USING AN ECONOMIC INCENTIVE AND MARKETING STRATEGY FOR HEALTHY FOOD AND BEVERAGE PURCHASES AT SPORTS STADIUMS

by

Casey Lauren Stephens

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Approved by:

_____
Dr. Elizabeth Racine

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Dr. Sarah Laditka

_____
Mrs. Meghan Charpentier, MS, MPH

ABSTRACT

CASEY LAUREN STEPHENS. Using an Economic Incentive and Marketing Strategy for Healthy Food and Beverage Purchases at Sports Stadiums. (Under the direction of DR. ELIZABETH RACINE)

The prevalence of chronic disease and obesity is a public health problem in the United States. Nearly 37% of adults are obese. Federal agencies and foundations such has the Robert Wood Johnson Foundation (RWJ), Center for Disease Control and Prevention (CDC), and the United States Department of Agriculture have shifted their obesity prevention focus from the individual to the broader population. These groups are focused on changing the built environment to make healthy foods easily accessible. However, evidence that these programs improve healthy food purchases, diet quality, and health is limited. In Cabarrus County, North Carolina, the Cabarrus Health Alliance (CHA) received a grant from the CDC to address some of these built environment issues. The primary focus of the CDC Racial and Ethnic Approaches to Community Health (REACH) Grant is to reduce health disparities among Cabarrus County's Hispanic and African American population. There has been extensive research regarding built environment and healthy food access. However, there has been limited research testing the impact of recreational concession modification on healthy food purchasing. This study examined food and beverage data to determine if an economic incentive and effective marketing strategy would increase the sales of healthy food items and decrease the sales of unhealthy food items during the 2015 baseball season of the Kannapolis Intimidators single-A minor league baseball team. There were 5 Get Healthy Cabarrus

Nights (GHCN) games and 23 non-promotional weekend comparison games. The quantity of healthy and unhealthy food and beverages were examined for each game. Of the 16 healthy items added to the menu, the sales of hummus increased at the promotional games ($p=0.029$) and the quantity of an unhealthy item, candy, decreased ($p=0.041$). Bottled water, a healthy item, significantly increased at the comparison games ($p=0.047$). Additional research is needed to determine if the price promotion or the marketing strategies, or both, influenced the sales during the 2015 baseball season.

ACKNOWLEDGEMENTS

I would like to thank Dr. Racine and thesis committee members for their guidance and support while working on this project. I would also like to thank my friends and family for their support throughout my graduate school career and while writing my thesis. Lastly, I would like to thank the Kannapolis Intimidators for working with the CHA to heighten the quality of life of the residents of the Cabarrus County area.

DEDICATION

This project is dedicated to my friends and family, and their overflowing support for me while pursuing a higher level of education.

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CHAPTER 1: INTRODUCTION

The prevalence of chronic disease and obesity is a public health problem in the United States. Nearly 37% of adults are obese (Ogden et al., 2015). Moreover, 43% of Hispanic adults and 48% of African American adults are obese (Ogden et al., 2015). U.S. diabetes prevalence rates have increased by nearly 400% since 1980 (5.5 to 22 million) (Center for Disease Control and Prevention [CDC], 2015). Federal agencies and foundations such has the Robert Wood Johnson Foundation (RWJ), Center for Disease Control and Prevention (CDC), and the United States Department of Agriculture have shifted their obesity prevention focus from the individual to the broader population. These groups are focused on changing the built environment to make healthy foods easily accessible. One strategy for changing the built environment is by changing the foods offered in vending machines and concession stands at recreational facilities (Naylor et al., 2010).

The CDC has provided communities with nearly $1.1 billion dollars in funding to address the chronic disease epidemic (CDC, 2016). Furthermore, grant programs such as the RWJ's Healthy Eating Research Program have funded interventions/programs intended to increase healthy food options, including interventions at recreational and sports concessions. However, the evidence that these programs improve healthy food purchases, diet quality, and health is limited (Robert Wood Johnson Foundation, 2015; Naylor et al., 2015; Naylor et al., 2010; Laroche et al., 2014). Economic strategies, like coupons, may incentivize the purchase of healthy food options offered at concession stands and vending machines (Olstad et al., 2014; French, 2003; French et al., 2001;

Epstein et al., 2012). Research is needed to examine the impact of economic strategies intended to increase sales of healthy food options at local recreational facilities.

