozen fruits and vegetables into daily meals.

• Discuss using frozen fruits and vegetables without added sugars, sauces and cheese as a highly recommended option.

Questions / Evaluations

Take participants back to the primary meeting area and answer questions. Give participants a satisfaction survey and explain process for follow-up survey in three months. Explain the incentives for returning the survey. Provide closing remarks.
# Program Evaluation Comments

<table>
<thead>
<tr>
<th>Category/Theme</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Appreciation for the tour experience and the RD     | “Elizabeth did a great job. The tour was very informative. Everyone should take it.”  
“Very informative”  
“Tour was very informative. We are also going to schedule a 2nd tour for the ones that couldn't make it today. We appreciate Food City!”  
“Elizabeth did a great job giving examples and answering everyone's questions.”  
“Elizabeth is very knowledgeable, helpful, and effectively communicates her expertise.”  
“Great work! I love shopping at Food City.”  
“Great job!”  
“Definitely learned new things; so much information to take in - a very worthwhile thing to do.”  
“Elizabeth and her team were very informative and full of Food City wisdom”  
“Great tour, very informative!”  
“The tour was very informative and strongly emphasizes MyPlate concept. Great job!”  
“Revamped what I had forgotten”  
“Good tour, very informative”  
“Nicely done”  
“Good info”  
“Thank you, learned a lot”  
“Learned a lot”  
“Thanks”  
“Interesting” |
“It's always nice to hear shopping and nutrition advice from someone with our same thoughts and ideas about nutrition.”

“The info was presented in ways that are easy to remember. Great tour!”

“I learned stuff I didn't know before.”

“Very interesting”

“Very good information and ideas, could answer questions.”

“Enjoyable”

“She was very informative.”

“The tour was very good.”

“Very helpful and interesting”

“Would like to bring my 6 year old daughter to a tour, This is a great program! Everyone should do a grocery tour.”

“Enjoyed it, thank you.”

“Very well done. Presenter was knowledgeable and articulate.”

“Excellent”

“Very well done”

“Elizabeth is very knowledgeable and outgoing. Her passion for nutrition is very evident.”

<table>
<thead>
<tr>
<th>Label reading/Finding specific nutrients in foods</th>
<th>“Learned about the change in labels, low-sodium broths and sauces”</th>
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<tbody>
<tr>
<td></td>
<td>“I learned how to find the amount of added sugars.”</td>
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<td></td>
<td>“New food labeling laws”</td>
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<tr>
<td></td>
<td>“Enjoyed finding out about the different labels on food.”</td>
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<tr>
<td></td>
<td>“Learned about protein, B12, and organic foods. Very good, wonderful.”</td>
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<tr>
<td></td>
<td>“Watch carb intake”</td>
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<td></td>
<td>“I learned about looking at foods that contain unsaturated fat, besides cooking oils.”</td>
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<tr>
<td></td>
<td>“I learned about the sugar content in yogurt.”</td>
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</tbody>
</table>
| Interest in trying new or alternative foods | “I learned how to choose cheeses, added sugars in foods.”  
“I learned about fat in fish vs. red meat.”  
“I learned it is better to get plain yogurt.”  
“How to cut a mango”  
“Learned how to make hummus”  
“I learned about fruits, veggies, meats, cheeses, etc. nutritional stuff! Also some items I did not know about. All was great!”  
“I learned that almond milk has no protein.” |
| General healthy eating/Meal planning | “I learned about portion sizes.”  
“I really appreciated the detailed nutrient facts and healthy cooking tips. They will definitely be in my mind as I create grocery lists from here on out.”  
“Eating healthy is better”  
“It helped me learn a lot about the store and eating healthier together. I loved the tour, but more planning healthy meals.”  
“Learning how to eat healthier and still eat what I like. I really enjoyed the tour” |
| Advertising/Store programming/Shelf placement | “I learned where to find gluten-free items in all areas of the store.”  
“I learned lots of valuable information. I plan to use Nuval in the future.”  
“I learned that organic food has a purple label.”  
“Need constant updates, always confused especially with advertising.”  
“I learned about the "numbering" system at Food City stores. That was helpful in identifying the best foods and I will pass that along to my patients. I am a renal dietitian in the Chattanooga area. I met Elizabeth at a CAND (RD) meeting and knew I wanted to organize a grocery store tour with my group from our dialysis clinic. Elizabeth was great! She did a great job and I feel like my group benefited from this I would like to do it again and bring another group.”  
“I learned about the 5 for $19.99 at Food City.”  
“Store brands vs name brands, shelf placements (ex. Cereals)” |
<table>
<thead>
<tr>
<th>Suggestions for future tours</th>
<th>“I learned about the variety of products available at Food City; label gluten-free items.”</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>“Provide lists of recommended healthy or better choices in each category on MyPlate or allow participants to share their favorite choices for discussion / critique.”</td>
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<tr>
<td></td>
<td>“Possibly one that includes a cooking demo.”</td>
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<tr>
<td></td>
<td>“I do wish your store carried a greater variety of whole wheat / grain products especially when it comes to waffle and pancake mixes. Your Eastman Rd store has no whole wheat / whole grain options.”</td>
</tr>
<tr>
<td></td>
<td>“Offer samples”</td>
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<tr>
<td></td>
<td>“Going over other items as well; we count calories and watch stuff”</td>
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<tr>
<td></td>
<td>“Perhaps have tours for WIC clients that teach them the nutritional benefits of their vouchers and cooking / recipe suggestions for those foods.”</td>
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<tr>
<td></td>
<td>“Need more time”</td>
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<tr>
<td></td>
<td>“It would be good if you consider making milk and juices in smaller quart sizes along with the half gallons.”</td>
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<tr>
<td></td>
<td>“Develop visual aids, have close-ups of the labels to help the near blind.”</td>
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<tr>
<td></td>
<td>“Meal planning would be a good tour”</td>
</tr>
<tr>
<td></td>
<td>“Participants should not be &quot;shopping&quot; during the tour - it slows the group while waiting for the shopper to catch up.”</td>
</tr>
</tbody>
</table>
ELIZABETH L. HALL

