AN ABSTRACT OF THE THESIS OF

Amy M. Frasieur for the degree of Master of Science in Nutrition presented on July 8, 2009.

Title: Posting Point of Sale Nutrition Information in a College Dormitory Food Court: Impact on Students' Food Choice Motives and Venue Sales

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As rates of obesity continue to rise in the United States, interest in restaurant menu labeling has become a growing phenomenon. Many proposed initiatives to require posted nutrition information at the point of sale or decision point for choosing restaurant fare are gaining attention. Research to explore how nutrition labeling may impact food selection, sales and consumer response is limited. The purpose of this study was to explore the various impacts of posting point of sale nutrition information (calories and fat grams) on venue and item sales as well as how food choice motives (FCM), nutrition awareness and purchase choice motives influence choice among subjects in a college dormitory food court. Nutrition information was posted for menu items at two (treatment venues) of seven total venues in a college dormitory food court. Sales data was gathered via ETEK system software to analyze trends in overall sales for all venues and for specific items sales at treatment venues. Survey data was collected before and after the treatment posting, with an N=348 respondents. Results revealed that sales declined in both treatment and some control venues over time. The experimental treatment also revealed that one venue with posted nutrition information showed significant declines in sales transactions during the nutrition information

posting period, compared to baseline. Several food items from both of the treatment venues decreased in sales with the posting of nutrition information. Survey data revealed that taste and convenience ranked higher than health in motives driving food choice. Females ranked health and weight control more highly on the scale of food choice motives than males. Food choice motives from surveys were frequently similar to purchase choice motives among respondents, suggesting for this population, FCM may relate to actual purchase. Nutrition awareness was measured by two survey items asking respondents to estimate their own caloric and fat requirements; answering both correctly earned a positive score for nutrition awareness. The females in this study were more likely to earn a positive score for nutrition awareness than males. In general, only half of surveyed respondents noticed the posted nutrition information in the venues and of those who noticed it, fewer than 15% indicated that the posted nutrition information was a strong influence on their purchase choice. Although the posting of nutrition information appeared to have some impact on respondents' food purchases, additional research is needed to understand if college students' value the need to choose healthy fare; the factors that drive food choice among them; and if calorie and fat labeling will impact healthy dining in dormitory food courts.

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Posting Point of Sale Nutrition Information in a College Dormitory Food Court: Impact on Students' Food Choice Motives and Venue Sales

by

Amy M. Frasieur

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Dean of the Graduate School

I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

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Amy M. Frasieur, Author

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Posting Point of Sale Nutrition Information in a College Dormitory Food Court: Impact on Students' Food Choice Motives and Venue Sales

CHAPTER I: INTRODUCTION

Motivation for Study

Obesity rates among the American public have been increasing over the past few decades (Centers for Disease Control and Prevention [CDC], 2008). Although the equation for stable weight appears relatively simple; calories in equal's calories out; trends in weight gain imply that individuals are not able to apply this to their dietary behaviors. Obesity threatens everyone, including the elderly, adults and even children. Staggering health consequences related to obesity include type 2 diabetes, hypertension, heart disease, stroke, arthritis, fatty liver disease, sleep apnea and some cancers (CDC, 2008). The economic burden of obesity and its co-morbidities has taken an overwhelming toll on our nations' health care system. In 2007, the estimated diabetes-related costs alone in the US totaled $174 billion dollars (American Diabetes Association, 2008). The likelihood that health care expenditures for obesity and co-morbidities will increase is great considering the increase in childhood obesity rates. As these children reach adulthood, greater medical costs are inevitable.

In addition to cost, being obese also contributes to stigmatization and discrimination of those individuals (Puhl & Brownell, 2001). Thus, many obese adults

and children may suffer from depression and low self esteem providing a continuous circle of frustration and desperation that often renders them unable to make healthful and long term behavior changes.

Multiple explanations for the causes of obesity are being proposed with consideration to biological (e.g., genetics, hormones, etc), sociological (lifestyle, etc), psychological (eating and activity behaviors, etc) as well as environmental causes (foods available, marketing and advertising, etc) (Drewnowski & Rolls, 2005). The role of portion size, dietary choices, and eating patterns that include frequent foods consumed outside the home has received attention (Clemens, Slawson, & Klesges, 1999; Lin & Frazao, 1997; Clausen, 1999; Young & Nestle, 2002; Burton, Creyer, Kees, & Huggins, 2006). Up to 5.8 meals and snacks per week are consumed away from home by Americans each week according to the National Restaurant Association (National Restaurant Association, 2008). Others suggest that individuals consume larger portions and inaccurately assess the number of total calories and fat in restaurant fare (Burton et al, 2006). Additional evidence indicates that food away from home is not only higher in energy density; it is also higher in saturated fat and sodium than food prepared in the home (Clemens et al, 1999; Lin & Frazao, 1997). A potential strategy for reversing the obesity trend, quickly gaining popularity, is the option of point of sale nutrition labeling for restaurant fare.

Menu labeling laws are currently being considered at local (King County, 2008), state and federal levels (Romeo, 2007; Koteff, 2008; Center for Science in the Public Interest [CSPI], 2008).

Most recently, three U.S. Senators are sponsoring a menu labeling bill that, if passed, will preempt all existing state and local menu labeling requirements (Nation's Restaurant News, 2009). Menu labeling initiatives are poised as having potential for influencing the obesity epidemic considering Americans' penchant for eating out. Critics commonly blame low-cost, readily available restaurant and snack food for making us obese (Nestle, 2002). Therefore, the potential outcome of point of sale nutrition information is thought to be the ability to influence more healthful food choices while dining out.

The current menu labeling initiatives being considered are improvements upon previous labeling requirements that were implemented in 1997. This 1997 legislation regulated restaurants' provision of menu based health claims and symbols, such as menu sections designated as "low fat" or "heart healthy" (Kurtzweil, 1997). However this legislation is limited and does not address caloric content of restaurant fare which would be more consistent with FDA regulations for packaged foods.

Restaurants must back up any nutrition or health claims with "reasonable" evidence. And while this information must be available to the customer, it is not required to be posted on the menu or at the point of sale. It must be made available upon request, in either written or verbal format (Kurtzweil, 1997). The downfall of existing legislation is twofold as consumers: (1) often do not have the forethought to look up nutritional information (at a website) before going out to eat and/or may have already made their choice before seeing the information and (2) do not know that they can ask for additional nutrition information if it is not conspicuously posted.

Although new and pending legislation regarding menu labeling may have impact on consumers' food choices while dining out, it is important to remember that this legislation will only impact specific venues (i.e. primarily fast food and franchise restaurants, those with several (~15-20+) locations) and therefore will not impact all restaurant venues (Nation's Restaurant News, 2009). Because not all restaurant venues will be impacted, there is the concern that consumers may make choices based on venue (whether or not nutrition information is posted) which could mitigate the usefulness of menu labeling.

Additional research is needed in the area of menu labeling to determine how such legislation might impact consumers' restaurant venue and menu choices. There is still uncertainty if posting nutrition information in restaurants will encourage people to make better choices when presented with such information at the point of sale. In addition, some are concerned that consumers may not understand or use such information. A recent study found that up to 57% of respondents reported they would not use food label information in restaurants even if it were available (Krukowski, Harvey-Berino, Kolodinsky, Narsana, & DeSisto, 2006). Older research has tried to explore the role of labeling and nutrition education campaigns in restaurants and other locations, but none has focused on food choice motives or to what extent respondents' noticed or used the posted nutrition information (Albright & Flora, 1996; Devost, Masson & O'Loughlin, 1999; Fitzgerald, Kannan, Sheldon & Eagle, 2004; Holdsworth & Haslam, 1998; Dwivedi & Harvey, 1999).

Menu labeling may be an appropriate way to facilitate the food choices among students' on college campuses. For the first time young adults in college will

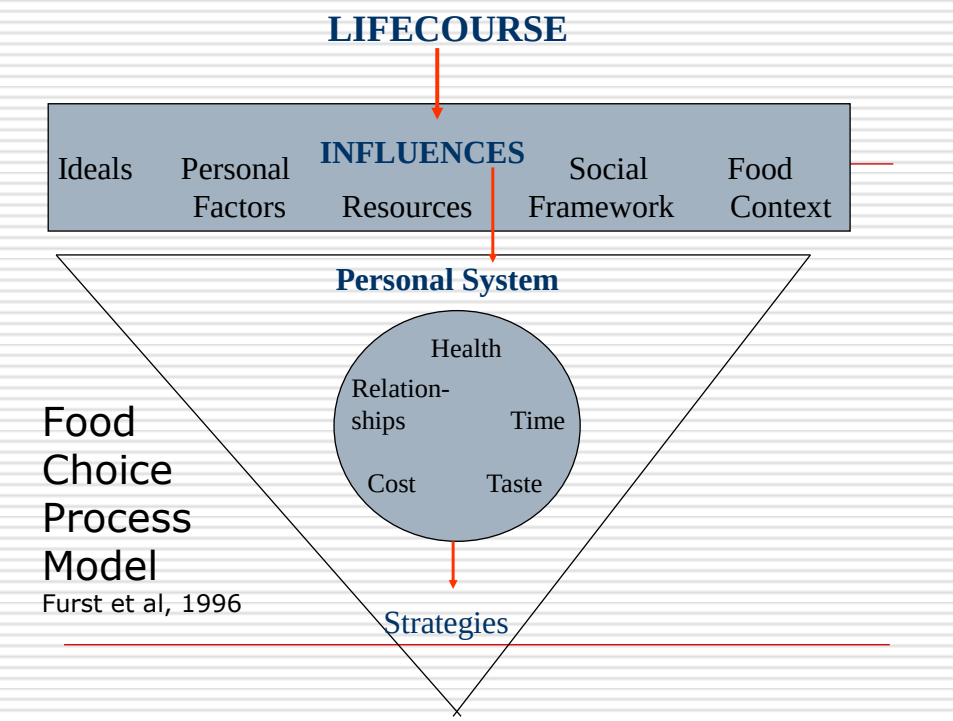
experience significant freedom including making independent food choices as they are eating away from home on a daily basis. College students report being challenged in making healthy food choices (Cluskey & Grobe, 2009) and this challenge may be aggravated when dormitory food plans include fast food-like concepts. Studies have shown that students gain weight at college and the confusion with making food choices may be a contributing factor (Anderson, Shapiro & Lundgren, 2003; Butler, Black, Blue & Gretebeck, 2004). While peer influence on alcohol behaviors has been studied among college students, there is limited investigation in the role of peer influence upon college student eating behaviors. Several studies have reported that social influence is highly influential on choice and eating behaviors (Pliner & Mann, 2003; Stroebele & De Castro, 2004).

One study in 2005 by Conklin et al, examined how posting nutrition information in a college dormitory influenced awareness of nutrition labeling as well as food choice. The study reported significant differences by gender and recommended posting nutrition information in college dormitories in order to promote nutrition education (Conklin, Cranage, & Lambert, 2005). Providing students' information such as menu labeling may assist in improving their food choices and therefore play a role in better weight management.

Food choice and eating behavior has been explained with the Food Choice Process Model (Figure 1) (Furst, Connors, Bisogni, Sobal & Falk, 1996). This describes the process by which individuals make food selections. The model provides three major components: (1) life course, (2) influences and (3) personal system. Life course refers to the expansive cultural, social and physical influences within one's

environment to which individuals are exposed over the course of a life. These influences provide a framework from which one may create and shape their personal system for making food choices. An individuals' personal system involves negotiating values in making a food choice as well as developing routine decision making strategies or food habits. The individuals' personal system is used to create a set of motives that drive food choice including sensory perceptions, monetary considerations, convenience, health and nutrition, managing relationships and quality (Furst et al, 1996). Strategies for choice are used to decide what to eat when motives conflict (eating healthy is expensive) or when eating context requires the motive priorities to change (food choices with friends at a party).

Figure 1: Food Choice Process Model



Food choice motives have been explored by others that report very similar motives including: sensory appeal or taste, health, convenience or time, cost or price, mood or context (social situation or eating with others) (Steptoe, Pollard & Wardle, 1995; Glanz, Basil, Maibach, Goldberg, & Snyder, 1998; Pliner, Bell, Hirsch & Kinchla, 2006). Research has helped us understand that eating behavior occurs as a set of strategies for managing food choice motives in various eating situations and frequently those food choice motives may conflict (Furst et al, 1996). Although consumers have varying responses to their most important food choice motive, taste (sensory appeal/perceptions) frequently ranks highest among the list of food choice motives (Glanz et al, 1998; Steptoe & Wardle, 1999; Prescott, Young, O'Neill, Yau & Stevens, 2002).

Few studies have examined the use of food choice motives among college students and if those motives are modified by the presence of nutrition information (menu labeling). One study by Krukowski et al, 2006, found that from a sample of over 900 individuals from a college and a community setting, "only 67% of the participants were able to identify the number of calories that they should be consuming." The researchers did find that college females were significantly more likely to have accurate nutrition awareness of the appropriate calorie range than either college males or both genders from the community. However, this percentage still reflects an absence of awareness for one third of the subjects and does not address if subjects knew how to identify which foods or choices would provide those required calories. Questions remain regarding whether or not posting nutrition information will make individuals more aware of healthful purchases. Also, if students consider health

to be an important food choice motive, will the awareness of caloric content of foods offered for sale impact their choices?

Statement of Purpose

The purpose of this research was to contribute to an understanding of how posting nutrition information may impact food choices among college students. Ultimately, this information will add to the body of literature about food choice, restaurant menu nutrition information and college students. It examines one intervention that could impact weight gain in this population.

Objectives of Study

The objectives of this study were to:

- Evaluate the impact of posting point of sale (POS) nutrition information (calories and fat content) at the Oregon State University (OSU) Campus MarketPlace West (MPW) dormitory food court on:
    - Item sales at two (treatment venues – Calabaloos and the Deli) of seven total restaurant venues.
    - Total sales at opposing (control) restaurant venues (EBGB's, Ring of Fire, Serrano Grill, Tomassitos, and Four Corners).
- Investigate food choice motives, purchase choice motives, nutrition awareness and the use of posted information among the patrons of Calabaloos and the Deli venues at the OSU MPW dormitory food court.

