Spring 5-5-2015

Relationship between Syracuse University Employees' Perceptions, Behaviors, Environment, and Fruit and Vegetable Intake

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Relationship between Syracuse University Employees' Perceptions, Behaviors, Environment, and Fruit and Vegetable Intake

A Capstone Project Submitted in Partial Fulfillment of the Requirements of the Renée Crown University Honors Program at Syracuse University

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May 2015

Honors Capstone Project in Nutrition

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Date: April 23, 2015

Abstract

Objective: To determine how employees' perceptions of the availability and price of fruits and vegetables within the work and surrounding environment correspond to the actual availability and price of fruits and vegetables and influence employees' fruit and vegetable intakes.

Design: This study is a cross-sectional design comparing a survey of employees' perceptions and behaviors and an environmental audit assessing the healthfulness of dining facilities on campus.

Setting: Syracuse University and the surrounding eating environment.

Participants: 130 Syracuse University employees.

Methods: Employees were invited to complete the Work Campus Environment & Behavior Perceptions Survey. The survey consisted of 28 Likert scale questions to assess employee's perceptions of the healthfulness of the work environment and their related behaviors (choosing healthy foods, exercise, etc). The survey assessed fruit and vegetable intake, perceived weight category (under, over) and weight intention (lose, maintain). Employees self-reported weight and height, and body mass index (BMI) was calculated. The environmental audits assessed the dining options both on and off campus, including convenience stores, dining halls, sit-down, fast food, and delivery restaurants. The audits were conducted by trained undergraduate research assistants to evaluate the healthfulness of the dining facility based on specific criteria, such as the availability of fruits and vegetables, whole grains, and less healthful choices. The healthfulness of the foods and the supportiveness of the environment sub-scores were generated for each dining facility. Non-parametric, t-test, and ANOVA statistics were used to compare the results.

Results: The average fruit and vegetable intake among employees was 1.17 ± 1.0 and 2.04 ± 1.3, respectively. BMI was not related to fruit and vegetable intake, but it did affect weight intention. Only 3% of employees believed that the university encourages healthy eating, while 56% believe there is healthy food where they usually eat on campus. However, those with the highest fruit /vegetable intake perceived limited supports for healthy eating on campus. Dining halls had the highest average sub-scores for healthfulness of food (37.56 ± 12.0) and supportiveness of environment (25.33 ± 5.9). Delivery restaurants had the lowest sub-scores for both categories.

Conclusion: While this study uncovered important information regarding how perceptions, behaviors, and the work environment can affect fruit and vegetable intake, further research should incorporate worksite interventions and compare results to other campuses.

Executive Summary

This project is based on a study observing how Syracuse University employees' perceptions, behaviors, and environment are related to their fruit and vegetable intake. The topic of fruit and vegetable intake is extremely important and relevant to current diet and health issues in today's society. The obesity epidemic is still prevalent as over a third of adults were obese in the United States between 2009 and 2010 (Odgen et al., 2012). Diet quality is very important when addressing the obesity epidemic. Diets with inadequate fruits and vegetables and with excessive sugars, saturated fat can lead to obesity, which increases people's risks for developing other health conditions and chronic diseases (Pi-Sunyer et al., 1998). While choosemyplate.gov recommends that fruits and vegetables make up half a person's plate for each meal, many adults are not following these guidelines. In fact, many Americans are consuming fruits and vegetables 1.1 and 1.6 times per day, respectively (McGuire, 2013). Diets rich in fruits and vegetables are associated with lower risks for obesity and developing chronic diseases (Hung et al., 2004).

There are many factors contributing to poor diet quality in adults. While some people may not understand the difference between a healthy and unhealthy diet, many people do (Povey et al., 1998). These people may choose not to include fruits and vegetables in their diets because other factors affect their dietary intake, such as high cost (Vermeer et al., 2010), or limited availability (Larson et al., 2009). Perceptions are also extremely important when considering food choices. One study found that people who perceive their diet to be unhealthy more commonly self-report eating fast foods than those who perceive their diet to be healthy (Povey et al., 1998). Perceived barriers to healthy eating have also been found to negatively affect intake (Dittus et al, 1995). Another factor affecting individual's fruit and vegetable intake is that they

may not have the willpower to consume the fruits and vegetables they know and perceive to be healthy (Bisogni et al., 2012).

The food and eating environment may also influence fruit and vegetable intake. Many adults typically spend a lot of time in their work environment, which is usually away from home. This work environment includes both the worksite and the area closely surrounding it. Food choices are not only made based on food available from home, but can also be made based on what is available within the work environment or in food stores or restaurants near the work environment. Within the work environment, employees can be influenced to consume more fruits and vegetables if they are available, advertised, and appropriately priced. Some worksites have interventions where the costs of fruits and vegetables within the workplace are decreased, which has been shown to increase fruit and vegetable consumption. Jeffrey and colleagues found that as the number of fruit and salad options available on site increased and the prices were discounted by 50%, the sale of fruit and salads rose threefold (Jeffrey et al., 1994).

Outside the work environment, employees can be influenced by cost, availability, and convenience. If fast-food chains surround the workplace, employees may be more likely to consume the foods they offer. Access to unhealthy foods in other places, such as stores, may promote unhealthy snacking, which is often associated with higher energy intake (Nicklas et al., 2014). This is based on convenience and availability. Because the restaurants and stores surrounding the workplace are convenient and accessible, employees may be less likely to travel farther away for healthier food options.

The purpose of this study is to determine how people's perceptions of the price and the availability of fruits and vegetables within the worksite, in this case on the college campus, and

surrounding environment correspond to the actual accessibility of fruits and vegetables and influence employees' fruit and vegetable intakes.

The College Environment Perceptions Survey (CEPS) (Colby, 2014) instrument was utilized in this study. Modifications were made to make the questionnaire appropriate for and relevant to adult employees. The modified survey was titled Work Campus Environment & Behavior Perceptions Survey. This survey instrument consisted of 28 items related to overall perceptions of different health categories. These categories included both perceptions (CEPS) of the work environment and perceived behaviors of the employees from the College Environmental Behavior Survey (CEBS). The response choices for response to these questions were: strongly agree, agree, neither agree nor disagree, strongly disagree, and choose not to answer. The participants, a convenience sample of English-speaking employees that were at least 18 years of age, then answered questions about topics, such as if the university encourages them to eat healthy, if healthy food is available on campus, and if healthy food is available where they choose to eat.

There were five questions regarding body composition. Height and body weight were self-reported and Body Mass Index (BMI) was calculated for each participant. Participants categorized their weight as follows: very underweight, slightly underweight, about the right weight, slightly overweight, and very overweight; reported their intentions for weight loss: lose weight, gain weight, stay the same weight, or I am not trying to do anything about my weight; and stated if they had or had not attempted weight loss over the past 12 months.