In Cabarrus County, North Carolina, the Cabarrus Health Alliance (CHA) received a grant from the CDC to address some of these built environment issues. The CHA is the Public Health Authority of Cabarrus County. CHA's mission is "to achieve the highest level of individual and community health through collaborative action" by providing clinical services, education, and prevention programing to the underserved citizens of Cabarrus County (Cabarrus Health Alliance, 2016). The primary focus of the CDC Racial and Ethnic Approaches to Community Health (REACH) Grant is to reduce health disparities among Cabarrus County's Hispanic and African American populations. By using policy, systems, and environmental approaches, the REACH project strives to address the causes of chronic diseases and promote healthy, active lifestyles.

One component of Cabarrus REACH is a partnership between the Kannapolis Intimidators and the CHA to provide healthy foods at Intimidators concession stands. The Kannapolis Intimidators is a local Single-A baseball farm team for the Chicago White Sox in Cabarrus County, NC. The Intimidators baseball games attract thousands of fans each season. They have 66 games per season with 5 of these games designated as "Get Healthy Cabarrus Nights" (GHCN). One component of the partnership was to offer the healthy foods at the concession stand at buy one, get one free (BOGO). The purpose of my thesis is to test whether the BOGO strategy increased the quantity of the healthy food items sold at the GHCN games at the Kannapolis Intimidator baseball games.

CHAPTER 2: LITERATURE REVIEW

This section describes the following topics: Healthy Food Access; the Impact of the Built Environment on Food Access, Food Choice, and Health; Concessions Research to Increase Healthy Eating; and Effective Marketing Strategies to Encourage Healthy Food Purchasing. These topics collectively assess the lack of healthy food access and how the environment plays a role in providing healthy food and beverage options to the community.

2.1 Healthy Food Access

In 2013, The Food Trust (Bell et al., 2013) reviewed 75 articles that were published between 2002-2012, synthesized the research, and discussed the importance of making healthy food accessible and its implications on the population's health. The study concluded that there are three areas of healthy food access concern: accessing healthy food is a challenge for many families, particularly those living in low-income neighborhoods, communities of color, and rural areas; living closer to a food retail store that sells healthy food choices is associated with better eating habits and decreased risk for obesity; and healthy food retail stimulates economic activity. The authors state that by addressing each of these areas of concern, communities that are lacking healthy food options can increase their healthy food availability, which would likely decrease the risk of obesity in the community and stimulate the local economy.

The United States Department of Agriculture and the U.S. Surgeon General also advocate for such interventions (U.S. Department of Agriculture [USDA] & U.S.

Department of Health and Human Services [USDHHS], 2015; U.S. Department of Health and Human Services, 2010). After reviewing 79 scientific journal articles, The Scientific Report of the 2015 Dietary Guidelines Committee concluded that environmental changes such as limiting electronic screen time, increasing healthy food choices at home, and increasing physical activity are key to providing healthy environments to all populations. The report highlights the healthy food access disparities in low-income and rural communities. The committee's primary goal for the United States is to make healthy, affordable foods and beverages available to all neighborhoods and communities in multiple settings throughout those areas. The report further supports environmental changes to increase healthy food access and prevent chronic disease by stating that there are critical opportunities to intervene at the community level in multiple settings such as in the home, school, workplace, and community.

2.2 The Impact of the Built Environment on Food Access, Food Choice, and Health

Larson and colleagues (2009) conducted a systematic review that examined neighborhood differences and their relationship to healthy food access including access to healthy and less healthy foods and dietary intake and the relationship of healthy food access and weight. Articles were searched via PubMed and MEDLINE using the key words neighborhood, environment, restaurant, obesity, disparity, and poverty to identify 43 studies. The review concluded that supermarkets tend to have the highest quality products at a lower cost for consumers. However, convenience stores sell more high calorie foods that are mostly prepared at higher prices than grocery stores. Larson et al. (2009) also determined that residents of low income, rural, and minority communities are

most often affected by the lack of access to healthy food products at supermarkets and chain grocery stores.

A review article by Story and colleagues (2008) examined the impact of changes to the built environment and policies on healthy food access. With a section that specifically emphasized disparities in food access in low-income communities, Story et al. (2008) focused on eight studies that found that healthy food options were less available in lower income communities compared to higher income communities. The article concluded that the lack of healthy food options in low-income areas may be contributing to the disparities in diet-related chronic diseases. Story and colleagues also stated that an effective strategy was working with local community churches and organizations to provide opportunities to purchase produce from local farmers.

In a prospective study, Rose et al., 2009 examined the relationship between weight status and the neighborhood food environment. The study was conducted in 26-parish areas of Southeastern Louisiana and examined the urban census tracts within that region. Of the 379 urban tracts in the area, 114 were randomly selected for healthy food assessment. Additionally, phone surveys were administered among 1,243 area residents to better understand the demographics of consumers in the area. Height and weight were collected during the phone interview. The results concluded that the most frequently observed stores in the area were gas/convenience stores (n=133) and small food stores (n=119). The information collected from both studies concluded that there was a positive association between the availability of energy-dense, unhealthy snack foods and higher BMI.

