

HEALTH BELIEFS, EATING BEHAVIOR, OBESITY, AND THE WORKPLACE

HEALTH BELIEFS, EATING BEHAVIOR, OBESITY, AND THE EXPANDING ROLE OF
THE WORKPLACE

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ABSTRACT

Background: Obesity is a growing concern with respect to our nation's health. Increasingly, the workplace has become a venue for promotion of health and wellness, though evidence to support this practice is limited. A review of the literature reveals a need for an improved understanding of the employee population in order to enhance participation in such programs.

Objective: The objective of this study was to obtain employee population-specific data and explore relationships between weight status, health beliefs, attitudes, eating behavior, perceptions of food and social environments, and readiness for change, in order to identify opportunities to better meet wellness needs at a single healthcare worksite.

Participants and Methods: A quantitative, cross-sectional, 17-question survey was offered to all employees at a single outpatient Veterans Affairs clinic. Participation was voluntary and confidential.

Results: Out of 51 respondents, 51% were classified as overweight or obese. Body mass index was found to be related to age; older participants were more likely to be obese. Although 80% of participants reported a high level of confidence in their ability to make healthy food choices, many do not meet the American Dietary Guidelines for recommended daily servings. Overall, 53% of participants consumed less than the recommended daily number of servings for fruits and vegetables. Overweight respondents consumed the greatest number of servings per day, obese respondents consumed the fewest. Barriers to consumption were cost, preparation time, and family preferences. Obese respondents were more influenced by foods offered in the workplace and foods colleagues are eating. Overweight respondents were more likely to have started making a change to improve their health. Lastly, results of this survey revealed that participation in workplace health promotion opportunities was low (36%), with the most significant barriers being lack of awareness, time, and perceived benefit or need by respondents. Average body mass index for those who participated was greater than those who did not. Of those who did participate in workplace wellness opportunities, more did so if a prize or incentive was offered.

Conclusions: Creating a workplace culture that facilitates healthy employee behavior is ideal for helping individuals at all stages of readiness improve health and wellness. Offering and promoting healthier food choices may help employees overcome barriers to meeting recommended intake guidelines for healthful foods, especially fruits and vegetables. To overcome barriers to participation, especially in younger individuals with a body mass index closer to normal, involving employees in identifying target areas for wellness and determining strategies for implementation and potential incentives is key. Strong support from leadership is also needed to build a workplace culture that encourages social support for healthy behavior at work.

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CHAPTER 1: INTRODUCTION

Employee health and wellness is a growing area of interest with respect to nutrition and behavior intervention. Increasingly, employers are implementing programs and initiatives aimed at improving employee health as a strategy to control costs and improve productivity (Heinen & Darling, 2009). It has been acknowledged that in order for programs to be successful, in-depth knowledge about the target population, often by means of a needs assessment, is essential (Verwij, Proper, Weel, Hulshof, & van Mechelen, 2009; Viester et al. 2012). The effectiveness of many workplace wellness programs and initiatives has been studied in conjunction with their implementation. The results of these studies suggest that an improved understanding of factors such as employee health beliefs, perceptions and attitudes in combination with knowledge of existing eating behaviors, food choices and the food environment may be needed to design more suitable programs, interventions, and incentives and to be more successful overall (Lemon et al, 2010; Brug, 2008). The purpose of this research is to conduct a survey at a healthcare worksite to elicit employee population-specific data including health beliefs, attitudes, perceptions of the food and social environments, eating behavior, weight status, and readiness for change. The goal is to use the information gained to recommend a tailored approach for a more effective health and wellness culture of the worksite. In addition to potentially impacting the health of employees through improvements in worksite wellness, healthcare workers are uniquely positioned to advance health promotion of patients or clients by modeling healthy behavior and disease prevention strategies.

Rationale

Obesity is a growing concern for the health of the population and the economy. The Centers for Disease Control and Prevention (CDC) reported that over one-third (35.1%) of adults in the United States of America were obese in 2011-2012 (Ogden, Carroll, Kit, & Flegal, 2013). Every year billions of dollars are spent on healthcare costs related to obesity. In 2008, the estimated medical costs associated with obesity were \$147 billion (Finkelstein, Trogon, Cohen, & Dietz, 2009). The rising cost of employer sponsored insurance premiums has presented a problem not only for employers, but also employees (Heinen & Darling, 2009). In addition, billions may be lost due to decreased productivity in the workplace secondary to obesity related diseases and conditions (Berry & Mirabito, 2011). Diabetes, heart disease, sleep apnea, depression, back and knee problems, and many more conditions exacerbated by obesity are of increasing concern to employers (Heinen & Darling, 2009).

As much of the population spends a significant amount of time in the workplace, it is logical that this environment provides an opportunity to positively impact health and obesity. An increasing number of employers are taking steps to improve employee health through the implementation of wellness programs or other health related initiatives. Many organizations have adopted a culture and environment that aims to be conducive to employee health. A 2010 Survey of Employer Health Benefits revealed that in 2009, 92% of surveyed employers with 200 or more employees reported offering a wellness program (Mattke, Schnyer, & Van Busum, 2012). It is important to recognize that even with these health promotion programs in place, many employees may not participate for a variety of reasons. In a non-representative survey conducted in 2010, it was estimated that less than 20% of eligible employees were participating in wellness programs offered (Mattke, Schnyer, & Van Busum, 2012). One reason may be that the program does not meet the perceived needs of many employees. Another may be that there is

little or no incentive to participate. In addition, programs offered may not be of interest or may not fit with the lifestyle or behaviors of employees. Also important, is how ready the employees are to make a health change. Programs that are tailored to address different levels of readiness and acceptance for change create potential for reaching more individuals and ultimately improving outcomes. To tailor a program effectively, the population must be well understood. Detailed data related to employee eating behavior, food choices, the food environment, health beliefs, attitudes, and perceptions are factors that affect employee health but are often unknown. By quantifying and describing a population using these parameters, interventions may be designed to more appropriately meet the needs of the population which may improve participation and intended outcomes of improved health and wellness.

Potential Significance

This study has potential for impacting the degree of participation and success of current and future health and wellness programs and interventions implemented at a healthcare worksite. Currently, there are opportunities for employees to improve their health, but these opportunities are underutilized. The detailed information gained related to employee health beliefs, attitudes, perceptions of the health environment, eating behavior, food choices, and readiness for change may offer guidance for a tailored program and intervention design as well as lead to increased participation and practice of healthy behavior in a particular worksite.

Purpose

The purpose of this study is to elicit health beliefs, attitudes, eating behavior, perceptions of food and social environments, and readiness for change among employees at a Veterans Affairs (VA) clinic and to evaluate the relationship between these factors and weight status in order to identify opportunities to better meet wellness needs.

Subproblems

Once the population-specific data is obtained via questionnaire and analyzed, the next step or problem, is to determine what intervention strategy or strategies are most appropriate to meet the wellness needs of the population. It may be ideal to design a multi-level wellness program that addresses employees at different levels of behavior change readiness. Once implemented, interventions should be reviewed for effectiveness and revised as necessary. This process could be included as a component of a subsequent study.

Limitations

Obtaining data via questionnaire has various limitations. One limitation is that the data is self-reported and may not be accurate. Another limitation is that respondents may be subject to bias, either individually or by the selection or response group. The survey design itself may create bias if the questions are leading or confusing. In addition, the respondents may be such that they are not representative of the organization as a whole. Data collected and subsequent recommendations provided may or may not be utilized based on constraints within the organization.

Delimitations

A delimitation of this study is that it will be conducted at one facility, in a clinic setting. The population surveyed will be employees of that clinic.

Assumptions

This study assumes that all respondents complete the questionnaire in a manner that is most consistent with their actual beliefs and behaviors in order for the data collected to be relevant. It also assumes employees will be willing or able to take part in a questionnaire and that the respondent sample is representative of the employees of the organization.

Definitions

Affordable Care Act – “The comprehensive health care reform law enacted in March 2010. The law was enacted in two parts: The Patient Protection and Affordable Care Act was signed into law on March 23, 2010 and was amended by the Health Care and Education Reconciliation Act on March 30, 2010. The name “Affordable Care Act” is used to refer to the final, amended version of the law.” (Healthcare.gov, 2013).

Body Mass Index - (BMI) a number calculated based on an individual’s weight and height. BMI is a strong predictor of overweight and obesity (CDC, 2014). A BMI below 18.5 is described as underweight, between 18.5-24.9 is considered healthy, between 25.0-29.9 is overweight, and greater than 30.0 is considered obese (2012).

Cognitive Behavioral Theory – A theory based on the assumption that all behavior is learned and related to internal and external factors that are related to the problem behaviors. The theory also assumes that just as behaviors can be learned, they can be unlearned. (Academy of Nutrition and Dietetics, 2009).

Transtheoretical model – Developed by James Prochaska and Carlo DiClemente, this model for behavior change, also called the Stage of Change model, suggests that successful behavior change requires a sequence of cognitive and behavioral steps. Identification of an individual’s stage of change involves assessing readiness or interest to make a change and is essential in determination of the appropriate approach for eliciting behavior change. The five main stages are listed below in order. (Constance & Sauter, 2011).

Precontemplation – no recognition of need for change or not ready for change; no intention to take action within the next six months

Contemplation – recognition of need to change or consideration of making a change; intends to take action within six months

Preparation – intends to take action in the next 30 days and has taken some behavioral steps in that direction

Action – has made changes in target behavior for less than six months

Maintenance – has changed target behavior for more than six months

Needs Assessment - A systematic process to acquire an accurate, thorough picture of a system's strengths and weaknesses, in order to improve it and meet existing and future challenges. (The Free On-line Dictionary of Computing, n.d.)

United States Department of Agriculture Dietary Guidelines for Americans – provided by the USDA and Department of Health and Human Services and updated every five years, these are recommendations intended to help Americans improve overall health through a diet that encourages a healthy weight, promotes physical activity, and chronic disease prevention (U.S. Department of Agriculture, 2010).

Workplace Health Program (also Worksite Wellness Program) - a coordinated and comprehensive set of strategies which include programs, policies, benefits, environmental supports, and links to the surrounding community designed to meet the health and safety needs of all employees. (Centers for Disease Control and Prevention, 2013).

CHAPTER 2: THE LITERATURE REVIEW

The purpose of this literature review is to critically analyze the evidence surrounding the need for a more thorough understanding of how employee health beliefs, attitudes, eating behavior, and perceptions of food and social environments impact food choices in a workplace setting, in order to better meet wellness needs. The ultimate goal of research in this direction is to understand how to effectively implement and tailor worksite interventions to impact the prevalence of obesity and improve our nation's health. As much of the population spends a significant amount of time in the workplace, it is logical that this environment provides an opportunity to positively impact health and obesity. An increasing number of employers have recognized this and are taking steps to improve employee health through the implementation of wellness programs or other health related initiatives. Despite having worksite health promotion programs in place, employees may not participate for a variety of reasons. Programs may not meet an employee's perceived need or interest, may be too time consuming, or provide little incentive for participation. Also important, is how ready the employees are towards changing their lifestyle for better health. Eating behavior, food choices, the food environment, health beliefs, attitudes, and perceptions are factors that affect employee health but are often unknown about specific populations. Quantifying and describing a population by such parameters may allow for improved program design which could impact the incidence of obesity and lead to greater improvements in employee health (Mattke et al., 2013)

The Centers for Disease Control and Prevention (CDC) report that over one-third (35.1%) of adults in the United States of America were obese in 2011-2012 (Ogden, Carroll, Kit, & Flegal, 2013). Not only is there concern for the growing number of overweight and obese adults in the United States and the associated health risks, there is also concern for the rising

costs of overweight and obesity. In 2008, the estimated medical costs associated with obesity were \$147 billion (Finkelstein, Trogdon, Cohen, & Dietz, 2009).

A growing area of research concerns the effect of nutrition, behavioral, and environmental interventions in the workplace. Employers have recognized the benefits of healthy employees (Heinen & Darling, 2009). Healthier employees are more productive at work and have lower healthcare costs (Berry & Mirabito, 2011). The increased implementation of workplace wellness programs has created an environment that lends itself to the study of employee dietary and behavioral intervention and its impact on food selection and healthy employee behaviors. Less studied, however, is the relationship between obesity and health beliefs and attitudes, perceptions of food and social environments, food choices, and readiness for change in a workplace setting. Assessing employee characteristics may better determine appropriate intervention strategies in the workplace, so that workplace wellness programs are successful.

Detailed in this review is an introduction to the topic of obesity as well as a discussion related to current efforts to reduce the current obesity rates, focusing on the workplace as a promising venue for health promotion. Next, is an in-depth review of recent workplace wellness literature intended to understand characteristics of employees and the worksite as well as intervention studies that aim to impact the health of employees at the workplace. Lastly, are conclusions drawn from this body of research as well as implications for future research and practice.

Background

Overweight and obesity are defined by the CDC as ranges of weight above what is considered healthy for a given height (2012). Body mass index (BMI) is a number calculated

based on an individual's weight and height and is a strong predictor of overweight and obesity (CDC, 2014). The CDC describes a BMI between 18.5-24.9 as healthy, 25.0-29.9 as overweight, and greater than 30.0 as obese (2012). Individuals may be more at risk for certain diseases or health problems at higher BMI ranges (CDC, 2012).

The CDC lists the following diseases or conditions as having increased risk related to obesity: coronary heart disease, type 2 diabetes, cancer (endometrial, breast, and colon), hypertension, dyslipidemia, stroke, liver and gallbladder disease, sleep apnea, osteoarthritis, and gynecological problems (2012). Each of these diseases or conditions presents a significant economic expense in terms of medical cost and potential loss of productivity for working individuals (CDC, 2012).

The CDC also describes several factors, or combinations of factors that contribute to overweight and obesity. One factor is energy imbalance, which means more calories are consumed from food than those that are expended. Over time, this can lead to weight gain. Genetics, illness, disability, or medication side effects may also lead to weight gain. Work, school, home, and the community together make up the environment that can affect obesity (CDC, 2012). In the community, whether or not there are safe or easily accessible streets or sidewalks to walk on may impact a person's daily activity. In the home, finances and resources available may play a role in the type and amount of food purchased. Limited access to healthier food such as fresh fruits and vegetables in combination with readily available, inexpensive food high in added sugar, fat, and calories, has become the norm in many communities. Working individuals may struggle with long hours worked and reduced lunch or break periods, which may drive meal choices to convenience or fast food and leave little time for exercise. Schools are hard pressed to serve nutritious meals on a tight budget and may opt for more processed foods in an

effort to save money. The factors affecting weight and obesity are complex and for individuals, obesity is likely multi-factorial.

Initiatives to reduce incidence of obesity

At present time, there are a number of programs and campaigns on national, state, and organizational levels that aim to address obesity. Many programs promote healthy eating and increased physical activity for improved health. The Dietary Guidelines for Americans, issued by the U. S. Department of Agriculture (USDA) and Department of Health and Human Services (HHS), has been expanded to include MyPlate, a widespread healthy eating message. Revisions to the Dietary Guidelines for Americans due in fall of 2015 will further emphasize the role of physical activity and a healthy diet, high in fruits and vegetables and low in sodium, saturated fat, and added sugars in an effort to impact the nation's obesity rates. Substantial information and resources intended to help individuals and organizations implement healthier diet and lifestyle strategies are available online through government health promotion organizations, such as MyPlate, CDC, USDA, Let's Move, and many more. The Wisconsin Department of Health Services offers a Worksite Wellness Resource Kit to guide employers through the process of starting a wellness program (2015). Legislation promoting health and wellness is also becoming more widespread. The Affordable Care Act (ACA) supports and promotes worksite wellness programs as a strategy for addressing chronic illness. The Prevention and Public Health Fund (PPHF) of the ACA contains provisions designed to improve public health and wellness such as waiving cost sharing for preventive services, providing new funding for community preventive services, and creating workplace wellness programs (Anderko et al., 2012).

The current state of workplace wellness

At this time, there is no universal definition for workplace wellness programs. Instead, there is a broad range of benefits that a program may offer. These components are described by Mattke et al. in the “Workplace Wellness Programs Study; Final Report” (2013). Mattke et al. identifies three main types of wellness activities: screening, prevention, and health promotion. An organization may utilize one or more of these strategies as part of a wellness program. With that in mind, an employer offering a single flu shot as a yearly activity is considered to offer a workplace wellness program (Pronk, 2014). Screening activities are intended to collect information on particular health related risk factors. An example is the health risk assessment (HRA), a self-administered questionnaire about nutrition, physical activity, smoking, and other modifiable risk factors. In addition, biometric screening may be included and usually consists of clinical measurements such as blood pressure, height, weight, waist circumference, blood glucose, cholesterol, or other tests. Often there is an incentive, many times financial, for the employee to complete the HRA. Prevention activities may include lifestyle or disease management education, either through a campaign or individual counseling. Smoking cessation or step counting programs are examples of this. Finally, health promotion activities are intended to encourage a healthy lifestyle. Examples of these benefits include on-site vaccinations, on-site gym access or subsidized gym memberships, healthy food options in workplace cafeteria and vending areas, or improvements in the physical workplace environment, such as walking trails and bike racks.

Workplace wellness programs are a strategy to reduce costs and increase productivity by improving employee health. Healthier employees are more productive as they require less time off related to illness and are more productive while at work (Berry & Mirabito, 2011). Studies have shown that average yearly healthcare costs for employees participating in a wellness plan

are lower (Berry & Mirabito, 2011). Additionally, it has been estimated that for every dollar invested in worksite wellness programs, the average return on the dollar is \$3.27 (Anderko et al., 2012). Adoption of wellness programs and other strategies to manage healthcare costs, promote a healthy lifestyle, and a healthy weight are becoming more widespread. According to 2012 survey data, nationally, 51% of employers with greater than 50 employees offered a wellness program; significantly more of these employers are large organizations. Ninety-one percent of large employers (>1000 employees) reported offering a wellness program; whereas only 39% of small employers did (Mattke, et al. 2013). Despite this, according to a non-representative survey from 2010, employers estimate that less than 20% of eligible employees are participating in preventative health and wellness intervention programs offered (Mattke et al., 2012).

The question persists, with so many efforts underway to impact obesity, why does it remain so prevalent and why are such interventions underutilized? In a review conducted by Snyder, it was found that the average health campaign using mass media has an effect size of 5% (2007). This means, if 20% of the population were doing the behavior prior to the campaign, 25% would be expected to do it after. To highlight this, Snyder explained that the number of women who were aware of the 5-A-Day Campaign was greater than the number of women who ate the recommended servings of fruits and vegetables (2007). Despite information on a healthy diet and lifestyle being readily available, other factors and events often take precedence on an individual level. In addition, the effect of a communication campaign often decreases when the campaign is over (Snyder, 2007). Campaigns and initiatives as part of a wellness program in a worksite are likely to encounter similar obstacles, making the evidence for their effectiveness difficult to determine. According to Mattke, Schnyer, and Van Busum, in comparison to the number of employee wellness programs in existence, peer-reviewed literature demonstrating the

effectiveness of such intervention is sparse. In addition, the analysis of such complex interventions poses a significant challenge to researchers (2012).

If the workplace is going to continue to be a venue for health promotion and wellness, there must be continued and ongoing research to support its use and determine the most effective implementation strategies for improved health and behavior outcomes. This literature review aims to evaluate the current evidence surrounding the need for detailed knowledge of employee health beliefs and attitudes, perceptions of the environment, and readiness for change when designing and implementing workplace wellness programs. Following is a body of current research related to employee health and workplace interventions using various strategies to promote healthy eating and activity. Studies of programs that emphasize other areas of wellness (i.e. flu shots) were not included in this review.