Demographic questions assessed age, gender identity, ethnicity, where and how long employed, job title, location of residence, hours per week they work, and current relationship status. Fruit and vegetable intake was assessed using a 19-item fruit and vegetable screener

(NCI) (Thompson et al., 2007; Thompson et al., 2004). Participants considered the fruits and vegetables they usually ate in the last month, including raw and cooked, eaten as snacks and at meals, eaten at home and away from home (i.e. restaurants, friends, take-out), and eaten alone and mixed with other foods. They also were asked about how frequently they consumed these foods.

Another method in this study included conducting environmental audits for dining options both on and off campus, such as restaurants, cafes, and stores in the area. These audits evaluate the healthfulness of the facility based on specific criteria, such as the availability of fruits and vegetables, whole grains, and less healthful food choices. This study, as previously mentioned, focuses more on fruits and vegetables. This study utilized both a restaurant audit tool and a store audit tool. For the restaurant audit tool, 27 categories assessed types of food, pricing, and sustainability within the restaurant. Generally, these categories were ranked from a scale of 1-5, with 1 being less available or less healthy and 5 being more available or healthier, or not applicable. The store audit tool used Likert ranking questions to assess 19 categories regarding the healthfulness of the foods and store environment.

Thirteen stores and 51 restaurants were audited. The stores were chosen based on which stores are most frequented by the campus population and which stores make up a representative sample of available food stores on campus. Stores chosen were to include at least 30% of each type of store in the area (convenience stores/mini-marts, drug stores, and bodegas/corner stores). The stores were typically chosen to be within 1.5 miles from the center of campus, but more distant stores were chosen if the campus population obtained food from there frequently. Restaurants were chosen based on frequency of visits by campus population and if they were a representative sample of eating and food outlets. Restaurants were chosen to include at least 30%

of each type of dining establishment in the area (dining halls/buffets, sit down restaurants, fast food restaurants, or delivery options). They were typically chosen to be within 1.5 miles from the center of campus, but more distant dining establishments were chosen if the campus population ate there frequently.

Seventy-nine percent of the participants in this study were female and 89% were white. The majority of employees have been employed between one and 20 years, with over half (58%) reporting they work 30-40 hours per week. Forty-eight percent of employees described themselves as slightly overweight, and 68% of participants were currently trying to lose weight. This study found a significant difference between fruit and vegetable intake based on the employee's perception that there is healthy food available on campus. The group that perceived that there is not healthy food available on campus was the group with the highest fruit and vegetable intake (five servings per day). Whereas, the group that was neutral about their perception of availability of healthy food available on campus had the lowest intake of about two servings per day and those who agreed that there were healthy foods on campus had an average intake of 3.5 servings per day.

This study also found that fruit and vegetable intake did not differ by weight goals among employees. However, BMI was found to differ by weight goals: the group that wanted to lose weight has the greatest average BMI of 27.2, the group that wants to gain weight had an average BMI of 18.4, and the group that desires to stay the same had an average BMI of 22.8. This is consistent with the classification of a healthy BMI falling within the range of 18.5-24.9. There was no significant difference in BMI or fruit and vegetable intake based on how many hours per week the employees work.

Sub-scores were calculated for each dining facility in order to assess overall healthfulness of the food. Reviewing the dining data, all four types of restaurants were significantly different in terms of the healthfulness of the food sub-scores. While there was not a significant difference in the healthfulness of the food sub-scores between delivery, fast food, and sit down restaurants, there was a large difference between these three dining options and dining hall/cafeteria/buffet. This means that dining halls/cafeterias/buffets were found to be significantly healthier than the other dining options. Dining halls were also found to have significantly higher fruit availability than the other options. Unfortunately, the majority of employees do not eat in dining halls on campus, so this healthy option is not as relevant to them. The majority of stores did not have fresh fruit available, five had frozen fruit available, and 11 out of the 12 stores (92%) had processed fruit available. The majority of stores also did not have fresh vegetables available, six had frozen vegetables available, and 10 out of the 12 stores (83%) had processed vegetables available.

Many people have researched the topic of healthfulness in work environments, but few studies have analyzed the interactions between perceptions, behavior, and environment on a college campus. Participants in this study had an average fruit intake of one serving per day, an average vegetable intake of two servings per day. This may be due to the fact that the majority of participants do not believe the University encourages them to eat healthy (Bandoni et al., 2010), the perception that healthy foods on campus are more expensive than unhealthy foods (Jeffrey et al., 1994), and the perception that there are not healthy foods available on campus (Capsi et al, 2012). Employees may also have a lower fruit and vegetable intake because they do not typically frequent the dining halls, which were found to be the healthiest dining option with the most fruit and vegetable availability on campus. While this study identified certain trends

between perceptions, behavior, and the environment, further research should be done that includes a worksite intervention.

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Acknowledgements

This project was partially funded by a FRUVED Grant. The author acknowledges Dr. Tanya Horacek, RD, PhD, for assistance with statistical analysis and general guidance; Dr. Jennifer Wilkins, RD, PhD, Mr. Henry Jankiewicz for proofreading suggestions; and the undergraduate and graduate students from Syracuse University for data collection. This study was completed as part of an Honors Capstone Project at Syracuse University.

Chapter 1

Introduction

The obesity epidemic among Americans is a nationwide problem. In 2003-2004, 32.2% of adults were obese (Odgen et al., 2006). This number increased between 2009-2010 to over a third of adults and 16.9% of children and adolescents were obese in the United States (Odgen et al., 2012). The obesity problem has not only failed to improve, it is has actually worsened. Obesity also increases the risk for developing other health conditions, including hypertension, type 2 diabetes mellitus, and metabolic syndrome (Pi-Sunyer et al., 1998).

Obesity is often a result of poor diet quality and overeating, which may be affected by increased portion sizes of foods that are particularly high in calories (Young and Nestle, 2002). According to the dietary guidelines for Americans, it is recommended that people decrease sodium, saturated fatty acids, dietary cholesterol, trans fatty acids, solid fats and added sugars, refined grains, and alcohol. The dietary guidelines recommend that people should increase include fruits and vegetables, whole grains, lean protein, and fat-free milk products. The guidelines also suggest eating a variety of vegetable types, such as dark-green vegetables, red and orange vegetables, and beans and peas (USDA, 2010).