Valdez et al. (2008) studied the availability of fruits and vegetables in urban and rural areas of New York. The researchers surveyed 263 food retail stores and farmers' markets in downtown Albany and in New York's Columbia and Greene counties. The counties were divided into 4 areas within Columbia County and Greene County: a rural community, a small-town community, a minority neighborhood, and a mixed neighborhood. Each food retail store and farmers' market was visited, and the amount of fruit and vegetable for each store was tabulated. The authors found that rural communities had greater access to fresh fruits and vegetables compared to urban minority neighborhoods even though the rural area had fewer stores (4.2 stores per 10,000 rural residents and 6.5 stores per 10,000 urban residents, respectively).

The four journal articles (Rose et al., 2009; Larson et al., 2009; Valdez et al., 2008; Story et al., 2008) concluded that there are barriers to healthy food access, which impact the health of those low-income, minority communities. There is a need in low income, minority communities for additional grocery stores and retail food outlets to provide the opportunity to purchase healthy foods. Public community gatherings, such as sporting events and recreational facilities, are locations that could increase healthy food options.

2.3 Concessions Research to Increase Healthy Eating

The following is a review of three studies (Naylor et al., 2015; Naylor, et al., 2010; Laroche et al., 2014) that examined the benefits of adding healthier options to menus and labeling food options, using observational data and sales data.

Naylor, Olstad, and Therrien (2015) examined the impact of providing healthy food at recreational and sports facilities in British Columbia, Canada. The study compared two community types who agreed to add healthy food options to their menu. An intervention group (23 communities) received training, resources, and technical support to increase healthy food options in their concessions stands or vending machines; the comparison group (23 communities) received nothing to assist with the implementation of healthy food options. In the intervention group, the number of healthy vending products available increased by 4% while the unhealthy products available decreased by 10%. No changes were found in the comparison group.

In another study, Naylor et al. (2010) increased the healthy food and beverage options via concession stands and vending machines at recreational facilities such as public pools in British Columbia, Canada. Signs were used to promote the healthy food options to the pool patrons. The researchers surveyed patrons (N=561) about their opinions of the healthy food additions and the effect of the promotional signs on their purchasing decisions. The authors found that while 90% of patrons felt eating healthy was important, the lack of healthy food selection and the cost of healthy food were consistent barriers to purchase healthy food options. A significant number of patrons also reported that the health promotion marketing strategies at the recreational facilities did not affect their food purchases. The study concluded that as the number of healthy items increased, the sales of healthy items also increased. Researchers also stated that using only marketing strategies was not a sufficient tactic to increasing healthy food purchases at recreational facilities.

Laroche et al. (2014) compared the sales data from a high school concession stand for two seasons of fall sports in Muscatine, Iowa. In between seasons, healthy food options were added to the menu. Existing menu items were modified; some ingredients were substituted for those with less saturated fat or no trans-fat. Sales revenue was compared between seasons. In addition, students and parents completed a satisfaction survey at the end of each season. The new items accounted for 9% of the revenue in the second fall season. The survey results indicated that concession stand satisfaction remained the same or improved between the two seasons with the addition of the new foods and food modifications.

The three studies reviewed above provide evidence that increasing the accessibility of healthy foods is associated with the increased sales of healthier foods. A limitation to previous research is the lack of published studies in the United States. Canada has spearheaded research regarding the healthy foods in public recreational facilities initiative with promising results. A second limitation is the inconsistent definition of the terms “healthy” and “concessions” among the different studies. A third limitation is the lack of research in a variety of sports venues and other public settings; most research to date has been limited to recreational concession stands.

2.4 Effective Marketing Strategies to Encourage Healthy Food Purchasing

The following is a review of four studies that examined the effect of economic incentives on healthy food purchases. The four studies (Olstad et al., 2014; French 2003, French et al., 2001; Epstein et al., 2012) reported the results of behavioral economic interventions intended to promote healthy eating at recreational facilities.

Olstad et al. (2014) observed the effects of marketing strategies that included signs and 30% price reductions. The study was done at an outdoor pool facility in Alberta, Canada. The pool patrons included children and their parents. The researchers observed the purchasing habits of the patrons for 5 hours each day, for one workday and one weekend day. When using signs only, there was a 13% increase in healthy items sold, but this increase was not statistically different from pre-intervention sales. There was a 30% increase in healthy food sales when the cost of those items was reduced by 30%. When the economic incentive was used by itself, the increase of healthy food sales remained.