Current Research

The workplace as a venue for healthy behavior

The workplace has been identified as an ideal setting for the promotion of health and wellness and the prevention of obesity and other related conditions. As discussed previously, it can be beneficial both for the employee and the employer. The employee will benefit from better health and the employer from reduced health care costs and increased productivity. According to Mujtaba and Cavico, the objective for an employer attempting to begin or improve upon a wellness program should be to create a “wellness culture” that promotes positive interaction with employees (2013). They reference three themes identified by Mattke, Schnyer, and Van Busum in “A Review of the U.S. Workplace Wellness Market” that provide strategies that are key to the success of a program. These themes are internal marketing; planning, evaluation, and program improvement; and leadership and accountability (2012). The first theme, internal marketing,

refers to strategies used by employers to actively engage employees, which includes face-to-face interactions, mass disseminations or campaigns, new hire orientations, and various additional communication channels. The second theme, planning, evaluation, and program improvement, approaches wellness programs from the standpoint of the continuous quality improvement process. One component of this process is the needs assessment, which is essential for obtaining employee specific concerns and input as well as assessing the organization's physical environment and management climate related to employee health and wellness. This theme also includes the processes of data integration, performance measurement, and data sharing, which are all useful tools for assessing participation and effectiveness of interventions. The third theme, leadership and accountability, acknowledges that successful programs are set apart by a strong organizational commitment to employee health, at all levels. Senior management support is necessary for visibility and employee buy-in of a wellness program. In addition, aligning the overall mission of the organization with employee health and wellness goals asserts the importance of those programs for achieving the organization's mission. The studies described in this subsection highlight aspects of the three themes described above and bring to light some general considerations of the workplace as an opportunity for health and wellness promotion.

Organizational leadership in promoting behavior change has been recognized as a key theme for successful wellness programs. "Perceptions of Worksite Support and Employee Obesity, Activity, and Diet" (Lemon, Zapka, Li, Estabrook, Magner, & Rosal, 2009) is one study that supports this theme. This cross-sectional study was conducted at a hospital worksite to examine the association of perceptions of organizational commitment to employee health with BMI, physical activity, and eating behavior. Data from this study was used as baseline data for a subsequent intervention trial aimed at weight gain prevention among hospital employees. This

intervention trial will be discussed in another subsection (Lemon, et al., 2010). The study was conducted at six hospitals in the same geographic area. Study participants were randomly selected from human resources to represent the entire hospital employee population. Letters were sent to those selected for participation. The participants who responded were further screened to meet the inclusion criteria of: age between 18-65 years, ability to understand and communicate in English or Spanish, no plan to leave employment in the next two years, work in only one hospital at least 20 hours per week, and no barrier to being weighed and measured.

The study collected baseline data at two different times, six months apart. Height and weight were measured at baseline one and baseline two. The average of these was used for assessment. A thirty-minute self administered survey was also conducted. The survey included demographic data, validated food frequency and physical activity questionnaires, and three sets of subscales designed to assess perceived organizational commitment and perceptions of coworker norms. The first was perception of organizational commitment to employee health, a four item subscale where each item was rated on a five point Likert scale from “strongly disagree” to “strongly agree.” Next, was perceived coworker eating behavior norms, a five item subscale where each item was rated on a seven point scale from “almost none” to “almost all.” Last, was perceived coworker physical activity behavior norms, a four item subscale where each item was rated on a seven point scale from “almost none” to “almost all.” Additional data were collected from human resources related to job characteristics. Data analysis included frequency distributions of the study sample. Multivariable linear regression models were used to assess associations of demographic and job characteristics with worksite perception scales and the relationship of the worksite perception scales with BMI, fruit, vegetable, and fat consumption, and physical activity.

The final study included 899 eligible employees from the 6 hospitals. Of those employees, 849 (94%) completed both baseline one and baseline two measurements. The BMI data obtained showed that 30% of employees had a normal BMI (<25.0), 35% were overweight (25.0-29.9), and 35% were obese (>30.0), which closely mirrors national averages of the US population. The analysis of the three perceived worksite support scales revealed that the average ratings were as follows: 2.96 (SD=.84) for organizational commitment to employee health (range 1-5, 5 indicating strongest perceived commitment), 3.19 (SD=.88) for coworker eating behavior (range 0-6, 6 being the most positive eating behavior), and 1.7 (SD=.99) for coworker physical activity behavior (range 0-6, 6 being the most physical activity). Multivariable adjusted association of worksite environment perceptions with outcome measures revealed that a perception of stronger organizational commitment to employee health was associated with a lower BMI ($\beta=-0.73$; 95% CI= -1.38, -0.07; $p=0.03$). A higher perception of coworker healthy eating behavior was associated with greater fruit and vegetable consumption ($\beta=0.33$; 95% CI= 0.16, 0.49; $p<0.001$) and less fat consumption ($\beta= -0.84$; 95% CI= -1.35, -0.34; $p=0.05$). A higher perception of coworker physical activity was associated with greater individual physical activity ($\beta=18.2\%$; 95% CI= 6.0%, 31.9%; $p=0.003$).

The authors concluded that an association was found between employee perception of a supportive worksite environment and obesity and related behaviors. They acknowledge that obesity is common among hospital employees and that these individuals, as healthcare employees, may be seen as role models for health promotion and disease prevention in the public eye. The argument is made that prospective studies are needed to study the effect of targeting perceptions of social norms among coworkers. It is further implied that the role of leadership in the worksite should include modeling and advocating a healthy lifestyle and promotion of

healthy behavior as the norm. Based on the findings of the study, the authors recommended using social support and groups for motivation toward healthier behaviors as well as the use of media, both print and electronic, to highlight employee successes with positive behavior change.

This study is strengthened by the large sample size of 849 employees from which data was collected as well as the collection of two sets of baseline data. The study participants were also representative of the organization as a whole in terms of demographics and job characteristics. A limitation of the study is that the data collected through the survey were self-reported and therefore, subject to bias. The bias may be in the form of under or over-reporting of dietary intake and physical activity. There may also be a discrepancy between responders and non-responders. The associations that can be made based on the data are also limited. For example, it is not clear if the perception of organizational support for employee health resulted in a lower BMI or if the participants with a lower BMI were more likely to take advantage of healthy lifestyle opportunities at work which then results in an increased perception of support. Conversely, it may be the case that obese individuals may be more likely to blame the organization for their weight.

This study highlights a challenge that many organizations face when implementing health and wellness programs or initiatives. The social aspect of eating plays a significant, yet hard to address, role in food choices and behavior as well as physical activity. The worksite environment itself is an entity that may either promote or discourage healthful behavior. The perception employees have of the worksite organization may impact their own commitment for behavior change. To address the perceptions of employees and act as a role model, dissemination of healthy lifestyle and behaviors from leadership may be one way to create new norms for eating and physical activity behaviors. Using the strength of social support, possibly

through the formation of groups or sharing positive stories to inspire positive changes, may be a powerful tool for health promotion in the worksite.

When developing programs for the workplace, it may not be enough to learn about employee health beliefs, perceptions, and behaviors without also recognizing and addressing any barriers to participation that may be present. Different work environments pose different challenges to offering a comprehensive wellness program and must be carefully considered when designing organizational wellness activities. A study that demonstrated a need for in-depth program planning prior to initiating a wellness program was “Barriers to Participation in a Worksite Wellness Program” (Person, Colby, Bulova & Whitehurst-Eubanks, 2010). Researchers sought to determine what factors were preventing participation in a wellness program implemented at a university. The study was conducted in conjunction with the implementation of a new wellness program designed for employees of ARAMARK who worked within the university, primarily in foodservice. The wellness program was called Wellness Wednesdays: “Eat & Meet” About Healthy Living. Over the course of ten weeks, participants attended 30-minute nutrition and health focused classes taught by a registered dietitian once a week. For each class they attended, employees received five dollars, which was credited to their paycheck at the end of the program. Classes were held in one of two dining halls on campus, alternating between the two each week. The distance between the locations was such that it took approximately 15 minutes to walk from one location to the other. After each class, a post-test was given to assess effectiveness and retention of the information and material presented. At the end of the ten week program, researchers conducted randomized qualitative interviews with ARAMARK employees (n=19). Of the employees interviewed, 11 attended the classes, 7 did not attend the classes, and the final interview was conducted with the program organizer.

Because the data were qualitative, results were reported as frequency data in terms of the responses given. Characteristics of the program's outcome were also described.

There were 481 ARAMARK employees at the time of the program. Fifty employees were interested in the program and attended at least one of the ten classes offered. Fifty percent attended one class, 22% attended two classes, 14% attended 3 classes, 4% attended four classes and 1% attended five classes. None of the participants attended more than five out of the ten classes. Class size varied from four to twenty, the average being eleven participants. Average scores on the post-tests ranged from 71-100%.

The results of the qualitative interviews of the employees revealed several themes and barriers for not participating. The top 3 reported barriers were insufficient incentives, inconvenient location, and time limitations. Employees revealed that an incentive offering more money would have made them more likely to attend. Some employees only went to class if they also worked at the location where the class was offered. Timing and scheduling posed a significant barrier because it was difficult to find a time that employees could attend without disrupting their work as the classes were held during the day. In addition to the previously mentioned barriers, some employees reported that they were not interested and some felt that the program was not well marketed, despite flyers and communication from management. Health beliefs were also considered a barrier as there were comments related to perceived sufficient knowledge about health and already having a healthy family. From the perspective of the program organizer, some of the barriers were similar to those described by the employees and included: scheduling and timing of weekly classes, employee sick calls/production behind schedule, location of classes (this was a large campus with 14 dining sites), and length of classes (it is challenging to provide adequate information in 15-30 minutes). Another concern for the

organizer was the fact that evaluation of the program was limited given that attendance by participants was irregular.

The authors concluded that when employees were presented an opportunity to participate in a wellness program designed to increase awareness for nutrition and health related topics, use of program planning that addressed identified barriers, such as insufficient incentives, inconvenient locations, and time limitations, may have improved participation and facilitated a greater benefit to employees. The authors acknowledged that it would be useful to obtain employee specific information through a needs and interest survey prior to initiating a program or class. This would allow for a more population-specific approach to choosing topics for classes.

This study is strengthened by the use of a qualitative interview process that allowed for a broader range of responses. Limitations include a small sample size and that the findings of the interviews may not be applicable to all employees. A finding of the study was that the wellness program was not designed well enough to meet the needs of the target population. Though the authors may not have known that upon initiation of the program, it affected the outcome and the responses of the employees interviewed and ultimately became a strength to the overall discussion.

This study demonstrates the importance of addressing the target audience in a way that is appropriate and comfortable to them. This involves not just environmental comforts, such as location, time and incentives, but also includes meeting their needs and addressing their concerns by offering a program that is relevant. In order to encourage participation, it makes sense to provide a program that will be perceived as worth the time and effort on the part of the participant.

An example of this concept is demonstrated by Crane, Tate, Finkelstein and Linnan in which employees participating in a year-long worksite weight loss program were randomized to either an intervention group which received a financial incentive of five dollars for each percent of weight lost or the control group which received no incentive. The result of the study revealed no difference in participation or in weight loss between the groups suggesting that the incentive may not have been significant enough to promote behavior change (2012). Effective program planning must take potential barriers to participation as well as the strength of incentives offered into consideration in order to be successful.

The studies previously described bring to light examples of how strategies related to the three key themes identified previously could be utilized to create more successful wellness programs. Additionally, they demonstrate how obtaining information on unique characteristics of an employee population may be useful prior to designing any workplace wellness program or intervention. Taking into consideration not only the specific characteristics of employees such as demographics, beliefs, attitudes, and behaviors, but also employee perceptions of the organization and their peers as well as understanding potential barriers to participation and the importance of incentives in health and wellness improvement activities is necessary to gain a more complete understanding of the employee population. Incorporation of this knowledge into wellness program design may lead to greater employee engagement and interest, which is critical for successful outcomes. At this time, the majority of research related to employee wellness and health improvement interventions in the workplace have studied the effects of changes to the food or physical environment on health without taking into account many of the characteristics of employees described in this section. The subsections that follow are a sample of such research.

Modification of the Food Environment

Employees who work in larger organizations, such as hospitals or large clinics, often have on-site dining options. The food choices, layout, signage and utilization combined make up the food environment of an organization. For some organizations, this has been identified as an opportunity to impact employee health. Offering healthier meal options, providing nutrition information, and cost or other incentives for healthy food purchases are interventions aimed at improving employee food choices. Several examples of studies designed to modify the food environment can be found in this subsection.

The food environment both inside and outside of the workplace is widely considered to play a significant role in obesity. Readily available high-calorie foods with limited nutritional value are thought to contribute to excessive calorie intake by many individuals. The U. S. Food and Drug Administration (FDA) proposed policy changes that would require mandatory calorie labeling on menus of chain restaurants (FDA, 2013). Preliminary studies on the effectiveness of menu calorie labeling have been inconclusive. A review conducted by Harnack and French (2008) found that five out of the six studies reviewed demonstrated that providing calorie information did exhibit an influence on food choices, however, the effects were weak and inconsistent. The sixth study showed no effect. In addition, they determined that many of the studies were poorly designed and that more research is needed. It is important to consider the effectiveness of menu labeling in the workplace because if effective, it provides another opportunity to impact food choices and obesity of employees.

An example of such a study was “Evaluating the Impact of Menu Labeling on Food Choices and Intake” (Roberto, Larsen, Agnew, Baik, & Brownell, 2010). This was a randomized controlled trial with the purpose of testing whether menu labeling would influence the total calories ordered and consumed during a dinner meal as well as food consumed after the meal.

Participants were recruited via flyers, word of mouth, newspaper advertisements and online postings. The only exclusion criterion was for age under 18 years. Participants were from one geographical community. Study participants were blinded to the study's purpose and were told they were involved in consumer market research and would be provided a free meal. They were instructed to arrive at the study site at 5:30 pm on the day of the test and return for a brief interview on the following day. On the test day, participants were instructed to refrain from eating after 2:30 pm to attempt to standardize hunger levels. During the test dinner meal, participants sat behind blinders so they could not see other participant meal choices. Menu items were obtained from one local and one chain restaurant.

Participants were randomly assigned to one of three menu calorie labeling conditions. The first condition was a menu with no calorie labels (no calorie labels), the second condition was a menu with calorie labels (calorie labels), and the third was a menu with calorie labels and a statement on the menu that read "The recommended daily caloric intake for an average adult is 2000 calories" (calorie label plus information) (Roberto, Larsen, Agnew, Baik, & Brownell, 2010). All menus contained the same items and included salads, dressings, sandwiches, wraps, beverages, desserts, and traditional fast foods such as French fries, pizza, hamburgers, and mozzarella sticks. Participants circled their choices on the menu so as not to influence others. They were also told that no food could be taken home in an attempt to prevent over-ordering.

Measurement involved weighing foods and beverages before and after the meal in order to calculate calories consumed. The interview conducted on the following day included a dietary recall which assessed calories consumed after the test dinner meal. Additional measures obtained through questionnaire responses included self-reported height and weight (used to calculate BMI), race, ethnicity, and education level. Hunger was assessed prior to and after the

meal as well as how the food was liked. The Three Factor Eating Questionnaire was included to assess subscales for disinhibition, hunger, and cognitive restraint.

The initial study group included 303 people, however due to errors in orders given to participants, participants eating less than 50% of meals or not eating any of the meal, or participants ordering more than one entrée, the final study sample was 273. This sample was comprised of 147 males (49.83%) and 148 females (50.17%). There was no significant difference between the menu type conditions for age (30.5 ± 12.4 years), BMI (25.2 ± 6.1 kg/m²), degree of liking the meal, hunger prior to or fullness after the meal, or any of the Three Factor Eating Questionnaire subscales.

The results of the study analysis revealed a significant difference for total calories ordered between the no calorie labels and the calorie labels conditions ($p = .03$) and between the no calorie labels and the calorie labels plus information conditions ($p = .03$). There was no difference in total calories ordered between the calorie labels and calorie labels plus information conditions ($p = .99$). The participants in the no calorie labels condition ordered on average 2,189 calories for the meal (SD = 1,081), and the calorie labels and calorie labels plus information conditions ordered 1,862 (SD = 937) and 1,860 (SD = 1,063) calories, respectively.

To assess total calories consumed at the study meal, calorie labels and calorie labels plus information conditions were combined as there were no significant differences between the categories. Calorie intake was significantly lower in the combined label condition ($1,289 \pm 656$) than in the no calorie labels condition ($1,466 \pm 724$; $p = .04$).

Total calories consumed after the study meal were significantly different between the no calorie labels condition and the calorie labels condition ($p = .02$) as well as between the calorie labels condition and the calorie labels plus information condition ($p = .02$). There was no

significant difference between the calorie labels plus information and the no calorie labels conditions. The calorie labels condition had a higher average post meal calorie consumption (294 ± 387) when compared to the no calorie labels (179 ± 310) or the calorie labels plus information conditions (177 ± 309). Of note, there were significantly more participants in the calorie labels condition who reported having an evening snack (70%) when compared to the no calorie label (57%) or calorie labels plus information conditions (46%).

Differences for total calories consumed (study meal plus calories consumed in the evening) were significantly different between the no calorie labels and calorie labels plus information conditions ($p = .02$). The two calorie label conditions were also significantly different from each other ($p = .03$). Participants in the no calorie labels condition consumed an average of 1,630 calories ($SD = 811$); those in the calorie labels condition consumed 1,625 calories ($SD = 741$), and those in the calorie labels plus information consumed 1,380 calories ($SD = 639$).

The authors of the study concluded that providing calorie information on restaurant menus lead to a reduction in total calories ordered and consumed for a meal and possibly had an impact in calories consumed later in the day. Participants in both calorie label conditions ordered and consumed fewer calories than those in the no calorie labels condition during the study meal. Also of interest was that the calorie labels plus condition, which included the additional statement of calorie requirement information, resulted in the lowest total calorie intake for the study meal and for food eaten in the evening. This suggests that effectiveness of reducing calorie intake by providing menus with calorie labels may be enhanced by also providing daily requirement information, not only for that meal but also at a later point in time.

The study was strengthened by the use of randomization of participants. In addition, there was a variety of food choices offered for the test meal, including fast food items which allowed participants to choose their own foods based on their own tastes and preferences. A limitation was that calorie values for all menu items and dietary recall items were estimated using calorie databases. Dietary recall is subject to participant error based on estimation of portion sizes. The authors mentioned that lack of price information of menu items was a limitation as there may have been an interaction between cost and calorie labels. Lastly, participants were a convenience sample, which may have introduced bias. Although they were randomized within the study, the group as a whole may not have been nationally representative.

This study provides insight for the argument for menu calorie labeling in that both labeling conditions did reveal a significant effect on total calories consumed for the study meal when compared to the control. As mentioned previously, many previous studies have been weak, inconclusive, or have shown no effect of menu calorie labeling. In addition to being utilized in some restaurants, this is an intervention that worksites are now implementing in cafeterias either alone or as part of a greater wellness initiative. It is imperative that the conditions under which menu calorie labeling is effective are understood in order to have the greatest impact on those it is trying to reach.

An example of a health and wellness intervention implemented in a workplace setting that included an alternative menu labeling plan was “A 2-Phase Labeling and Choice Architecture Intervention to Improve Healthy Food and Beverage Choices” (Thorndike, Sonnenberg, Riis, Barraclough, & Levy, 2012). This was a randomized controlled trial that used a crossover design intended to determine whether labeling foods and conducting a choice

architecture intervention would increase the sales of healthy foods and beverages in a large hospital cafeteria.