According to Choose MyPlate (choosemyplate.gov), fruits and vegetables should compose approximately half of a person's plate at a given meal. While fruits and vegetables tend to improve diet quality, many adults are not consuming an adequate amount of these food groups; in fact, on average Americans consume about 1-2 servings less than recommended per day (Heimendinger & Van Duyn, 1995), which is about 1.5-2 cups of fruits and 2-3 cups of vegetables per day, depending on age and gender (Choose MyPlate). More recent data indicate

that about 38% of adults in the United States reported consuming fruits less than one time daily, while about 23% report eating vegetables less than one time daily. The same report found that the median intake of fruits and vegetables consumed, in times per day, were 1.1 and 1.6, respectively (McGuire, 2013). A diet rich in fruits and vegetables may help reduce the risks for obesity and other chronic diseases (Hung et al., 2004), such as hypertension, CHD, and stroke (Boeing et al., 2012). Scarborough and colleagues analyzed deaths caused by chronic diseases in participants from the United Kingdom. They found that consuming five servings of fruits and vegetables each day is sufficient to reduce mortalities; specifically, meeting this recommendation would result in about 15,000 fewer deaths per year (Scarborough et al., 2012).

There are various reasons adults may have poor diet quality. One possible reason is that they simply do not know the difference between foods that contain nutrients and those with empty calories. Empty calories are calories that do not contribute many nutrients to the diet (Choose MyPlate). Knowledge may be linked to level of education, which is sometimes correlated with a healthy diet. One study found that lower-educated participants were less likely to identify aspects of a healthy diet, compared to more highly educated participants (Margetts et al., 1997). However, many people do know the difference between healthy and unhealthy. Participants in a study conducted by Povey and colleagues (1998) expressed that a diet rich in fruits and vegetables was considered healthy by most, while fast food and junk food were classified as unhealthy. Despite this knowledge, many people choose to prioritize other lifestyle factors, such as time, cost, or convenience, over health, and consume foods that they know will not optimize their health.

Another factor that may influence what people choose to eat is the perceptions people have about food. These perceptions may play a large role in influencing dietary intake. For

example, in six out of seven studies, perceived availability of food was positively associated with dietary choices (Capsi et al., 2012). In addition, people may perceive their environment in general to be healthy or unhealthy, which may influence the food choices that they make. For example, patrons eating at a restaurant featuring specialty salads may be more likely to choose a healthier salad option, due to their perception of the healthfulness of the restaurant. On the other hand, patrons at a fast food restaurant may ignore the healthier alternatives in favor of the unhealthier options, such as the classic cheeseburger, French fries, and soft drink. Either they have chosen to eat there because of their "unhealthy" perception of the environment or give themselves permission to eat unhealthy foods when they find themselves in such an environment. One study found that even when nutrition information was provided on-site at fast food restaurants, few patrons made a healthier decision based on this information (Breck et al., 2014). Also, people who perceive their diet to be unhealthy more commonly self-report eating fast foods than those who perceive their diet to be healthy (Povey et al., 1998). There is also evidence that a higher concern for nutrition and perceived susceptibility to cancer can affect nutrition behaviors, such as fruit and vegetable intake (Dittus et al., 1995). In addition, perceived barriers to healthy eating might negatively affect intake (Dittus et al., 1995).

Nutrition educators must first understand people's perspectives and experiences with food and eating before they can truly help them make positive dietary changes (Bisogni et al., 2012). This idea highlights the gap between people's ideals and their behaviors relating to their health and wellness. Many people know and understand what they should do, but do not have the willpower or the resources to succeed in their own nutrition interventions (Bisogni et al., 2012). Specifically, many adults know that it is important to include fruits and vegetables in their diet, but the majority of adults are still do not abide by the recommendations.

In addition to people's perceptions, their overall environment may influence dietary intake. One of the five overarching principles in *The Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity* is to "encourage environmental changes that help prevent overweight and obesity" (Office of the Surgeon General, 2001, p. V). More specifically, people's work environments may play a role in dietary consumption. Most adults spend a large portion of their day in their work environment, and therefore consume a large portion of their daily calories away from home. Larson et al found that, "food choices and eating behaviors are influenced by the physical availability of food in the workplace and surrounding neighborhood, workplace policies, organizational support for health programs, and social norms among coworkers" (Larson et al., 2009, p. S61). According to Write and Aronne, the number of processed foods available in stores has greatly increased, which may also be contributing to the obesity epidemic (Wright and Aronne, 2012).

Employees may also influence each other in making certain food choices. If coworkers typically go out to eat fast food daily for lunch, their peers are likely to do the same, whereas, if coworkers typically eat fruits and vegetables at lunch, their peers might be more inclined to do so as well. One study found that eating with peers increased intake of unhealthy food, while eating with strangers increased intake of healthy food (Batista & Lima, 2013). In addition, prompts encouraging healthy eating, such as signage and advertising, can lead to healthier choices (Dorresteijn et al., 2013). For example, signage about a healthy eating program being implemented in a hospital cafeteria was reported to influence changes in eating habits (Dawson et al., 2006).

Based on previous worksite wellness interventions, the availability of, and access to, healthy food in the working environment could encourage employees to make healthier choices

(Larson et al., 2009; Devine et al., 2007). For example, when the work environment promotes healthy eating with cost-effective deals and signage, employees may be influenced to consume healthier meals and snacks at work. Kushida and Murayama found that increasing knowledge about vegetables in the workplace resulted in doubling the intake of vegetables (Kushida & Murayama, 2014). In addition, interventions in the worksite that promote fruits and vegetables increased consumption among employees (Bandoni et al., 2010). Encouraging increased fruit and vegetable consumption via the Stages of Change model in the work environment also proved to be effective (Beresford et al., 2001). Jeffrey and colleagues found, as the number of fruit and salad options available increased and as the prices were discounted by 50%, the sale of fruit and salads rose threefold (Jeffrey et al., 1994). This supports the idea that increasing availability and decreasing cost are both effective ways to increase the consumption of particular foods, in this case fruits and vegetables.

Not only is the actual work environment important in making healthful choices, but the stores and restaurants in the surrounding area must also be considered. Although one study suggests that the prevalence of supermarkets within a community is associated with a decreased prevalence of overweight and obesity among the people that live in that community (Morland et al., 2006), the location and density of supermarkets near a work environment may not be relevant to mid-day meal behaviors for employees. Employees are likely to consume food from nearby fast-food outlets, casual dining restaurants, grocery stores, and vending machines before, during, or after a shift (Blanck et al., 2007). These dining options impact dietary intake because employees may want a break from their work environment or grow tired of the options made available to them at the worksite. Therefore, they may choose to venture to a convenient restaurant or fast-food outlet or a convenience store in the area for meals or snacks.

Access to these unhealthy foods in convenience stores may promote unhealthy snacking, which is often associated with higher energy intake (Nicklas et al., 2014). If the stores offer healthy snacks, employees may be more inclined to buy them. One study found that people who had whole fruit as a snack had an overall lower energy intake than people who did not eat any type of snack (Nicklas et al., 2014). However, if healthy food stores and restaurants surround the work environment, employees will have easier access to healthy foods, such as fruits and vegetables, which may improve the quality of their diet.