These study objectives were explored with an experimental research design whereby nutrition information was posted in one OSU campus dormitory food court and sales were monitored for the pre and post treatment periods. Groups of students eating at the two venues where the menu information was posted were surveyed once during the pre-treatment and once during the post treatment time to gather data about their food choice motives as well as nutrition awareness and use of posted information.

Null Hypotheses

As the focus of this research study, six primary research hypotheses and one secondary research hypothesis were considered.

Primary Research Hypotheses:

<u>Null Hypothesis H01</u>: There will be no significant difference in weekly item sales (as a percentage of total sales) at either Calabaloos or the Deli at MPW after posting calorie and fat information to the menu.

<u>Null Hypothesis H02</u>: There will be no significant difference in the total weekly sales transactions at MPW venues (Calabaloos, the Deli, EBGB's, Ring of Fire, Serrano Grill, Tomassitos or Four Corners) after posting calorie and fat information at Calabaloos and the Deli.

<u>Null Hypothesis H03</u>: There will be no correlation between food choice motive and purchase choice.

<u>Null Hypothesis H04</u>: The addition of calorie and fat information will not change the respondents' food choice motive.

<u>Null Hypothesis H05</u>: There will be no difference in food choice motives among pre and post survey respondents eating at either Calabaloos or the Deli.

<u>Null Hypothesis H06</u>: There will be no difference in purchase choice motive among pre and post survey respondents eating at either Calabaloos or the Deli.

Secondary Research Hypothesis:

<u>Null Hypothesis H07</u>: There will be no difference in the demographic characteristics among pre and post survey respondents at Calabaloos or the Deli.

CHAPTER II: LITERATURE REVIEW

Nutrition Labeling Laws

Over the past few decades we have seen a significant rise in the incidence of overweight and obesity in our country. Many factors can be attributed to this rise such as increased portions sizes, increases in the amount of meals eaten away from home, decreases in physical activity and others (National Institute of Diabetes and Digestive and Kidney Diseases [NIDDK], 2008). Nutrition labeling for packaged food began in 1966 with the Fair Packaging and Labeling Act, requiring all consumer products in interstate commerce to be honestly and informatively labeled (Federal Trade Commission, 2009). An additional law came into effect two decades later; The Nutrition Labeling and Education Act (NLEA) of 1990 required the labeling of manufactured and packaged foods in an effort to help consumers better understand the nutritional makeup of their purchased food. This Act, although effective in allowing consumers to determine the nutritional content of the foods they were purchasing (e.g. grocery stores), exempted food sold for immediate consumption (e.g. restaurants) (U.S. Food and Drug Administration [FDA], 2008).

The fact that the food sold for immediate consumption was exempted from the NLEA has proved to be somewhat of a fatal flaw. Because the initial goal of the NLEA was to facilitate the American public in making healthy food choices, many now question the decision to omit restaurant foods. Congress has worked to improve the NLEA with addendums such as the 1997 inclusion of regulations for any restaurant menu items suggesting health claims.

The newest addition to menu labeling has begun with implementation in a handful of cities, counties and states. Specifically, New York City (the first to implement a menu labeling law), as well as King County (Seattle) have both passed legislation and begun implementation requiring caloric menu labeling at restaurants. Although each law has its own specific version, they follow similar guidelines. New York City, the first to implement its legislation in 2008, requires that all chain restaurants (including fast food) with 15 or more units, list calories for standard menu items on menu boards, menus or food item display tags. The information must be displayed in the same font and format as the name and price of the menu item itself. To encourage compliance, fines of up to $2,000 may be imposed on any restaurant not participating (CSPI, 2008).

In addition to New York City and King County, many other cities, counties and states have passed legislation into law or have introduced menu labeling legislation. Statewide menu labeling measures have fairly recently been approved by lawmakers in Oregon, Connecticut, California and Massachusetts (Nation's Restaurant News [NRN], 2009). Most recently, U.S. Senators Tom Harkin D-Iowa, Tom Carper, D-Del., and Lisa Murkowski, R-Alaska, have proposed a federal bill that would require any chain restaurant with 20 or more locations to disclose the number of calories per menu item on the menu or menu board. These restaurants would also be required to provide written information including calories from fat, total fat, saturated fat, cholesterol, sodium, carbohydrates, sugars, dietary fiber and protein (NRN, 2009).

Proposed labeling laws will require restaurants to clearly post nutritional information on menu boards or menus at the point of sale so that consumers are not

required to request or search for this information (Wootan, Osborn & Malloy, 2006). The current federal bill, which would preempt all other menu labeling laws if passed, would require restaurants to post a statement regarding daily caloric intake and notify customers of the additional nutrition information available upon request (NRN, 2009).

Providing information at point of sale is considered superior by proponents as consumers are unlikely to be able to or have the forethought to look up nutrition information before making their restaurant purchase. Likewise, they may not recall that information when ordering. Providing nutrition information on food wrappers or tray liners has also been suggested, but has been criticized as being less effective since it is only available for review after a purchase is made. An important concept is that menu labeling provides information a consumer may or may not choose to utilize.

A study in 2007 asked focus group participants' questions regarding menu labeling and in general, found that participants said they may not always use the nutrition information provided when deciding what to eat. Consumers stated that taste, convenience, price, cravings and family preferences were all factors that compete with healthful eating (Lando & Labiner-Wolfe, 2007). As more and more labeling laws are implemented in different areas of the nation, it is important that we continue to research their effect on consumer behavior. As we do so, the arguments for both sides of this issue will continue, trying to determine whether or not menu labeling will improve the health of our nation.

Restaurant Eating, Foods Away From Home and Nutritional Impact

Research has found that food consumed when eating out is frequently higher in calories, fat and sodium than foods prepared at home (Clemens et al., 1999; Lin & Frazao, 1997). In 2006, Burton et al, found that consumers substantially underestimate the calories and fat content in the foods they purchase when dining out. In many cases, actual content of fat, saturated fat and calories were more than twice what consumers' estimated. Not only do average consumers have difficulty estimating the nutrition content of foods away from home, another study found that nutrition professionals also frequently underestimate the content of popular restaurant meals by several hundred calories (Backstrand, Wootan, Young & Hurley, 1997).

The study by Burton, et al (2006) also suggested that menu labeling could prove to be exceptionally helpful to consumers by decreasing calorie consumption. On average, consumers significantly underestimated less-healthful (higher fat and calorie) items by more than 600 calories. Burton suggested that if diners consumed this amount (600 calories) of additional calories unknowingly for only one restaurant meal a week, they would be adding up to 30,000 calories a year to their diet. This amount of calories could theoretically cause a weight gain of approximately 9 pounds annually.

Burton's estimation of weight gain by the overconsumption of food (unbeknownst to the consumer) paints a fascinating portrait of obesity in our country. If individuals are frequently unaware of the amount of calories and other nutrients they are consuming when dining out, it is entirely possible that the knowledge provided by menu labeling could very well slow or reverse the obesity epidemic we are currently

facing in the U.S. Even if individuals are unaware of their daily nutrient needs, consumers could choose a lower calorie option when comparing the nutrition information of various choices. Whether or not consumers will actually utilize the information provided remains unclear.

Increases in Portion Size

Meals consumed at restaurants generally have larger portions than those consumed at home (Stroebele & De Castro, 2004). Not only are consumers eating out more than ever before, but the expanding portion sizes at restaurants and other venues appear to be contributing to the steady rise in overweight and obesity. Several studies have explored the trend of increasing portions, including one study examining comparisons of current portion sizes with standards from the USDA (Young & Nestle, 2002). Not only has the American expenditure for food eaten away from home increased from 34 to 47 percent between 1970 and 1995, the serving sizes of the food provided also continues to expand (Clausen, 1999). Young and Nestle (2002) reported that bread products, alcoholic beverages, steaks and soda have displayed the largest excess above the USDA standard portions, up to 480 percent greater than the standard.

From an epidemiological perspective, larger portions in the US parallel the increasing rates of obesity in our country. Larger amounts of food presented results in consuming larger amounts of food for most people. Studies have shown that people eat more when served larger portions (Rolls, Morris & Roe, 2002) and individuals make the assumption that serving sizes presented at service or sold in a container is a portion (Diliberti, Bordi, Conklin, Roe & Rolls, 2004). A study by Wansink and Kim

(2005) researched individuals' food consumption as related to the amount of food provided. Medium and large containers of fresh and stale popcorn were offered to consumers at a movie theatre venue. Even when given stale popcorn, subjects ate increased amounts when provided the larger container. The results of the study suggest that consumers will over eat foods, even when they are not particularly palatable, if they are presented in large quantities. The authors concluded that portion size can be as influential as taste in influencing consumption; remarkable considering taste has repeatedly been found to be the primary food choice motive (Steptoe et al, 1995). The idea that portion size can challenge taste for influence on consumption provides insight into the parallel of portion size and obesity in our country.

Improving the Healthfulness of Eating Out

Research continues to explore whether or not the requirement for adding nutritional information in restaurant environments would foster improved eating habits for the American public. Studies have been conducted to look at menu labeling, nutrition education and other forms of information provided to the public. A study by Harnack (2006) researched the extent to which nutrition information is currently being provided on the menus of major chain table-service restaurants. The top table-service restaurant chains (by sales volume) such as Applebee's, Red Lobster, Outback Steakhouse, Olive Garden, The Cheesecake Factory and P.F. Chang's China Bistro were studied and this direct observation research was used to identify the availability of nutrition information on the menus. Of fifteen total restaurants observed, only ten had any posted nutritional information on the menu and nine of those had information only for items labeled with health claims such as low fat or heart healthy (which is

mandatory by the 1997 NLEA legislation). None of the restaurants provided nutrition information for greater than half of their men items.

Other promotional campaigns focusing on healthy choices in restaurants have been conducted to reveal their impact upon consumer restaurant choice. An article by Fitzgerald, Kannan, Sheldon & Eagle (2004) found that during an 8-week promotional campaign focusing on heart healthy menu items, only a slight increase in the sales of healthy items. The campaign used several promotional strategies (posters, table tents and advertisements in newspapers and other media publications) to promote the sales of healthy fare. Further research was suggested to determine what strategies may be useful in assisting individuals with more positive behavior change.

A similar study by Acharya et al, in 2006, evaluated the "TrEAT Yourself Well" restaurant nutrition campaign. The primary objectives of this campaign was creating consumers' awareness of healthy items on the menu and encouraging purchase through various promotional activities such as in-restaurant promotions, community events and media advertising. The overall sales results of this campaign were considered significant, yet only a small percentage increase (3.7%) in purchases were realized (Acharya, Patterson, Hill, Schmitz & Bohn, 2006).

These studies demonstrate some success at improving consumer awareness and knowledge of the nutritional information on menus, however without impact on actual sales. Additional research has been conducted to determine the impact of pricing strategies on food purchase. A study by French, 2003 found that when prices of lower fat vending machine snacks were reduced by 10%, 20% and 50% respectively, sales

soared, up to 93% above baseline (French, 2003). A second study by French, 2003 found that sales of fresh fruits and vegetables increased when they were price reduced by 50%. These studies show that reducing the price of healthful foods may be an appropriate strategy for promoting choice of healthy fare.

College Students Eating Behaviors

Eating on college campuses continues to be a concern for many students. Previous college student weight gain studies report several influencing factors that may promote weight gain which include: increased consumption of evening snacks, consumption of high-fat foods, eating larger amounts in dorm cafeterias and increased consumption of "junk food" (Levitsky, Halbmaier & Mrdjenovic, 2004).

A study by Conklin et al (2005) focused on college students and the influence of menu labeling on food choice. The study found significant differences between females and males in their use of nutritional information and also revealed that approximately two thirds of students stated that they noticed nutritional information posted on the menu boards. However, only one third reported using the information for the basis of their purchase. The study did not examine what factors influenced food choice for the other two thirds of students. Looking at food choice motives and the factors influencing individuals' purchases other than nutrition or healthy, may assist researchers in identifying ways to influence those choices or motives.

In a recent study looking at college weight gain, students commented on the struggles they face in adapting healthful eating and exercise behaviors in their first year of college. Both male and female students consistently agreed that eating

healthful diets was perceived to be a greater challenge in the transition to college than maintaining exercise behaviors, with campus food perceived as not offering healthy options. The same study revealed that males were somewhat less concerned about college weight gain, despite having larger weight gains among the subjects in the study (Cluskey & Grobe, 2009). Additional research has found that during this time of transition, the freshman year is a specifically critical period for weight gain in the college population (Anderson, Shapiro & Lundgren, 2003; Economos, Hildebrandt & Hyatt, 2008) with those living on campus at greatest risk for weight gain (Pliner & Saunders, 2007).

Summary

Previous research has shown several correlations between eating trends (including dining away from home and portion size) and the increasing obesity epidemic in our nation. Research suggests important parallels in those trends and thus has fueled continued efforts to study various strategies to encourage healthy choices in restaurants. However, there is a significant lack of research connecting individuals' food choice motives and what outside environmental factors may influence those motives. It is important to understand whether or not menu labeling will have a significant impact on the reason people are motivated to eat away from home and what they chose to eat and how a group of students eating together may react to this in making choices.

This information may also reflect how new legislation focusing on point of sale nutritional information at restaurants will impact consumers. However, the food

choice motives are not well understood and seldom does research to improve poor eating habits or obesity address this important element of the psychology of eating behavior. Will those with food choice motives for eating healthy be the ones that will utilize or appreciate the nutritional information? And if so, how will this information influence other individuals?