The methodology of the research involved two phases. The first phase was a three month labeling intervention. Foods were labeled as follows: red (unhealthy), yellow (less healthy), and green (healthy) (Thorndike et al., 2012). The second phase added a three month choice architecture intervention designed to increase the visibility and convenience of healthier foods and beverages. To determine whether the interventions were effective, sales data was compared from baseline to phase one and from phase one to phase two. Each phase was three months long.

The study protocol involved obtaining all food and beverage sales data for three months prior to any intervention to obtain baseline data. Cafeteria registers were programmed to recognize foods or beverages that had been previously identified as either red, yellow, or green so the purchases could be tracked. The same method of data gathering was used in all phases of the study. The first intervention phase involved labeling all cafeteria foods as red, yellow, or green. Determination of a food or beverage color was based on the USDA's 2005 MyPyramid guidelines. After three months of recording sales data, the second phase was initiated. The choice architecture intervention involved changing the layout of the cafeteria to allow for increased access and convenience of healthier foods and beverages. Additionally, healthier items were placed at eye level on racks and shelves, and less healthy choices were moved to either above or below eye level. Once again, sales data was recorded for three months.

Baseline data revealed that prior to intervention, 24.9% of sales were red, 32.9% were yellow and 42.2% were green. The results of the intervention revealed that from baseline to phase one and from phase one to phase two the sale of red items decreased and the sale of green items increased. During phase one, total sales of red items had decreased 9.2% and red

beverages had decreased 16.5%. Total sales of green items increased by 4.5% and green beverages increased by 9.6%. During phase two, total sales of red items further decreased by 4.9% and red beverages decreased 11.4%. Total sales of all green items decreased in phase two when compared to phase one by 0.8%. Green beverage sales however did further increase by 4.0%. All changes in sales between phases were significant ($p < .001$). Sales of beverages saw the largest changes.

The authors of the study concluded that utilizing a simple color-coded labeling intervention increased sales of healthy foods and beverages and decreased sales of unhealthy foods and beverages in a large hospital cafeteria setting. They determined that a choice architecture intervention enhanced the effectiveness of labeling by increasing convenience and visibility of healthier items. The authors recognized that many consumers may have a low level of nutrition literacy, especially when reading and interpreting complex nutrition labels. A simplified menu labeling scheme, such as the color-coded one implemented in this study, may be more effective for reaching a larger audience as well as more appropriate for those who typically make quick decisions in a cafeteria setting.

A major strength for this study was that sales data was collected at the point of purchase. In addition, the study design allowed for the tracking of purchases of green, yellow, and red food items in an efficient manner. The most significant limitation of this research is the length of time over which the study was conducted. Often, as people are faced with a health message on a regular basis, the effectiveness of that message weakens over time. To determine if the interventions have a sustained effect or if the effectiveness is diminished over time, the duration of data collection should be much longer. Based on the result of this study, this may have already started during the six months between the onset of phase one and the completion of

phase two. Another limitation was that there was no control cafeteria. In addition, the study did not assess changes for individuals.

The results of this intervention reflect a positive change in consumer choices in a hospital cafeteria setting as a result of a labeling intervention. The use of a simplified labeling system to help consumers easily identify healthier food choices is a relatively simple intervention with potential for making a significant impact on dietary intake. Continued implementation of this type of intervention is needed to fully understand the long term effects on total dietary consumption and obesity prevalence.

Another component of the food environment that may influence food purchasing behavior is price. The cost of food alone may drive sales toward certain items. On a day to day basis, many people are confronted with the economic difficulty of increasing prices and decreasing income. This scenario creates pressure for individuals to purchase the food at the lowest cost, which makes highly processed, high-calorie foods seem more desirable and healthy, low-calorie foods seem unattainable (Andreyeva, Long & Brownell, 2012). To determine if offering healthier foods at a lower cost would increase sales of those foods, Kottke, Pronk, Katz, Tillema, & Flottemesch conducted the study “The Effect of Price Reduction on Salad Bar Purchases at a Corporate Cafeteria” (2013).

The study aimed to determine the effect of reducing the price of salad bar purchases at a corporate worksite. The study was both observational and crossover in design. For one month, the worksite organization subsidized half the cost of salad bar purchases to reduce the price from \$0.38 to \$0.19 per ounce, which resulted in salads costing about the same amount as entrees. Employees were notified of this change via e-mail and a large poster in the cafeteria. Food sales were recorded by food category beginning one month before the price change started and

continuing for three months after it was over. Mean daily sales for each category were compared for the study month and the months before and after. Salad bar sales were also calculated by weight. Two months after the test month, an anonymous online survey was e-mailed to all employees to gather additional information about employee lunchtime eating patterns.

The result of the price change intervention revealed that salad bar sales for the study month (\$6,747) were 83% higher when compared to the average of the other months (\$3,687) ($p = .008$). Non-salad bar food purchases were somewhat, but not significantly lower for the same month when compared to other months. The change in salad bar sales by weight for the study month when compared to the average of the other months revealed an increase of 366%.

Of the 2,643 employees offered the online survey, 677 (25.6%) responded. Nearly all respondents reported increasing the number of salads purchased during the study month. Researchers asked several open-ended questions which were categorized based on response. Not all respondents provided answers; however, 176 did identify cost as a barrier to salad purchases.

The authors concluded that the change the salad bar price resulted in an increase in salad purchases. They argued that this may indicate that a salad bar in a cafeteria may be viewed as more of a luxury than a necessity. They mentioned that the cost of a typical entrée in this particular worksite cafeteria is four to five dollars, whereas the cost of a typical salad is about eight dollars. In this setting, the less healthful food options represented a significant cost savings to the employee. They suggested that this type of intervention is feasible in a worksite cafeteria and that the cost of subsidizing the reduced salad bar cost could be offset by raising prices on other less healthy foods.

The study is strengthened by the collection of sales and weight data both before and after the intervention month. It is limited in that the duration of the intervention was only one month.

It is unknown if the increase in salad bar purchases would have been sustained or if they would have diminished over time. Additional studies should be conducted over a longer period of time to assess whether the reduction in price has a lasting effect on salad consumption. In addition, studies that demonstrate the feasibility and effect of controlling food costs when salad bar prices are offset by other less healthy foods are needed. With respect to the employee survey, due to the fact that no employee information was obtained, it is not known if this was a representative sample of the population.

The worksite cafeteria environment in this study provides an example of how the high cost of healthier food is a barrier for healthy eating. Though this scenario is present across the country and beyond, the worksite may be an environment in which this cost relationship can be modified. There is also potential for even greater impact if price incentives are combined with menu labeling and other healthy dining interventions. Although further research is needed, there is building evidence that these changes do result in healthier food choices by employees.

An example of a worksite study which combined modifications of several environmental factors was “An Intervention Study Targeting Nutritional Intake in Worksite Cafeterias” (Lowe et al., 2010). This was a randomized controlled trial designed to evaluate dietary and weight changes of individual participants after implementation of a new cafeteria program at two hospital cafeterias. The program aimed to reduce calorie content of purchased food as well as reduce the percentage of dietary fat consumed.

Eligibility of participants included being ages 21 and 65 years and report eating lunch in the cafeteria at least two times per week. Employees with a current diagnosis of a chronic disease or condition known to affect weight, taking a medication known to affect weight or appetite, planning to enroll in a weight management program, those pregnant or planning to

become pregnant within 24 months, or planning to terminate employment within 12 months were excluded. Participants were randomized into two groups within each hospital worksite. Group 1 received the environmental change intervention, which was a change implemented at both study hospitals at the same time. The intervention was reduced energy density of select foods offered in the cafeterias and nutrition labels posted for all foods sold. The nutrition labels included a color coding system that described food items based on energy density. Very low energy density foods were labeled green, low energy density foods were labeled yellow, medium energy density foods were labeled orange, and high energy density foods were labeled red. All food labels also provided total calories, fat, carbohydrate, protein, and energy density (kcal/g) for the portion sold. Group 2 included the same interventions as Group 1 and added pricing incentives for purchasing low energy density foods as well as education about low energy density eating. Education was conducted in four, one-hour group sessions.

Study participants were adults ($n = 96$, age = 44.2 ± 9.9 years, BMI = 29.7 ± 6.0 kg/m²) who regularly ate lunch at their workplace cafeteria. There were no statistically significant differences in gender, ethnicity, weight, or BMI between the two conditions or between the two hospitals.

Participants' lunch choices were monitored at the point of purchase using scan card technology for three months prior to the intervention to obtain baseline data as well as for three months during the intervention. Due to a technical failure, the third month of baseline data was not captured so only months one and two were included. Additional data measures included height, weight, body composition, waist circumference, blood lipids, blood pressure, and cognitive restraint, which is a self-reported measure of conscious restriction of food intake. Cognitive restraint was measured using The Cognitive Restraint subscale of the Three Factor

Eating Questionnaire, a validated assessment tool. Data was collected at four points; baseline, three-months, six-months and 12-months post the start of the intervention. Diet recalls were also conducted at these times to assess whether participant intake changed outside the cafeteria setting.

Results of the study revealed there was no difference in total energy intake between groups over the intervention period. Both groups decreased the total energy content of lunch purchases over baseline and intervention ($p < 0.001$). The largest change in energy intake occurred between baseline month one and baseline month two ($p < 0.001$). Each month showed a statistically significant main effect of time when compared to baseline month one however no other month-to-month comparisons revealed statistically significant changes. Similarly, the percent of energy from fat also showed a main effect of time over the baseline and intervention months. Although there was no statistically significant change between any consecutive months, a downward trend was identified and found to be significant when comparing baseline month one to intervention month three ($p < 0.005$). There was no statistically significant change in weight, waist circumference, or body fat over time or between study groups. Cognitive restraint increased significantly during the cafeteria monitoring period for all participants, but then decreased leading up to the six month follow-up assessment. From the six month to 12 month assessments, cognitive restraint remained steady. Attrition rates were 19.8% at 6 months post-intervention initiation, 34.4% at 6-months after the conclusion of the intervention, and 42.7% at 12-months after conclusion.

The authors concluded that providing nutrition labels and reducing the energy density of selected foods was associated with a reduction in energy and fat intake over a 3 to 4 month period at the study hospital sites. They recognize that there was no control group to compare to.

They acknowledge the fact that there was no difference between study groups and that both groups experienced a decrease in the total energy and fat intake over baseline and the intervention period based on cafeteria purchases, the greatest change however, being from baseline month one to baseline month two. This suggests the possibility of a Hawthorne effect, meaning, the results may be attributable to the fact that the participants knew their food choices were being monitored. This is further supported by the fact that measures of cognitive restraint increased during the monitoring period, though participants were not instructed to restrict their diet in any way. The researchers recommended additional studies to determine the effect of monitoring alone in this type of intervention.

The researchers acknowledged that the results of the study were limited. Without a control group for comparison to determine whether the changes made by participants were due to the intervention itself or perhaps the knowledge that they were being monitored, it is difficult to make any conclusive associations as a result of this study. Additionally, the attrition rate was high, which may have introduced bias at follow-up assessments. A strength of the study was the use of point of sale technology to obtain each participant's purchase information. This technology may be useful for tracking purchases made by consumers over long periods of time and applied to further research in this area.

This study goes beyond the previously described studies and looks at cafeteria purchases made by individual participants over time rather than total sales data. It is important to note however, that despite group two receiving the incentive of reduced cost of healthier food and education provided by the researchers, there was no difference between that group and those that were only exposed to the environmental changes through the course of the study. This is significant as it is becoming apparent that the factors surrounding eating behavior are complex,

especially in a social situation such as a worksite cafeteria. Also interesting is the fact that although both groups did experience a decrease in energy and fat intake over the course of the baseline and intervention periods, the greatest decrease occurred from baseline month one to baseline month two, suggesting that the awareness of the monitoring of food purchases may have played a greater role, at least initially, in the food choices made by participants.

Each study described in this section highlights at least one aspect of the food environment. Not only is the food environment comprised of available food choices, but also product placement, information, and price. Inclusion of nutrition information at the point of service, such as calorie labels, may have some benefit for employees making food purchase decisions in the workplace. As evidenced by the studies included in this section, providing nutrition or other health information may be more effective when put into context and combined with other food environment changes in the workplace. In the study “Evaluating the Impact of Menu Labeling on Food Choices and Intake” (2010), Roberto, et al. suggest that by including daily calorie requirement information in addition to calorie content of foods on a menu, not only is the current meal impacted, but potentially meals consumed later in the day as well. With respect to “A 2-Phase Labeling and Choice Architecture Intervention to Improve Healthy Food and Beverage Choices” (2012), Thorndike et al. determined that a simplified labeling system may have allowed for easier identification of healthier food items in a cafeteria that ultimately lead to an increase in sales of these items. This was enhanced by subsequent environmental changes that allowed for a greater visibility of the healthier options. Another environmental change to consider is cost. In “The Effect of Price Reduction on Salad Bar Purchases at a Corporate Cafeteria” (2013) Kottke et al. saw that by subsidizing the cost of salad bar purchases, those purchases significantly increased. The researchers also identified cost as a barrier to eating

healthier foods at that worksite. This study demonstrates an additional strategy employers can utilize to promote the selection of healthier foods while at work. Finally, in “An Intervention Study Targeting Nutritional Intake in Worksite Cafeterias” (2010), Lowe et al. demonstrated that an environmental change to a worksite cafeteria that included both the use of nutrition labels and the addition of new, more healthful food items was key to reducing total energy and fat intake for study participants. Employers are in a position to create a food environment that supports and encourages positive employee health changes. Utilizing the strategies described here, such as providing easy to understand nutrition information, price incentives for healthy foods, and ensuring high visibility of healthier foods, employers have the potential to impact the food choices made by employees at work. However, to know if any of these modifications have lasting effects on food purchases, studies examining the long-term effects must be done.

Behavioral and Environmental Modifications to Promote Health in the Worksite

Modifying the food environment is only one approach for targeting employee health behaviors. The scope in which employers are able to reach employees and drive behavior change is broad, and can include the realms of physical, social and media environments. As described by Anderko et al., employers can provide financial, organizational, and social support for health promotion interventions. They can uphold policies, procedures, and practices that support a healthy lifestyle. Employers can offer financial or other incentives to promote participation in health improvement programs. They can also disseminate consistent communication with employees to share the organization’s commitment to employee health and encourage healthy behavior (2012). Worksite intervention trials have incorporated varying degrees of these concepts into wellness programs. The following are examples of worksite

intervention trials that go beyond the food environment and attempt to reach employees through the physical, social, and media environments.

The purpose of “Health Works: Results of a Multi-Component Group-Randomized Worksite Environmental Intervention Trial for Weight Gain Prevention” (Linde et al., 2012) was to implement an environmental intervention in a worksite to positively influence weight status among employees over a two year period. The study was a randomized-controlled trial of six worksites that had food service available on-site in the same geographical location. Participants of the study were eligible if they were employed at least half-time on a daytime shift and were not pregnant at any time during the study. Prior to initiating the study, a thorough assessment of the food environment was conducted at each site, including: food availability, price, portion and calorie content in order to classify appropriate foods as calorie smart. Measurements of the health environment were taken at baseline and 24 months over a 4 week period at each point in time. An abbreviated one week scan of measurements was also completed at 12 months. These measures included stair use (measured by infrared beam sensors placed at stairway entry points), the presence of health media (posters and magazines related to healthy behavior, physical activity, or eating, measured using standardized forms), participant height and weight (obtained by a trained specialist), and participant response to an online survey assessing demographic characteristics, individual dietary intake, and physical activity. The six worksites were randomized to either control or intervention. Neither the researchers nor participants were blind to the study condition given the nature of the study. The control sites had no interaction with study staff except in measurement procedures at baseline, 12 months and 24 months.

Program interventions were targeted to four areas: the food environment, physical environment, body weight tracking environment, and health media environment. Modification

of the food environment aimed to increase the availability of healthy, calorie smart foods, reduce the price of calorie smart foods by 15% and increase the price of non-calorie smart foods by 15%, offer smaller portion sizes as substitutes (such a 12 ounce can of soda in place of a 20 ounce bottle), and label calorie smart items at the point of purchase as well as promote them throughout the cafeteria. The physical environment intervention promoted walking at work through organized activities, group walks, competition between coworkers, and activity monitoring. Participants received free pedometers and access to an online step tracking site. Walking challenges were implemented to encourage competition between groups of employees where steps were counted during challenge periods. Activity was promoted and encouraged throughout the workday. Signs, posters, and pleasant music in stairways were used to enhance the appeal of the physical environment. Body weight tracking was encouraged through the placement of scales in four accessible, yet private locations at each site. BMI charts were posted near scales as well as weight tracking forms to encourage self-monitoring of weight. Weight tracking competitions were also held to encourage social support for weight tracking. The health media environment modification included additional placement of signs and posters as well as a monthly two-page newsletter created by the intervention staff with input from an advisory panel of employees at each site. Newsletters included site-specific information including testimonials from coworkers and results of competitions. An analysis of covariance was used to evaluate the results. The primary outcome was BMI change between baseline and follow-up measurements.

At baseline, there were 752 participants assigned at intervention sites and 995 participants at control sites. At the end of 24 months, 637 intervention participants remained eligible for the study. Of those eligible, 611 (96%) were seen for follow up measures. Eligible control participants numbered 815 at the end of 24 months and 795 (97.6%) were seen for follow

up measures. The only significant difference between the control and intervention sites was the percentage of smokers. The control sites had 15.6% of the participants report smoking, whereas the intervention sites had 12.1% ($p < 0.05$). Participants in the study were more likely to be women (60.5%).

Of the total participant population, at baseline 68.8% were overweight or obese and at the end of 24 months 70.9% were overweight or obese. Percent overweight rose from 33% to 34.8% and percent obese rose from 33 to 34.8%. Across all sites, mean BMI at baseline was 28.4 kg/m² and at 24 months was 28.7 kg/m². Mean weight gain at intervention sites was 0.32 kg/m² and for control sites, 0.19 kg/m². The difference was not statistically significant. Average weight gain was that which would be expected in an untreated cohort over two years. Data describing weight change by individual sites was not provided.

The authors concluded that although health promotion activities of any kind are beneficial, it may be unrealistic to suggest that programs which focus primarily on the environment alone are strong enough to improve individual health outcomes. They acknowledge that not all interventions were carried out in the same manner between sites and some interventions were not put in place at all. The price modification aspect of the intervention was not carried out in any of the study sites. Despite the importance of the physical environment, other environments, such as the social environment, may be more closely related to health and obesity than previously thought.

The study's power was limited by the group-randomized design and a small sample size at the group level. At the individual level the sample size was fairly large but when separated by group (worksites), the sample size was small. It may have been helpful if they had looked at other indicators of risk of chronic disease in addition to BMI. It may have also been helpful to also

separate results by individual worksites to assess what impact the degree to which the interventions were implemented may have impacted the results. This study is strengthened by the high retention rate of participants for the duration of the study.

This study is important in that it reveals the potential significance of other environments, besides the physical environment, on behavior change and health promotion. A lack of significant intervention in social or media environments could have resulted in a diminished effect of changing the physical environment. In addition, perhaps the potential impact of the work environment on behavior change is not as strong as originally thought. The design of interventions that address all aspects of the individual's environment, not only in the workplace but potentially even at home or outside of work may be more successful at improving health outcomes for employees.

Another example of a worksite intervention trial that aimed to prevent weight gain in employees was "Step Ahead: A Worksite Obesity Prevention Trial among Hospital Employees" (Lemon et al., 2010). This was a cluster-randomized trial conducted at six hospitals in a healthcare system in the same geographic area. Hospitals were matched into pairs according to their size and level of service then randomized to either the intervention or control condition.