French (2003) focused on the impact of price reduction strategies on healthy food purchases. The study was conducted in two secondary schools in Minnesota. One school was in a middle-income, primarily white suburban neighborhood, and the other was in an urban area with a mixed racial/ethnic population. Prices for fresh fruit and baby carrot packages were reduced by 50%. During the price reduction intervention, sales of fresh fruit increased from 14 items per week to 63 items per week. Baby carrot package sales increased from 37 packets per week to 77 packets per week. Among all items, the price reduction was associated with an increase in sales at both venues.

French et al. (2001) examined the effects of two marketing strategies on low-fat food purchases from vending machines: pricing and promotion. The two types of locations chosen were 12 secondary schools and 12 work sites in the Minneapolis-St. Paul, Minnesota area; the intervention lasted one year. The study reported food purchases at baseline, during the price reduction, and after the return to the baseline prices along

with effects of 3 promotional strategies (none, low-fat label, and the combination of low-fat label plus a promotional sign). The prices were reduced by 10%, 25%, and 50% at all locations every few months; the reductions led to an increase of low-fat food purchases by 9%, 39%, and 93%, respectively. The price reduction was significantly associated with a higher percentage of low-fat food sales compared to no price reduction.

A review conducted by Epstein et al. (2012) assessed the relationship between the change in food prices and food-purchasing patterns. The authors reviewed the feasibility of using economic incentives in real world settings. The real-world settings included vending machine sites, cafeterias, restaurants, super markets, and farmers' markets. Economic incentives were defined as tax increases and price reductions. The authors concluded that tax increases on unhealthy food options did decrease the purchases of those food options, especially with impulse purchases. They also concluded that a price reduction of 50% was associated with a significant increase in the sale of healthier foods. The review could not quantify the precise price reduction necessary before health benefits are produced.

Among the studies reviewed, three were conducted in the United States (French 2003; French et al., 2001; Epstein et al., 2012), and one was conducted in Canada (Olstad et al., 2014). They consistently found that economic incentives influenced the sales of healthy food options. None evaluated the precise decrease necessary to provoke a change in purchasing behavior (Epstein et al., 2012).

Limitations of these studies include the lack of research conducted among larger public venues such as sports stadiums and arenas. The findings not be generalizable to

different food venues and populations. Finally, the ability to apply these findings in communities may be a challenge given that reducing prices may negatively impact profits.

2.5 Overall Findings in the Literature

There has been extensive research regarding built environment and healthy food access (Bell et al., 2013; USDHHS, 2010; USDOA & USDHHS, 2015; Larson et al., 2009; Story et al., 2008; Rose et al., 2009; Valdez et al., 2008). However, there has been limited research testing the impact of recreational concession modification on healthy food purchasing. The behavioral economic studies consistently found that a price decrease may increase the sales of healthy food items (French 2003; French et al., 2001; Epstein et al., 2012, & Olstad et al., 2014). The literature reviewed indicated that there was an inconsistent definition of the term "healthy" when selecting healthier foods and beverages for concession stands. The length of the interventions was also inconsistent, ranging from a few weeks to 12 months and had similar results. A final issue is the lack of research conducted in the United States. While federal agencies and foundations have supported healthy food concession projects, there is limited research on the impact of these interventions.

CHAPTER 3: HYPOTHESES

Null Hypothesis 1:

H_0: There is no significant increase in the quantity of X* healthy items sold and no decrease in the quantity of Y* unhealthy items sold comparing the GHCN games to the games that do not include GHCN during the 2015 season of the Kannapolis Intimidators minor league baseball team.

*X represents each of the 22 healthy food and beverage items listed below.

*Y represents each of the 33 unhealthy food and beverage items listed below.

Unhealthy Food Items	Hot Dog		Helmet Nachos
	Hot Dog Meal		Candy
	Hamburger		Pretzel
	Hamburger Meal		Cotton Candy
	Grilled Chicken Basket		Cracker Jacks
	Chicken Tender Basket		
	Brat		
	Colossal		
	Pretzel Dog		
	Pretzel Dog Basket		
	BBQ		
	Corn Dog		
	Fries		
	Chili Fries		
	Pizza		
	Wings (6 Count)		
	Wings (12 Count)		
	Tomato Sandwich		
	Kids Meal		
	Homemade Chips		
	Peanuts		
	Soda		
	Small Popcorn		
	Large Popcorn		
	Helmet Popcorn		
	Nachos		

Healthy Food Items	Turkey Wrap
	Grilled Chicken
	Water
	Lemonade Tea
	Salad
	Whole Fruit
	Lite Hot Dog
	Fruit Medley
	Nuts
	Hummus
	Applesauce
	Cheese Sticks
	Veggies
	Granola Bar
	Yogurt

Null Hypothesis 2:

H_0: There is no significant decrease in the ratio of Unhealthy Foods to Healthy Foods (UH:H) comparing the GHCN games to the games that do not include GHCN during the 2015 season of the Kannapolis Intimidators minor league baseball team.