CHAPTER III: METHODOLOGY

Design

This study explores the impact of posting nutrition information on college dormitory food court menus upon food choice. The primary objective of this research study was to determine if nutrition (calorie and fat) information posted point of sale (POS) at two specific venues would influence patrons' food choice motives, purchase choice motives and sales of menu items within those venues. The present study was an experimental design using a field experiment, completed on the Oregon State University Campus in the MarketPlace West (MPW) dormitory food court. Two venues were chosen to display nutrition information at point of sale during the treatment period. This observational experiment employed a two group – before and after design that was conducted among patrons purchasing menu items from the treatment venue. In addition, a survey design was also used to explore more information about food choice as well as nutritional awareness and dormitory eating habits among two groups of students patronizing the venues at two points during pre and post treatment periods.

The two components of this study included the gathering of sales data and the collection of survey information. Sales data was gathered from MPW over an eight week period during fall term 2008. For the first three weeks, baseline sales data was collected, followed by five weeks of data collection during the application of the treatment (addition of calorie and fat gram information on the menus of the two venues). In order to post the calorie and fat gram content to the menus, menu item

recipes were obtained and analyzed by the researcher and a Registered Dietitian (RD) at the MPW dormitory to determine an accurate nutrition analysis. The sales tracking software used by the MPW venues (ETEK Solutions, 2008) provides ability to integrate nutrition analysis using the USDA Handbook 8 nutrient database. Each food item is placed in the ETEK system as a recipe and all ingredient components of the recipe are analyzed by the USDA database to provide their nutrient content. Calorie and fat content were posted for items (POS) either on a menu board (Calabaloos) or as menu item tags (the Deli) (Appendix 6). Items were posted beginning October 20, 2008 and left until their subsequent removal on November 23, 2008.

Sales data was gathered for MPW venues using ETEK Solutions computerized ETEK (2008) system. This software system is linked to the cash sales terminal in the venues at MPW. It provided information regarding total sales as well as item sales and number of transactions for the pre-treatment and post-treatment periods. Sales for all items are reported by week, and a file is generated with a variety of sales information. At the conclusion of the treatment period, sales data including weekly totals were provided for each venue at the college dormitory where the study was conducted. Additional final data included an item count total and total sales for both venues in the treatment group. This information reflected all sales, from open to close each day, for all seven MPW venues. In addition, surveys were collected from patrons before and after the treatment was applied. Pre-treatment surveys were collected at both lunch and dinner times between October 15^{th} – 17^{th}, 2008. Patrons entering either of the treatment venues during the pre-treatment survey collection times were possible participants. The post-treatment round of surveys was distributed at both lunch and

dinner times between November 19th – 21st, 2008. Both pre/post survey instruments identified food choice motives, purchase choice motives, nutrition awareness and dormitory eating habits.

Venue

The venues chosen for this experiment were based on their physical proximity as well as the distinction of their menu concepts. Calabaloos is a branded "burger and french fries" type venue offering several items such as burgers, fries, and milkshakes. The Clubhouse Deli (Deli) is a delicatessen operation offering custom made-to-order sandwiches, panini's, wraps, soups, and salads as well as various other fresh and packaged items. These two venues differ in their menu concepts and therefore likely may cater to individuals with different food preferences. The close physical proximity of the venues facilitated survey data collection and the contrasting menu concepts may reveal food choice motive differences among the respondents.

Sample

Sales data was measured from all patron purchases during the pre and post treatment periods. Recruitment of subjects for both pre and post-treatment surveys involved asking every third individual exiting from either Calabaloos or the Deli after purchasing food (at least one food item), to participate by completing a short survey. Respondents must have purchased food from either treatment venue (Calabaloos or the Deli) in order to be eligible to participate. Surveys from each venue were color coded for accurate collection and retrieval. If an individual declined participation, the next person in line was asked. If the individual agreed, an informed consent informational

page and the survey were given to the participant. Respondents were asked not to participate more than once during each survey collection period.

Experimental Observation

The first three weeks of the term was used as a baseline period in order for new students (particularly freshman) to become familiar with the MPW dining center, the venues and menu choices. After the pre-treatment surveys were gathered, the treatment was applied to the point of sale menu boards or item tags at both Calabaloos and the Deli. The treatment involved posting calories and fat content, point of sale, for almost all menu items (Deli Appendix D & Calabaloos Appendix E) for each venue. The treatment was applied for five weeks during the middle of fall term 2008. This allowed students to become familiar with the information provided at the two venues. The post-treatment survey was conducted while nutrition information was still posted during the last week of the treatment (week eight of the academic term) period. After the completion of the second survey collection, the labeled nutrition information was removed from both venues.

Survey Instrument

The survey instrument was designed to test some of the hypotheses for this study, primarily those focusing on food choice motive, purchase choice motive and nutritional awareness. Both pre-treatment and post-treatment surveys were approximately 2 pages long, with the post-treatment survey asking an additional 3 questions. Questions on the pre-treatment survey included dining habits of respondents at MPW, food choice motives, purchase choice motives, specific food purchase,

nutrition awareness and demographic characteristics. The post-treatment survey was identical to the pre-treatment survey with the addition of 3 questions regarding the posted nutrition information (Pre survey Appendix A & Post survey Appendix B). The surveys were pre-tested by 10 students to determine length of time required to complete the survey as well as to check face validity. Pre-test surveys were completed between 5 and 10 minutes, with no questions deemed "poorly understood."

Food choice motive questions were developed using a compilation of the various authors who have explored the motives, including the validated Food Choice Questionnaire by Steptoe, et al (1995). The FCM items were simplified phrases depicting motives identified by the scales from a longer instrument by Steptoe et al, 1995. The FCM items listed on the survey included the measures reflecting the most common motives (taste, price, convenience, health, social, weight control and other). A seven-point scale was used to determine the FCM's of respondents, with the 1 – 7 scale having end points rarely to frequently. No time limit was specified for survey completion, and surveys were to be completed before leaving the dormitory food court.

A respondent's nutrition awareness was calculated by the correct (or incorrect) response to two nutrition-related survey questions. The first question asked the respondent to identify the approximate amount of calories needed for a lunch or dinner meal to maintain their body weight. The survey included two possible correct answers based on a 2,000 calorie diet. The second question asked how many grams of fat a lunch or dinner meal should provide approximately, also with two correct answers (based on 20 – 35% fat). Respondents who answered both questions correctly were

categorized as being nutritionally "aware" and those who answered one or both questions incorrectly were considered nutritionally "unaware."

Approval

The Oregon State University Institutional Review Board (IRB) for the Protection of Human Subjects approved all research materials and procedures for this study. The IRB protocol was approved so that informed consent signatures were waived, due to the minimal risk of the survey. Survey completion indicated respondents consent to participate. The surveys were completely anonymous and respondents were asked not to include their names or any identifying information. Informed consents were provided to respondents for their own information and included assurances of anonymity and confidentiality as well as a description of the study and contact information for further questions.

Statistical Analysis

Data from this study was analyzed through a variety of methods using SPSS (Statistical Package for Social Sciences, versions 16.0, 2007, SPSS Inc, Chicago, IL). Analysis of Variance (ANOVA) in conjunction with other descriptive statistics used to determine significance in FCM and venue choice, FCM and gender, and gender and nutrition awareness from the survey instruments. *T*-test statistics compared pre and post sales differences of selected items at treatment venues. They were also used to analyze weekly sales transactions for all MPW venues. Linear regression assisted in analyzing sales data by evaluating the specific interaction between time and treatment of selected item sales. A chi square analysis was used to determine significance

between PCM and venue choice. Descriptive statistics, specifically cross-tabulations, were used to compare gender and venue choice, gender and nutrition awareness, and venue choice and nutrition awareness. A Pearson's correlation evaluated relationships between the respondents FCM's. Lastly, frequencies described respondents' dormitory food behaviors as well as connections between gender and respondents' acknowledgement of noticing posted nutrition information. Frequencies were also used to provide information about what factors individuals' felt made a food choice healthy.

CHAPTER IV: RESULTS

This study examined both sales and survey data in order to determine the impact of posting nutrition information (POS) on food choice. Seven original hypotheses are reported in this section. This study included two data collection components; an experimental treatment and a survey collection. They will be discussed separately as results and then discussed as a whole in the following chapter.

Analysis of Sales

Both the pre-treatment and post-treatment sales data collection was compiled from the OSU MPW dormitory food court from September 29, 2008 to November 23, 2008. The total sales counts for all venues for all weeks of pre and post-treatment are listed in Table 1.

Table 1: Raw sales counts for MPW venues

Week	EBGB	RingFire	4Corners	Tomassitos	SerranoG	Calabaloos	Deli	Total
1	5850	2174	2351	2543	1301	2141	7547	23907
2	7292	1978	2396	2355	1617	2045	7527	25210
3	7305	1768	2301	2120	1553	1990	6888	23925
4	7818	1782	2284	2186	1617	1804	7071	24562
5	7863	1710	2500	2182	1578	1892	6924	24649
6	7758	1675	2417	2140	1385	1768	6565	23708
7	7598	1671	2326	2054	1426	1734	6451	23260
8	7799	999	2269	2265	1470	1595	5979	22376

Week 1 = 9/29/08 – 10/05/08; all weeks follow chronologically

Since the pre-treatment period was 3 weeks in length and the treatment period was 5 weeks; unpaired *t*-tests were used to analyze venue transaction trends in order to determine any significant differences in sales during the treatment period. Of the seven venues in MPW, three venues showed steady declines in all sales transactions, while MPW total sales did not decline. One venue showed significant changes in transaction trends from pre to post treatment using *t*-tests. EBGB's (control venue) revealed a significant increase in transactions with a pre-treatment mean sales count 27.67 (s.d. 4.04); post-treatment mean sales count 34.20 (s.d. 2.77) (Table 2).

Table 2: Pre and post treatment total mean sales counts at MPW

Venue	Pre-Treatment *M*ean (*SD*)	Post-Treatment *M*ean (*SD*)	*p*
EBGB's	27.67 (4.04)	34.20 (2.77)	0.033**
Ring of Fire	8.00 (1.00)	6.60 (0.89)	0.085
4 Corners	9.33 (0.58)	10.20 (0.84)	0.169
Tomassitos	9.67 (0.58)	9.40 (0.89)	0.665
Serrano Grill	6.00 (1.00)	6.60 (0.55)	0.303
Deli	29.67 (1.53)	29.00 (0.71)	0.419
Calabaloos	8.33 (0.58)	7.80 (0.45)	0.190

**Statistically significant at $p < .05$

Sales counts are as a percentage of sales

Given that the ETEK system generated extensive sales information which was not revealing for the analysis, selected items for both the treatment venues were chosen to be evaluated for item sales differences (Appendix D & E). Seven selected (higher calorie/fat) items were selected from the Calabaloos menu. These higher calorie/fat items included: bacon swiss mushroom burger, bacon cheeseburger, french fries and large cookies & cream milkshake. Lower calorie/fat items from Calabaloos were also used in the analysis and included: hamburger, chicken burger and small vanilla milkshake. Eight selected items from the Deli (higher calorie/fat) included: berry blast parfait, club panini, Italian panini, chicken caesar wrap and spicy buffalo wrap. Lower calorie/fat items included: made-to-order sandwiches, vegetarian panini and turkey cranberry wrap.

Since the pre-treatment period was 3 weeks in length and the treatment period was 5 weeks, unpaired *t*-tests and linear regression were both used to analyze specific items transaction trends to determine any significant differences between pre and post treatment, and to control for interaction. The *t*-test analysis revealed several items from both Calabaloos and the Deli were significantly different ($p<0.05$) in sales between pre and post treatment periods. Three higher calorie/fat items from Calabaloos (bacon mushroom swiss burger, bacon cheeseburger and french fries) decreased significantly in sales over the treatment period. Sales of the bacon mushroom swiss burger significantly changed from the pre to post treatment periods; Pre-treatment bacon mushroom swiss burger mean sales count was 103.67 (s.d. 20.11) compared to post mean sales count which declined to 67.00 (s.d. 6.96). Sales of bacon cheeseburger also significantly changed from pre to post treatment periods; Pre-

treatment mean sales count of 348.67 (s.d. 48.69) compared to a post mean sales count which dropped to 250.00 (s.d. 15.49). Lastly, french fry sales also significantly declined from pre to post treatment periods with a mean sales count of 1100.33 (s.d. 104.22) versus post treatment sales of 886.00 (s.d. 44.88).

Three higher calorie/fat items from the Deli also revealed significant decreases in sales during the treatment period. Sales of the club panini significantly changed from pre to post treatment periods; 162.33 (s.d. 15.57) versus 95.60 (s.d. 20.24). Sales of the Italian panini also significantly changed with counts of 205.00 (s.d. 34.39) versus 121.00 (s.d. 51.11). Sales of the chicken caesar wrap significantly changed from pre to post treatment periods showing mean sales count of 255.33 (s.d. 34.12) before treatment and a mean sales count of 163.60 (s.d. 25.00) after treatment (Table 3). Null hypothesis 2 has been rejected.