Within the work and surrounding food environment, employees' intake of fruits and vegetables may be influenced by the prices or perceived availability of fruits and vegetables. Many Americans desire to get the most for their money (Vermeer et al., 2010). Often, fruits and vegetables are perceived to be more expensive than more energy-dense foods, such as chips, French fries, or baked goods (Lucan et al., 2010). However, in one study, lowering the prices of healthier food options in vending machines in diverse worksites increased their sales (French et al., 2001). The same is true of restaurants; offering fruits and vegetables at discounted prices may result in increased consumption (Glanz et al., 2004). Advertisement of this reduced pricing is important; without it, people may perceive a fruit or vegetable side to be more expensive than a traditional energy-dense side, and therefore may not even consider it. For example, a sandwich may come with French fries, but patrons may be encouraged to substitute a fruit or vegetables side, and may do so, if they know that it will save them money (such as with a meal deal) or not cost them any additional money.

Caldwell and colleagues discuss the importance of the perceived availability of fruits and vegetables to encouraging consumption. They found that when people perceive that they have greater access to fruits and vegetables, they might consume more of them (Caldwell et al., 2009).

Their findings support the importance of the environment surrounding the work environment and the healthfulness of the food that is available. People tend to choose what is readily available and accessible to them. This is also applicable in a restaurant setting, where the creativity of the chef can result in more availability of options for fruits and vegetables (Glanz et al., 2004).

Obesity is not simply the result of one aspect of a person's life; it is likely that it is influenced by genetic, behavioral, and environmental factors (Morland et al., 2006). The purpose of this study is to determine how people's perceptions of the availability and prices of fruits and vegetables within the work and surrounding environments, specifically those of a college campus, correspond to the actual availability of fruits and vegetables and influence employees' fruit and vegetable intake.

Chapter 2

Methods

Many people have researched the topic of healthfulness in work environments, but few studies have analyzed the interactions among perceptions, behavior, and environment in a college campus work environment. This study used a cross-sectional design, including an environmental audit of the healthfulness of the food environment and a survey analyzing employees' environmental perceptions and health behaviors. This research specifically focuses on fruit and vegetable intake, and on perceptions, and the availability of fruits and vegetables.

Participants

The International Review Board (IRB) approved this study. A convenience sample of 200 English-speaking Syracuse University employees was recruited for this study. An email was sent to the faculty and staff to request participation in a survey about perceptions and behaviors. To be included, a participant had to be an employee of Syracuse University and at least 18 years of age. There were no exclusion criteria for the participants in this study. Subjects were recruited with an email explaining the survey and its purpose. At the beginning of the survey, which was accessed via a Qualtrics survey link, participants reviewed the statement and provided informed consent. The survey required about 20 minutes to complete. Compensation for participating was described as having a 1 in 20 chance of winning an SU or local food item.

Environmental Perceptions and Health Behavior Survey

Tools

Because the College Environment Perceptions Survey (CEPS) was originally created for students, certain modifications were made to make the survey appropriate for adult employees (Colby, 2014). The modified survey was titled Work Campus Environment and Behavior Perceptions Survey. This survey consisted of 28 questions related to overall perceptions of the environment in regard to policies and programs, and the availability of healthy foods and exercise facilities. A 5-point Likert agree/disagree scale was used. Participants were asked about on-campus policies regarding health, the availability of healthy food at grocery stores around campus, the prices of healthy vs. unhealthy foods on campus, the availability of healthy foods at restaurants on or around campus, and the availability of healthy foods at the cafeteria/food court on campus. More generally, participants were asked if the university encourages them to eat healthy, if healthy food is available on campus, and if healthy food options are available where they choose to eat. There were 10 questions assessing the participants' behaviors (CEBS) for healthy eating and exercise, such as asking if the employees participate in programs on campus that promote health, if they use the stairs in most buildings on campus, and if they walk on campus during the day. These response choices included: *never, rarely, sometimes, often, and frequently.*

There were five questions regarding body composition. Height and body weight were self-reported. Participants categorized their weight as *very underweight, slightly underweight, about the right weight, slightly overweight, and very overweight*; report their intentions for weight loss as *lose weight, gain weight, stay the same weight, or I am not trying to do anything about my weight*; and report if they attempted weight loss over the past 12 months.

Demographics questions assessed respondents' age, gender identity, and ethnicity, where and how long they were employed, their job title, the location of their residence, hours per week worked, and their current relationship status.

Fruit and vegetable intake was assessed using a 19-item fruit and vegetable screener (NCI) (Thompson et al., 2007; Thompson et al., 2004). Participants considered the fruits and vegetables they usually ate in the last month, including raw and cooked, eaten as snacks and at meals, eaten at home and away from home (i.e. at restaurants, with friends, as take-out), and eaten alone or mixed with other foods. They were then asked a series of questions about frequency of their consumption of foods. These questions addressed how many times per month, week, or day they drank 100% juice, and ate fruit, lettuce salad, French fries or fried potatoes, other white potatoes, cooked dried beans or other vegetables, tomato sauce, vegetable soups, and mixtures that included vegetables. They then indicated how often, if at all, they consumed that particular category of food.

Participants were also asked about their healthful intentions at mealtime and self-regulation of these behaviors. Self-instruction was assessed with questions regarding how often in the past three months participants had reminded themselves of the importance of preparing quick and easy meals, reminded themselves that preparing these meals is a simple process, told themselves it is acceptable to eat dessert for enjoyment, reminded themselves to think about beverage choices, and told themselves that fruits and vegetables should be included in each meal. Self-regulation was assessed by asking the participants how often in the last three months they had planned a quick and healthy snack, allowed health to influence beverage choices, added vegetables to meals and snacks, and been flexible and sensible regarding their food choices.

These responses were assessed using a 5-item Likert scale (0 = never and 4 = very often) (Kattelmann et al., 2014; Strong et al., 2008).

Environmental Audit

Setting

The environmental audits assessed the objective healthfulness of the campus environment. The audits were conducted in restaurants and convenience stores both on and off campus for the Syracuse University environment. A 1.5-mile perimeter beyond campus was established to set a boundary for evaluating the restaurants and stores closest to campus that most employees might utilize during their workday.

Research Assistants

Research assistants were undergraduate students at Syracuse University. They were selected based on applications submitted to Dr. Tanya Horacek and her graduate assistants. They were chosen based on academic criteria and interest in the research field. These research assistants collected all data used in this study.