Null Hypothesis 3:

H_0: There is no significant increase in the quantity of healthy food items sold per 100 patrons comparing the GHCN games to the games that do not include GHCN during the 2015 season of the Kannapolis Intimidators minor league baseball team.

CHAPTER 4: METHODS

4.1 Data Origin

The CHA in Cabarrus County, North Carolina was 1 of 49 organizations to receive a federal grant from the CDC to, in part, incorporate healthy food into the local minor league baseball concessions. The CDC REACH (Racial and Ethnic Approaches to Community Health) grant's primary focus is to reduce health disparities among African American and Hispanic populations in Cabarrus County. The Kannapolis Intimidators Food Sales Team agreed to add healthy food items to their menu throughout the 2015 baseball season. The Kannapolis Intimidators also agreed to host GHCN games throughout the baseball season during which a BOGO promotion was in place for healthy food items. During the 2015 baseball season, there were 66 home games. Of those 66 home games, 5 were GHCN games. The GHCN games occurred on Friday nights throughout the season.

The study data includes Kannapolis Intimidators Baseball food and beverage sales data from 28 weekend games held during the 2015 season; 5 GHCN games and the other 23 were regular weekend games (hereafter comparison games). GHCN games were on weekends; because purchasing behavior may be different on weekend days vs. weekdays, other weekend games were used as comparison games in this study.

4.2 Study Population

The study population is the Kannapolis Intimidator patrons' food and beverage purchases from the 2015 baseball season weekend games. Kannapolis is home to 44,359

residents and is the 20th largest city in North Carolina (Kannapolis.gov, 2016). The Kannapolis population is 68% White, 20% African-American, 12% Hispanic/Latino, and 1% Asian (Kannapolos.gov, 2016). Compared to the North Carolina average income of $46,334, Kannapolis residents' median income is $39,275 (Kannapolis.gov, 2016). According to the Cabarrus County Needs Assessment, 78.5% of Cabarrus County residents do not eat enough fruits and vegetables (Cabarrus Health Alliance, 2016).

4.3 Intervention Design

4.3. a. Get Healthy Cabarrus Nights

The city of Kannapolis partnered with the CHA to establish the GHCN games at the Kannapolis Intimidators ballpark. During these nights, attendees were encouraged to participate in fitness related games (such as a hula hoop contest) and to purchase healthy food and beverage options at a discount because of the BOGO promotion. CHA also partnered with a local fitness instructor to engage the audience in yoga during the 7th inning stretch of the baseball game. The GHCN games were advertised in the newspaper and local churches to promote the event. The healthy food options were sold at every game throughout the 2015 season; the BOGO promotional offer was available only at the GHCN games.

4.3. b. Marketing

Promotional signs were a key component of the GHCN games during the 2015 baseball season. Slogans such as "rethink your drink" and "eat smart at the ballpark" were displayed on large signs in the outfield to promote the healthy food options offered in the concessions. The menu boards highlighted the healthy food and beverage items

with an apple-shaped baseball emblem. Finally, announcements were made throughout the baseball game promoting the healthy foods offered at the concessions stands and promoting the BOGO promotional offer.

4.4 Choosing Food and Beverages to Add to the Menu

Nutritional guidelines from the CDC (CDC, 2015), the American Heart Association (American Heart Association, 2015), and the YMCA (YMCA, 2014) were used to define "healthy" foods and beverages. The CHA staff wrote the healthy food concession nutrition guidelines for the Intimidators concession staff. The following are the healthy food guidelines:

Foods (individual serving size):

- Not more than 200 calories
- Not more than 30% calories from fat, except for nuts and seeds; snack mixes and other foods of which nuts are a part much meet the 30% standard.
- Not more than 10% of calories from saturated fat
- Does not contain trans fat
- Not more than 35% total weight from sugar and caloric sweeteners
- Fruits and vegetables that have not been processed with added sweeteners or fats
- Not more than 300mg of sodium per serving

Beverages:

- Water with no additives
- 100% fruit juices with no added sugar
- Sports drinks less than or equal to 100 calories

Using the guidelines, the general manager of the ballpark chose the healthy food options which were then approved by a certified nutritionist at CHA.

4.5 Primary Independent Variable

The Kannapolis Intimidators' GHCN games that offered the BOGO promotion for healthy foods and beverages and marketing promotions is the primary independent variable for this analysis.