Table 3: Pre and post treatment mean item sales comparisons at Calabaloos and the Deli

Item	Pre-Treatment *M*ean (*SD*)	Post-Treatment *M*ean (*SD*)	*p*
Calabaloos			
Bac. Mush. Burger	103.67 (20.11)	67.00 (6.96)	0.008**
Bac. Cheeseburger	348.67 (48.69)	250.00 (15.49)	0.004**
French Fries	1100.33 (104.22)	886.00 (44.88)	0.005**
LG Ck & Crm Shake	24.00 (3.61)	17.60 (4.39)	0.079
Hamburger	214.67 (2.89)	200.80 (13.68)	0.143
Chicken Burger	155.33 (10.02)	141.20 (17.78)	0.261
Vanilla Shake	29.33 (2.08)	23.60 (4.72)	0.099
Deli			
Berry Blast	272.00 (34.12)	233.00 (24.97)	0.108
Club Panini	162.33 (15.57)	95.60 (20.24)	0.002**
Italian Panini	205.00 (34.39)	121.00 (51.11)	0.047**
Chx Caesar Wrap	255.33 (34.12)	163.60 (25.00)	0.044**
Spicy Buffalo Wrap	136.00 (45.97)	78.20 (25.91)	0.058
Made-to-Order Sand	1750.33 (67.55)	1634.60 (97.73)	0.124
Vegetarian Panini	38.67 (11.24)	25.80 (5.63)	0.068
Turkey Cran Wrap	120.67 (17.21)	85.00 (29.23)	0.107

** Statistically significant at $p<.05$

A visual inspection of the sales figures for individual items over eight weeks revealed a downward trend. To assess the significance of this trend a linear regression analysis model including time (week), a dummy variable for pre/post-treatment and an

interaction term was used. This regression analysis specifically focused on identifying differences in both the slope and intercept of the trend in sales. Thus, regression modeling was used to determine if the slope and intercept of the pre-treatment and treatment time periods would differ (Cohen & Cohen, 1983). A hierarchical regression was performed where both independent variables were entered (model 1) and then the interaction term was added (model 2). The change in F was calculated between models 1 and 2 to determine if the addition of the interaction term was statistically significant. The following equation was used for the regression analysis:

$$\text{Sales} = \text{constant} + b_1\,(\text{week}) + b_2\,(\text{treatment}) + b_3\,(\text{interaction})$$

A zero/one coding of treatment was used for these equations and therefore parts of this equation "fall out" when the analysis is performed. In the first three weeks (pre-treatment), the value for treatment is always a zero and the interaction is also a zero, therefore treatment and interaction drop out of the equation producing a final equation for pre-treatment:

$$\text{Sales} = \text{constant}_1 + b_1\,(\text{week})$$

For the treatment time period, the treatment variable is always a 1 and therefore the coefficient of the treatment can be added to the constant, providing a final equation for the treatment:

$$\text{Sales} = \text{constant}_2 + b_1\,(\text{week}) + b_3\,(\text{interaction})$$

Each of the 15 higher and lower calorie/fat items from both venues (listed previously) were analyzed using linear regression. Regression analysis revealed three items having

significant changes in sales utilizing the treatment-interaction model. These items included the bacon mushroom swiss burger, the bacon cheeseburger and the berry blast parfait. The regression model for the Bacon Mushroom Swiss Burger, the Bacon Cheeseburger and the Berry Blast Parfait all revealed a significant F Change of $p<0.05$ (from model 1 to model 2) (Table 4). Figures 2, 3 and 4 are bar graphs visually reflecting sales counts for these items. Null hypothesis 1 has been rejected.

Table 4: Regression values for item sales

Item	Model 2 Significance of F Change from model 1	Model 2 *p*
Bacon Mush Swiss	.019**	.002**
Bacon Cheeseburger	.014**	.001**
Berry Blast Parfait	.046**	.048**

**Statistically significant p<.05

Figure 2: Regression for bacon mushroom swiss burger

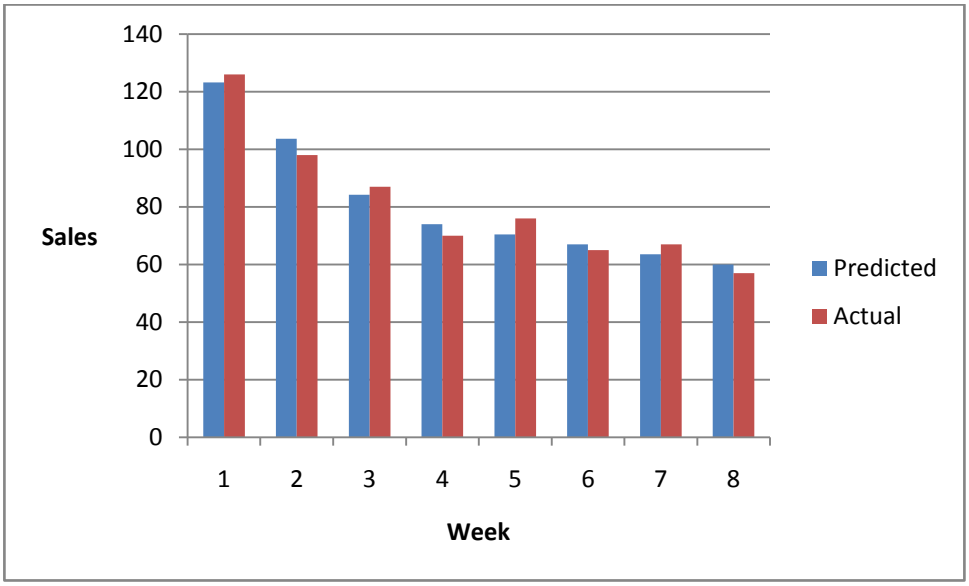


Figure 3: Regression for bacon cheeseburger

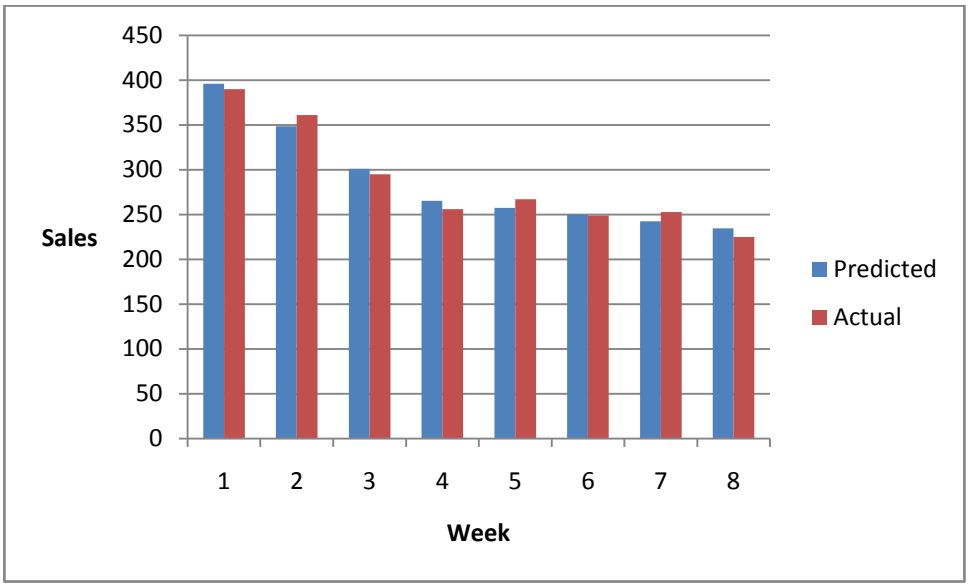
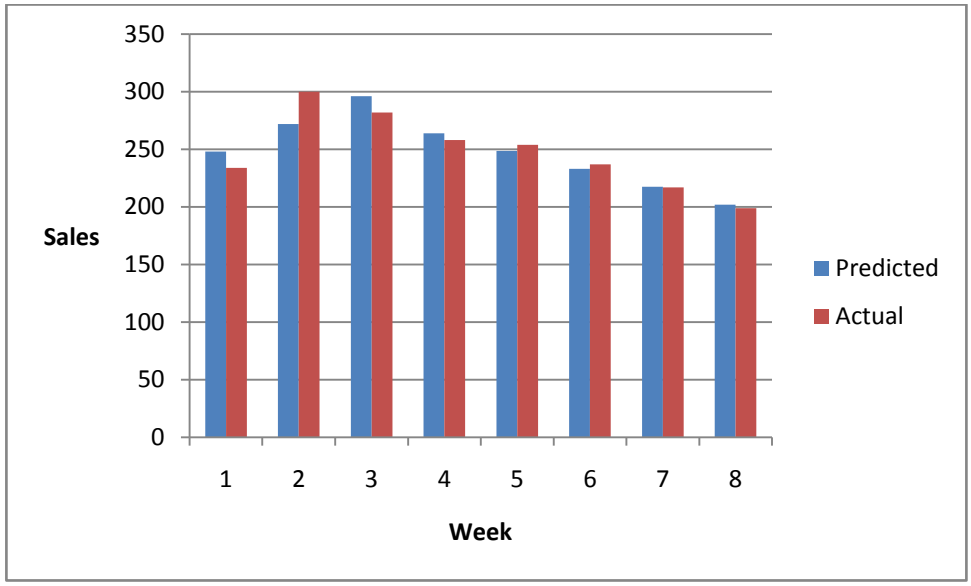


Figure 4: Regression for berry blast parfait



Participant Characteristics and Survey Analysis

The second part of data collection for this study consisted of pre and post-treatment surveys. Descriptive statistics for respondents from the pre-treatment and post-treatment surveys are found in Table 5. The original combined surveys consisted of 361 respondents, however 13 surveys were found to be completed by individuals who had not purchased food from the participating venues and therefore were dropped from the study. The final combined sample consisted of 348 total respondents, almost equally divided by gender with 166 male, 152 female, 1 transgender and 29 missing demographic information. Of the genders surveyed, 102 males ate at Calabaloos with 64 males eating at the Deli; 54 females ate at Calabaloos with 98 females eating at the Deli. Summarizing the sample, the majority (57.5%) were completed by freshman, with 9.2% sophomores, 8.3% juniors, 5.5% seniors, 3.4% graduate, 3.7% faculty/staff, 3.4% other and 9.0% missing University status. When broken down, there were a total

of 172 pre-treatment surveys and 176 post-treatment surveys showing more females responding to the pre treatment survey and more males responding to the post treatment survey. Cross-tabulations were used to reveal the percentage of males versus females who dined at the two treatment venues (Calabaloos and the Deli). This analysis revealed a valid percent of 61.4% males who ate at Calabaloos versus 35.5% females. Thus, 38.6% of males dined at the Deli and 64.5% of females dined there. Therefore, a significantly larger percentage of men ate at Calabaloos and a significantly larger percentage of women ate at the Deli. Null hypothesis 7 has been rejected.

Table 5: **Demographic characteristics of survey respondents (*N = 348*)**

		Pre-Treatment *n* = 172 Frequency (%)	Post-Treatment *n* = 176 Frequency (%)
Sex	Male	67 (39.0)	99 (56.3)
	Female	90 (52.3)	62 (35.2)
	Transgender	1 (0.6)	0 (0.0)
	Missing	14 (8.1)	15 (8.5)
University Status	Freshman	101 (58.7)	99 (56.3)
	Sophomore	18 (10.5)	14 (8.0)
	Junior	13 (7.6)	16 (9.1)
	Senior	11 (6.4)	8 (4.5)
	Graduate	8 (4.7)	4 (2.3)
	Faculty/Staff	2 (1.2)	11 (6.3)
	Other	4 (2.3)	8 (4.5)
	Missing	15 (8.7)	16 (9.1)
Venue	Calabaloos	86 (50.0)	81 (46.0)
	Deli	86 (50.0)	95 (53.9)

Survey respondents (*n* = 348) were asked to identify how often they eat at MPW. Frequencies of this question reveal that the majority of respondents (31.3%) eat at MPW two times per day. Additional frequencies revealed that 29.9% of respondents eat at MPW less than once daily, 22.7% eat at MPW approximately once daily and 16.1% eat at MPW approximately three times per day.

Respondents of surveys (*n* = 348) were also asked to rate the percent of purchases made at MPW venues (six venues were included: Serrano Grill, Tomassitos, Four Corners, Ring of Fire, Calabaloos and the Deli). Descriptive statistics reveal the most popular venue by those surveyed was the Deli with a mean percentage of

purchases as 41.66 (s.d. 31.66). Calabaloos ranked second with a mean percentage of purchases as 22.35 (s.d. 28.03). The subsequent venue rankings included Ring of Fire, Tomassitos, Serrano Grill and Four Corners.

Seven FCM's were listed on both the pre and post surveys as drivers of food choice. These food choice motives included taste, price, convenience, health, social, weight control and other. A seven-point scale with end points (7 = frequently; 1 = rarely) was used to ask respondents which of the following influenced their purchase when dining at MPW. Mean scores for these motives, separated by venue, are reported in Table 6.

Table 6: Food choice motive mean rankings among gender and venue

Food Choice Motives	Gender		Venue	
	Males [n=166] Mean (s.d.)	Females [n=152] Mean (s.d.)	Calabaloos [n=167] Mean (s.d.)	Deli [n=181] Mean (s.d.)
Taste	5.7 (1.5)	6.0 (1.3)	5.8 (1.4)	5.9 (1.4)
Convenience	5.4 (1.6)	5.6 (1.6)	5.5 (1.6)	5.6 (1.6)
Price	4.4 (1.9)	4.6 (1.9)	4.5 (1.9)	4.6 (2.0)
Health	3.9 (1.9)^{a}	5.1 (1.6)^{a}	3.9 (1.9)^{b}	5.1 (1.6)^{b}
Social	3.7 (2.1)	3.9 (2.0)	3.9 (2.1)	3.8 (2.1)
Weight Control	2.5 (1.9)^{c}	3.2 (2.0)^{c}	2.5 (1.8)^{d}	3.2 (2.0)^{d}
Other	0.8 (2.0)	0.4 (1.7)	0.8 (2.0)	0.4 (1.6)

a, b, c, d: Values in rows with different superscript letters are significantly different according to ANOVA ($p<0.05$)
H05 Rejected

Taste and convenience were determined to be the primary FCM's for respondents in this study. Health as a FCM was the third most important motive for Deli patrons, but not for those dining at Calabaloos. An ANOVA of food choice motives mean scores and venue location (Calabaloos or the Deli) revealed statistically significant differences between health as a FCM among those eating at either Calabaloos or the Deli. Descriptive statistics revealed the mean of health as a FCM for those dining at the Deli was 5.11 (s.d. 1.62) and for those dining at Calabaloos the mean of health as a FCM was 3.85 (s.d. 1.86). Therefore, respondents who dined at the Deli ranked health higher on the FCM scale than those dining at Calabaloos (Table 6).

ANOVA analysis also revealed that weight control as a FCM was significantly different between patrons eating at different venues. The mean for weight control as a FCM for those dining at the Deli was significantly higher 3.20 (s.d. 2.03) than those dining at Calabaloos with a mean weight control as a FCM of 2.51 (s.d. 1.81). Therefore, respondents who dined at the Deli also ranked weight control higher on the FCM scale than those dining at Calabaloos (Table 6). Null hypothesis 5 has been rejected.