Restaurant Audit Tool

The Full Restaurant Evaluation Supporting a Healthy (FRESH) Dining Environment Audit evaluates the nutritional environment of dining establishments, including restaurants (fast food, sit down, cafes), dining halls, cafeterias, buffets, and food courts. The audit evaluated food and preparation descriptions to determine the healthfulness of menu items, rather than adopting a nutrient analysis perspective, and the availability/extensiveness of other supports for making healthy dining decisions (Matthews et al., 2014).

Restaurants were also assessed using a similar restaurant audit. These restaurants included fast food, sit-down, and delivery. Some restaurants were located on campus and some were located off campus. About 27 categories assessed the types of food, the pricing, and sustainability within the restaurant. Generally, these categories were ranked using a 5-item Likert scale (1-5 or not applicable), with criterion scores using a five-point semantic-differential scale, ranging from limited to extensive healthfulness or environmental support/evidence. Specifically, the audit inquired about:

- how food items were described on the menu
- how many distinct lean meat options were available
- how many vegetarian entrée options were available
- how side dishes were included with the meal
- what type of fruit is available what were the vegetable side options
- what were the labeled whole grain options
- how many varieties of healthy cereals were available (if in a dining hall)
- how many fresh vegetables were on the salad bar
- how appealing the lettuce on the salad bar was, how extensive were the healthy additions to the vegetables on the salad bar
- how were high fat condiments/salad dressings served
- how many health beverage categories were offered
- how many healthy dessert categories were offered
- if/where nutrition information can be found
- menu planning/nutrient analysis tools available,
- how/if substitutions were offered
- what signage was in the restaurant

- a description of board/menu labeling
- portion sizes of main entrees
- the largest cup size available for fountain drinks
- fried food options, general facility pricing
- price differences for comparable individually-priced meals or items
- if there was pricing by weight, sustainability/green eating signage
- the types of plates/flatware used
- and the trays (if any) that are used in the restaurant.

This study, however, focused mainly on the questions relating to fruits and vegetables. Each audit was reviewed by experts, pilot-tested, and displayed acceptable Inter-rater reliability.

Store Audit Tool

The Convenience Store Supporting Healthy Environment for Life-Promoting Food (SHELF) Audit evaluates the healthfulness of the food store environment of convenience stores, drug stores, dollar stores, mini-marts, corner stores, and food carts. The audit evaluates the presence of healthy foods and the availability/extensiveness of other environmental supports for making healthy food purchasing decisions (Mullin and Horacek, 2014). The audit assessed 19 categories regarding the healthfulness of the foods and store environment. This audit tool assessed the availability of fresh, frozen, and processed fruits and vegetables; the quality of fresh fruit and vegetables; and the pricing differences between light processed fruits and low-sodium vegetables. The audit tool also assessed the varieties of low-fat dairy products or dairy substitutes available, the largest cup size available for self-service or fountain drinks, the varieties of healthy staple foods, the varieties of healthy prepackaged frozen entrees/meals available, the healthy products adjacent to the checkout counter, and unhealthy products adjacent to the checkout counter. Generally, the audit used a 5-item Likert ranking scale (1-5 or not

applicable), with criterion scored using a five-point semantic-differential scale ranging from limited to extensive healthfulness or environmental support/evidence. The audit tool also assessed approximately how far the store is from the geographic center of campus, which programs are in use to advertise healthy choices, the average number of hours this store is open on Tuesdays and on Sundays.

Procedures

Before completing the audits, each researcher completed the Collaborative Institutional Training Initiative (CITI) as well as training specifically for one type of audit (stores or restaurants). Within this training, which was implemented in the form of a narrated PowerPoint presentation, each category on the audit tool was explained in great detail, so that there was little confusion or error during the audits. Before a research assistant audited a dining facility alone, a group of research assistants audited the same dining facility individually, and the results of each individual audit were compared to establish inter-rater reliability. The goal was to achieve an inter-rater reliability score of at least 80%. If the research assistants failed to achieve this score, they would meet and go over the possible causes of error. Then, the audit for inter rater reliability would be completed again, until a score of 80% was achieved.

Thirteen stores and 51 restaurants were selected for the audit. The stores were chosen based upon how often they were frequented by the campus population given the representative sample of available food stores on/near campus. The sample included at least 30% of each type of store (convenience stores/mini-marts, drug stores, and bodegas/corner stores). Selected stores were typically within 1.5 miles from the center of campus, but further stores were audited if the campus population utilized them frequently. Similarly, a representative sample of restaurant venues was audited if the campus population typically used them. Restaurants were chosen to

evaluate at least 30% of each type of dining establishment (dining halls, sit-down, fast food, and delivery restaurants). These were typically within 1.5 miles from the center of campus, but more distant restaurants were chosen if the campus population utilized them frequently.

Upon entering the store or dining facility, researchers presented a letter to the manager/attending staff to explain the audits. The letter explained the research project and emphasized that the researchers were not inspectors or evaluators, nor were they working for competitors. The letter also explained that information about that particular facility would be combined with other facility data before it was shared and that the name of the facility would not be used. After completing the data collection, information was entered into Qualtrics to be analyzed.

Dining Hall Assessment

Because employees of the university do not typically utilize dining halls, their evaluation and results were not a primary outcome for this study. However, data gathered through assessment of healthfulness of dining halls was utilized as comparative data.

Data Analysis

Non-parametric statistics from CEPS were used to summarize the mean, median, and standard deviation of continuous variables such as height, weight, BMI, and age. Percentages and frequencies were run for discrete variables such as gender, ethnicity, job category, length of employment, hours per week worked, location of residence, relationship status, weight description and weight attitude, and attempts on the part of the employee to lose weight. Mean, standard deviation, minimum, and maximum values were also calculated for total fruit intake,

total vegetable intake, total fruit and vegetable intake, BMI, weight difference, and meal intention. To assess the perceptions of employees, *agree and strongly agree* were collapsed as well as *disagree and strongly disagree*. ANOVA was used to compare BMI, the fruit and vegetable intake by employee perceptions, and hours worked per week. ANOVA was also used to compare weight intentions (lose weight, gain weight, stay the same/do nothing about weight) and differences in BMI and fruit and vegetable intake.

For the dining data, two sub-scores were generated: 1) for the healthfulness of the food and 2) for the supportiveness of the environment for making healthy choices (Horacek et al., 2015). The healthfulness of the food subscale included information on lean meat, vegetarian options, fruit, vegetable sides, cereals, fresh vegetables on the salad bar, the lettuce on the salad bar, salad bar extras, condiments, beverages, desserts, and price differences, for a potential total of 60 points. The environmental supportiveness subscale includes menu descriptions, nutrition information, menu-planning tools, availability of substitutions, signage, board labeling, portion sizes, information on sustainability, and whole grains, for a potential of 50 points. Higher scores indicated a more favorable healthy environment and options. Cross-tabs and ANOVA were used to assess relationships between these sub-scores and the dining option. Cross-tabs and ANOVA were used to assess individual questions relating specifically to fruits and vegetables in each dining facility. Correlations were used to compare CEPS, CEBS, and fruit and vegetable intake. Statistical significance was set at $p < 0.05$.