4.6 Outcome Variables

Outcome Variables for Aim 1: Quantity of Food and Beverages Items Sold

The food and beverage items sold were classified as "healthy" or "unhealthy." Apples, bananas, grapes, and oranges were grouped together as whole fruits in the dataset; carrots, snap peas, and celery were grouped together as vegetables in the dataset. The study examines the quantity of the 16 healthy and 33 unhealthy foods and beverages sold at the 28 2015 Kannapolis Intimidators weekend home baseball games.

Outcome Variable for Aim 2: Unhealthy:Healthy Ratio of Food and Beverages Sold per Game

The total quantity of unhealthy and healthy items sold were compared as a ratio (UH:H) for each game. The study examines the ratios of the GHCN games to the ratios of the comparison games for the 28 2015 Kannapolis Intimidators weekend home baseball games.

Outcome Variable for Aim 3: The Quantity of Food and Beverages Sold per 100 patrons

The quantity of healthy and unhealthy food items sold per 100 patrons was examined to control for game attendance. The study compared the quantity of food and

beverages sold per 100 patrons during GHCN games to the comparison games for the 28 2015 Kannapolis Intimidators weekend home baseball games.

4.7 Validity and Reliability of Data Collection Methods

Validity of the study: The sales data collected during the 2015 Kannapolis Intimidators baseball season included the sales data from every game throughout the 66-game season. To monitor sales and inventory, the Intimidators Concessions food transaction and payment system electronically records all sales data for every game.

Reliability of the study: Other than the current study, no other study has examined healthy concessions at a venue like a minor-league baseball stadium making it difficult to test reproducibility of our results to the literature. To measure reliability of the data, we could compare the 2015 sales data to the next season's data, 2016, and perform the same analysis.

4.8 Data Analysis

The quantity of each food and beverage item sold during the 2015 Kannapolis Intimidators Baseball Season is presented and stratified by healthy or unhealthy categorization. The healthy items were advertised with the BOGO promotion only during the GHCN games. The food and beverage purchases from 28 Kannapolis Intimidator baseball games were analyzed. Wilcoxon Rank Sum tests were used to compare sales at GHCN and comparison games. SAS statistical software was used and significance was set at $p<0.05$.

Aim 1: A non-parametric, one-sided Wilcoxon Rank Sum test analyzed whether there was a significant increase in each healthy and a decrease in each non-healthy food and beverage item sold at the GHCN games vs. the comparison games.

Aim 2: A second non-parametric, one-sided Wilcoxon Rank Sum test analyzed the ratios of the quantity of unhealthy foods sold to quantity of healthy foods sold. The ratios for the GHCN games vs. the comparison games were calculated to test if there was a significant decrease in the ratio at GHCN games.

Aim 3: A third non-parametric, one-sided Wilcoxon Rank Sum test analyzed the total quantity of healthy food sold at each game per 100 attendees. Differences in the quantity of healthy food items sold were tested between GHCN games and comparison games.

CHAPTER 5: ETHICAL ISSUE/HUMAN SUBJECTS PROTECTION

This project was reviewed by the University at North Carolina at Charlotte Office of Research Compliance. It was determined that this study does not require IRB approval because the sales data is not human subjects research (see Appendix A).

CHAPTER 6: RESULTS

Table 1 presents the significant results comparing the quantity of healthy and non-healthy foods sold at GHCN games and comparison games (Appendix B). Of the 16 healthy items added to the Intimidators menu in the 2015 season, the sales of one item, hummus snacks, significantly increased during the GHCN games when offered at a promotional price (p=0.029). Bottled water was sold significantly less at the GHCN games vs. the comparison games (p=0.047). Of the 31 unhealthy items offered, one item, candy, significantly decreased during the GHCN games vs. the comparison games (p=0.041).

Table 1: Significant results comparing the quantity healthy and non-healthy foods sold during the Get Healthy Cabarrus Nights games and comparison games.

	Food Item	**Number of items sold at GHCN games (median)**	**Number of items sold at comparison games (median)**	**P-value**
Healthy Items	Hummus snacks	4.0	1.0	0.029
	Bottled water	134.0	153.0	0.047
Unhealthy Items	Candy	6.0	10.0	0.041

Table 2 shows the UH:H ratios for GHCN games and comparison games. There was no significant decrease in the ratios..

Table 2: Comparison of Ratios of Food sold during the Get Healthy Cabarrus Nights games and comparison games.

Game	Ratio (UH:H)	Difference	P-value
GHCN games (n=5)	11.3	3.9	0.18
Comparison games (n=23)	15.2		

Table 3 displays the total quantity of healthy food per game by the game's attendance. There was no significant difference in total healthy items sold per 100 patrons when comparing the GHCN games and comparison games..