We also conducted ANOVA analysis on the mean of FCM and gender to determine if any statistically significant differences would be found. This analysis revealed significant differences similar to those found with FCM and venue. Both motives of health and weight control were significantly different between genders, with females mean of 5.08 (s.d. 1.59) greater than males mean of 3.93 (s.d. 1.89). Thus females ranked FCM health significantly higher than males.

ANOVA analysis also revealed that weight control as a FCM was significantly different between males and females, for males the mean was 2.48 (s.d. 1.87) and for females the mean was 3.22 (s.d. 1.94). Thus females also ranked FCM weight control significantly higher than their male counterparts (Table 6).

Food choice motives were also analyzed for differences between pre and post survey respondents in order to test the influence of posting nutrition information on these motives. ANOVA analysis was used to determine any differences between the FCM's. Two FCM's were ranked from the pre to post treatment period among respondents. Again, health and weight control were both found to be statistically significant ($p<0.05$) between the pre and post period, revealing both motives had decreased in ranking after the posting of nutrition information. Descriptive statistics revealed the mean of health motive for the pre survey respondents was 4.72 (s.d.1.76) and for post survey respondents the mean was 4.30 (s.d.1.91). The pre treatment mean for weight control was 3.08 (s.d. 2.03) and the post survey respondents' mean was 2.66 (s.d. 1.86). Therefore, respondents answering the pre survey ranked health and weight control more highly than respondents answering the post survey.

Disclaimers must be made regarding the results of FCM and the posting of nutrition information due to the fact that respondents were not a matched pair sample; followed longitudinally. In addition, there were more females among the pre and more males among the post survey respondents (Table 7). Null hypothesis 4 has been rejected.

Table 7: Food choice motive mean rankings among Pre (*n* = 172) and Post (*n* = 176) survey respondents

Survey	FCM	*M*ean (*SD*)	F	*p*
Pre	Taste	5.94 (1.11)	1.618	.204
Post	Taste	5.74 (1.63)	1.618	.204
Pre	Price	4.62 (1.88)	0.951	.330
Post	Price	4.42 (1.97)	0.951	.330
Pre	Convenience	5.66 (1.51)	2.363	.125
Post	Convenience	5.40 (1.62)	2.363	.125
Pre	Health	4.72 (1.76)	4.636	.032**
Post	Health	4.30 (1.91)	4.636	.032**
Pre	Social	3.85 (2.05)	0.013	.911
Post	Social	3.82 (2.08)	0.031	.911
Pre	Wt Control	3.08 (2.03)	4.078	.044**
Post	Wt Control	2.66 (1.86)	4.078	.044**
Pre	Other	0.56 (1.78)	0.012	.913
Post	Other	0.59 (1.85)	0.012	.913

Degrees of freedom (1, 346)

**Statistically significant at $p<0.05$

A Pearson's correlation was also used to explore any relationships among respondents ranking of FCM. Strong correlations were found between: weight control and health, taste and health, taste and price, social and convenience, convenience and price, health and price, and weight control and social (Table 8). These correlations reveal how food choice value sets occur in this population of respondents.

Table 8: Pearson correlation among respondents food choice motives (*n* = 348)

FCM	FCM	Pearson Correlation
Weight Control	Health	.503**
Taste	Health	.355**
Taste	Price	.340**
Social	Convenience	.322**
Convenience	Price	.290**
Health	Price	.269**
Weight Control	Social	.234**

**Statistically significant at $p<0.01$

Respondents were asked to choose a primary purchase choice motive (PCM) for the purchase they made when completing the survey. Although respondents were asked to choose only one primary motive, several respondents marked additional motives. Those who incorrectly answered their PCM (with more than one motive) were eliminated, leaving an (*n*=230). Chi-square analysis was examined to test for differences between venue choice and primary PCM. Due to an infrequent choice (<6) of the motives price, social and weight control, these three motives were collapsed, resulting in five primary PCM's for analysis. The Chi-square analysis provided a critical F value of 11.12. The degrees of freedom for this Chi-square were 4, thus the critical value for 4 degrees of freedom is 9.49. This Chi-square result reveals significant difference in the primary PCM's between Calabaloos and the Deli (Table 9). Null hypothesis 6 has been rejected.

Table 9: Frequency response for primary PCM by Venue (n=230)

PCM	Deli	Calabaloos	Total
Taste	56	75	131
Price/Soc/Wt.Control	11	10	21
Convenience	14	20	34
Health	17	0	17
Other	9	18	27

A cross-tabulation was used to compare gender and nutrition awareness score. The score for nutrition awareness was based on the respondents' correct or incorrect answers to two nutrition-related questions in the survey. The cross-tabulation analysis revealed a difference between gender and nutritional awareness with 63.9% of males found to be nutritionally unaware and 55.3% of females found to be nutritionally aware.

A cross-tabulation also compared venue and nutrition awareness score. This cross-tabulation analysis revealed a difference between nutrition awareness and venue with 63.9% of nutritionally aware respondents purchasing food from the Deli and 56.4% of nutritionally unaware respondents purchasing food from Calabaloos.

In the post-treatment survey respondents were asked if they noticed the nutrition information posted for the item(s) they purchased (yes/no) as well as if this posted nutrition information influenced their purchase (Five point scale: 1 = No to 5 = Absolutely). An ANOVA analysis was completed comparing means by gender for the two questions regarding nutrition information posting, revealing no differences. Forty-

eight percent of males and 57% of females noticed the information. This information reveals on average, approximately 50% of the respondents actually noticed the posted nutrition information.

Statistical analysis (ANOVA) comparing gender and the influence of posted nutrition information on purchase was significant ($p<0.05$). Descriptive statistics revealed the mean influence for males was 1.83 (s.d. 1.08) and for females was 2.41 (s.d. 1.37). This result suggests that females were more highly influenced by the posted nutrition information (the mean was low for all respondents with an average of 2.1 = "Not Much influence" on the five point scale). Sixty-seven percent of respondents said the posted nutrition information had no or not much influence on their purchase, and 13.3% of respondents indicated that the posted nutrition information (yes or absolutely) influenced their purchase.

Finally, respondents were asked to mark items which they felt made a food choice healthy; including low calorie, low fat/saturated fat, low in salt, fresh fare (e.g., fruits/vegetables), vegetarian, meets my dietary needs (balance, diabetes, gluten free etc), organic or unprocessed, high in vitamins/minerals/anti-oxidants, and other. Frequencies of total respondents revealed that low fat/saturated fat, fresh fare and high in vitamins/minerals/anti-oxidants were the highest ranking options for making a food choice healthy. Respondents' ranked vegetarian, organic or unprocessed, meets my dietary needs and other as the least likely to make a food choice healthy (see Table 10).

Table 10: Frequency responses for characteristics describing a "healthy" food choice

Factor	Percent responding
Fresh fare	74.1%
Low fat/saturated fat	71.6%
High in vitamins/minerals/anti-oxidants	64.1%
Low Calorie	48.9%
Low in salt	48.6%
Meets my dietary needs	46.6%
Organic or unprocessed	35.1%
Vegetarian	13.3%
Other	2.0%

Null Hypothesis H03: There will be no correlation between food choice motive and purchase choice.

This hypothesis was intended to be used to analyze the respondents' actual food purchase (determining healthfulness based on calories and fat) in order to provide possible correlation between their food choice motives and the actual food/beverage purchase made.

Due to imprecise subject responses regarding actual food purchase, this hypothesis could not be tested. Respondents were asked for their menu choice (with an open-ended response) at the time of completing the survey. The survey design was flawed in not making this item a check-list, and open-ended responses could not be

converted or measured for healthfulness of the choice. Therefore, it was impossible to test this hypothesis due to imprecise response data.

Table 11: Hypothesis testing

Null Hypothesis		Result
H01:	There will be no significant difference in weekly item sales at either Calabaloos or the Deli at MPW after posting calorie and fat information to the menu.	Rejected
H02:	There will be no significant difference in the total weekly sales transactions at MPW venues (Calabaloos, the Deli, EBGB's, Ring of Fire, Serrano Grill, Tomassitos or Four Corners) after posting calorie and fat information at Calabaloos and the Deli.	Rejected
H03:	There will be no correlation between food choice motive and purchase choice.	Unable to Test
H04:	The addition of calorie and fat information will not change the respondents' food choice motives.	Rejected
H05:	There will be no difference in food choice motives among pre and post survey respondents eating at either Calabaloos or the Deli.	Rejected
H06:	There will be no difference in purchase choice motive among pre and post survey respondents eating at either Calabaloos or the Deli.	Rejected
H07:	There will be no difference in the demographic characteristics among pre and post survey respondents at Calabaloos or the Deli.	Rejected

CHAPTER V: DISCUSSION

This study addressed the impact of posting point of sale nutrition information on menu item sales in a college dormitory food court and evaluated respondents' food and purchase choice motives. This chapter provides interpretation and discussion of the results of the study as well as theoretical implications.

Interpretation of Results

The experimental component of this study examined the change in selected item sales at Calabaloos and The Deli, the two treatment venues. Five other venues served as control at MarketPlace West (MPW). Total sales transactions for all seven venues in MPW dormitory food court were examined over the study period. In evaluating the results, we found that few items provided statistically significant sales changes during the time of the posted nutrition information.

The two food items having the highest caloric and fat content at the Calabaloos venue, the bacon mushroom swiss burger and the bacon cheeseburger, showed significant decreases in sales during the 5 week treatment period of posted nutrition information. The berry blast parfait, sold at the other treatment venue, was not the highest calorie or fat item at the Deli, but showed initial increase and then significant decline in sales during the treatment period. *T*-tests comparing pre and post treatment weekly sales also revealed a sales decline among several high calorie and fat items at each of the treatment venues during the experiment.

This data regarding sales changes during the 5 week treatment period suggests that some respondents may have been influenced by the posted nutrition information

and consequently in some cases higher calorie and fat items were chosen less frequently. Interestingly, the berry blast parfait showed increasing sales trends during the baseline period of the experiment (prior to adding nutrition information), which dropped off significantly during the treatment time. Anecdotally, several individuals' indicate the berry blast parfait is a popular breakfast or lunch menu item among college female students. As it is perceived as "healthy" based on the inclusion of ingredients such as fresh fruit and yogurt. However, ingredients such as granola and cream found in the parfait add many calories and fat. Likely, consumers are unaware that the seemingly healthy item is neither low calorie nor low fat. Thus, our experimental nutrition information posting may have contributed to the decline in sales of this popular item.

Sales data was collected and analyzed for total venue transactions for all venues at MPW during the 8 week experiment. This data was used to examine the extent to which consumers might either frequent venues with posted nutrition information more often, or change venue choice to one without posted nutrition information. The idea of consumers either choosing or avoiding a venue with posted nutrition information is relevant in light of pending legislation. If menu labeling laws do not require all restaurants to provide nutrition information, there is the possibility that consumers will avoid nutrition labeling by frequenting venues where it is not posted. If this reaction is realized, the desired impact on consumers (e.g. switching to lower calorie choices) may be reduced.

Total sales across the weeks at all venues in MPW were found to be steady overall. Three venues revealed a downward sales trend, which was not statistically

significant. Our results did indicate one statistically significant change in total venue transactions over the 5 week treatment period at EBGB's. EBGB's (a control venue) revealed a significant sales increase over the treatment period. EBGB's is a grocery store-type venue offering quite different choices than all other venues in MPW. They offer many packaged foods with nutrition labels, therefore sales movement here may reflect students' boredom with the fast food court dining offered and/or the ability to choose lower calorie items. Increased sales at EBGB's may also be impacted by students increased workload during the term leading to a need for convenience. It is also possible that as the term progressed, patrons had other reasons to choose those venues outside of the nutrition labeling spectrum.

The second component of data collection for this study involved gathering survey information. The dormitory dining habits revealed in the respondent sample suggest that the majority of the respondents dine frequently at MPW. The frequency of dining percentages revealed that the largest percentage of patrons purchased food from the Deli, followed by next by purchases made at Calabaloos. Due to the Deli's large variety of food offerings, it is likely that respondents would choose to eat there more frequently than other venues.

The survey explored food choice motives (FCM), individual values or factors that drive which foods people choose. Although FCM's were compared between pre and post survey respondents, the fact that respondents were not surveyed as a matched pair sample must be considered. Given that, significant differences were found using ANOVA analysis, between the FCM's of health and weight control among respondents. Pre survey respondents ranked both health and weight control more

highly on the food choice motive scale that the post survey respondents. Therefore it appears that the posted nutrition information was not influential on respondents' food choice motives for health or weight control. However, many factors other than the treatment effect may have contributed to this difference including the frequency of gender distribution between pre and post survey respondents (with more females responding to the pre survey and more males responding to the post survey).

Food choice motives were also compared to see if FCM differed by respondents' venue choice or gender. This analysis revealed that two FCM's among respondents varied significantly be venue. Motives for both health and weight control were different between respondents purchasing food from Calabaloos or the Deli. Those respondents who purchased food from the Deli ranked health and weight control significantly higher as a FCM than those who purchased food from Calabaloos. In comparing these two venues' menu items, there are important differences in food offerings. Calabaloos offers primarily burgers and fries, as well as vegetarian burgers which are somewhat lower in calories and fat. However, the venue may not attract the more health conscious student since Calabaloos' image is more likely to be perceived as a burger-type fast food restaurant with an expectation of an unhealthy menu.