Chapter 3

Results

Out of the 130 participants in this study, the majority was female (79%) and white (89%). Almost half the participants (47%) had been employed at Syracuse University for 1-10 years, and over half were working 30-40 hours per week (58%). About a third of participants worked in the administrative/secretarial field (30%) and the majority lives in their own home (78%). Eighty-one percent were in a relationship at the time the survey was taken. About half of the participants (48%) considered themselves slightly overweight, with slightly fewer (38%) considering themselves to be just about the right weight. However, 68% of the participants reported that they were currently trying to lose weight. See Table 1.

Table 1. Demographics of sample

Category	Frequency	Valid %
Gender		
Male	28	19.9
Female	112	79.4
Trans female/Trans woman	1	0.007
Hispanic or Latino?		
Yes	3	2.1
No	137	97.2
Race		
White	121	89.0
Black or African American	4	2.9
Asian	6	4.2
Other	5	3.7
Length of Employment		
<1 year	18	13.1
1-10 years	64	46.7
11-20 years	31	22.6
20-25 years	11	8.0
>25 years	13	9.5
Hours worked per week*		
1-29 hours	15	10.9
30-40 hours	79	57.7
>40 hours	43	31.4

Job category		
Executive/Managerial	27	19.6
Faculty	18	13.0
Administrative/Secretarial	42	30.4
Health Care	3	2.2
Maintenance	1	0.7
Support Services	16	11.6
Other	31	22.5
Where do you live?		
Apartment	22	15.7
Own home	109	77.9
Parent or guardian's home	1	0.7
On campus	5	3.6
Other	3	2.1
Current relationship status		
Single	26	18.7
In a committed relationship	113	81.3
How do you describe your weight?		
Very underweight	1	0.7
Slightly underweight	5	3.5
About the right weight	54	38.3
Slightly overweight	68	48.2
Very overweight	13	9.2
What are you trying to do about your weight?		
Lose weight	96	68.1
Gain weight	3	2.1
Stay the same/nothing	42	29.7

**Collapsed into 1-29 hours, 30-39 hours, and >40 hours*

The mean total intake of fruits in this sample was 1.17 ± 1.07, the mean total vegetable intake was 2.04 ± 1.37, and the mean total fruit and vegetable intake was 3.74 ± 2.31 (which also included mixed sources). The average BMI of the participants was 25.62 ± 5.37, and the desired weight change was 15.16 ± 19.87 (see Table 3). In general, slightly over half (56%) of the participants perceived that there was healthy food available at grocery stores around campus, and slightly over half (52%) also perceived healthy food to be more expensive than unhealthy food on/near campus. Thirty-nine percent perceived there that there was healthy food available at

restaurants around campus. While the majority of participants (56%) perceived that there was healthy food where they choose to eat on campus, only 16% perceived that there was healthy food available on campus in general. That being said, only about 3% perceived the university as encouraging healthy eating (see Table 4).

Although fruit and vegetable intake did not significantly differ by BMI or most of the questions regarding perceptions, there was a significant difference in fruit and vegetable intake, based on the employees' perception that there was healthy food available on campus. The group that perceived there was limited healthy food available on campus had a significantly higher fruit and vegetable intake (5.16 ± 3.04), whereas, the group that was neutral about their perception of availability of healthy food available on campus had the lowest intake of 1.91 ± 1.12. Those that agreed that there were a sufficient number of healthy foods available on campus had an average intake of 3.52 ± 1.63 (see Table 2).

Table 2. Fruit and vegetable intake based on the perception of healthy food available on campus Tukey $B^{a,b}$

Perception of healthy food available on campus	Fruit and vegetable intake ± SD
Disagree	5.15^{a} ± 3.04
Agree	3.52^{ab} ± 1.63
Neutral	1.91^{b} ± 1.12

For this sample, fruit and vegetable intake did not significantly differ by weight goals. BMI significantly differed by their desired weight loss goals: the group that wanted to lose weight had the greatest average BMI of 27.2 ± 5.44 SD the group that wanted to gain weight had an average BMI of 18.4 ± 1.08, and the group that wants to stay the same had an average BMI of

22.87 ± 3.71. This was consistent with the standard of a healthy BMI falling within the range of 18.5-24.9.

There was no significant difference in BMI based on how many hours per week the employees worked, and there was also no significant difference based on hours worked per week and fruit and vegetable intake.

Table 3. Fruit and vegetable intake, BMI, desired weight change, and meal intention

	Mean ±SD	Minimum	Maximum
Total fruit intake	1.17 ± 1.07	0.02	8.00
Total vegetable intake	2.04 ± 1.37	0.28	6.51
Total fruit and vegetable intake	3.74 ± 2.31	0.72	13.99
BMI	25.62 ± 5.37	17.16	49.64
Desired Weight Change	15.16 ± 19.87	0.00	152.00
Meal Intention	21.38 ± 5.47	6.00	30.00

While more employees agreed that there were healthy foods available at grocery stores around campus and where they usually ate on campus, they disagreed that there were healthy foods available on campus in general and that the campus encourages employees to eat healthy. Very few participants (13%) disagreed with the statement that the healthy foods on campus were more expensive than unhealthy foods on campus, and 33% disagreed with the statement that healthy foods were available at grocery stores around campus. There was not much difference between the number of participants who disagreed or agreed that there were healthy foods available at restaurants on or around campus (36% and 39%, respectively). Half of the participants disagreed that there were healthy foods available on campus, and over half (56%) disagreed that the university encourages employees to eat healthy (see Table 4.)

Table 4. Employee perceptions of campus environment

	Disagree n(%)	Neutral n(%)	Agree n(%)
Healthy foods are available at grocery stores around campus	24(32.9)	8(11.0)	41(56.2)
The healthy foods on campus are more expensive than unhealthy foods on campus	8(13.6)	20(33.9)	31(52.5)
There are healthy foods available at restaurants on or around campus	12(36.4)	8(24.2)	13(39.4)
There are healthy foods where I usually eat on campus	22(32.4)	8(11.8)	38(55.9)
There are healthy foods available on campus	19(50.0)	13(34.2)	6(15.8)
The university encourages employees to eat healthy	44(56.4)	32(22.4)	2(2.6)

Dining Data

Data for the 51 fast food restaurants, sit down and delivery restaurants, and dining halls/cafeterias/buffets results are summarized in Table 5. While dining halls/cafeterias/buffets were not considered as relevant to this employee population, the results are presented for comparison purposes. There is a statistically significant difference ($p = .000$) among the all four types of restaurants in terms of the healthfulness of their food sub-scores. While there was no significant difference in healthfulness sub-scores among delivery, fast food, and sit down restaurants, there was a large difference between these three dining options and dining halls/cafeterias/buffets. Dining halls/cafeterias/buffets were determined to be significantly healthier than the other dining options. For supportiveness of the environment sub-scores, delivery had the lowest sub-score and was therefore found to be the least healthy option. Fast food and sit down restaurants were not significantly different and scored in the middle range, and again dining halls/cafeterias/buffets received the highest sub-score. Therefore, dining halls/cafeterias/buffets were found to have the most supportive environment for making healthy choices, as well.