Education:  
BS, Dietetics, Harding University, Searcy, Arkansas 2012  
RDN, Dietetic Internship, Vanderbilt University Medical Center,  
Nashville, Tennessee 2013  
MS, Clinical Nutrition, East Tennessee State University, Johnson  
City, Tennessee, Expected Graduation December 2017

Professional Experience:  
Laboratory Assistant/Teacher’s Aid, Harding University, Searcy,  
Arkansas 2009-2012  
Clinical Dietitian/Foodservice Manager, Psychiatric Research  
Institute, University of Arkansas for Medical Sciences,  
Little Rock, Arkansas 2013-2015  
Corporate/Retail Registered Dietitian, K-VA-T Food Stores Inc.,  
Abingdon, Virginia 2015-present

Presentations:  
Hall E. Evaluation of consumer acceptance, baking properties, and  
nutritional content of chocolate cupcakes with flaxseed  
flour. Oral presentation at White County Medical Center;  
November, 2011; Searcy, AR.  
Hall E. Evaluation of consumer acceptance, baking properties, and  
nutritional content of chocolate cupcakes with flaxseed  
flour. Poster presented at Arkansas State Capitol; February,  
2012; Little Rock, AR.  
Hall E. Evaluation of consumer acceptance, baking properties, and  
nutritional content of chocolate cupcakes with flaxseed  
flour. Poster presented at Alpha Chi Super-Regional  
Convention; March, 2012; Baltimore, MD.  
Hall E. Evaluation of consumer acceptance, baking properties, and  
nutritional content of chocolate cupcakes with flaxseed  
flour. Poster presented at Arkansas Dietetic Association  
Annual Meeting and Exhibition; April, 2012; Little Rock,  
AR.  
Hall E. Nutrition in eating disorder recovery: review of current  
literature and practice guidelines. Oral presentation at  

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University of Arkansas for Medical Sciences; November, 2014; Little Rock, AR.

Hall E. Dietitians in supermarket retail: leadership in the aisles and beyond. Oral presentation at Chattanooga Academy of Nutrition and Dietetics Meeting; January 2016; Chattanooga, TN.

Hall E. Love your heart, love your food. Oral presentation at AAAD Annual Conference on Aging; May 2016; Johnson City, TN.

Hall E. Cooking with Herbs. Oral presentation at Tri-Cities Academy of Nutrition and Dietetics Fall Meeting; September, 2016; Johnson City, TN.

Honors:

Outstanding Dietetic Student Award 2012, Arkansas Academy of Nutrition and Dietetics, Harding University
Honors College Graduate with Distinction 2012, Harding University
Outstanding Dietetic Student Award 2013, Nashville District Dietetic Association
Supermarket Dietitian of the Year 2015, Produce for Better Health Foundation
Outstanding Dietetic Educator of the Year Award 2017, Tri-Cities Academy of Nutrition and Dietetics
Recognized Young Dietitian of the Year Award, 2017, Tri-Cities Academy of Nutrition and Dietetics