The Deli on the other hand, offers food options including a salad bar, soup, sandwiches, etc. which may be perceived as providing options lower in calories or higher in fresh ingredients and more nutritious. This may prompt more health-minded consumers to dine there. It is worthwhile to point out that many Deli offerings can be high in both calories and fat with the berry blast parfait a case in point. Since many

consumers (and nutrition professionals) have difficulty determining the number of calories and fat in food items when eating out (Burton et al, 2006; Backstrand et al, 1997), they may not be good at distinguishing which of the Deli items are actually healthier. In addition, healthy items are defined differently by consumers, ranging from low calorie, high in nutrients, organic and unprocessed among other definitions (Falk, Sobal, Bisogni, Connors & Devine, 2001; Roininen, Lahteenmaki & Tuorila, 1999). When an individual indicates that they choose for healthy, calories and fat may not be part of their definition.

Demographic differences were found among respondents choosing one or the other of the two treatment venues at MPW. A significantly larger number of males chose to dine at Calabaloos and a larger number of females dined at the Deli according to our survey. This is consistent with research reports that males are less likely to be concerned with caloric content of foods, compared to females (Levi, Chan & Pence, 2006). Analysis of variance of FCM and gender was consistent with results of FCM and venue. Statistically significant differences were found only between gender and the FCM's health and weight control. This suggests that a relationship between larger percentages of males dining at Calabaloos and numbers of females dining at the Deli may have been related to significant differences of FCM's for health and weight control at the venues. Thus, as females tend to rank health and weight control higher on a scale of importance, they may be more likely to frequent a venue that they may perceive to provide healthier options.

Consistent with previous research, the primary food choice motive of all respondents in this study was taste (Glanz et al, 1998; Steptoe & Wardle, 1999;

Prescott et al, 2002), followed closely by convenience. Other food choice motives may have not been as important in this context for various reasons. Price, often a popular food choice motive, may have been less meaningful to this population as many respondents were likely to have had a pre-paid meal plan that is included with their tuition costs. Due to this type of payment system, price may not have been exceptionally important to many of the dormitory food court patrons.

Social influence upon choice (based on eating context) was a food choice motive included on the survey. This option may not have been clearly labeled on the survey however and therefore may have been misunderstood by respondents. Social refers to the context of eating such as who an individual is eating with and why they are choosing to eat. However the terminology used on the survey stated "I eat here because my friends want/like to eat here." This survey statement may have not been all-inclusive of the aspects of social or meaningful to respondents as a food choice motive. Lastly, not all options for food choice motives were provided to respondents. Many studies have used between 7 to 9 motives, with our study choosing to reduce this to the 6 most common (taste, price, convenience, health, social and weight control) along with an "other" option. Other was not often chosen as a FCM.

Convenience was ranked highly as a FCM by respondents of the pre and post surveys. Convenience plays an important role in the college setting due to the frequent number of classes, study sessions etc that students participate in. It is also important to note that FCM changes with context. The survey revealed that although "other" was not highly chosen as a FCM, it was chosen much more often as a primary PCM. This suggests that the purchase choice often reflects the eating context of the day.

Purchase choice motive closely reflected the respondents' food choice motives with the vast majority choosing taste as their primary purchase choice motive. Taste was again followed by convenience as the second highest PCM. Also important was the PCM of health, which about 7% chose as their primary PCM. Interestingly, only respondents from the Deli chose health as their PCM. This appears to support our suggestion that the Deli menu items are perceived as more "healthful" than options at the Calabaloos venue. Again, it is important to mention that several items at the Deli could be considered high in both calories and fat, therefore nutrition labeling may be important in assisting individuals' in making appropriate choices at all venues.

Approximately 11.5% of respondents chose "other" as their primary PCM. This may have been a confounder to the study since it was the third highest response, and respondents were not asked to indicate why they chose "other." This tells us that for the populations surveyed, there are likely several "other" eating context motives that may be important factors in why they make their food purchases. These "other" factors are not well understood and show how the food choice process varies by context and with eating occasions. Some of the voluntary comments regarding why a respondent made their specific food purchase "other" included:

"Hungry" – Deli
"It was 1 of 2 things open" – Calabaloos
"I've been eating good [sic]…& I finally wanted to treat myself" – Calabaloos
"Okay…I had a bad day" & "I'M NOT FAT" – Calabaloos
"That it is a special for a limited time" – Calabaloos
"Food perk for work, otherwise I'm not hungry" – Calabaloos

"I've had my daily serving of fruits/veggies, and am looking for a treat" Calabaloos

"Its Friday!" – Calabaloos

"Insanely hungry" – Calabaloos

"This is atypical for me. I'm being treated by a friend" – Calabaloos

"Hangover" – Calabaloos

Not surprisingly, individuals have many methods and decision-making processes for identifying and deciding on a specific food purchase as suggested by the Food Choice Process Model (Furst et al, 1996). Context for eating (who are you eating with and why are you eating) influences food and purchase choice motives as values shift with varying occasions. This "other" category including contextual factors of importance such a hangover, or a way to treat oneself, or even the fact that it happens to be Friday illustrates how context can "trump" primary motives. For these situations, nutrition information will not likely influence their choice, if it is not a prevailing motive for all eating occasions.

Social eating, while provided as a motive in our study, may have been chosen less frequently because of our unclear survey label. The literature describes the importance of eating partners and eating occasions or reasons as being very important for young people and/or peers (Stroebele & De Castro, 2004). Research has also found that students, away from home, are likely to be influenced in food choice by their peers (Cluskey & Grobe, 2009). Individuals' decision for choice is based on established strategies for balancing daily food choice decisions. As students, they may just be independently learning this process for the first time. At home they were likely provided with foods more often than they were choosing restaurant offerings.

Theories are not completely clear on understanding food choice motives (Fotopoulos, Krystallis, Vassallo, Pagiaslis, 2008). Food choice motives often differ with different populations and research has found that FCM's do not always match purchase choice (Sun, 2008).

Cross-tab analysis revealed a possible gender effect with regards to choice of venue and nutrition awareness. Differences between gender and nutrition awareness were found, with over half of the female respondents demonstrating nutrition awareness (55%) and only about 36% of males demonstrating nutrition awareness. At the Deli, patrons were nutritionally more aware (64%) compared to Calabaloos patrons (56%).

Investigation explored whether or not respondents noticed the posted nutrition information at the time of their purchase and if that influenced their purchase. Approximately 50% of both male and female respondents stated that they noticed the posted nutrition information. The percentage of respondents in this study who were aware of the posted nutrition information is slightly lower than previous studies, with Conklin, et al., (2005) having 60.7% noticing posted information. Since it is not clear how Conklin's information was posted, in this study the posting was clear and obvious, consistent with proposed legislation. Perhaps respondents were less interested in noticing nutrition information due to an attitude of "I'm young and healthy" and not that worried about health right now. It is also possible that some respondents were being facetious about not noticing the clearly posted information. Another important aspect of noticing nutrition information has to do with reading a menu. Some respondents of our survey may have been familiar with the menu at their chosen venue

and therefore did not look at the menu causing them to miss the posted nutrition information.

Although there was no difference between genders in whether or not a respondent noticed the posted nutrition information, it did provide an influence in respondents' purchase. Cross tabs revealed that females were more highly influenced than their male counterparts, even though posting nutrition information had little overall influence with only 13.3% indicating a strong persuasion. This result suggests that although some individuals are influenced by the posting of nutrition information, the vast majority are not. It is also important to note that many respondents were unaware of their nutritional needs (64% of males and 45% of females were nutritionally unaware), which may cause them to pay little attention to nutrition posting. Interestingly some respondents, whether being influenced by the nutrition information or not, took a moment to make comments on their part of the survey stating:

> "I didn't pay attention to calories/fat because it makes me feel bad" – Deli
>
> "I didn't specifically pay attention – picked items with low numbers" – Deli
>
> "Chose an item for weight control because you posted the calories of the bacon burger" – Calabaloos

This information may lead one to believe that more respondents may have utilized the posted nutrition information in different ways but did not really indicate it as such on the survey. Some choose to avoid it completely, others use it in limited ways and finally some choose to make significant changes to their food purchase.

It appears that for those who are primarily motivated to choose food for health or weight control reasons, posting nutrition labeling in the restaurant environment will be a welcome tool. This study suggests that gender is highly related to choosing foods for health or weight control and women are more likely to appreciate posted nutrition information. For others, it appears that a whole host of factors influence food choice, which is consistent with the research to date on the topic. Therefore additional research is needed to determine how and if these individuals will utilize posted nutrition labeling in a restaurant environment.

CHAPTER VI: CONCLUSIONS

The purpose of this research was to explore how posting point of sale nutrition information at two venues in a dormitory food court on the OSU campus might impact food choice and sales. Analysis revealed that a significant decrease in sales transactions during the treatment period was found for one of the treatment venues and may have been impacted by the posting of nutrition information at that venue. Several of the high calorie/fat items with posted nutrition information on the menu board or menu tags saw declined in sales transactions over the treatment period as well. This suggests that posting nutrition information might have had some impact in this college dormitory setting.

Survey data analysis contributed to a limited body of literature indicating that taste continues to be the primary food and purchase choice motive among respondents in a college setting, consistent with the other populations. Females in this population appear to have greater nutrition awareness and rank health and weight control higher on the food choice motive scales than do males. Approximately half of the respondents indicated that they observed the posted nutrition information, but only 13.3% were strongly influenced by it. This suggests that a large percentage of this population do not notice, nor are influenced by posted nutrition information.

Although posting nutrition information has the potential of being a useful tool for those who are interested in making healthful food choices, it does not appear to be a means for facilitating food choices in those who are not motivated by such. More likely, individuals who are already interested in healthy fare will be influenced by this

information. Therefore, reflecting on the Food Choice Process Model (Furst et al, 1996), many other factors influence food choice motives and eating context including the values and strategies individuals create for prioritizing them. Since the FCP model theorizes that a life-course of factors shape the development of FCM's, efforts toward education and behavior change with families and younger adults may be needed. Perhaps food choice may be influenced by early interventions teaching strategies to balance motives for choosing nutritious and healthy foods.

The results of this study suggest that although the posting of nutrition information appeared to have some effect on respondents' food purchases, additional research is needed in the areas of college students' perception of the need for choosing healthy fare and their understanding of their own nutrition needs and nutrition labeling in restaurants and other food away from home venues. If even slight notice to calorie and fat content are realized, it is possible that requirements to label foods in restaurants may be a great tool to build awareness.

Strengths

The strengths of this study included reinforcing existing literature and providing information new to the literature. Our results that reinforce existing literature include: data revealing that respondents were not well aware of their estimated calorie or fat needs; a tendency to not notice posted nutrition information; Females showing greater concern for health and weight control; and lastly, context for eating frequently appeared to "trump" stated food choice motives, with health motives not always driving purchase choices. Some results from this study are new for the

literature and include: a decrease in sales shown after the posting of nutrition information, specifically for higher calorie/fat items. The evaluation of food choice motives in the college population, of which taste proved consistent as the primary FCM. Lastly, the comparison between food choice motives and purchase choice motive (intent), providing an overall comparison between the two.

Limitations

This study also had some limitations. Data was gathered through a convenience sampling design and the respondents were limited to individuals (primarily college students) consuming food at one of the two chosen treatment venues in the MPW dormitory food court on the Oregon State University.

Second, the survey tool developed for use in this study had drawbacks. It was not validated and was minimally field tested. Labels for FCM's may not have been clear. Respondents were asked to specify the food purchase(s) they made in order for the researchers to evaluate the connection between FCM and actual purchase. However, the researchers did not predict the level of inaccurate or non-descriptive responses revealed with the open-ended item for purchase choice. Due to these imprecise responses, hypothesis 3 was unable to be tested. This also suggests that behavioral intentions were measured rather than actual food choice. As a result, socially desirable bias in reporting may have impacted some respondents.

Third, respondents surveyed were not studied as a matched pair (longitudinal cohort) in completing pre and post comparisons. Because a specific group of individuals was not followed throughout the experiment, possible confounders exist

between differences found for respondents' pre and post FCM's based on the posting of nutrition information.

Lastly, sales data for both item sales and venue transactions cannot be specifically connected to the posting of nutrition information at the venues. Sales in the food court venues decreased over time, with an increase in the purchases made at a mini-grocery store. We cannot suggest that this change occurred due to the posted nutrition information treatment. Increasing or declining sales with certain items or venues may have had a number of other influential factors.

Recommendations for Future Research

This study provided a number of valuable insights into the posting of nutrition information in a college dormitory setting. The information can be applied in future studies focusing on nutrition labeling, college weight gain and food choice motives. Recommendations for future research include:

- Additional research to better understand the role of social interactions, peer groups and the context for eating occasions on choice. Given the social nature of college dormitory living, how this impacts FCM is not clear. This knowledge will be necessary to build interventions to prevent college weight gains among vulnerable groups of students.
- More college eating studies focusing on how nutrition information will effect this population since they are often new at making independent food choices and may be particularly persuadable in their food choices.

- How requirements to post nutrition information may impact all restaurant patrons and how the information posting at some but not all restaurants may influence consumer behavior.

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APPENDICIES

APPENDIX A:

PRE-TREATMENT QUESTIONNAIRE

Research Questionnaire

Please read the following questions and select the answer(s) that best represent your opinion.