A cohort of employees was selected to represent the total employee population. Random samples were drawn, stratified by gender and minority status. Oversampling of male and minority employees was intended to allow for ability to perform subgroup analysis. To be eligible for the study, participants must have been age 18-65 years, able to communicate in English or Spanish, not planning to leave employment in the next two years, working at least 20 hours per week, not working at more than one participating hospital, not pregnant, and agreeable to being weighed and measured. Letters were sent to employees meeting these requirements.

There were several intervention components. A social marketing campaign included use of a common logo, a weekly newsletter, a website and an information center with print materials available in a centrally located place in each study hospital. Environmental strategies that promoted physical activity involved using stairway signs with unique messages located at stairwell entrances, landings, and elevators. Indoor and outdoor maps with walking routes and mileage and step counts were developed for each site. There were also “Walks with the President” offered which allowed groups of employees to take a 20 minute walk with the organization’s president. Environmental strategies that promoted healthy eating included menu labeling of most foods and beverages, healthy menu options, and special events highlighting ethnic cuisines. A farmers’ market was also offered weekly at two of the intervention sites. Interpersonal or social support was enhanced through periodic campaigns and challenges, which targeted physical activity, healthy eating, and weight maintenance or loss. Group and individual prizes were given. Strategies that targeted individual knowledge, skills, and behaviors included a display and workshop series, weekly newsletters, recipe books, and other print materials.

Participants completed assessments at baseline, 12 months, and 24 months. Assessments included human resources records to determine demographic and job related information, height and weight to calculate BMI, and a 30-minute self-administered survey that included an assessment of employee perception of organizational commitment to employee health, perception of normative coworker physical activity and eating behavior, and an assessment of employee physical activity and eating behaviors at work. At the 12 month and 24 month assessments, intervention sites were also given a survey to assess participation in intervention activities. The initial response rate of eligible participants was 56% (806 participants). The 24 month retention rate was 80% for all enrolled participants (648/806); however, the retention rate

for participants who remained eligible was 94% (648/688). The participant majority was female, non-Hispanic white, and overweight or obese.

The most common activities that participants reported utilizing were stairway and cafeteria signs and weekly newsletters. The website and participation in project challenges or walking groups were less frequently utilized.

There was no intervention impact on change in BMI. The estimated difference between groups in change in BMI from baseline to 12 months was 0.272 kg/m² and from baseline to 24 months was 0.276 kg/m². When intervention participation was used as an independent variable (range from 0 to 100 units), there was a decrease of 0.012 BMI points for each unit increase in participation at 24 months. Average BMI for the intervention and control conditions at baseline was 28.4 and 29.0, at 12 months was 28.7 and 29.1, and at 24 months was 28.9 and 29.4, respectively. Employee participants at intervention sites reported improved perceptions of organizational commitment to employee health at 12 and 24 months compared to those at the control sites. There was no change in perceptions of normative coworker physical activity or dietary behavior.

The study authors concluded that the intervention had no effect on weight gain prevention over the two-year period. Greater intervention participation was associated with greater weight gain prevention, however, overall participation was not high enough to suggest an effect at the population level. In addition, it can be challenging to offer the same resources and exposure to interventions in a hospital setting in which employees work different shifts. Employees who worked second and third shifts had lower attendance rates to displays and workshops. Participant perception of organizational commitment increased over the course of the trial. Future research suggested by the authors should involve developing multiple

intervention strategies that actively facilitate participation for employees who may not be as self-motivated in combination with demonstrated leadership support for employee health. The authors recognize that targeting the interpersonal level to change social norms may allow for more effective behavior change. This type of change is often slow, but with time and policy changes it may be possible.

Strengths of this study include the diverse nature of the employee population of the hospitals, a high retention rate for participants, and the inclusion of a matched, control hospital for each intervention hospital. Conversely, limitations include a low initial response rate and self-reported survey data, which are subject to bias. In addition, a portion of the study group working second and third shift did not have the same access to all aspects of the intervention.

Despite a strong presence of physical environment interventions with the inclusion of social and media environment interventions, this study is similar to what was seen in the previous study. The intervention did not result in significant change in weight gain prevention compared to control. This study supports the argument for an improved understanding the employee population in that the authors acknowledge that a one-size-fits-all approach for behavior change is not effective for controlling weight. They suggest that multiple strategies may be necessary to improve participation by individuals.

As described in the previously reviewed studies in this subsection, a potentially important venue for workplace support and promotion of behavior change is through the media environment. Electronic media, such as computer programs, e-mail, smart phone applications, and other web-based programs are being developed and integrated into behavior change efforts. “Demonstration of an E-mailed Worksite Nutrition Intervention Program” (Block, Block,

Wakimoto & Block, 2004) was a pilot study that assessed feasibility and efficacy of an e-mailed nutrition intervention program.

Large-scale nutrition education and health promotion campaigns raise awareness in Americans, however changes in diet are usually small. This could be in part due to the limited capacity to incorporate behavior-change principles into the campaign. Utilizing these principles, especially individualized face-to-face counseling, which has been shown to be effective, can be very costly and not feasible for a large scale setting. The Worksite Internet Nutrition (WIN) program was developed to apply behavior-change principles in a broad and inexpensive manor.

A 12-week pilot program of WIN to test the feasibility and acceptability of a nutrition intervention delivered by e-mail was conducted. The program was offered to all 230 employees at a corporate worksite and participation was voluntary. Dietary intake of fat, fiber, fruits, and vegetables was collected prior to the program via questionnaire. Demographic and lifestyle data specific to gaining information needed to tailor interventions was also obtained through a separate questionnaire. Stage of readiness for change was assessed at baseline and at the end of 12 weeks. The three categories used for stage of readiness for change included precontemplation, contemplation/preparation, and action/maintenance. Self-efficacy for increasing fruit and vegetable consumption and decreasing fat consumption was assessed at baseline and at 12 weeks. At the end of the 12 week study period, participants were sent an evaluation questionnaire on program satisfaction and follow-up questionnaire on dietary intake.

The program consisted of weekly automated e-mails sent to participants. The e-mails contained nutrition information, tips and goals that were specific for each participant. Based on the result of the baseline surveys, messages and goals within the e-mail were tailored to one of seven predetermined lifestyle paths. Participants could choose an emphasis of either increasing

fruit and vegetable intake or decreasing fat intake. In addition to weekly e-mails, social support was promoted through family members being encouraged to participate, an online bulletin board for participants to facilitate social networks and information, and provision of links to other websites for information. The analysis of continuous data utilized linear regression and correlation models. Classification and Chi-square were used for categorical data. Differences between respondents and non-respondents to the evaluation questionnaire were evaluated. Program effectiveness was evaluated using analysis of covariance, where change score was the dependent variable and baseline level was the covariate.

Eighty-four participants consented to the program pilot. The age range was 21-63 years, 73% of participants were female, 41% had children in the home, and 72% did most of the food preparation. At baseline, 50% were in precontemplation or contemplation/preparation stage of readiness for change in fat intake and 46% were in the same stages for fruit and vegetable intake. Of the 84 participants, 47 (56%) completed the evaluation questionnaire at the end of the 12-week programs. Non-responders were more likely to have been in the action/maintenance stage at baseline. With regard to feasibility and satisfaction, 93% of respondents found the nutrition information and goals helpful and 83% reported that they would recommend the program. At the end of 12 weeks, there was significant forward movement in stage of readiness for change in respondents for fat intake and fruit and vegetable intake, which was also reflected in change in dietary intake. There was a decrease in frequency of consumption of fat (-0.39 times/day, $p < .001$) and an increase in consumption of fruit and vegetables compared to baseline (0.73 servings/day, $p < .001$).

The authors concluded that the delivery of an e-mail based, tailored nutrition intervention in a worksite is feasible and may improve both the stage of readiness for change of individuals

and dietary intake of fruits, vegetables and fat. The use of such a program could bring tailored and widespread diet and lifestyle screening and counseling to a large number of Americans at a low cost.

The study does have several limitations, the first being that the study period was a relatively short amount of time. Had the pilot been longer, the results may have been different. There may have been some bias in the initial and the final respondent group based on the fact that participation was voluntary. Participants may have been more interested in the pilot and therefore more likely to be successful. The low response rate to the evaluation questionnaire was also a limitation. In addition, the changes in diet scores were based on self-reported data obtained from the questionnaire. A strength of the study was that the program was designed to automatically send the nutrition information to participants. The program did not rely on participants to initiate the interaction. In addition, the use of messages and goals tailored to specific lifestyles may have improved participant adherence and the effectiveness of the intervention.

Despite being a pilot program, this study provides an example of how technology may be used to reach out to employees at a worksite to promote positive, healthy changes in diet and lifestyle. The low cost of the program combined with potential for reaching a large number of individuals is desirable as the financial aspect of promoting health and wellness has become a challenge for many organizations due to budget constraints. The internet and use of e-mail is very much a part of society. The use of computers and the number of people who have computers continues to grow. This is an ideal venue for marketing and access to programs and information to promote behavior change on a large scale, both in and out of the workplace, but it does continue to present challenges. Current research has shown that participation rates are low

and attrition rates are high for a majority of internet-based intervention programs (Robroek, Lindeboom, & Burdorf, 2012). On any given day an individual may receive tens to even hundreds of e-mails and the likelihood that a particular one gets overlooked increases.

Additional research is needed to determine more effective strategies for attracting and retaining participants for such programs.

It must be recognized that although some individuals are resistant to adoption of advancing technology, it is likely that many may only be reached through this venue. Additionally, the use of standard intervention methods (such as print and interpersonal) in addition to electronic media based methods remains critical to the concept of tailoring interventions. What remains unclear is the role of the social media environment and whether or not it is strong enough to influence change in the same way that interpersonal relationships within the social environment in the workplace do.

A study that used the influence of the social environment to promote healthy behavior change was “Weight Loss among Female Health Care Workers: A 1-Year Workplace Based Randomized Controlled Trial in the FINALE-Health Study” (Christensen, Overgaard, Carniero, Holtermann, & Sogaard, 2012). The purpose of the study was to test the effect of a 12 month worksite intervention that included diet, physical activity, and cognitive behavioral training on overweight female healthcare workers. The study was a cluster-randomized single-blinded controlled trial conducted over 12 months.

All employees of a health care worksite working over 15 hours per week were invited to participate. Inclusion criteria included being female, overweight (BMI over 25 or body fat over 33% for age 18 to 40 or over 34% for age over 40), and a health care worker. Of the 202 employees invited, 101 met inclusion criteria and 98 consented to the study. Participants were

divided into clusters based on age, job seniority, and job type and randomized to either control or intervention group. Fifty-four participants were in the intervention group and 44 participants were in the control group.

The intervention involved participants meeting as a group for one hour each week during the work day. The first three months focused on weight loss and included information on dietary changes, calorie counting, weight measurements, weight loss targets, strengthening exercise, and leisure time exercise. The remaining nine months focused on weight loss maintenance, additional physical activity, and cognitive behavioral training. The control group was offered a monthly two-hour oral presentation during working hours. These presentations focused on dietary recommendations and other health related topics.

Measures were obtained at baseline, three months and twelve months. Specific measurements included height, weight, body fat, waist and hip circumference, blood pressure, and various strength tests. Questionnaires consisting of standardized, validated scales related to musculoskeletal disorders and localized pain were completed at all three measurement points.

Of the initial study cohort of 98 participants, 83 completed all three tests. At baseline, there was no difference between the intervention and control groups for any measure. Mean BMI was 30.6 kg/m² for all participants. At 12 months, significant differences were found for change in weight, BMI and fat percentage between the two groups. The intervention group saw a mean decrease in body weight of 84.2 to 78.4 kg which corresponded to a decrease in BMI from 30.7 to 28.5 kg/m² and a decrease in body fat percentage from 41.2 to 38.4%. Weight loss for the intervention group was highly variable, ranging from +15 to -42 kg, however, the majority of participants lost from 0 to 10 kg. There were no significant weight changes in the control group from the beginning to the end of the study and there were no significant

differences between the intervention and control groups for blood pressure or strength measures at the end of the study.

The study authors concluded that a 12 month intervention among overweight female health care workers that included diet, physical activity, and cognitive behavioral training resulted in an average weight loss of about six kg, a BMI decrease of over two units and a body fat reduction of almost three percent. This suggests lifestyle intervention that is integrated into the workplace is effective at achieving weight loss for employees and that the workplace is an appropriate venue for weight loss programs for overweight individuals.

The study was strengthened by the high adherence of participants. The dropout rate was 15% after 12 months. Several limitations can be identified. The population studied was all female and worked in a health care setting so the results may not be able to be generalized to the entire population. Similarly, the participants were all overweight to begin with so it may not be possible to assume that the intervention methods used in the study would also be useful in a weight maintenance campaign. In addition, because the interventions were integrated, it is not possible to evaluate the effectiveness of any of the components individually. The researchers did not assess adherence to dietary recommendations, physical activity or other aspects of the interventions throughout the trial. Lastly, cost was not a concern for this study and therefore the researchers acknowledged that it was likely not cost-effective for widespread implementation, which poses a barrier for its use as in intervention for weight loss.

This study is noteworthy in that the effect on weight loss and reduction in BMI and body fat percent was significantly greater than previous studies described. The intervention design for this study was unique in that it incorporated several aspects of behavior change, including cognitive behavioral training. Although it was not described in the initial study design, it is

possible that the frequency with which the groups met may have encouraged strong social support within the groups. In the study discussion, the authors mentioned that during the intervention period, participant groups tended to meet on a daily basis to share meals or initiate physical activity after work. The social environment created as a result of this intervention may have played a role in the strong adherence to the program and the high retention rate. This is important to recognize as the measure of weight loss seen in this study is greater than other studies described in this review that did not have as strong of a social component. In addition, previous studies that were discussed did not have overweight as initial inclusion criteria, while this study did.

The studies reviewed in this subsection demonstrate that despite offering a variety of behavioral and environmental interventions in a worksite, the effects of these interventions, with respect to weight loss or maintenance, are often limited. Linde et al. found in their study on multi-component worksite environmental intervention (2012) that changes in the physical environment at a worksite can be difficult to implement entirely and may not be strong enough to impact behavior at work. They suggest that use of behavior change strategies that also influence behavior outside of the workplace may be more beneficial. In the Step Ahead trial, Lemon et al. (2010) determined that a one-size-fits-all approach is not effective for controlling employee weight. Multiple strategies are likely needed to increase meaningful participation. Block et al. identified e-mail as a cost effective and far-reaching venue for connecting with employees in their e-mail nutrition intervention program (2004). It is important to note however, that an e-mail program may not have the ability to retain participation over time. The greatest impact on a study outcome in this subsection was seen in the last study that assessed the 1-year effectiveness of weight loss among female health care workers (Christensen, et al., 2012). This study differed

in that a social support environment was created as a result of the study design. In studies where social relationships were less prominent, results were not as significant. When developing study protocols or designing interventions, the social environment in the workplace should be considered and thought of as an essential tool to influence, support, and promote behavior change and improve employee health.

It can also be said that of the studies included in this subsection, the specific employee population was not taken into account when designing study interventions. Based on the results of the studies described in this review, it appears that utilizing one strategy to impact employee health may not be enough to drive behavior change. Several authors have indicated that an area of focus for new research is the concept of understanding a worksite population with the goal of designing nutrition and health interventions that are tailored to different groups of employees.

Describing the Workplace Population

When developing any program or intervention, it is of utmost importance to understand the target population in order to maximize participation and overall success of the program (Verwij, Proper, Weel, Hulshof, & van Mechelen, 2009). Similarly, as Mattke, Schnyer, and Van Busum described in “A Review of the U.S. Workplace Wellness Market,” a component of one of the key strategies identified as essential for implementation of successful wellness programs is the needs assessment (2012). This process may pose a significant challenge for worksite program development. Employees often encompass a wide demographic range. Age, gender, ethnicity, level of education, and socioeconomic status are all important factors that potentially affect health behaviors. In addition, personal beliefs, attitudes, and influences impact health related behavior on a daily basis. These are just some of the characteristics pertinent to the employee population. To date, there are few studies that incorporate a significant assessment

of the employee population into the study design prior to initiating a wellness program or intervention. Included in this subsection are examples of two studies that aimed to describe and understand in detail specific employee populations.

“Obesity and Food Choices among Faculty and Staff at a Large Urban University” (Freedman & Rubinstein, 2010) was a qualitative, cross-sectional study that aimed to examine eating behavior, food choices, health beliefs, and attitudes as well as determine prevalence of overweight and obesity among university employees. The methodology for the study included administration of an online survey to all full- and part-time university faculty and staff via e-mail. The survey was pretested and collected demographic data, self-reported height and weight (used to calculate BMI), dietary patterns, food purchasing behavior, influences on eating behavior, and estimated intake of fruits, vegetables, dairy and grains. The survey assessed the perceptions of the university’s physical food environment using a set of Likert scale questions related to food access and availability. The study also assessed the influences of peers on food choices as well as perceived attitudes and beliefs about health and nutrition using the same Likert scale format.

The final sample of survey respondents was 806 people and was considered to match the distribution of ethnicity of all university employees. Based on the self-reported data, 28.5% of respondents were overweight (BMI 25.0-29.9) and 19.5% were obese (BMI ≥ 30). It was found that BMI was significantly related to gender, ethnicity and age. The incidence of BMI ≥ 25 was higher for men (60%) when compared to women (43%). Hispanic employees were found to have the highest percent (61%) of overweight and obese respondents, next was African American (59%), then Filipino (54%), white (50%), and Asian (29%). BMI was also found to be higher in older respondents. Mean fruit and vegetable intake was significantly greater in normal weight

participants when compared to overweight or obese participants. Forty-two percent of participants were not satisfied with food choices on campus. Thirteen percent were satisfied with the availability of fruits and vegetables on campus. Data collected also revealed that 80% of participants strongly agreed that they were in good health. Of those participants, significantly more were normal weight or overweight. Seventy-six percent of participants strongly believed that what they eat has an effect on their health. Obese employees were significantly less confident in their ability to make healthy food choices when compared to overweight or normal weight participants. Overweight and obese participants were significantly more influenced by peers' food choices when compared to normal weight participants.

This study made available a wealth of information related to food choices, the food environment, and health beliefs and attitudes of the population. The authors concluded the findings of the study highlight several opportunities to encourage healthy eating and improve the health of university employees in ways that are specific to this population's needs. Increased availability or access to healthy foods (including fruits and vegetables), increased awareness of healthier food options, and access to nutrition information at the point-of-purchase were suggestions made as a result of this study. The authors also conclude that the study reveals a need for wellness programming, specifically, to increase employee self-efficacy for making healthy food choices.

Strengths of the study include a large sample size and the survey tool. The survey design, which included scaling questions to assess health beliefs and attitudes, was useful for gaining a more detailed and useful description of the study population. In addition, inclusion of open-ended responses allowed respondents to have an opportunity to provide specific information that may not have otherwise been captured by the survey. The most significant limitation of the

study was the self-reported nature of the survey data, especially body measures and food consumption. In addition, the actual respondents to the survey may have been more interested in the topic and could have potentially created bias.

This study highlights a methodology to better describe and understand a target population in order to design wellness programs to meet specific needs. It provides a useful framework for other institutions or employers who are looking to improve the health and wellness of their population. Learning about specific health beliefs, influences, attitudes and self-efficacy in addition to observing a population's behavior may provide opportunity for a more tailored approach to health and wellness interventions. It would be beneficial for future studies to follow the development of tailored wellness programs designed based on the results of such a survey and determine whether they are more successful at reaching employees and achieving wellness goals when compared to those that did not utilize employee specific data in the implementation of a program.