Crosstabs were used to summarize the number of dining options in each category relating to employees (delivery, fast food, and sit down restaurants), in terms of their healthfulness: healthy, moderately healthy, and least healthy. Out of the 32 delivery options assessed, 20 (63%) were the least healthy, and only 2 (6%) were rated healthy. Out of 34 fast food options, 19 (56%) were moderately healthy, and only 5 (15%) were rated healthy. Out of 28 sit down restaurants, 4 (14%) were the least healthy, and 15 (54%) were rated healthy. The results for the supportiveness of the environment sub-scores were similar. There were no statistically significant differences in dining establishment healthfulness or supportiveness sub-scores based upon on or off campus location.

The questions specifically analyzed for this study were: "How many vegetarian options are available?" "What type of fruit is available?" and "How many vegetable side options are there?" as well as questions regarding the salad bar, such as the number of fresh vegetables on the salad bar, the appearance of the lettuce on the salad bar, and how extensive the healthy additions to the vegetables on the salad bar were. ANOVA was conducted for the different types of restaurants and for these particular variables. In terms of these variables, all of the types of restaurants displayed statistically significant differences. A score of .00 for questions relating to salad bars indicates that the restaurant did not offer a salad bar.

Table 5. Tukey B[a,b] Differences between specific categories of dining facilities

Type	Fast Food ± SD	Delivery ± SD	Dining Hall ± SD	Sit Down ± SD
Healthfulness of food sub-score	23.53 ± 8.71[a]	20.86 ± 3.02[a]	37.56 ± 12.0[b]	23.76 ± 4.21[a]
Supportiveness of environment sub-score	19.89 ± 4.69[b]	15.86 ± 1.57[a]	25.33 ± 5.9[c]	20.2 ± 3.04[b]
Vegetarian	2.87 ± 1.39[a]	3.57 ± 1.13[ab]	3.65 ± 1.52[ab]	4.38 ± 1.02[b]
Fruits	2.50 ± 1.69[a]	2.29 ± 1.89[a]	4.23 ± 1.53[b]	2.14 ± 1.59[a]
Vegetable side	1.98 ± 1.25[a]	2.43 ± 1.27[ab]	3.28 ± 1.74[b]	3.05 ± 1.20[ab]
Fresh vegetables on salad bar	0.89 ± 1.66[a]	0.00[a]	3.27 ± 1.95[b]	0.00[a]
Lettuce on salad bar	0.93 ± 1.69[ab]	0.00[a]	2.04 ± 1.75[b]	0.00[a]
Healthy additions to salad bar	0.62 ± 1.15[a]	0.00[a]	3.08 ± 1.91[b]	0.00[a]

- a-c similar subscripts are not significantly different per variable between restaurant types

Sit-down restaurants had the highest average number of vegetarian options (4.38 ± 1.02) while fast food restaurants had the least (2.87 ± 1.39). Dining halls had the greatest averages for fruits available (4.23 ± 1.53) and vegetable sides available (3.28 ± 1.74). Sit-down restaurants had the lowest average number of fruits available (2.14 ± 1.59) while fast food restaurants had the lowest average number of vegetable sides (1.98 ± 1.25). There were no salad bars available at the sit-down or delivery restaurants, and the dining halls/buffets scored significantly higher than fast food restaurants for fresh vegetable items available on the salad bars, how fresh and appealing the lettuce was, and for the extensiveness of the healthy additions to the vegetables on the salad bar, but not for how fresh and appealing the salad bar appeared. Despite the lack of a significant difference for appearance, the mean score of the dining halls was higher than the fast food restaurant mean score.

In terms of the accessibility of the restaurants, 128 out of 130 (98.5%) dining options were accessible by car, 16 (12.3%) were accessible by public transportation, 12 (9.2%) were accessible by bike, 4 (3.1%) were between two-thirds of a mile to one mile away, and 90 (69.2%) were less than two-thirds of a mile or about a ten minute walk. The remaining seven dining facilities were delivery and, therefore, were accessible that way.

Stores

Twelve convenience-type food stores were analyzed in this study. Audits were completed at eight (66%) convenience stores/mini-marts, two (17%) drug stores, and two (17%) bodegas/corner stores. This study did not audit grocery stores because it was thought that employees would not typically go to a grocery store to eat during the work day. It is important to note, however, that if employees had to rely on convenience, the stores observed in this study would be most available to them, due to their close distance from campus; most grocery stores are further away than the convenience stores included in this study.

The majority of the stores did not have fresh fruit available, five had frozen fruit available, and 11 of the 12 stores (92%) had processed fruit available. The majority of stores also did not have fresh vegetables available, six had frozen vegetables available, and 10 of the 12 (83%) had processed vegetables available. Slightly more fruits (58%) and vegetables (58%) were available at stores off campus than on campus. At 7 of the 12 stores (58%), light varieties of processed fruits cost the same as regular varieties, while four stores had no light varieties of processed fruits available. At 8 of the 12 stores (67%), no low-sodium versions of processed vegetables were available for purchase.

Chapter 4

Discussion

While many have researched healthfulness in work environments (Gardner et al., 2014; Larson et al., 2009; Devine et al., 2007), few have analyzed the interactions among perceptions, behavior, and the environment at a worksite, and how they affect fruit and vegetable intake among employees. Many researchers have found that worksite wellness interventions involving increased access and availability to healthy food in the work environment could result in healthier dietary choices among employees (Larson et al., 2009; Devine et al., 2007). No intervention was involved in this study, so the data obtained were descriptive based on a cross-sectional design. The data collected were from dining facilities and from a survey completed by participants who were currently employed by Syracuse University.

While it has been determined that healthy dietary choices may be related to perceived availability (Capsi et al., 2012, Caldwell et al., 2009), the participants in this study who perceived a limited availability of healthy food on campus had the highest fruit and vegetable intake, while the group that had a neutral perception of the availability of healthy food available on campus had the lowest fruit and vegetable intake. This may be due to the fact that the people who perceived that the environment lacked availability of fruits and vegetables might have been packing fruits and vegetables from home to eat at work. The group with the highest intake might also have been more motivated to eat healthfully, so they might have been paying more attention to their environment and what is available there. The neutral group might have been less motivated about their health, and therefore less concerned about the availability of fruits and vegetables in their environment. This may relate to stages of change, as it has been found that

people in the precontemplation stage have the lowest fruit and vegetable intake, while people in the contemplation and preparation stage have a high fruit and vegetable intake (Greene et al., 2003).