1. How often do you eat at MarketPlace West (MPW)?
   ___ Less than once daily
   ___ ~ 1 time/day
   ___ ~ 2 times/day
   ___ ~3 or more times daily

2. Please rank the frequency of dining at these MPW restaurants using 0 – 100%. Your answers should total 100%.
   Serrano Grill _____ Pasta _____ 4 Corners _____

   Ring of Fire _____ Deli _____ Calabaloos _____

Overall, the following have been identified as the key factors that influence food choices:

3. Which of the following influence your purchase(s) when you eat at MPW?

	Frequently						Rarely
Taste: "I like the taste"	7	6	5	4	3	2	1
Price: "The cost is reasonable"	7	6	5	4	3	2	1
Convenience: "It is quick and easy"	7	6	5	4	3	2	1
Health: "I believe it is healthy"	7	6	5	4	3	2	1
Social: "I eat here because my friends want/like to eat here"	7	6	5	4	3	2	1
Weight Control: "I eat here to find lower calorie choices"	7	6	5	4	3	2	1
Other: _____	7	6	5	4	3	2	1

4. Which of the following options do you believe make a food choice healthy? (Mark all that apply)
   ☐ Low calorie
   ☐ Low fat/saturated fat
   ☐ Low in salt
   ☐ Fresh fare (e.g. fruits/vegetables
   ☐ Vegetarian
   ☐ Meets my dietary needs (balance, diabetes, gluten free etc)
   ☐ Organic or unprocessed
   ☐ High in vitamins/minerals/anti-oxidants
   ☐ Other _____

5. At which restaurant did your buy your food today? Mark all that apply.
   ☐ Serrano Grill ☐ Pasta ☐ 4 Corners
   ☐ Ring of Fire ☐ Deli ☐ Calabaloos

6. What item(s) did your buy? Please include food and drink.

   _____

7. Which factor was the primary reason that influenced your purchase today? Please choose only one.
   ☐ Taste
   ☐ Price
   ☐ Convenience
   ☐ Health
   ☐ Social
   ☐ Weight Control
   ☐ Other

8. How many calories do you approximately need for a lunch or dinner meal to maintain your weight?
   - ☐ Less than 350
   - ☐ 350 – 700
   - ☐ 701 – 1050
   - ☐ 1051 – 1400
   - ☐ 1401 – 1750
   - ☐ 1751 – 2100
   - ☐ 2101 – 2450
   - ☐ More than 2450

9. Approximately how many grams of fat should one meal (lunch or dinner) provide?
   - ☐ Less than 10 grams
   - ☐ 10 – 25 grams
   - ☐ 26 – 40 grams
   - ☐ 41 – 55 grams
   - ☐ 56 – 75 grams
   - ☐ More than 75 grams

10. What is your gender?
    - ☐ Male
    - ☐ Female
    - ☐ Transgender

11. What is your University status?
    - ☐ Freshman
    - ☐ Sophomore
    - ☐ Junior
    - ☐ Senior
    - ☐ Graduate/Post Bac
    - ☐ Faculty/Staff
    - ☐ Other

12. What is your major?

    _____

APPENDIX B:

POST-TREATMENT QUESTIONNAIRE

Research Questionnaire

Please read the following questions and select the answer(s) that best represent your opinion.

1. How often do you eat at MarketPlace West (MPW)?
   ___ Less than once daily
   ___ ~ 1 time/day
   ___ ~ 2 times/day
   ___ ~3 or more times daily

2. Please rank the frequency of dining at these MPW restaurants using 0 – 100%. **Your answers should total 100%.**
   Serrano Grill _____ Pasta _____ 4 Corners _____

   Ring of Fire _____ Deli _____ Calabaloos _____

Overall, the following have been identified as the key factors that influence food choices:

3. Which of the following influence your purchase(s) when you eat at MPW?

	Frequently						Rarely
Taste: "I like the taste"	7	6	5	4	3	2	1
Price: "The cost is reasonable"	7	6	5	4	3	2	1
Convenience: "It is quick and easy"	7	6	5	4	3	2	1
Health: "I believe it is healthy"	7	6	5	4	3	2	1
Social: "I eat here because my friends want/like to eat here"	7	6	5	4	3	2	1
Weight Control: "I eat here to find lower calorie choices"	7	6	5	4	3	2	1
Other: _____	7	6	5	4	3	2	1

4. Which of the following options do you believe make a food choice healthy? (Mark all that apply)
   ☐ Low calorie
   ☐ Low fat/saturated fat
   ☐ Low in salt
   ☐ Fresh fare (e.g. fruits/vegetables
   ☐ Vegetarian
   ☐ Meets my dietary needs (balance, diabetes, gluten free etc)
   ☐ Organic or unprocessed
   ☐ High in vitamins/minerals/anti-oxidants
   ☐ Other _____

5. At which restaurant did your buy your food today? Mark all that apply.
   ☐ Serrano Grill ☐ Pasta ☐ 4 Corners
   ☐ Ring of Fire ☐ Deli ☐ Calabaloos

6. What item(s) did your buy? Please include food and drink.

   _____

7. Which factor was the primary reason that influenced your purchase today? **Please choose only one.**
   ☐ Taste
   ☐ Price
   ☐ Convenience
   ☐ Health
   ☐ Social
   ☐ Weight Control
   ☐ Other

8. How many calories do you approximately need for a lunch or dinner meal to maintain your weight?
   - ☐ Less than 350
   - ☐ 350 – 700
   - ☐ 701 – 1050
   - ☐ 1051 – 1400
   - ☐ 1401 – 1750
   - ☐ 1751 – 2100
   - ☐ 2101 – 2450
   - ☐ More than 2450

9. Approximately how many grams of fat should one meal (lunch or dinner) provide?
   - ☐ Less than 10 grams
   - ☐ 10 – 25 grams
   - ☐ 26 – 40 grams
   - ☐ 41 – 55 grams
   - ☐ 56 – 75 grams
   - ☐ More than 75 grams

10. Did you notice nutritional information posted for the item you purchased today?
    ☐ Yes ☐ No

11. If yes, approximately how many calories and fat did your purchase contain? If no, please skip this question and move to question 13.

    Calories _____

    Fat _____

12. Did the posted nutritional information influence which item(s) you purchased?

Absolutely	Yes	Somewhat	Not Much	No
5	4	3	2	1

13. What is your gender?
    - ☐ Male
    - ☐ Female
    - ☐ Transgender

14. What is your University status?
    - ☐ Freshman
    - ☐ Sophomore
    - ☐ Junior
    - ☐ Senior
    - ☐ Graduate
    - ☐ Faculty/Staff
    - ☐ Other

15. What is your major?

    _____

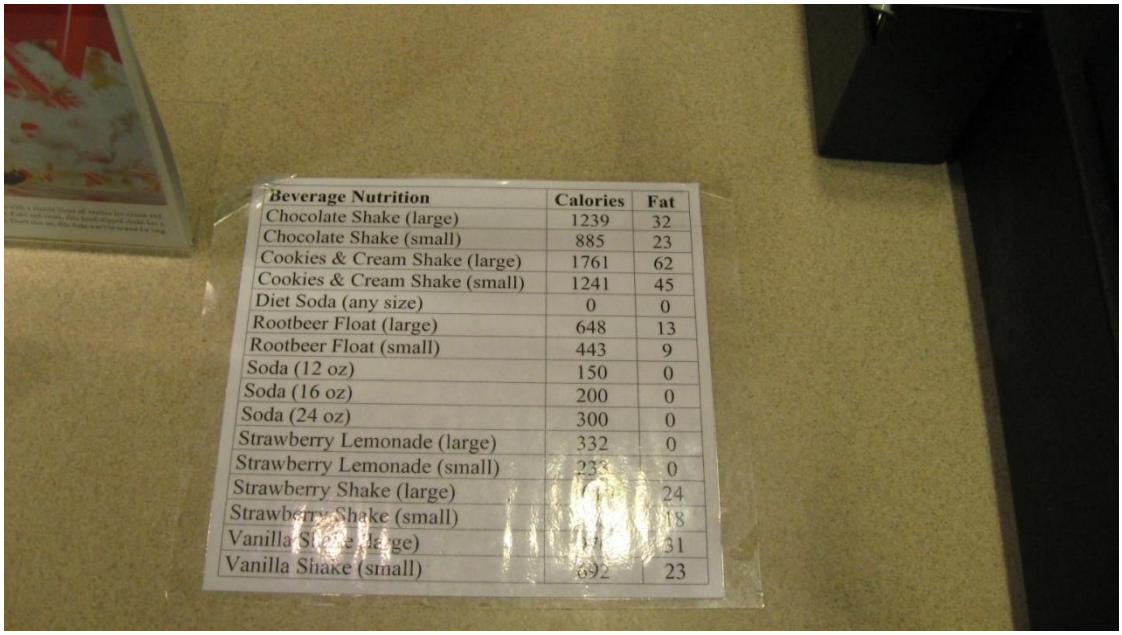
APPENDIX C:

PHOTOS FROM EXPERIMENT

Calabaloos Menu Board

Calabaloos Menu Board Close Up

Calabaloos Drink Items



Beverage Nutrition	Calories	Fat
Chocolate Shake (large)	1239	32
Chocolate Shake (small)	885	23
Cookies & Cream Shake (large)	1761	62
Cookies & Cream Shake (small)	1241	45
Diet Soda (any size)	0	0
Rootbeer Float (large)	648	13
Rootbeer Float (small)	443	9
Soda (12 oz)	150	0
Soda (16 oz)	200	0
Soda (24 oz)	300	0
Strawberry Lemonade (large)	332	0
Strawberry Lemonade (small)	238	0
Strawberry Shake (large)	[illegible]	24
Strawberry Shake (small)	[illegible]	18
Vanilla Shake (large)	[illegible]	31
Vanilla Shake (small)	692	23

Deli Soups

Soup Description	15 ounces			
	[illegible]	Fat Grams	Calories	Fat Grams
Broccoli Cheese	[illegible]	3	204	4
Chicken & Wild R[illegible]	[illegible]	30	552	40
Chicken & Dumpl[illegible]	[illegible]	14	367	18
Chicken Chipotle [illegible]	[illegible]	10	515	13
Clam Chowder	[illegible]	30	625	40
Cream of Potato	570	45	758	60
Creamy Garden Vegetable	[illegible]	20	623	27
Curried Corn w/Wild Rice	[illegible]	14	368	18
French Onion	291	4	388	5
Home-style Chicken Noodle	221	11	294	15
Italian Wedding	263	6	350	8
Red Pepper Bisque	331	12	441	17
Rosemary Chicken Dumpling	444	28	592	37
Seven Bean	210	3	280	4
Split Pea w/Ham	331	1	441	2
Tequila Spike Fiesta Chicken	225	5	300	6
Thai Style Fire 'N Rice w/Chicken	407	26	543	35
Tomato Basil Bisque	496	32	661	42
Tomato Ravioli	225	10	300	14
Vegetable Garden w/Pasta	308	4	405	6
Yukon Gold Potato w/Bacon	221	3	294	4
	709	55	945	74

Deli Salad Dressings

Salad Dressing (1 oz)	Calories	Fat grams
Ranch	110	11
Caesar	77	8
Blue Cheese	150	15
Honey Mustard	150	14
Golden Italian	90	9
Lite Ranch	50	7
Thousand Island	100	11
Raspberry Vinaigrette	0	0

Deli Sandwiches

Deli Drink Items

APPENDIX D:

NUTRITION INFORMATION FOR CALABALOOS ITEMS

Calabaloos Food Items	Calories	Fat
Bacon Cheeseburger	924	57
Boca Burger	373	5
Burger	674	32
Cabo Boca Burger	512	19
Cabo Burger	832	46
Cheeseburger	779	41
Chicken Burger	552	10
Chicken Strip Tenders (1)	245	15
Chicken Strips (3)	731	45
Fish Fillet (2)	396	20
French Fries (6 oz)	724	39
Hula Boca Burger	442	5
Hula Burger	755	32
Mushroom Bacon Swiss	1122	75
Mushroom Boca Burger	642	32
Onion Rings (4 oz)	377	21
Twister Fries (6 oz)	608	38
Calabaloos Drink Items	**Calories**	**Fat**
Chocolate Shake (LG)	1239	32
Chocolate Shake (SM)	885	23
Cookies & Cream Shake (LG)	1761	62
Cookies & Cream Shake (SM)	1241	45
Diet Soda (any size)	0	0
Rootbeer Float (LG)	648	13
Rootbeer Float (SM)	443	9
Soda (12 oz)	150	0
Soda (16 oz)	200	0
Soda (24 oz)	300	0
Strawberry Lemonade (LG)	332	0
Strawberry Lemonade (SM)	233	0
Strawberry Shake (LG)	1019	24
Strawberry Shake (SM)	722	18
Vanilla Shake (LG)	976	31
Vanilla Shake (SM)	692	23

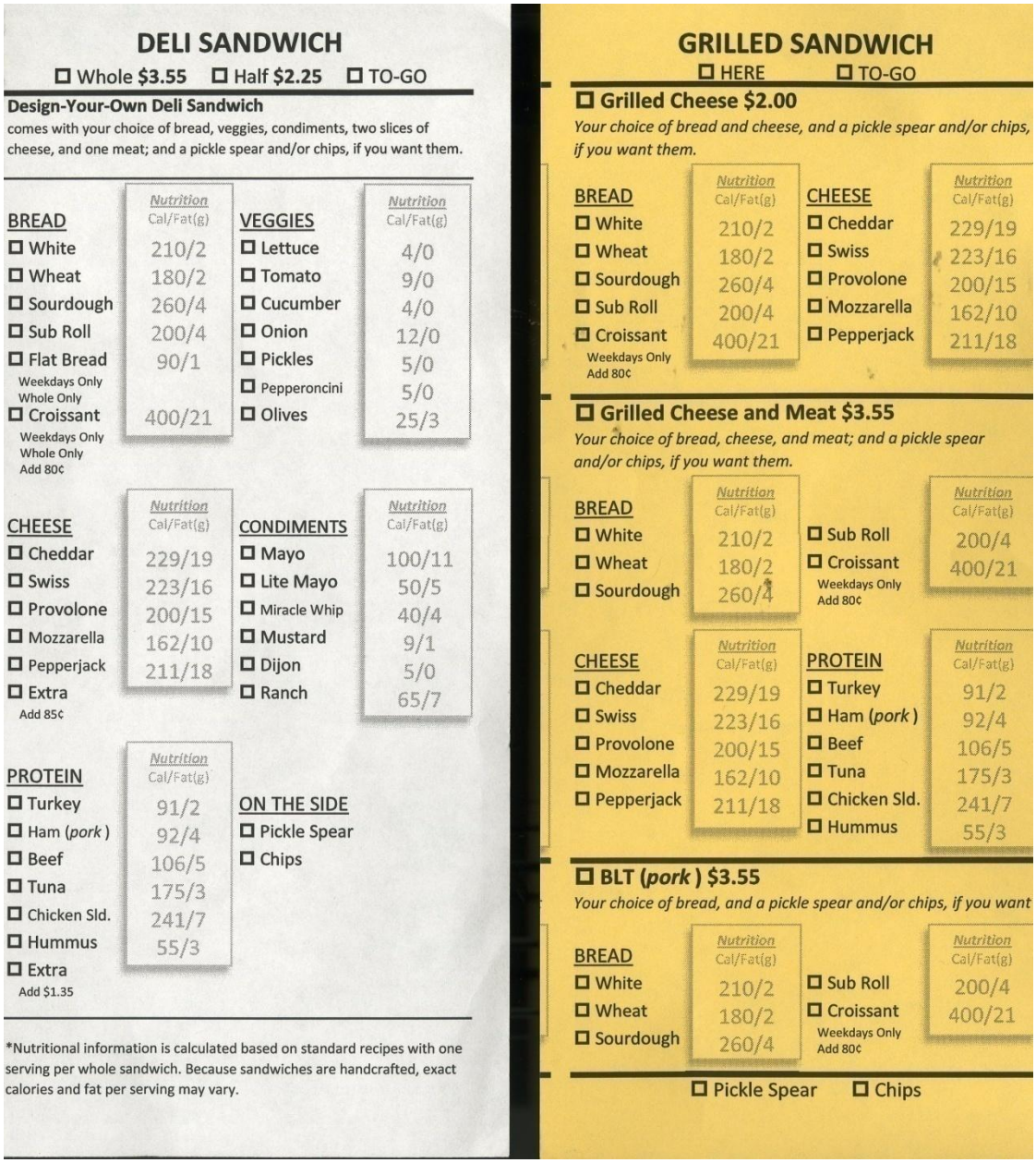
APPENDIX E:

NUTRITION INFORMATION FOR DELI ITEMS

Deli Food Items	**Calories**	**Fat**
Italian Panini	431	26
Club Panini	502	31
Turkey Panini	343	13
Vegetarian Panini	409	17
Chicken Caesar Wrap	523	23
Spicy Buffalo Wrap	696	39
Club Wrap	665	41
Turkey Cranberry Wrap	301	21
Dessert Items	**Calories**	**Fat**
Apple Cinnamon Muffin	509	30
Apple Spice Cake	258	35
Banana Bread	430	16
Banana Nut Muffin	462	21
Berry Berry Blast Parfait	510	28
Brownie	503	11
Cappuccino Muffin	571	30
Carrot Muffin	532	30
Chocolate Chip Cookie	250	11
Chocolate Chip Energy Bar	320	7
Chocolate Turtle	250	13
Cinnamon Rolls	318	18
Cornflake Bar	391	16
Cranberry Orange Muffin	423	19
Dutch Apple Pie	407	19
Montage Bar	351	12
Oatmeal Raisin Cookie	230	10
Peanut Butter Cookie	260	14
Pecan Pie	708	43
Pumpkin Bread	490	19
Pumpkin Pie	337	15
Raisin Bran Muffin	485	21
Rice Krispie Treat	296	9
Sour Crm Poppy Seed Muffin	533	30
White Choc.Mac. Nut Cookie	260	13

Salad Dressing (1 oz)	Calories	Fat
Ranch	110	11
Caesar	77	8
Blue Cheese	150	15
Honey Mustard	150	14
Golden Italian	90	9
Lite Ranch	80	7
Thousand Island	120	11
Raspberry Vinaigrette	30	0
Ranch	110	11
Caesar	77	8
Blue Cheese	150	15
Soups	**12oz Kcal(Fat)**	**16oz Kcal(Fat)**
Beef & Mushroom Burgundy	153 (3)	204 (4)
Broccoli Cheese	414 (30)	552 (40)
Brown & Wild Rice w/Chicken	275 (14)	367 (18)
Chicken & Dumpling	386 (10)	515 (13)
Chicken Chipotle Chowder	469 (30)	625 (40)
Clam Chowder	570 (45)	758 (60)
Cream of Potato	467 (20)	623 (27)
Creamy Garden Vegetable	276 (14)	386 (18)
Curried Corn w/Wild Rice	291 (4)	388 (5)
French Onion	221 (11)	294 (15)
Home-style Chicken Noodle	263 (6)	350 (8)
Italian Wedding	331 (12)	441 (17)
Red Pepper Bisque	444 (28)	592 (37)
Rosemary Chicken Dumpling	210 (3)	280 (4)
Seven Bean	331 (1)	441 (2)
Split Pea w/Ham	225 (5)	300 (6)
Tequila Spike Fiesta Chicken	407 (26)	543 (35)
Thai Style Fire 'N Rice w/Chicken	496 (32)	661 (42)
Tomato Basil Bisque	225 (10)	300 (14)
Tomato Ravioli	308 (4)	405 (6)
Vegetable Garden w/Pasta	221 (3)	294 (4)
Yukon Gold Potato w/Bacon	709 (55)	945 (74)

Deli Drink Items	Calories	Fat
Diet Soda (any)	0	0
Soda (12 oz)	150	0
Soda (16 oz)	200	0
Soda (24 oz)	300	0
Kiwi Strawberry (12 oz)	165	0
Kiwi Strawberry (16 oz)	220	0
Kiwi Strawberry (24 oz)	330	0
Cranberry (12 oz)	205	0
Cranberry (16 oz)	274	0
Cranberry (24 oz)	411	0



DELI SANDWICH

☐ Whole **$3.55** ☐ Half **$2.25** ☐ TO-GO

Design-Your-Own Deli Sandwich

comes with your choice of bread, veggies, condiments, two slices of cheese, and one meat; and a pickle spear and/or chips, if you want them.

BREAD	Nutrition Cal/Fat(g)
☐ White	210/2
☐ Wheat	180/2
☐ Sourdough	260/4
☐ Sub Roll	200/4
☐ Flat Bread (Weekdays Only Whole Only)	90/1
☐ Croissant (Weekdays Only Whole Only Add 80¢)	400/21

VEGGIES	Nutrition Cal/Fat(g)
☐ Lettuce	4/0
☐ Tomato	9/0
☐ Cucumber	4/0
☐ Onion	12/0
☐ Pickles	5/0
☐ Pepperoncini	5/0
☐ Olives	25/3

CHEESE	Nutrition Cal/Fat(g)
☐ Cheddar	229/19
☐ Swiss	223/16
☐ Provolone	200/15
☐ Mozzarella	162/10
☐ Pepperjack	211/18
☐ Extra (Add 85¢)	

CONDIMENTS	Nutrition Cal/Fat(g)
☐ Mayo	100/11
☐ Lite Mayo	50/5
☐ Miracle Whip	40/4
☐ Mustard	9/1
☐ Dijon	5/0
☐ Ranch	65/7

PROTEIN	Nutrition Cal/Fat(g)
☐ Turkey	91/2
☐ Ham (*pork*)	92/4
☐ Beef	106/5
☐ Tuna	175/3
☐ Chicken Sld.	241/7
☐ Hummus	55/3
☐ Extra (Add $1.35)	

ON THE SIDE

☐ Pickle Spear

☐ Chips

*Nutritional information is calculated based on standard recipes with one serving per whole sandwich. Because sandwiches are handcrafted, exact calories and fat per serving may vary.

GRILLED SANDWICH

☐ HERE ☐ TO-GO

☐ Grilled Cheese $2.00

Your choice of bread and cheese, and a pickle spear and/or chips, if you want them.

BREAD	Nutrition Cal/Fat(g)
☐ White	210/2
☐ Wheat	180/2
☐ Sourdough	260/4
☐ Sub Roll	200/4
☐ Croissant (Weekdays Only Add 80¢)	400/21

CHEESE	Nutrition Cal/Fat(g)
☐ Cheddar	229/19
☐ Swiss	223/16
☐ Provolone	200/15
☐ Mozzarella	162/10
☐ Pepperjack	211/18

☐ Grilled Cheese and Meat $3.55

Your choice of bread, cheese, and meat; and a pickle spear and/or chips, if you want them.

BREAD	Nutrition Cal/Fat(g)
☐ White	210/2
☐ Wheat	180/2
☐ Sourdough	260/4
☐ Sub Roll	200/4
☐ Croissant (Weekdays Only Add 80¢)	400/21

CHEESE	Nutrition Cal/Fat(g)
☐ Cheddar	229/19
☐ Swiss	223/16
☐ Provolone	200/15
☐ Mozzarella	162/10
☐ Pepperjack	211/18

PROTEIN	Nutrition Cal/Fat(g)
☐ Turkey	91/2
☐ Ham (*pork*)	92/4
☐ Beef	106/5
☐ Tuna	175/3
☐ Chicken Sld.	241/7
☐ Hummus	55/3

☐ BLT (*pork*) $3.55

Your choice of bread, and a pickle spear and/or chips, if you want

BREAD	Nutrition Cal/Fat(g)
☐ White	210/2
☐ Wheat	180/2
☐ Sourdough	260/4
☐ Sub Roll	200/4
☐ Croissant (Weekdays Only Add 80¢)	400/21

☐ Pickle Spear ☐ Chips

APPENDIX F:

APPROVAL OF HUMAN SUBJECTS REVIEW (IRB)

APPLICATION

OSU Oregon State University

Institutional Review Board • Office of Sponsored Programs and Research Compliance
Oregon State University, 312 Kerr Administration Building, Corvallis, Oregon 97331-2140
Tel 541-737-4933 | Fax 541-737-3093 | http://oregonstate.edu/research/osprc/rc/humansubjects.htm
IRB@oregonstate.edu

TO: Mary Cluskey
Nutrition and Food Management

IRB #: 4070 – Influence of Point of Sale Nutritional Information on College Students' Food Choice Motives and Retail Sales (Student Researcher: Amy Frasieur)

Level of Review: Exempt

Expiration Date: 9-7-09

Approved Number of Participants: 400

The referenced project was reviewed under the guidelines of Oregon State University's Institutional Review Board (IRB). The IRB has **approved** the:

(X) Initial Application ( ) Continuing Review ( ) Project Revision
with a (if applicable): (X) Waiver of documentation of Informed Consent ( ) Waiver of Consent

A copy of this information will be provided to the full IRB committee.

- **CONSENT FORM:** All participants must receive the IRB-stamped informed consent document. If the consent is in a format that could not have stamp placement (i.e. web site language, email language, etc), then the language must be **exactly** as the IRB approved it.
- **PROJECT REVISION REQUEST:** Any changes to the approved protocol (e.g. protocol, informed consent form(s), testing instrument(s), research staff, recruitment material, or increase in the number of participants) must be submitted for approval before implementation.
- **ADVERSE EVENTS:** Must be reported within three days of occurrence. This includes any outcome that is not expected, routine and that result in bodily injury and/or psychological, emotional, or physical harm or stress.
- **CONTINUING REVIEW:** A courtesy notice will be sent to remind researchers to complete the continuing review form to renew this project, however – it is the researcher's responsibility to ensure that continuing review occurs prior to the expiration date. Material must be submitted with adequate time for the office to process paperwork. If there is a lapse in approval, suspension of all activity including data analysis, will occur.
- **DEVIATION/EXCEPTIONS:** Any departure from the approved protocol must be reported within 10 business days of occurrence or when discovered.

Forms are available at: http://oregonstate.edu/research/osprc/rc/humansubjects.htm.

If you have any questions, please contact the IRB Human Protections Administrator at IRB@oregonstate.edu or by phone at (541) 737-8008.

Elisa Espinoza Fallows

Elisa Espinoza Fallows
IRB Human Protections Administrator

Date: 9-8-08

APPENDIX G:

INFORMED CONSENT DOCUMENT (IRB)

Nutrition and Exercise Sciences
Oregon State University, 101 Milam Hall, Corvallis, Oregon 97331-5109
Phone 541-737-2643 | **Fax** 541-737-6914

INFORMED CONSENT DOCUMENT

Project Title:	Influence of Point of Sale Nutritional Information on College Students' Food Choice Motives and Retail Sales
Principal Investigator:	Mary Cluskey, PhD, RD, Nutrition and Exercise Sciences
Student Researcher:	Amy Frasieur, RD, Nutrition and Exercise Sciences

WHAT IS THE PURPOSE OF THIS STUDY?
You are being invited to take part in a research study designed to better understand your attitudes about eating and making food choices. This information will assist us in understanding what influences college students' food choices and what affect the labeling of nutrition information on menus will have on those food choices.

WHAT IS THE PURPOSE OF THIS FORM?
This consent form gives you the information you will need to help you decide whether or not you would like to participate in this study. Please read this form carefully. You may also ask any additional questions that you have about the research. When all of your questions have been answered, you can decide whether or not you would like to participate and complete the following survey.

WHAT WILL HAPPEN DURING THIS STUDY AND HOW LONG WILL IT TAKE?
After you read this form (should you decide to participate) you will be asked to complete the following survey about your food purchase(s) today. The survey should take only about 5 to 10 minutes to complete.

WHAT ARE THE RISKS/BENEFITS OF THIS STUDY?
There are no risks or benefits to you when participating in this study and it requires only a few minutes of your time. Although there are no specific benefits, we hope that the information you provide us will be influential in continuing to make positive changes in the food offerings and nutritional information provided by OSU housing and dining.

DO I HAVE A CHOICE TO BE IN THE STUDY?
This study is completely voluntary (and completely anonymous) and you reserve the right to say yes or no to completing the survey. Also, you may skip questions if you do not want to answer them and you may turn in an incomplete survey. Participation in this study is completely up to you.

WHAT IF I HAVE QUESITONS?
If you have any questions about this research project, please contact: Mary Cluskey, 541-737-0960 or cluskeym@oregonstate.edu or Amy Frasieur, 541-217-9976 or frasieua@onid.orst.edu

If you have questions about your rights as a participant, please contact the Oregon State University Institutional Review Board (IRB) Human Protections Administrator, at (541) 737-4933 or by email at IRB@oregonstate.edu

Oregon State University · IRB Study #: 4070 Approval Date: 9/8/08 Expiration Date: 9/7/09