A study that gathered and took into consideration population specific data when designing worksite wellness programs was "Engaging Participants in Design of a Native Hawaiian Worksite Wellness Program," (Leslie, Hughes, & Braun, 2010). Researchers were committed to working closely with the community of native Hawaiians in order to gain trust and buy-in for participation. Administration and employees were both included in the conceptual design of tailored programs for eight organizations. Through the use of environmental assessments, administrative interviews, focus groups and an employee survey, researchers were able to identify workplace wellness activities preferred by large numbers of employees. The environmental assessment was conducted with the use of a standardized tool that included assessment of three domains known to influence health behaviors, the physical environment, the

information environment, and the surrounding neighborhood. Administrative interviews were conducted to assess current resources, policies, and the level of managerial support for a healthy work environment. Focus groups were held with both employees and employers to learn about opinions, suggestions, and desired health promotion activities. The three main areas discussed were availability and access, desired programming and incentives, and acceptable measures of determining positive health change. Focus groups separated employees and employers to promote open discussion. Fifty-six individuals participated in nine focus group sessions. The anonymous employee survey obtained preferences for specific program, policy, and evaluation ideas identified in the focus groups. The total number of employee respondents was 437, which was 72% of all eight organizations.

The study resulted in the suggestion that a toolkit be created or identified that could be customized to further meet the individual needs of each organization. The researchers concluded that the high participation in data collection suggests that by engaging the individuals the program is designed for, enthusiasm for worksite wellness was enhanced. Though the implementation of the wellness programs was not included in this study, it demonstrates a process for development of and potentially improved participation in tailored workplace wellness programs.

Conclusions

This review illustrates that although the policy and practice of offering worksite wellness programs is rapidly growing, there is much to learn about the most effective strategies for engaging employees in order to promote sustained and positive behavior change. The implementation of worksite wellness programs has been supported by many employers as well as the Affordable Care Act due to the realization that such programming has the potential to lower

costs for both employers and the healthcare system as well as improve the health of the population. With no formal definition for what constitutes a wellness program, however, it has been challenging to determine what strategies and efforts have the greatest impact in the employee population. Mattke et al. described a set of key strategies for designing and implementing successful wellness programs. These are internal marketing; planning, evaluation, and program improvement; and leadership and accountability. Few studies to date have shown the impact of worksite wellness programs that have fully utilized these strategies.

The strategy of internal marketing is one that several studies included in a variety of ways. Most notable is the adoption of calorie or nutrition labels at worksite cafeterias. This type of intervention is becoming more widespread; however, the calorie message must be clear to employees for it to be effective. Roberto et al. (2010) found that the effect of providing calorie labels may be enhanced by the inclusion of additional information, such as a statement describing the number of calories recommended per day. Thorndike et al. (2012) utilized a color-coded labeling system that may have improved the understanding of the consumer, especially when making quick purchase decisions. Another marketing strategy used in the same study was the placement of healthy food and beverage choices in highly visible and convenient locations. Kottke et al. (2013) demonstrated the effect of marketing a reduced price of a worksite salad bar. The significant increase in salad bar purchases during the study period allowed researchers to identify cost as a barrier to making a healthier choice. Food choices, product placement, price, and nutrition information are components that should be not only modified to create a healthier food environment that may impact employee health, but they should also be well marketed and affordable.

With respect to the planning portion of the second theme, Freedman and Rubenstein (2010) demonstrated that the administration of a survey in the workplace can provide a wealth of information related to employee health beliefs, attitudes, perceptions of social and food environments, and eating behaviors which could be translated into employee health and wellness interventions that are specific to the population. Another aspect of involving employees in the planning of any wellness programming was described by Person et al. (2010). Researchers identified barriers for employee participation in workplace wellness activities. Insufficient incentives, inconvenient location, and time limitations had the greatest impact on employee participation. In order to more effectively design, implement, and tailor programs and interventions, including employees as part of the planning strategy is essential. This creates potential for engaging a greater number of employees and improving the overall success of any program or intervention.

Program evaluation and improvement are also significant wellness program components that should be addressed. Several studies saw minimal or no change in desired health outcomes after the study period. Linde et al. (2012) and Lemon et al. (2010) are examples of studies where interventions were minimally successful after a trial of 24 months. Not only do these studies further support the involvement of employees in program planning but they also suggest the importance of ongoing evaluation of the program results as well as the implementation of a program improvement process. In the actual workplace setting, continuous monitoring of results and making enhancements or changes to a program as a result of that data is essential to ensure the program is effective.

An example of the leadership and accountability theme was described by Lemon et al. (2009). Researchers found that how employees perceive the worksite social environment and

organizational support may affect health behaviors. Dissemination of support for employee health by leadership has the potential to impact the social environment of the worksite and change social norms and the workplace culture over time (Mujtaba & Cavico, 2013). The social environment itself was shown to be a strong influence for positive health behaviors by Christensen et al. (2012). Intervention groups appeared to develop strong social bonds as well as a group approach to healthy behaviors (healthy eating, exercise, etc.). Interestingly, this study did demonstrate a significant difference in weight loss between the study group and the control group, suggesting that this aspect of the work environment could be used for the promotion of health and wellness.

The ever growing body of research in the area of employee health and wellness is key to the success of workplace wellness programs. Understanding what motivates and how to best reach out to employees may improve participation and retention for these programs. Workplace wellness programs are not going to be equally effective for all people; understanding the population that the program is intended for will allow for the development of a program that is specifically tailored to the needs of the employees. Future research to determine the most effective strategy for obtaining employee population-specific data that may be used for program design and tailoring is needed as current research has revealed that a lack of knowledge of such information has resulted in limited study outcomes and inconclusive results. Furthermore, it is unclear whether or not workplace wellness programs that are tailored to the needs of employees are more successful than those that are implemented without taking into consideration the exact population they are designed for.

Though some aspects of intervention studies have been promising, long-term studies are needed to determine if the effects are lasting or if they diminish over time. Studies that

emphasize environmental changes in the workplace should include more prominently the concept of the social environment and social support as an intervention tool. This concept has been shown to play a potentially significant role in behavior change and should be utilized by employers and researchers to enhance the effectiveness of interventions. In addition to research studies, employers currently offering health and wellness programs should track and monitor the outcomes of interventions in order to enhance participation and effectiveness over time. A program that offers dynamic options for participation may be more successful than one that is unchanging.

The workplace has increasingly become an area of study and concern for health promotion and disease prevention as it has been demonstrated that healthier employees represent a reduced cost to employers and society. This literature review summarized a variety of studies types including studies pertaining to the use of the workplace as a venue for employee health improvement, studies concerning the impact of modification of the food environment on food purchasing behavior, studies that evaluated the effectiveness of behavioral and environmental interventions on employee health outcomes, and studies that focused on describing the employee population in order to better meet health and wellness needs. Each area provides an essential piece in the process of determining the most effective dietary and behavior intervention strategies to impact health behavior and food choices of employees. There is evidence that employees are individuals and their decision making processes, especially for health related behaviors, is exceedingly complex. However, despite being individuals, employees work in a social environment that can have strong effects on employee behavior change. Incorporation of employee health beliefs, attitudes, perceptions, and behavior into a workplace program design that includes tailored interventions and relies on social interaction and support may enhance

program effectiveness through increased participation and retention. Future research should be expanded in this direction to better determine the most effective strategies for implementation. Research in the area of workplace wellness continues to be exceptionally important as it has the potential to influence the future of workplace health and nutrition related interventions and over time, impact the prevalence of obesity and other chronic diseases. Gathering employee population-specific data related to health beliefs, attitudes, perceptions, and behavior is an important first step in the process of designing a more successful workplace wellness program.

CHAPTER 3: METHODS

The purpose of this research was to conduct a survey at a healthcare workplace to establish employee population-specific data including health beliefs, attitudes, perceptions of the food and social environments, eating behavior, readiness for change, and weight status. Data obtained from this survey will provide information to develop or improve health and wellness activities at that workplace. The survey consisted of 17 questions and was pretested for use in this study (Appendix A). All employees of the Veterans Affairs Community Based Outpatient Clinic in Green Bay, Wisconsin were invited to participate. Approval from Mount Mary University's Institutional Review Board (IRB) was obtained prior to conducting the survey. The project was determined to meet criteria for a quality improvement project through the VA and therefore did not require review by the VA IRB.

Study Overview

All clinic employees were informed about the study via e-mail at the beginning of the study period. The e-mail notified employees that the survey would be available at the National Nutrition Month booth at various times during the month of March, 2015. In addition, the survey as well as a cover letter was attached to the e-mail with instructions for submission for those individuals who were not able to visit the booth. A second e-mail was sent after two weeks to remind employees of the study and again included the survey. Responses were kept confidential and no information that could identify participants was collected on the survey. After completion of the survey, a drawing entry form was filled out and submitted separately so they could in no way be associated. Participants were entered into a drawing for a prize, a lunch bag, water bottle and food container, as an incentive for participation.

Data Collection

The 17 question survey was adapted with permission from the survey tool utilized in “Obesity and Food Choices among Faculty and Staff at a Large Urban University” by Freedman and Rubenstein (2010). The original survey was 40 questions and included many demographic related questions as well as questions pertaining to specific eating and cooking habits. In an effort to reduce the time to take the survey for participants, these were eliminated. Several questions were modified to be more applicable to the healthcare employee population. Questions about readiness for change as well as prior participation in VA health and wellness opportunities were added. The survey was pretested with a convenience sample of the population. Based on responses and a focus group discussion, modifications were made. The greatest being the addition of examples for each of the dietary intake questions. The intent of the survey was to collect data related to health beliefs, attitudes, eating behavior, food choices, perceptions of the food and social environment, as well as incidence of obesity and readiness for change at a single worksite. Following is a description of the questions used to accomplish this.

A description of health beliefs, or, self-efficacy for health and related behaviors, was obtained using a five-item set of five-point Likert scale questions. The response values ranged from “strongly disagree” (1 point) to “strongly agree” (5 points) for statements such as “Maintaining my health is important to me” and “What I eat affects my health.” To assess attitudes toward eating behavior, a nine-item set of five-point Likert scale questions was used. The response values ranged from “not important” (1 point) to “very important” (5 points) for statements such as “Eating breakfast is,” “Eating fruits and vegetables is,” and “Daily exercise is.” The next question consisted of a six-item set of five-point Likert scale questions, again ranging from “strongly disagree” (1 point) to “strongly agree” (5 points) for statements such as “What I eat is influenced by the type of food offered in the workplace.” Unlike previous questions, for

this set, due to variation in employee social and family life, the option to choose “not applicable” was available. This question set also included the statement “I am confident that I know how to make healthy food choices” to further assess self-efficacy for healthy eating behavior.

This was followed by questions that aimed to determine typical intake of fruits, vegetables, grains, dairy and sugar-sweetened beverages. Self-reported estimates of daily consumption of these foods were determined through provided portion size examples based on the USDA’s MyPlate portion size definitions. An example was offered to enhance understanding of the question. If participants listed a range of intake (for example, 2-3 fruits per day), the mid-point of that range was used for analysis. Fruit and vegetable intake data was combined into one group for analysis. In order to assess the importance of particular factors when making food to purchase decisions, a nine item set of five-point Likert scale questions was used. Similar to previous questions, response values ranged from “not important” (1 point) to “very important” (5 points) for statements such as “How the food tastes,” “Avoiding food that is highly processed,” and “The health benefits of the food.” To assess readiness for change, a question for which each response corresponded to an identified level of readiness (precontemplation, contemplation, preparation, action, maintenance) was asked. Self-reported age, gender, height and weight were obtained to determine body mass index (BMI) and assess for respondent bias. Also included were questions to identify those currently or watching their diet and determine involvement or participation in any health promotion programs offered at the worksite. Respondents were encouraged to provide information on what programs they participated in or what barriers may have prevented their participation. Inclusion of a space for open-ended responses to questions related to the food environment and food purchasing behavior allowed for communication of responses that were not otherwise asked for.

Data Analysis

Data was analyzed using Microsoft Office Excel 2007 data analysis toolkit and Real Statistics add-in. Response data collected was quantified in the form of frequency measures. Pearson's correlation was used to assess the relationship between BMI and self-reported dietary intake. Pearson's chi-square test was used to assess the association between BMI category (normal, overweight, and obese) and age, gender, eating behavior, beliefs, and attitudes about health and food choices. One-way analysis of variance (ANOVA) was used to evaluate BMI by age group. A series of independent t-tests were used to evaluate differences in responses by BMI category. The significance level for all tests was set at $p < 0.05$.

CHAPTER 4: RESULTS

Approximately 210 people were employed at the time the survey was administered. Fifty-one employees (24.3%) responded to the survey either at the National Nutrition Month Booth or by printing and turning in anonymously after receiving an e-mail announcement. Of the 51 responses, seven were missing at least one data point either due to skipping a question or marking more than one response to a question. These specific data points were excluded, however, and the remaining data for those individuals was included in the analysis. Of the seven responses missing data, two were missing height and/or weight data. Based on these individuals' responses to the perceived weight status as "overweight," BMI for these individuals was imputed using the average BMI of the overweight and obese groups (30.8).

Demographics

Of the 51 individuals who responded to the survey, 13 (25.5%) were male and 37 were female (72.6%). One participant did not complete the question and could not be included in analyses using gender. The average age of respondents was 44.7 ± 10.8 years. To further assess influence of age the following groups were identified: 25-39, 40-54, and 55-69 years. Based on self-reported height and weight, BMI was calculated for each respondent. The average BMI value was $26.8 (\pm 5.46)$ kg/m². Respondents were then classified into previously defined standard BMI categories: normal, overweight, and obese (Table 1.).

Variable	Average	<i>SD</i>	Range	%	<i>n</i>
Age	44.7	10.8	25-63		51
25-39 (group 1)				34.7%	17
40-54 (group 2)				42.9%	21
55-69 (group 3)				22.5%	11
Gender					
Male				25.5%	13
Female				72.6%	37
N/A				1.9%	1
BMI Category	26.8	5.5	18.8-45.1		
Normal (18.5-24.9)				49.0%	25
Overweight (25-29.9)				23.5%	12
Obese (>30)				27.5%	14

Relationships between BMI, gender and age were evaluated. For the total respondent group, BMI was not related to gender ($p = 0.94$). One-way ANOVA found that BMI was independent of age, however, t-tests comparing BMI between the identified age groups found that the average BMI for group 2 was significantly less than group 3 ($p = 0.047$) and that the BMI for group 1 was trending toward significance when compared to group 3 ($p = 0.099$) (Figure 1.) .

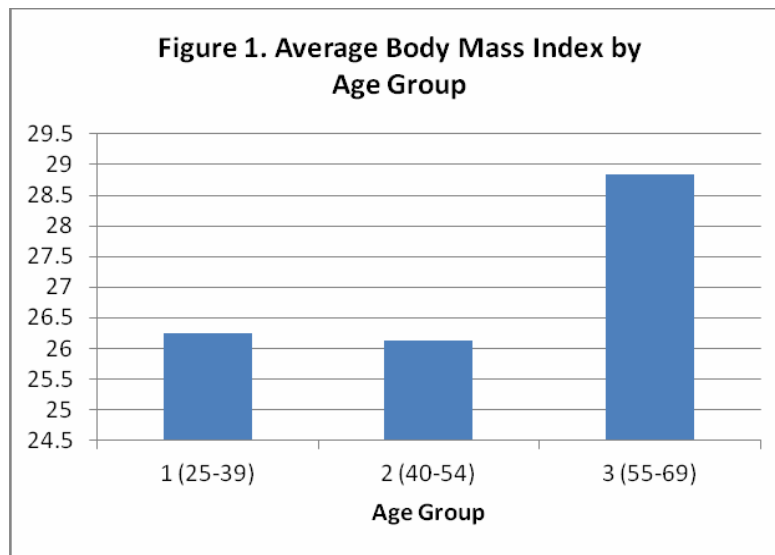


Figure 1. The average body mass index for age group 2 was significantly less than age group 3 ($p < 0.05$).

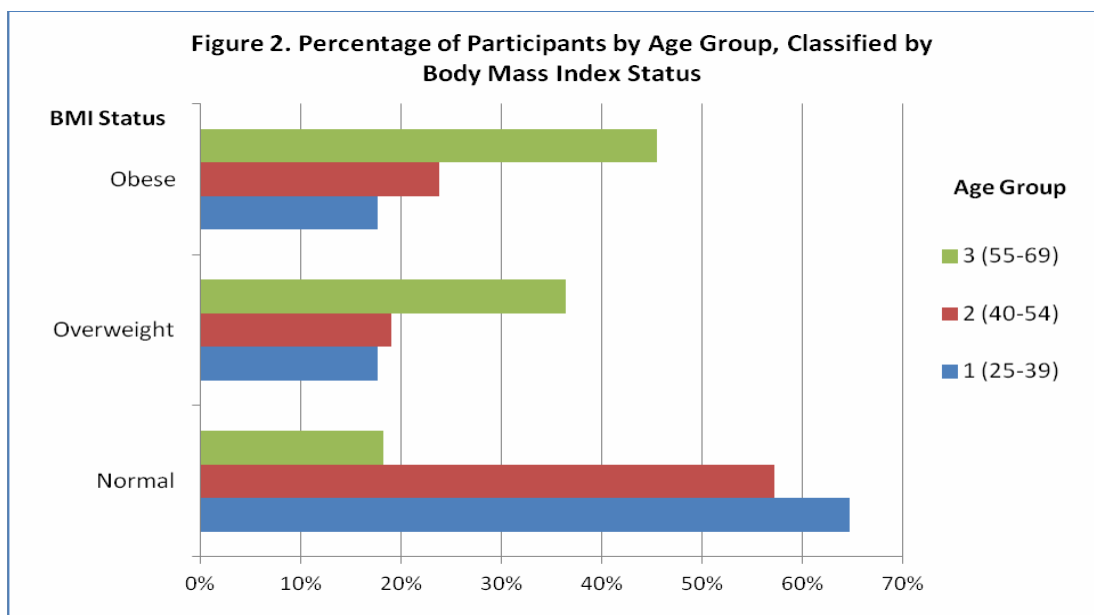


Figure 2. Percentage of respondents by age group, further classified by BMI status. A greater percent of younger participants were of a normal body weight. The older age group represented a greater percent of the overweight and obese BMI groups.

Survey Results

Perception of Weight Status

Respondents were asked to describe their own weight as either underweight, just right, or overweight in a single question. In order to generalize responses for comparison, the response “just right” reflects the standard BMI classification of normal and “overweight” reflects the standard BMI classifications of overweight and obese combined. Based on responses, no respondents felt they were underweight, 46.9% ($n = 23$) felt their weight was just right and 53.1% ($n = 26$) felt they were overweight. According to BMI classification standards, 49.0% ($n = 25$) of respondents were of normal BMI and 51.0% ($n = 26$) were of the combined overweight and obese BMI categories (Figure 3.). A comparison of individual responses revealed that 82.0% ($n = 41$) of respondents perceived their weight to be in the same category as their calculated BMI group. Nine respondents had differing responses. Five felt they were overweight when in fact they were of a normal BMI. Four were overweight when and felt they were “just right.”