Table 3: Comparison of Total Healthy Foods Sold per 100 patrons during the Get Healthy Cabarrus Nights games and comparison games.

Game	Total healthy items sold per 100 patrons (median)	Difference	P-value
GHCN games (n=5)	10.6 per 100 patrons	2.6	0.26
Comparison games (n=23)	10.7 per 100 patrons		

CHAPTER 7: DISCUSSION

Obesity and other chronic diseases continue to be a concern in the United States. Federal agencies have shifted their obesity prevention focus from an individual to the broader population, and focusing on changing the built environment to make healthier foods accessible to more people.

The results of the present study indicate that there was a significant difference of quantity sold in 3 of the 49 healthy and unhealthy food items comparing GHCN games and non-promotional games. Hummus was the only healthy food item that was sold significantly more at the GHCN games. This was consistent with French and colleagues (2003) study which found that the sales of healthy food items offered significantly increased with the addition of a price promotion. Fruit and carrots sales significantly increased in this previous study; however, the fruit and vegetable food options did not significantly increase in the current study. French (2003) did not test hummus snacks as a healthy food option in the study.

Candy was the only unhealthy food sold significantly less at the GHCN games vs. the comparison games. It is unclear why candy sales decreased. The authors suggest that it may be related to the person purchasing the item. For instance, Olstad, et al. (2014) found that the individual purchasing an item was a factor that influenced the items purchased. In the Olstad, et al. (2014) study, children accompanied by their mother were more likely to purchase healthier food options than if the children visited the concessions stand alone. Although the present study did not record who purchased each food and beverage item, parents attending the games with their child may be more likely to notice

the event's healthy food theme and as a result either purchase healthier food options for their child or avoid purchasing unhealthy items such as candy. Future research to understand the impact of a healthy eating campaign on parent food purchases for their children is warranted. Additionally, a patron-focused qualitative survey could also be given to better understand their thought processes in light of the healthy food focused GHCN game and determine if the social pressures from other parents is a factor when making healthy food purchases.

Bottled water was sold significantly more at the comparison games than the GHCN games. This result is not consistent with previous studies (French et al., 2003). which is a contradiction to the previous literature. The result may be due in part to the higher temperatures that occur during the day games rather than the evening baseball games. GHCN games were on Friday evenings only, while the comparison games occurred during the weekend days. A future study could perform the same procedures as the current study, excluding water as a healthy food item to determine if water had a biased impact on the results of this study.

It is unclear why the sales of hummus increased and other healthy food and beverage items did not as a result of the GHCN promotions. It may be related to cost. The BOGO promotion charged customers for the higher cost of two items. Price differences were not analyzed in this study; further research would need to be conducted to determine if the item price determined which healthy food items were purchased more frequently.

CHAPTER 8: STUDY STRENGTHS AND LIMITATIONS

Strengths

One strength of this study is the use of electronic sales data from the Intimidators Concessions as opposed to self-reported food purchasing data. Another strength is the completeness of the sales dataset. The sales data includes the sales made at every game during the 2015 season. The sales data were collected electronically through the point of service registers, a more valid method, compared to some the other studies that used personnel reported sales (Laroche et al., 2014).

Limitations

This study has several limitations. The dataset used was from one Kannapolis Intimidators baseball season, which only had 5 GHCH baseball games out of the total 66 games during the 2015 season. In the future, additional GHCN games should be added to create a larger sample of GHCN games which would provide the study more statistical power.

A second limitation is that we cannot determine that the BOGO component of GHCN promotion increased the purchasing of healthy food options during the games. We can only conclude that using marketing strategies simultaneously with the BOGO promotion increased the purchasing of these items. In a future study, investigators are encouraged to test each tactic (price reduction and marketing) separately to measure the effectiveness of each method to understand which is more effective by itself.

A third limitation is that the free item in the BOGO offer is unknown. The patrons' food and beverage sales data only contained information about the foods that were purchased. Therefore, we assume that the number of healthy food items distributed to patrons was double the items sold. In the future, the concessions team could keep a record of the patrons' free items to fully understand which food or beverage items were chosen as the free healthy item.

A final limitation of the study is the long run feasibility of this program. This program was funded through the CDC REACH grant with finite funding. To make this program a recurring event, funds would have to come from another stakeholder or additional research should be done to determine the net cost of the intervention. Perhaps the BOGO model encourages higher game attendance and does not negatively impact sales. If so, the promotion may not need outside funding.