Many people perceive healthy food to be more expensive than unhealthy food (Lucan et al., 2010), which was also true of participants in this study. Over half of the participants in this study felt that the healthy foods on campus were more expensive than the unhealthy foods on campus, which Jeffrey and colleagues determined may reduce intake of healthy food (Jeffrey et al., 1994). Dawson and colleagues found that employees desired less expensive healthy foods, such as fruit, for consumption in the work place (Dawson et al., 2007). If healthy options, such as fruits and vegetables, are promoted with discounts and deals, employees may be more inclined to purchase and consume them. Many people care more about getting the most they can for their money (Vermeer et al., 2010), so if healthy foods are not priced appropriately, people may be more inclined to choose cheaper, unhealthier food items. When prices of healthier options were decreased in vending machines, however, their consumption increased (French et al., 2001). This may have also contributed to the average intake of fruits and vegetables being lower than recommended for participants in this study.

Choose MyPlate recommends that women of ages 19-30 and men aged 19 and older consume 2 cups of fruits per day and that women aged 31 and older consume 1.5 cups of fruits per day. Women of ages 19-50 should consume 2.5 cups of vegetables per day, while women 51 and older should consume 2 cups per day. Men of ages 19-50 should consume 3 cups of vegetables per day and men aged 51 and older should consume 2.5 cups of vegetables per day (Choose MyPlate). While the averages for men and women are combined in the results, the average intake of fruits and vegetables fell below these recommendations. However, the CDC

found that the average American consumes fruits 1.1 times per day and vegetables 1.6 times per day (McGuire, 2013), which is more consistent with the results of this study in which participants ate an average of 1.2 servings of fruit and 2 servings of vegetables per day. However, the CDC measures fruit and vegetable intake by instance of consumption, not by serving.

Increased consumption of fruits and vegetables among employees has been found to be associated with interventions that promote these items (Bandoni et al., 2010), but the majority of employees (79%) in this study did not agree that the university encourages employees to eat healthy. While there are other influences affecting intake such as price, availability, and preference, this may contribute to the fact that the means for total fruit intake, total vegetable intake, and total fruit and vegetable intake were well below the recommended guidelines for Americans (Choose MyPlate). While a diet high in fruits and vegetables has been found to reduce the risk of obesity (Hung et. al, 2004; Vanasse, 2006), the mean BMI in this study (25.6) falls within the overweight category, which may progress to obesity.

There was a significant difference between desired weight goals based on BMI. The participants who wanted to lose weight had an average BMI in the overweight range, the group that wanted to gain weight had an average BMI in the underweight category, and the group that wanted to stay the same/do nothing about their weight had an average BMI in the healthy range. However, fruit and vegetable intake was not significantly different based on weight goals, so the participants in the study who desired to lose weight did not have a higher fruit and vegetable intake than the other participants. Therefore, they might have known what they should do, but are unable to execute their own nutrition interventions (Bisogni et al., 2012).

It is likely for employees to purchase and consume food at nearby fast-food outlets, casual dining restaurants, grocery stores, and vending machines before, during, or after a shift (Blanck et al., 2007). This study found that all of the dining facilities observed were significantly different from each other, but that dining halls offered more healthy foods and had a more supportive environment. This is consistent with the findings of Horacek and colleagues, who after assessing the healthfulness of dining environments on a college campus also found that dining halls were found to offer more healthy items than other types of dining facilities (Horacek et al., 2012). While more than half of the employees agreed that healthy food was available at grocery stores around campus, far fewer agreed that there were healthy foods available at restaurants on or around campus. Availability of certain food is associated with increased dietary intake (Capsi et al., 2012), and lack of availability may be perceived as a barrier to healthy eating, which may negatively affect intake (Dittus et al., 1995). Despite having knowledge of the difference between healthy and unhealthy food (Povey et al., 1998), this lack of availability of healthy food surrounding the work environment may influence employees' food choices (Larson et al., 2009), and access to unhealthy foods in stores may promote increased energy intake, due to the greater availability of unhealthy snacks (Nicklas et al., 2014).

Morland and colleagues found that more grocery stores and convenience stores are associated with more overweight or obese residents (Morland et al., 2006). This study found that very few stores on campus offered fresh vegetables, which is consistent with the findings of Horacek and colleagues in their study of fourteen postsecondary campuses (Horacek et al., 2013). However, the majority of the convenience stores in this study did offer frozen or processed fruits, which is more than what Horacek and colleagues found. Although there were more processed fruits and vegetables available, they are not likely to be purchased by employees

for a mid-day snack or meal. However, as previously discussed, the availability of fruits and vegetables may not influence intake if those who are motivated by health pack their fruits and vegetables from home.

While this study uncovered important information regarding how perceptions, behaviors, and the work environment can affect fruit and vegetable intake, further research should incorporate worksite interventions and compare results to other campuses to observe trends over time.

Implications for Research and Practice

This study recruited participants using a convenience sample, so the sample ultimately lacked size and diversity. The majority of participants were female and white, and the sample was also not randomized. In addition, those that work in maintenance may not have had access to a computer in order to complete the survey. Therefore, the sample in this study may not be representative of the employee population at this college campus, or at any other.

Another limitation of this study occurred during the recruitment process. There was an error with the survey when it was first sent out, so multiple participants and data were lost. After dealing with this problem, participants may not have wanted to complete the survey again, and therefore the potential for a larger, more represented sample was lost.

Because this was a cross-sectional study, there are no specific linkages to restaurants and stores between the employees' perceptions and behaviors and trends in behavior over time could not be observed. Additionally, the data for employees were self-reported, so heights, weights, and BMIs may not have been completely accurate. Vartanian and Gemeroth (2011) found that participants in their study tended to underreport their weight. Therefore, future studies could

benefit from conducting physical assessments instead of relying on self-reported height and weight data. Future studies should compare their research to that on other campus and worksite environments in order to assess differences. Future studies should also plan an intervention study, making changes to the environment and tracking the effects these changes have on the employees' perceptions of campus and on their fruit and vegetable intake. This could provide more evidence to support the idea that worksite interventions can improve the diet of employees, specifically their fruit and vegetable intake.

Some of the tools referenced in this study have not yet been published, such as the CEPS survey, which is a master's thesis at this time. This study's Work Campus Environment and Behavior Perceptions survey was based on this master's thesis.

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