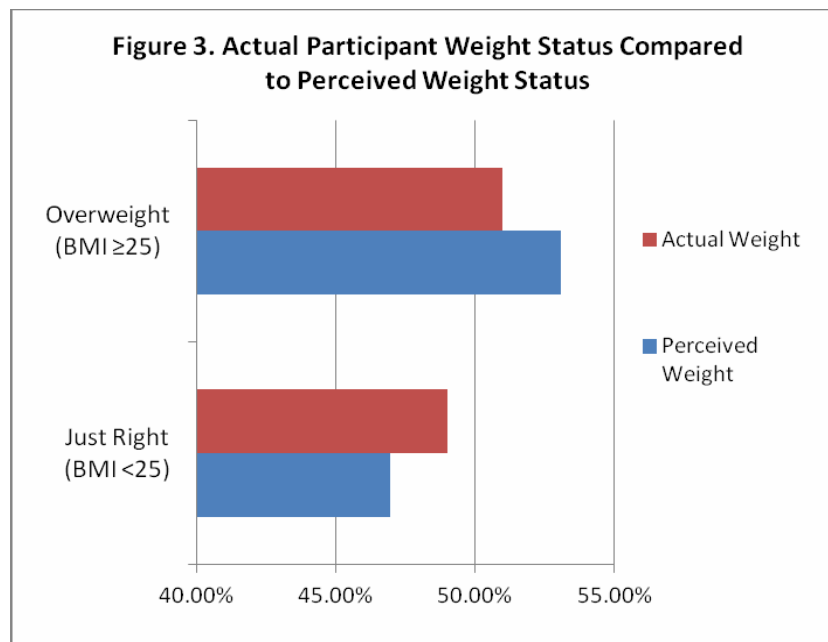


Figure 3. Actual BMI status compared to perceived weight status where the BMI categories of overweight and obesity were combined into one group ($BMI \geq 25$).

Dietary Intake

There was no relationship between reported dietary intake and gender for all food groups. Twenty four (47.1%) of respondents reported typically consuming 5 or more servings of fruits and vegetables every day. Average intake for all respondents was 4.60 ± 2.04 servings per day. Intake between normal and overweight respondents was not statistically different (4.82 ± 2.13 and 5.00 ± 2.36 servings/day, respectively). Obese respondents consumed significantly less fruits and vegetables when compared to the pooled group of those with normal and overweight BMIs (3.86 ± 1.41 and 4.88 ± 2.18 servings/day, respectively, $p = 0.029$).

Average daily intake of grains was 3.54 ± 2.17 servings/day, which is below the recommended six daily servings. Eight respondents (15.7%) reported eating six or more servings per day. There were no significant differences in grain intake between BMI categories. Sixteen respondents (31.4%) reported meeting the daily recommended intake of 3 servings of dairy foods daily. On average, the overweight BMI group consumed a greater number of dairy servings than the other two groups. The difference was significant for total dairy servings between the overweight and obese groups (2.75 ± 0.89 and 1.79 ± 1.19 servings/day, respectively, $p = 0.027$) and for low-fat dairy servings between the normal and overweight groups (1.02 ± 0.90 and 1.88 ± 1.05 , respectively, $p = 0.025$). Sugar-sweetened beverage intake was low, the average for all respondents was 0.38 ± 0.91 servings/day. A total of 40 participants (78.4%) reported drinking zero sugar-sweetened beverages on a typical day. Despite this, intake of sugar sweetened beverages among the normal BMI group was found to be significantly greater than the obese group (0.62 ± 1.18 and 0.14 ± 0.36 , respectively, $p = 0.036$) (Table 2).

Table 2. Dietary Intake by BMI		
BMI group	Mean Daily Servings	SD
<i>Fruit and Vegetable</i>		
Normal	4.82	2.13
Overweight	5.00	2.36
Obese	3.86*	1.41
Normal and Overweight	4.88	2.18
<i>Grains</i>		
Normal	3.33	2.44
Overweight	3.29	1.72
Obese	3.43	2.11
<i>Dairy</i>		
Normal	2.16	1.62
Overweight	2.75	0.89
Obese	1.79*	1.19
<i>Low-Fat Dairy</i>		
Normal	1.02*	0.90
Overweight	1.88	1.05
Obese	1.36	1.08
<i>Sugar-Sweetened</i>		
Normal	0.62*	1.18
Overweight	0.17	0.58
Obese	0.14	0.36

Table 2. Average daily servings of food groups reported by respondents, further separated by BMI category, where * indicates a significant difference ($p < 0.05$) between two groups. Bolded numbers within food groups are significantly different from each other

Health Beliefs

A total score for self-efficacy for health out of a possible 25 points, was determined for each participant. The average score for the question was 21.65 ± 3.83 (range 5-25). Based on the range of scores, with the majority being >20 , the following levels were identified: <20 , 20-22,

and 23-25. There was no difference in total score between BMI groups. There was a significant difference, however, for gender ($p = 0.011$). Females had scores in the lower self-efficacy range of <20 (10.81%), whereas no males fell into that range. More males were of the moderate self-efficacy group (score of 20-22) (76.9%) as compared to females (29.7%). Overall, females had the more than two times the percent of respondents within the high efficacy group (score of 23-25) (59.5%) when compared to males (23.1%).

To assess the impact of health beliefs on behaviors, some specific statements were addressed separately. Responses to the statement “What I eat affects my health” were compared to actual dietary intake measures. A weak negative correlation was found between this statement and combined fruit and vegetable intake ($r = -0.276, p = 0.05$), a moderate negative correlation for dairy intake was also found ($r = -0.324, p = 0.02$). Low-fat dairy had weak positive relationship ($r = 0.256$) however it did not reach a level of significance ($p = 0.07$). No correlation was found for grains or sugar-sweetened beverages. A comparison of BMI categories revealed no significant differences in response to this statement; however, it was noted that the normal weight group had a lower percent of individuals who selected “agree” and “strongly agree” (88.0%) when compared to the overweight and obese groups (100% for both groups).

The statement “What I weigh affects my health” had a moderate positive correlation to participant BMI ($r = 0.495, p < 0.001$). “How active I am affects my health” had no correlation to level of exercise importance reported and “I am in good health” was not correlated to BMI.

Attitudes Toward Eating Behavior

A total score for attitudes toward eating behavior out of a possible 45 points was determined. Again, based on responses, several score levels were identified: <30, 30-34, 35-39, and >40. The average score for the question was 34.82 ± 5.75 . Though there were no significant

differences in BMI between groups, generally, as the attitude score increased, average BMI decreased (Table 3.). A significant difference was found gender and attitude toward eating behavior score ($p=0.029$). Of note, 81.1% of females had attitude scores of 35 or greater (and 21.6% at 45), whereas males had 61.5% at the same score (and 0.0% at 45).

Eating Behavior Score	Average BMI	SD	<i>n</i>
<30	28.29	8.01	9
30-34	27.68	6.05	15
35-39	25.99	4.01	17
40-45	25.69	4.15	10

A moderate positive correlation was found between attitude towards eating and reported intake of fruits and vegetables ($r = 0.36, p < 0.01$) as well as low-fat dairy foods ($r = 0.426, p < 0.002$).

Social and Environmental Influences

Table 4 describes the percent of respondents by BMI category that responded to each statement with the combined “agree” and “strongly agree” responses. Though differences between groups were not significant, it was noted that obese participants were more influenced by the workplace food environment, the foods colleagues are eating, and the foods that friends are eating. Normal weight individuals were more influenced by spouses and children. Confidence level for making healthy food choices was high; of the total participant group, a combined 41 individuals (80.4%) responded with “agree” and “strongly agree;” 20 (39.2%) of which responded with “strongly agree.” Confidence level for making healthy food choices was

compared to actual reported dietary intake. A moderate positive correlation was found for fruit and vegetable intake ($r = 0.505, p < 0.001$). A moderate negative correlation for intake of sugar-sweetened beverages was also seen ($r = -0.487, p < 0.001$).

<i>What I eat is influenced by:</i>	BMI		
	<i>Normal</i>	<i>Overweight</i>	<i>Obese</i>
...the type of food offered in the workplace	40.00% (10)	16.67% (2)	50.00% (6)
...the food my colleagues are eating	8.00% (2)	8.33% (1)	33.33% (4)
...the food my spouse/partner eats	72.00% (18)	50.00% (6)	66.66% (8)
...the food my children eat	54.16% (13)	33.34% (4)	16.66% (2)
...the food my friends eat	12.50% (3)	9.09% (1)	16.67% (2)
I am confident that I know how to make healthy food choices	76.00% (19)	75.00% (4)	91.66% (11)

Food Purchasing Decisions

The percentage of the total respondent group selecting either “more important” or “very important” for each item can be found in Figure 4. Similar to previous scaled questions, a total score out of 45 points was determined for each respondent. The average score for the total group was 30.31 ± 4.69 (range 18-41). The following importance levels were identified based on the range of data: <27 , 27-31, 32-35, >36 . There was no significant difference in BMI between response groups; however, a general trend of lower BMI with greater importance level for food purchasing decisions was noted (Table 5.).

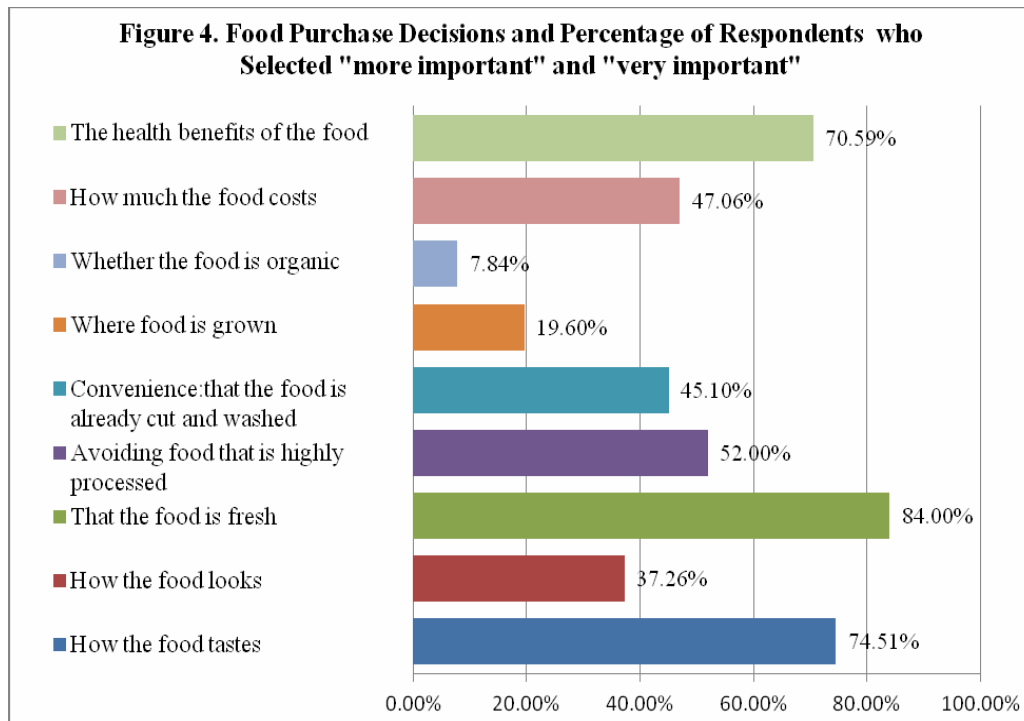


Table 5. Average BMI by Food Purchase Importance Score

Food Purchase Score	Average BMI	SD	n
<27	27.36	7.73	9
27-31	27.36	6.04	21
32-35	26.37	3.47	16
≥36	25.16	4.41	5

A comparison of reported dietary intake to responses to the statement assessing importance level of “The health benefits of the food” found a moderate positive correlation for fruit and vegetable intake ($r = 0.446, p=0.001$).

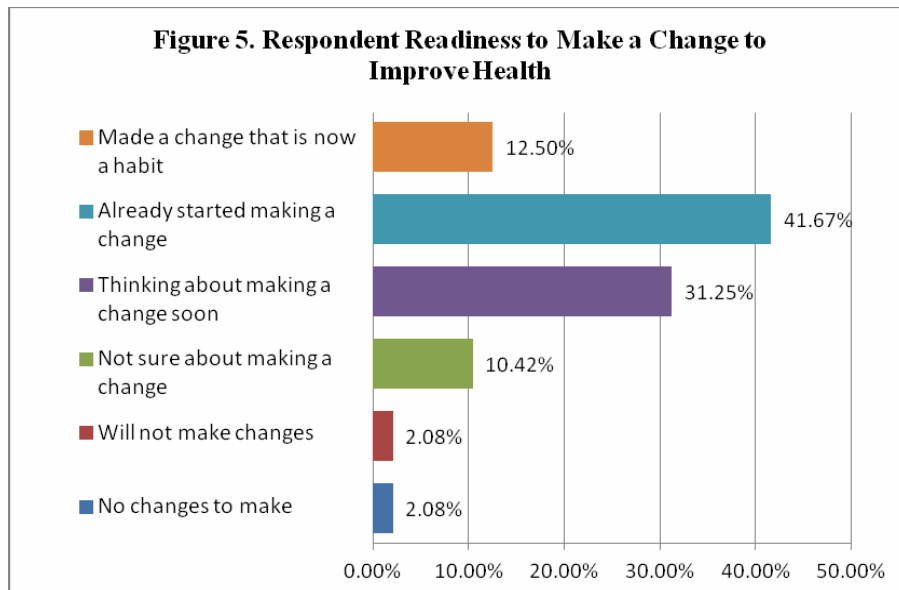
In addition to Likert scale responses, there was an opportunity for respondents to provide open-ended responses to the question “Is there something else that influences your food purchases.” Not all respondents provided comments. Of the comments provided, there were

several broader themes that could be identified as other influences to food purchase decisions. Sales and coupons were identified by several respondents as well as availability of seasonal and/or local produce. Others reported what family members eat as a major influence. Also mentioned was advertising and food packaging. Avoidance of particular nutrients or preservatives (sugar, corn syrup, sodium, etc.) or following a particular diet was also identified.

Readiness for Change

Participants were asked to consider their readiness to make a change to improve their health at the time of the survey. Twenty-six (54.2%) reported that they had started making a change or had made a change that is now a habit, 15 (31.3%) were thinking about making a change soon, and 7 (14.6%) were either not sure or had no intention of making any changes (Figure 5.).

There was a significant difference between the overweight BMI group and the normal and obese BMI groups ($p = 0.005$ and $p = 0.015$, respectively) for level of readiness reported. The overweight BMI group was more likely to have started making a change (72.7%) when compared to the normal (24.0%) or obese (45.5%) groups.



Report of Action

The last two questions of the survey asked respondents whether they were consciously watching their diet to maintain or lose weight (question 16) and whether or not they had participated in any VA endorsed health promotion opportunities (question 17). Both questions provided an opportunity for open-ended responses in addition to the “yes” or “no” choice. Thirty-two (64.0%) respondents reported that they were watching what they eat to maintain or lose weight. The average BMI calculated for those respondents was 27.22 ± 5.52 , which is greater than those who are not watching their diet (25.94 ± 5.49), but was not statistically significant. A greater percent of individuals in the overweight (75.0%) and obese (66.7%) BMI groups reported watching what they eat compared to those with a normal BMI (56.0%).

Eighteen (36.0%) respondents reported participating in at least one VA health promotion opportunity. Again, the BMI of individuals who participated was greater, but not significantly, than those who did not participate (27.41 ± 5.47 and 26.39 ± 5.55 , respectively). There was no difference in responses by gender or BMI group for both questions. A greater percent of overweight (50.0%) and obese (50.0%) individuals reported participating than normal BMI individuals (24.0%).

Of the 32 (64.0%) respondents who reported watching what they eat, 18 (56.0%) reported eating 5 or more servings of fruits and vegetables per day, five (16.0%) reported eating 6 or more servings of grains per day, and 3 (9.0%) reported eating 3 or more servings of low-fat dairy daily. Five (16.0%) of these individuals also reported drinking one or more sugar-sweetened beverage per day.

Responses for other survey questions and total scores for sets of questions were analyzed for differences by response to both report of action questions. Those who reported watching what they eat were significantly more confident in their ability to make healthy food choices when

compared to those who were not watching their diet ($p = 0.046$, item scores 4.31 ± 0.82 and 3.89 ± 0.83 , respectively). There was a difference in the attitude toward eating behavior score between those who reported participating in VA health promotion opportunities (question 17) and those who did not participate. The average score for respondents who participated was 32.56 ± 4.90 points whereas those who reported not participating averaged a higher score of 36.28 ± 5.82 ($p = 0.021$). In addition, respondents who participated in VA health promotion opportunities had a small, but significantly higher importance rating for maintaining their health than those who did not participate (4.67 ± 0.49 and 4.28 ± 0.99 , respectively, $p = 0.036$).

Open-ended responses for both questions were grouped by themes. Not all respondents provided written comments, therefore frequency data was not determined. Themes from comments are listed in order of most common to least common. In response to question 16, which asked if respondents are watching what they eat to maintain or lose weight, the most common theme was that respondents are watching what they eat to maintain health and/or weight. Some additional comments also included specific dietary changes. Examples include: eating fewer carbohydrates or sugary foods, drinking more water, and avoiding snacks between meals, etc. The second most common response was that the respondent was currently trying to lose weight. Others reported that they knew they needed to lose weight (“I know I need to lose weight - trying to watch what I eat.”). Several comments indicated a specific trademarked diet plan the individual was following. A few individuals reported being frustrated by trying to lose weight and reaching a plateau (“Have been trying to lose weight for the past 3 years. I lost 20 lbs but now am at a dead end.”). Last reported were comments made by respondents who included exercise along with diet in order to help lose or maintain weight (“Trying to eat more vegetables and fruit and just started back working out at the gym.”).

Open-ended responses for question 17 were also grouped by themes and listed in order of most common to least common. The majority of respondents reported participating in the holiday maintain campaign, a recent campaign aimed and not gaining weight over the winter holidays. Many respondents indicated that there is no time while at work to pay attention to personal health. Several self-identified new employees as well as other employees mentioned they were unaware of any VA health promotion opportunities. Some did not feel they had a need or saw no benefit for participation in VA health promotion opportunities. A few listed VA's WIN (Wellness is Now, online wellness program) as a program they participated in. Others reported participating in some of the VA's organized wellness events, such as the VA2K (a yearly walking event), VA biggest loser campaign, another VA walking contest, Eat Wisely event, or are working with an online health coach. Incentives emerged as a motivator for many employees. One respondent indicated that they participated in activities because they are motivated by coupons and prizes.

CHAPTER 5. DISCUSSION

This survey-based study was intended to document employee-specific data related to health beliefs, attitudes, eating behavior, food choices, perceptions of the food and social environments, as well document the prevalence of obesity and readiness for change at a single VA worksite. The low response rate of less than 25% of employees was not likely representative of the entire employee population. A comparison of responders and non-responders could not be completed due to the anonymous nature of the survey. It was noted that the gender distribution of survey responders is fairly consistent with the United States Department of Labor's statistic for employees in the category of health care and social assistance. Nationally, 78.6% of these employees are women, where 72.6% of survey responders were women (2014).

Prevalence of Overweight and Obesity

The self-reported rate of obesity in this sample population was less than one-third (27.5%) which is below the national rate of 35.7% (Ogden, et al., 2012). The combined group of overweight and obese participants was 51.0%. By comparison, “The State of Obesity,” a report of national survey data from 2013, found that the rate of obesity in Wisconsin was 29.8% and the rate of overweight and obesity was 66.5% (Levi, Segal, St. Laurent, & Rayburn, 2014). It is possible that due to the potential for underreporting of data of this nature as well as the low participation rate, the actual rate of obesity for the study population is greater. Older respondents were more likely to be obese in this study. This is consistent with the previously mentioned report by Levi et al. which revealed that adults aged 45-64 had a higher obesity rate (34.8%) than the younger group, ages 26-44 (28.2%). Though many respondents were correct in their perception of their own weight status, several respondents perceived themselves to be overweight when they were actually of a normal BMI. This suggests there may be a number of employees with concerns or dissatisfaction with their weight despite being of a normal BMI. On the contrary, others indicated that their weight was just right, when in fact they were within the combined overweight/obese BMI range. It should be mentioned that BMI is one indicator of health status. It is easily measured and therefore an individual’s health status has potential to be based on this information alone. As evidenced in part by the survey results, it is not always the case that individuals who fall within a normal BMI range also have a healthy diet and/or lifestyle so a better health assessment should include additional parameters. Additional measures to assess health status were not feasible for this study design.