CHAPTER 9: CONCLUSION

Overall, the number of healthy food items did not increase because of the GHCN intervention; however, the sales quantity of one healthy item did increase. Since there was an increase in sales, the CHA and Kannapolis Intimidators should have additional GHCN promotional games scheduled for next season to increase healthy food access and choice for baseball patrons and provide a more substantial sample size for analysis. Additional research is needed to fully understand if the price promotion or the marketing strategies, or a collaborative effort of both, influenced the sales of healthy foods during the 2015 Kannapolis Intimidators baseball season.

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APPENDIX A: UNVERSITY IRB NOTICE

OFFICE OF RESEARCH COMPLIANCE
9201 University City Boulevard
319 Cameron Hall
Charlotte NC 28223-0001
(704)-687-1871
Web site: http://research.uncc.edu/
Federalwide Assurance (FWA) #00000649

To: Casey Stephens
From: Office of Research Compliance
Date: 5/19/2017
RE: Determination that Research or Research-Like Activity does not require IRB Approval
Study #: 17-0214
Study Title: Offering an Economic Incentive and Marketing Strategy for Healthy Foods and
Beverages
at Sports
Stadiums
This submission was reviewed by the Office of Research Compliance, which has determined that this submission does not constitute human subjects as defined under federal regulations 45 CFR 46.102f and does not require IRB approval.
Study Description:

This study will test the impact of using a Buy One Get One Free promotion and marketing strategy to increase the purchasing of healthy food and beverage items at the Kannapolis Intimidators minor league baseball stadium. The study will compare the quantity of healthy food and beverages sold at the Buy One Get One Free promotion nights to the regular non-promotional games during the 2015 baseball season. The data used for this study will be the quantities of food sold during the 2015 baseball season and will come from the Kannapolis Intimidators Concessions Sales Data.

Please be aware that approval may still be required from other relevant authorities or "gatekeepers" (e.g., school principals, facility directors, custodians of records), even though IRB approval is not required.
If your study protocol changes in such a way that this determination will no longer apply, you should contact the above IRB before making the changes.

APPENDIX B: COMPARISON OF HEALTHY AND UNHEALTHY FOOD AND BEVERAGE ITEMS SOLD DURING THE GET HEALTHY CABARRUS NIGHTS GAMES AND COMPARISON GAMES

	Food Item	**GHCN games (median sold)**	**Comparison games (median sold)**	**P-value**
Unhealthy Food Items	Hot Dog	86.0	111.0	0.093
	Hot Dog Meal	25.0	23.0	0.489
	Hamburger	25.0	43.0	0.305
	Hamburger Meal	17.0	18.0	0.452
	Grilled Chicken Basket	9.0	11.0	0.440
	Chicken Tender Basket	30.0	40.0	0.264
	Brat	21.0	22.0	0.500
	Colossal	6.0	6.0	0.440
	Pretzel Dog	6.0	8.0	0.326
	Pretzel Dog Basket	10.0	8.0	0.154
	BBQ	10.0	9.0	0.488
	Corn Dog	16.0	19.0	0.274
	Fries	35.0	58.0	0.236
	Chili Fries	18.0	20.0	0.464
	Pizza	45.0	54.0	0.255
	Wings (6 Count)	5.0	4.0	0.369
	Wings (12 Count)	3.0	7.0	0.058
	Tomato Sandwich	1.0	4.0	0.090
	Kids Meal	25.0	36.0	0.326
	Homemade Chips	2.0	3.0	0.500
	Peanuts	29.0	31.0	0.371
	Soda	217.0	235.0	0.140
	Small Popcorn	22.0	27.0	0.084
	Large Popcorn	30.0	30.0	0.326
	Helmet Popcorn	2.0	3.0	0.206
	Nachos	20.0	28.0	0.326
	Helmet Nacho	1.0	1.0	0.500
	Candy	6.0	10.0	0.041*
	Pretzel	15.0	23.0	0.154
	Cotton Candy	0.0	1.0	0.128
	Cracker Jacks	7.0	6.0	0.264
Healthy Food Items	Turkey Wrap	7.0	6.0	0.235
	Grilled Chicken	14.0	11.0	0.154
	Water	134.0	153.0	0.047*
	Lemonade Tea	39.0	56.0	0.109
	Salad	0.0	1.0	0.450
	Whole Fruit	9.0	11.0	0.090

	Lite Hot Dog	3.0	3.0	0.290
	Fruit Medley	3.0	2.0	0.187
	Nuts	0.0	0.5	0.184
	Hummus	4.0	1.0	0.029*
	Applesauce	0.0	1.0	0.265
	Cheese Sticks	0.0	1.0	0.191
	Veggies	2.0	0.0	0.166
	Granola Bar	0.0	1.0	0.057
	Yogurt	1.0	1.0	0.253