Dietary Intake

Less than half of respondents (47.1%) reported consuming the recommended amount of fruits and vegetables daily (average intake 4.6 servings/day). According to the “State Indicator Report on Fruits and Vegetables” by the CDC, in Wisconsin, the median intake (in times per day) of fruits and vegetables is 1.1 and 1.5, respectively (2013). Interestingly, the study results revealed that obese respondents consumed fewer fruits and vegetables than normal or overweight respondents. A lower calorie diet is associated with increased consumption of these food groups. It is unknown if consuming fewer servings of these food groups is related to the weight status of these individuals without further study. However, promotion of a greater intake of these food groups may be beneficial for all employees based on the number of respondents who are not meeting the daily recommended intake. By comparison, Freedman and Rubinstein found that 51% of the total employee population surveyed consumed five or more fruit and vegetable servings/day, which is similar to this study population. When comparing BMI groups, however, the greatest intake of fruits and vegetables was actually found to be the normal weight participant group (2010). This demonstrates the idea that all work populations and environments are unique.

Relatively few respondents (15.7%) are meeting the recommended grain intake of six servings per day. Based on qualitative comments obtained with question 16 (“Are you watching what you eat to maintain or lose weight?”), several individuals described following a low carbohydrate diet or avoiding carbohydrates. Many popular diets are considered to be low in carbohydrate content and it appears that a number of employees are either intentionally limiting or have less interest in this food group.

Less than one-third (31.4%) of respondents are consuming the recommended three dairy servings per day. The greatest consumption of this food group was by those in the overweight

BMI category. In addition, this group had greater consumption of low-fat dairy. Low-fat dairy is considered to be consistent with a lower calorie diet (USDA, 2010). It may be possible that more of these individuals were attempting to reduce daily calorie intake in an effort to control weight. Normal weight respondents may not have felt the same pressure to monitor calories from this food group.

Similarly, despite a low reported intake of sugar-sweetened beverages for the group as a whole, normal weight respondents consumed significantly more of these beverages. Individuals in this weight category may not be as concerned with the potential for weight gain related to consumption of excess calories. Aside from the impact diet has on weight, it is important to recognize that a healthful diet, such as one that is in line with the USDA's Dietary Guidelines for Americans (2010) may be beneficial for general health and prevention of chronic disease.

With respect to the topic of health beliefs, females had a greater percent of respondent scores fall into both the lower self-efficacy group and the higher self-efficacy group when compared to males. This could be in part related to the overall greater number of female respondents and greater chance for response variability within that group. There could also be a difference in how females typically perceive the effects of their own health-related behaviors on their overall health status. The moderate positive correlation between agreement with the statement "What I weigh affects my health" to participant BMI is suggestive of a general understanding of the health concerns associated with obesity. This is not surprising given the fact that the worksite is a healthcare clinic and many respondents are likely to work directly in patient care which involves promotion of a healthy weight for the patient population. There is, however, a large number of clinic employees that work outside of direct patient care and it is

possible that they do not have the same understanding or self-efficacy for weight management due to not personally delivering the healthy weight message to patients.

When dietary intake was compared to the statement “What I eat affects my health,” a weak negative correlation was observed for fruits and vegetable intake and a moderate negative correlation was found for total dairy intake. Though this is not intuitive, it may be possible that for this population despite knowing that diet is important for health, specific actions to improve diet quality have not been realized, due to other influences or barriers. The weak positive relationship seen for low-fat dairy suggests that the selection of a specific food considered to be healthier choice is in part related to the belief that dietary choices can impact health. In the case of this survey, overweight participants had the highest consumption of low-fat dairy. This group was also the most likely to have reported making a change to improve health.

Attitudes Toward Eating Behavior

The inverse relationship observed between the attitude toward eating score and BMI is supported by the positive correlation between the attitude towards and actual intake of both fruits and vegetables and low-fat dairy. A higher level of importance for these food groups was associated with a greater intake. This association may be related to respondent understanding of the relationship between dietary choices and BMI.

Social and Environmental Influences

Though differences in eating influences between BMI groups were not significant, some trends were identified. Obese respondents were more influenced by the workplace food environment, including their colleague’s food choices. This is important to understand as workplace dining options can vary significantly and often include a number of less healthy options. A review of food sales within the workplace cafeteria may shed some light on the

frequency of types of meals or foods that are most commonly purchased. In addition, colleagues can be influential in multiple ways. As described by Lemon et al. (2009), the perception of healthy eating behaviors as well as physical activity for other coworkers may impact individual employee behavior, and therefore, influence weight status. A common scenario among the workplace is for coworkers to bring food to share. This can greatly affect an individual's daily calorie intake if the food consumed is high in calories. On the other hand, if colleagues are bringing in healthier foods to share, or, if during meals and breaks healthier foods are seen being consumed, they could be influencing others to follow suit in a more positive way. The CDC's Workplace Health Promotion web page offers suggestions for developing workplace policies that encourage healthy food choices by increasing offerings and requiring that only healthy foods be served in meetings (2015). Several states' health departments have developed toolkits to assist businesses in creating policies to support these changes. Wisconsin is one of these states with its Worksite Wellness Resource Kit, which offers examples of policies (Wisconsin Department of Health Services, 2015).

Interestingly, confidence for making healthy food choices was greatest among the obese BMI group. For the entire sample, there was a moderate positive correlation between confidence level and actual intake of fruit and vegetables as well as a moderate negative correlation for intake of sugar-sweetened beverages. Public health messages of fruits and vegetables as healthy and is sugar-sweetened beverages as unhealthy may bring a higher level of awareness to these two food groups. Data from this survey support this idea.

Food Purchase Decisions

A moderate positive correlation was observed between the importance of "The health benefits of the food" and reported fruit and vegetable intake. The same statement resulted in a

weak positive correlation for low-fat dairy and a weak negative correlation for sugar-sweetened beverages. This again suggests that healthy eating messages promoting a greater intake of low-calorie foods (fruits, vegetables, low-fat dairy) and reduced consumption of empty-calorie or calorie-dense foods (sugar-sweetened beverages) are perhaps understood by and perhaps even quite important for many individuals, however the implementation of such eating practices has not been realized for one reason or another.

Open-ended responses related to food purchase decisions revealed that often other factors come into play when purchasing food. Though the cost of the food was “more important” or “very important” for about 47% of respondents, many also included responses related to cost such as availability of coupons or sales, price, avoiding things that are expensive, or purchasing foods that are in-season. Interestingly, despite this being the most common open-ended response theme, a greater percent of respondents reported “the health benefits of the food,” “avoiding food that is highly processed,” “that the food is fresh,” and “how the food tastes” as being “more important” and “very important” (Figure 3).

Readiness for Change

In assessing respondent readiness for change, it was informative to find that those in the overweight BMI group were more likely to have started making a change as compared to the normal or obese BMI groups. This is consistent with dietary intake data previously reported in this study. The overweight BMI group was more likely to be consuming low-fat dairy when compared to other groups. In addition, this group consumed the greatest number of fruit and vegetable servings per day. One might infer that this group feels more motivated to make changes due to the potential to see improvements in health and/or weight status in a favorable timeframe. Those who are currently at a normal BMI may not see as great of a need to make

changes to improve health due to the interpretation of their own BMI and weight status as being normal. Those in the obese BMI range may feel inhibited or overwhelmed when considering a change to improve health and/or weight.

Report of Action

The report of action questions were intended to determine whether respondents were attempting to monitor or adjust their dietary intake at the time of the survey and to assess to what extent existing employee health opportunities had been utilized. Despite 64% of respondents confirming that they were watching their diet, many were not meeting recommended intakes of fruits and vegetables or low-fat dairy. The fact that many were consuming fewer daily servings of grains than the USDA's guidelines is not surprising, considering a number of respondents referenced following a reduced or lower carbohydrate diet plan in the available open-ended response section. A greater percent of respondents in the group that reported watching what they ate were consuming at least the recommended amount of fruits and vegetables daily when compared to those that were not watching their diet (56% compared to 33%, respectively). Fruits and vegetables are often the cornerstone of a healthy diet and the intake of these foods was expected to be higher within this group. Interestingly, despite only slightly more than half of the respondents in this group actually eating more fruits and vegetables, this group also felt more confident in their ability to make healthy food choices. Given this information, it appears as though there may be other barriers or influences that ultimately impact actual food choices or there may be a disparity between respondents' understanding of healthy eating and actual dietary recommendations considered to be part of a healthful diet.

The percent of respondents who had participated in a VA health promotion opportunity, either in the past or currently, was fairly low (36% of the total group). The higher attitude toward

eating behavior scores seen for those respondents who did not participate is suggestive that this group may already feel they have the insight and motivation to lead a healthier lifestyle and do not need to seek out additional guidance. This is supported by the finding that those who did not participate had a slightly lower BMI than those who did. As suggested previously, it is a possibility that these individuals do not see a need for health or weight improvement opportunities due to their weight status leaning toward a more normal range. This may also be supported by the finding that the respondents who did report participating in VA health promotion opportunities had a higher importance rating for maintaining health. Barriers to participation are important to acknowledge. Of those who did not participate, lack of time while at work, lack of awareness, and lack of perceived benefit were mentioned most frequently. This is consistent with open-ended responses described earlier by Person et al. in “Barriers to Participation in a Worksite Wellness Program” (2010). Also possible are that incentives or rewards offered were not great enough to elicit participation for many individuals, though it appears some employees are more motivated by this.

Summary

This survey determined that the health beliefs, attitudes, perceptions of food and social environments, and readiness for change of employees at one particular VA healthcare clinic do not always intuitively translate into health related behaviors or expected weight status. Fifty-one percent of participants were overweight and obese; however, responses by many of these individuals indicated a greater importance level for healthy behaviors as well as a greater number of healthier food choices for the food groups studied when compared to participants of a normal BMI. It is not possible to say whether overweight or obese individuals are more in tune with these behaviors due to having a desire to lose weight; however, it is interesting to note that more

of these individuals reported being in the action stage of change (“I have already started making a change”), watching what they eat, and participating in VA health promotion opportunities. Although obesity remains a major health concern among adults, the finding that as a group, normal weight employees are less likely to adhere to some general health and wellness recommendations is also a concern. In addition, for this population, normal weight employees were also more likely to be younger in age. A group of younger, normal weight employees may be overlooked as a group that may benefit from dietary and lifestyle modification due to the fact that their weight status is already within a desirable range. In reality, targeting this population as a preventative measure would be an ideal intervention. The creation and implementation of health and wellness programs should not alienate these individuals by being overly focused on weight loss. Improving the health of the whole person through organizational support and education that emphasizes healthy eating and living is likely to be relevant to more individuals.

Strengths and Limitations

There were several limitations of this study. Most significantly was the low response rate. Ideally, to better describe the employee population, a far greater number of respondents are desired. In addition, this increased the likelihood of respondent bias. Those who responded may have been more interested in opportunities for health and wellness. Those of a more desirable weight status may have been more confident in their weight and therefore more likely to respond. Unfortunately, due to the anonymous nature of the survey, it was not possible to determine if there was a difference between responders and non-responders. Non-responders may be less interested in the practice of employee health and wellness. Individuals with less healthy lifestyles or low self-efficacy for health related behaviors may have felt their responses would not be of value. They may have also felt they did not have time to complete a survey while at work or the

incentive was not sufficient enough to be worthwhile. Despite low participation rates, measures were taken to ease participation burden, such as limiting the number of questions. Questions to determine the area of employment within the worksite were eliminated; however, it may have been beneficial for comparing different work environments within the larger organization. As it was administered, the impact of social groups on health beliefs and dietary choices could not be elicited from this survey. In addition, an assessment of total diet quality was assessed.

Consumption of type and quantity of protein sources, combination foods, and energy-dense processed foods was not included in the assessment due to the high variability of the quality and content of these foods. Lastly, it is important to recognize that BMI was calculated from self-reported height and weight and all dietary intake measures were self-reported. There is high potential for respondent error or bias in both of these areas due to poor recall or desire to conform to what is perceived as a more acceptable response. A strength of the study was the inclusion of the opportunity for open-ended responses in order to expand on particular topics or capture responses that were not readily provided.

Recommendations for Enhancing VA Employee Health

Though the response rate of the survey was low, it may still be possible to suggest improvements or enhancements to existing VA employee health and wellness opportunities based on the data collected. The open-ended responses added depth and insight to particular topics that may not have otherwise been evident. Recommendations are based on knowledge of the topic gained through conducting the literature review, use of additional resources such as the CDC's Workplace Health Promotion website (2015, June 21) and the employee-specific information obtained from the study survey.

Mattke et al. described three themes identified as key strategies for successful workplace wellness programs. They are internal marketing, evaluation and program improvement, and leadership and accountability (2012). In coordination with these themes, it is becoming increasingly important to consider the workplace culture as a tool to inspire and promote behavior change. To expand on these ideas, Anderko et al. listed the components involved in “building a culture of health to facilitate healthy lifestyles for employees” (2012). These include:

- 1) financial and organizational support for evidence-based health promotion interventions;
- 2) consistent communication with workers that encourages positive health behaviors;
- 3) social and organizational supports from peers and supervisors;
- 4) policies, procedures, practices, and organizational norms that support a healthy lifestyle (for example, access to healthy foods and physical activity or banning smoking on company grounds);
- 5) financial or other types of incentives for participation in health improvement activities; and
- 6) a common purpose that is dedicated to a healthier workforce (Anderko et al., 2012, para. 8).

Incorporation of these strategies into existing programs or into the design of new programs may impact the overall success of the program. Anderko et al. also stated that employees are three times as likely to report taking action to improve their health in companies with a significant culture of health (2012).

The implementation of employee health and wellness programs has been identified as an opportunity to impact the nation’s health, especially with respect to the rate of overweight and obesity. As seen in multiple studies reviewed in the body of evidence for this work, a major area of concern for many employee health and wellness programs is in fact weight management. This is also true for the VA system. Based on the study survey, it is apparent that a number of VA

employees at the study worksite are either interested in and/or working on losing weight. In recent years, opportunities to motivate or encourage weight loss or maintenance for employees have included several short term weight loss or maintenance campaigns offered and announced at the worksite as well as several on the national level offered through the VA's WIN (Wellness is Now) Employee Health and Wellness Program, which is a website available to all VA employees. Though weight loss or maintenance campaigns can be effective in the short-term, changes to lifestyle often require a long-term commitment. As presented earlier, Snyder reported that a campaign's effectiveness often decreases when it is over (2007).

In order to drive behavior changes to impact the health, weight, and well-being of employees, a shift towards a focus on changing the culture of health of the worksite may be more effective than even several health or weight loss campaigns per year. An individual's weight status is multi-factorial and should therefore be addressed on multiple organizational levels. The VA's vision statement includes an emphasis on prevention and population health and their key business drivers include not only patient satisfaction but also employee satisfaction (U.S. Department of Veterans Affairs, 2015). It is apparent that the organization as a whole has an interest in promoting the health of employees who are then responsible for promoting the health of veterans. Beyond that, individual worksites and even work units have their own cultures that may or may not promote health and wellness, thereby impacting the success of the organization with respect to realizing its vision. Establishing a more cohesive workplace culture that emphasizes the importance of striving for personal and social health is ultimately the goal.

The social and environmental support systems within a workplace are critical to its health and wellness culture and are included in the components of building a culture of health listed above. Lemon et al. found that the perception of the social and organizational environments of a

worksite was significant in predicting healthy behavior in employees. Those who perceived their coworkers were eating healthier and more active were themselves more likely to demonstrate those behaviors. In addition, the presence of perceived organizational commitment to employee health was associated with a lower BMI (2009). This concept is further supported by Anderko et al. who report that with respect to employee job satisfaction, perception of the organization's commitment to employee well-being is more important than competitiveness of pay and benefits (2012). An increase in visibility of organizational leaders demonstrating healthy behavior and supporting that of employees is likely necessary to begin to change the norm. Several ways this may be accomplished include; daily interpersonal communication, modeling healthy behavior, and dissemination of regular e-mail messages or newsletters.

Several employees indicated they do not have time at work for participation in health promotion activities. This is an important part of organizational commitment. If employees perceive that their employer would prefer that they work through lunch and skip breaks in order to complete their assigned tasks, they will be very unlikely to participate in programs or initiatives to improve their health and well-being during working hours. This is consistent with another step in the creation of a culture of health, when employers provide "policies, procedures, practices, and organizational norms that support a healthy lifestyle" (Anderko et al., 2012). If the organizational norm dictates that employees should skip breaks or lunches, when someone does not do these things they may be considered less productive by fellow coworkers. From a leadership perspective, communicating the importance and expectation of employee breaks will increase the likelihood that they are taken. Identifying key individuals to meet with other employees for a walk or other activity over a 15 minute break may improve employee morale, health, and perceived organizational commitment to health.

The culture of the social environment within the worksite may be modified with the endorsement and support of social groups with goals of promoting healthy behavior. Though this may initially attract those who are in the preparation, action, and maintenance stages of change, over time, those who are in the contemplation or possibly even pre-contemplation stages of change may be motivated by the bonds that social networks can provide. One example may be the formation of walking groups who meet to walk before, during, or after work. Another example may be a healthy recipe sharing group or a group that takes turns bringing in a healthy dish to pass over the lunch break. Often meal times are a venue for social interaction. It is possible that the healthy messages repeatedly shared by peers at this time may promote lasting behavior and workplace culture changes. This was evident in the study described by Christensen et al. (2012), in which the formation of strong social groups as a consequence of the intervention resulted in more significant weight loss than other studies reviewed.

The existing VA WIN Employee Health and Wellness Program website offers many tools and resources for employees. After completing a wellness profile (similar to a health risk assessment), employees are able to utilize diet and activity tracking tools. There is a monthly newsletter and health topic, and a health library to help educate employees on various aspects of health and disease prevention. VA WIN also offers access to a health coach to assist with making diet and lifestyle changes to improve health. Health coaching is emerging as a useful tool that organizations can offer to employees. It is currently more widespread among larger companies. Mattke et al. reported that while only 12% of all firms studied reported offering health coaching services, 42% of large companies offer this service.

Despite all of these resources being available, the majority of survey respondents reported they were not participating in this opportunity (or any others). Several open-ended

responses indicated that employees were not aware of this or other programs or opportunities. Of these individuals, several were new employees. One of the strategies identified as part of the themes for workplace wellness success was marketing, which includes marketing to new hires. Upon starting a career within the VA, employees should be educated about and encouraged to take advantage of the available opportunities. Furthermore, continuous marketing of these programs to existing employees is needed to see the greatest benefit. As this is a national program, it may be advantageous to appoint a local point-person, or expert user of the program to assist other employees in navigating the website as well as taking advantage of all there is to offer.

The workplace food environment offers another important opportunity to improve the wellness culture of an organization. Foods offered to employees and visiting veterans at all VA sites are provided by the Veterans Canteen Service (VCS) organization. VCS promotes a healthy recipe and a healthy meal choice every month. They also provide access to nutrition information for their menu items available in a booklet or online. As a VA WIN member, monthly coupons are e-mailed for use in the stores or cafés. It is important to note that not all VA facilities have food service for employees and not all food service operations are the same. At the study facility, which is fairly small, there are daily soups, hot and cold sandwiches, a small selection of pre-made salads or other cold items, french fries and other hot sides, as well as bakery items. The site also offers a selection of coffee drinks, soda, juice, and water in various sizes. Though calorie information is available, it is not readily visible. A collaborative effort between VA and VCS should be explored in order to promote the selection of healthier food options. Providing calorie information alongside pricing information would likely increase awareness by the consumer, whether it be employee or veteran. Signage promoting daily calorie balance and encouraging 600

calories or less per meal would likely enhance the effectiveness of the calorie information. Due to the high variability of café offerings, an interest survey by employees and veterans may be helpful for VCS to identify what food offerings would be most acceptable for the population they are serving. In the interest of health promotion, highlighting and offering several rotating meal choices under 600 calories each day would likely be more appealing to the consumer than one choice each month. In addition, rather than receiving a coupon from VCS for being a VA WIN member, a better collaboration may be the offering of a reward or punch card for the repeated purchase of healthier options (for example, buy 10 salads get one free, etc.). In addition to these suggestions, many more can be found in various wellness program toolkits, such as Wisconsin's Workplace Wellness Resource Kit (2015).

Finally, prior to offering any specific wellness programming or health campaigns, it would be strongly recommended to place an even greater, more focused effort into understanding the employee population. Based on the result of the survey, though not completely representative of the worksite, there is evidence that improvements to the existing wellness environment can be made. A more specific needs assessment in the form of an interest survey could be offered to employees in order to identify the areas of the greatest concern, whether it is related to physical activity, healthy eating, mental health, etc. In addition, creation of focus groups involving a variety of peers from many different disciplines and work areas to gather input and ideas as well as buy-in from employees is crucial. If employees feel as though they had a say in the development of a particular program, event, or wellness initiative, they may be more likely to not only participate, but also promote it within their peer group. Within these discussions, it is important to recognize the level of engagement or readiness of those involved. There may be many individuals not as engaged and including them in these discussions may pave the way to

identifying a better way to reach out to them. For this particular study population, a focus group which includes younger, healthier weight individuals in addition to those who may be overweight or obese is imperative, because although they may be of a normal weight, their health/eating behaviors and beliefs were found to be less healthy and their participation rate was lower for VA offered wellness opportunities. In an effort to prevent weight gain later in life and promote a healthy lifestyle to prevent chronic disease, these individuals must be considered when planning any wellness activities. Younger employees may have different interests and responsibilities outside of work than older employees. Determining what motivates them will hopefully allow for the creation of programs they will be more likely to participate in.

In addition to having input in what is being offered as health and wellness opportunities, it is important to involve would be participants in a discussion about incentives. As seen in many studies reviewed in this work as well as based on open-ended responses to the study survey, incentives play a significant role in the degree to which employees participate. It may be necessary to consider the idea that one incentive does not fit all for certain types of programs. Though not all suggestions are likely feasible within the VA system, it may be worth exploring as an organization. Rather than only offering small coupons or the occasional gift card drawing prize as rewards, there may be individuals more motivated by other incentives. One example is earning additional leave or break time (up to a certain limit). There may be others who would be more involved if it meant lower health insurance premiums or discounts to local health clubs or gyms. Working with employees to identify incentives is likely to be mutually beneficial.

Recommendations for future research

Future research in the area of employee health and wellness should focus efforts on not only increasing participant response to this type of data collection survey, but also continuing to

evaluate the most effective strategy for obtaining employee population-specific data. In addition, research should include assessment of the result of any health and wellness changes implemented as a result of the population-specific data collected. Conducting similar studies in organizations outside of healthcare would also be recommended to assess whether a survey tool related to health beliefs and behaviors is as useful or effective outside of a healthcare workplace. A repeat of the initial survey after implementation of recommendations could assess whether a change in workplace culture has also changed the core measures of the survey. In this case, health beliefs, attitudes, eating behaviors, perceptions of food and social environments, and readiness for changes in combination with weight status were the measures of concern. In addition, there are many other aspects of an employee population that could be explored. Additional studies that attempt to create a culture of health would be beneficial in order to establish best practices that could then be tailored to the needs of specific organizations. Comparison of a wellness program that attempts to tailor interventions and establish a positive culture of health to a standard non-tailored program would be another suggested research area. In addition, to date, much of the research available is relatively short-term. A long-term longitudinal study of the implementation and continuous outcomes monitoring of a wellness program would be ideal for assessing the ongoing feasibility of such initiatives. In reality, the study of workplace wellness is still in its infancy. There will be much more to come as the desire to drive down healthcare costs and the need to improve the health of our population persists.

Conclusion

The study survey was intended to collect employee-specific data about the health beliefs, attitudes, dietary intake, perceptions of food and social environments, readiness for change, and weight status of employees at one particular VA healthcare clinic. Although the response rate for

this voluntary survey was low, information was obtained that allowed for a discussion about employee-population characteristics as well as possible interventions or recommendations for any future wellness program opportunities.

Fifty-one percent of participants were overweight and obese. Responses by many of these individuals indicated a greater importance level for healthy behaviors as well as a greater intake of healthier food choices than normal weight individuals. In addition, overweight respondents were more likely to have started making changes to improve their health. Creating a workplace culture that facilitates healthy employee behavior is ideal for helping these individuals either maintain or begin efforts for health and wellness. This is also beneficial for reaching younger, normal weight employees who may not place as high of a priority on healthy behavior due to lack of a perceived need. Workplace wellness programs provide an opportunity for prevention of future weight gain or chronic disease in this population.

Despite 80% of respondents reporting confidence in their ability to make healthy food choices, most are not meeting the USDA Dietary Guidelines for daily recommended servings for the studied food groups. This is especially significant for fruits and vegetables, which are the cornerstone of a healthy diet. Of the study population, 53% were below the recommended five servings per day. This disparity is reflected in the open-ended responses given for influences on food purchase decisions which included several barriers to purchasing these items: cost, preparation time, and family preferences were the most common. Interestingly, obese individuals consumed the fewest number of daily servings of fruits and vegetables whereas overweight individuals consumed the most. Obese respondents were more influenced by the workplace food environment and food eaten by colleagues. The offering and promotion of healthier food choices at the workplace as part of a greater wellness culture has potential to impact employee health by

possibly helping to overcome barriers to meeting recommended daily servings of healthful foods, especially with respect to fruits and vegetables.

Though the VA does offer some opportunities for employees to improve their health and wellness, these opportunities are underutilized. Of the study population, 36% reported participating in a VA health promotion opportunity, such as involvement in the VA WIN Employee Health and Wellness Program, participation in a weight loss or weight maintenance campaign, and/or taking part in other healthy living message initiatives. Reasons for not participating included lack of awareness, lack of time, and lack of perceived benefit or need. Of those who did participate, the majority did so when a prize, drawing, or incentive was offered. To overcome barriers to participation, it may be necessary to involve employees in identifying target areas for wellness and determining strategies for implementation and potential incentives. Strong support from leadership is also needed to build a workplace culture that encourages social support for healthy behavior at work.

As a result of this survey conducted at a single VA healthcare worksite, employee population-specific information was obtained, assessed, and used to recommend a tailored approach to the improvement and design of a greater health and wellness culture for that worksite. This remains an important and relevant matter as employees working in healthcare are uniquely positioned to positively impact the health of patients and clients by modeling healthy behavior which will further extend the goal of improving the nation's health and reducing rates of obesity and obesity related health conditions.

REFERENCES

- Academy of Nutrition and Dietetics. (2009). *International dietetics and nutrition terminology reference manual: standardized language for the nutrition care process*. (2nd Ed.). Chicago, IL: Academy of Nutrition and Dietetics.
- Anderko, L., Roffenbender, J. S., Goetzel, R. Z., Millard, F., Wildenhaus, K., DeSantis, C., & Novelli, W. (2012). Promoting prevention through the affordable care act: workplace wellness. *Preventing Chronic Disease*, 9(E175). doi: 10.5888/pcd9.120092
- Andreyeva, T., Long, M. W., & Brownell, K. D. (2012). The impact of food prices on consumption: a systematic review of research on the price elasticity of demand for food. *American Journal of Public Health*, 100(2), 216–222. doi: 10.2105/AJPH.2008.151415
- Ball, K., Jeffery, R. W., Abbott, G., McNaughton, S. A., & Crawford, D. (2010). Is healthy behavior contagious: associations of social norms with physical activity and healthy eating. *International Journal of Behavioral Nutrition and Physical Activity*, 7(86). doi:10.1186/1479-5868-7-86
- Berry, L. L. & Mirabito, A. M. (2011). Partnering for prevention with workplace health promotion programs. *Mayo Clinic Proceedings*. 86(4), 335-337. doi: 10.4065/mcp.2010.0803
- Block, G., Block, T., Wakimoto, P., Block, C. H. (2004). Demonstration of an e-mailed worksite nutrition intervention program. *Preventing Chronic Disease*, 1(4), 1-13. Retrieved from http://www.cdc.gov/pcd/issues/2004/oct/04_0034.htm
- Brug, J. (2008). Determinants of healthy eating: motivation, abilities and environmental opportunities. *Family Practice*, 25, i50–i55. doi:10.1093/fampra/cmn063
- Centers for Disease Control and Prevention. (2014, September 30). Healthy weight; body mass index. Retrieved from <http://www.cdc.gov/healthyweight/assessing/bmi/index.html>
- Centers for Disease Control and Prevention. (n.d.). Nutrition, physical activity and obesity: data trends and maps; Wisconsin location summary. Retrieved from http://nccd.cdc.gov/NPAO_DTM/LocationSummary.aspx?statecode=149
- Centers for Disease Control and Prevention. (2012, May 24). Overweight and obesity. Retrieved from <http://www.cdc.gov/obesity/>
- Centers for Disease Control and Prevention. (2013). State indicator report on fruits and vegetables. Retrieved from <http://www.cdc.gov/nutrition/downloads/state-indicator-report-fruits-vegetables-2013.pdf>
- Centers for Disease Control and Prevention. (2015, June 21). Workplace health promotion. Retrieved from <http://www.cdc.gov/workplacehealthpromotion/>

- Centers for Disease Control and Prevention. (2013, March 13). Workplace Health Promotion: Glossary Terms. Retrieved from <http://www.cdc.gov/workplacehealthpromotion/glossary/index.html#W>
- Christensen, J. R., Overgaard, K., Carneiro, I. G., Holtermann, A., & Sjøgaard, K. (2012). Weight loss among female healthcare workers- a 1-year workplace based randomized controlled trial in the FINALE-health study. *BMC Public Health, 12*(625). doi: 10.1186/1471-2458-12-625
- Crane, M. M., Tate, D. F., Finkelstein, E. A., & Linnan, L. A. (2012). Motivation for participating in a weight loss program and financial incentives: an analysis from a randomized trial. *Journal of Obesity, 2012*. doi: 10.1155/2012/290589
- Constance, A., & Sauter, C. (2011). *Inspiring and supporting behavior change*. Chicago, IL: Academy of Nutrition and Dietetics.
- Finkelstein, E. A., Trogon, J.G., Cohen, J. W., & Dietz, W. (2009). Annual medical spending attributable to obesity: payer-and service-specific estimates. *Health Affairs, 28*(5), 822-831. doi: 10.1377/hlthaff.28.5.w822
- Food and Drug Administration. (2013, March 14). Overview of FDA proposed labeling requirements for restaurants, similar retail food establishments and vending machines. Retrieved from <http://www.fda.gov/Food/LabelingNutrition/ucm248732.htm>
- Freedman, M. R., Rubinstein, R. J. (2010). Obesity and food choices among faculty and staff at a large urban university. *Journal of American College Health, 59*(3), 205-210. doi:10.1080/07448481.2010.502203
- Harnack, L. J., & French, S. A. (2008). Effect of point-of-purchase calorie labeling on restaurant and cafeteria food choices: A review of the literature. *International Journal of Behavioral Nutrition and Physical Activity, 5*(5). doi:10.1186/1479-5868-5-51
- Healthcare.gov. (2013, March 27). Glossary. Retrieved from <http://www.healthcare.gov/glossary/a/affordable-care.html>
- Hersey, J., Williams-Piehot, P., Sparling, P. B., Alexander, J., Hill, M. D., Isenberg, K. B., Rooks, A., & Dunet, D. O. (2008). Promising practices in promotion of healthy weight at small and medium-sized US worksites. *Preventing Chronic Disease, 5*(4). Retrieved from http://www.cdc.gov/pcd/issues/2008/oct/07_0172.htm.
- Heinen, L., & Darling, H. (2009). Addressing obesity in the workplace: The role of employers. *The Milbank Quarterly, 87*(1), 101–122. doi: 10.1111/j.1468-0009.2009.00549.x

- Johnson, S. S., Paiva, A. L., Cummins, C. O., Johnson, J. L., Dymont, S. J., Wright, J. A., Prochaska, J. O., Prochaska, J. M., & Sherman, K. (2008). Transtheoretical model-based multiple behavior intervention for weight management: effectiveness on a population basis. *Preventative Medicine, 46*(3), 238–246. doi: 10.1016/j.ypmed.2007.09.010
- Kottke, T. E., Pronk, N. P., Katz, A. S., Tillema, J. O., & Flottemesch, T. J. (2013). The effect of price reduction on salad bar purchases at a corporate cafeteria. *Preventing Chronic Disease, 10*. doi: 10.5888/pcd10.120214
- Lemon, S. C., Zapka, J., Li, W., Estabrook, B., Magner, R., & Rosal, M. C. (2009). Perceptions of worksite support and employee obesity, activity, and diet. *American Journal of Health Behavior, 33*(3), 299-308. Retrieved from <http://www.ajhb.org/issues/2009/3/03MayJun0809Lemon.pdf>
- Lemon, S. C., Zapka, J., Li, W., Estabrook, B., Rosal, M. C., Magner, R., Andersen, V., Borg, A., & Hale, J. (2010). Step ahead: A worksite obesity prevention trial among hospital employees. *American Journal of Preventative Medicine, 38*(1). doi:10.1016/j.amepre.2009.08.028
- Leslie, J. H., Hughes, C. K., & Braun, K. L. (2010). Engaging participants in design of a native hawaiian worksite wellness program. *Progress in Community Health Partnerships, 4*(2): 121-130. doi:10.1353/cpr.0.0121
- Levi, J., Segal, L. M., St. Laurent, R., & Rayburn, J. (2014). The state of obesity: better policies for a healthier America. Retrieved from <http://stateofobesity.org/files/stateofobesity2014.pdf>
- Linde, J. A., Nygaard, K. E., MacLehose, R. F., Mitchell, N. R., Harnack, L. J., Cousins, J. M., Graham, D. J., & Jeffery, R. W. (2012). Health Works: Results of a Multi-Component Group-Randomized Worksite Environmental Intervention Trial for Weight Gain Prevention. *International Journal of Behavioral Nutrition and Physical Activity, 9*(14). doi: 10.1186/1479-5868-9-14
- Lowe, M. R., Tappe, K. A., Butryn, M. L., Annunziato, R. A., Coletta, M. C., Ochner, C. N., & Rolls, B. J. (2010). An intervention study targeting nutritional intake in worksite cafeterias. *Eating Behaviors, 11*(3), 144-151. doi:10.1016/j.eatbeh.2010.01.002
- Mattke, S., Liu, H., Caloyeras, J. P., Huang, C. Y., Van Busum, K. R., Khodyakov, D., & Shier, V. (2013). Workplace wellness programs study; final report. Santa Monica, CA: RAND Corporation. Retrieved from <http://www.dol.gov/ebsa/pdf/workplacewellnessstudyfinal.pdf>
- Mattke, S., Schnyer, C., & Van Busum, K. R. (2012). A review of the U.S. workplace wellness market. Santa Monica, CA: RAND Corporation. Retrieved from <http://www.dol.gov/ebsa/pdf/workplacewellnessmarketreview2012.pdf>

- Mujtaba, B. G., & Cavico, F. J. (2013). Corporate wellness programs: implementation challenges in the modern American workplace. *International Journal of Health Policy and Management, 1*(3), 193-199. doi: 10.15171/ijhpm.2013.36
- needs assessment. (n.d.). The Free On-line Dictionary of Computing. Retrieved September 29, 2014, from Dictionary.com website: [http://dictionary.reference.com/browse/needs assessment](http://dictionary.reference.com/browse/needs+assessment)
- Office of Disease Prevention and Health Promotion (July 19, 2015). *Scientific Report of the 2015 Dietary Guidelines Advisory Committee*. Retrieved from <http://www.health.gov/dietaryguidelines/2015-scientific-report/02-executive-summary.asp>
- Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2013, October). Prevalence of obesity in the United States, 2011-2012. Retrieved from <http://www.cdc.gov/nchs/data/databriefs/db131.pdf>
- Person, A. L., Colby, S. E., Bulova, J. A., & Whitehurst-Eubanks, J. (2010). Barriers to participation in a worksite wellness program. *Nutrition Research and Practice, 4*(2), 149-154. doi: 10.4162/nrp.2010.4.2.149
- Phillips, J. F. (2009). Using an ounce of prevention: does it reduce health care expenditures and reap pounds of profits: A study of the financial impact of wellness and health risk screening programs. *Journal of Health Care Finance, 36*(2), 1-12. Retrieved from www.scribd.com/doc/47635135/Ounce-of-Prevention
- Pronk, N. P. (2014). Placing the workplace wellness in proper context: value beyond money. *Preventing Chronic Disease, 11*(140128). doi: <http://dx.doi.org/10.5888/pcd11.140128>
- Roberto, C. A., Larsen, P. D., Agnew, H., Baik, J., & Brownell, K. D. (2010). Evaluating the impact of menu labeling on food choices and intake. *American Journal of Public Health, 100*(2), 312-318. doi:10.2105/AJPH.2009.160226
- Robroek, S. J. W., Lindeboom, D. E. M., & Burdorf, A. (2012). Initial and sustained participation in an internet-delivered long-term worksite health promotion program on physical activity and nutrition. *Journal of Medical Internet Research, 14*(2), e43. doi: 10.2196/jmir.1788
- Robroek, S. J. W., Van Lenthe, F. J., Van Empelen, P., & Burdorf, A. (2009). Determinants of participation in worksite health promotion programmes: a systematic review. *International Journal of Behavioral Nutrition and Physical Activity, 6*:26. doi:10.1186/1479-5868-6-26
- Snyder, L. B. (2007). Health communication campaigns and their impact on behavior. *Journal of Nutrition Education and Behavior, 39*: S32-S40. doi:10.1016/j.jneb.2006.09.004

- Thorndike, A. N., Sonnenberg, L., Riis, J., Barraclough, S., & Levy, D. E. (2012). A 2-phase labeling and choice architecture intervention to improve healthy food and beverage choices. *American Journal of Public Health, 102*(3), 527-533. doi:10.2105/AJPH.2011.300391
- U.S. Department of Agriculture, U.S. Department of Health and Human Services (December, 2010). *Dietary Guidelines for Americans, 2010*. Retrieved from <http://www.health.gov/dietaryguidelines/dga2010/DietaryGuidelines2010.pdf>
- U.S. Department of Labor, Bureau of Labor Statistics (2015, June 13). *Labor force statistics from current population survey (2014)*. Retrieved from <http://www.bls.gov/cps/cpsaat18.htm>
- U.S. Department of Veterans Affairs (June 9, 2015). *Milwaukee VA Medical Center*. Retrieved from <http://www.milwaukee.va.gov/about/index.asp>
- Verwij, L. M., Proper, K. I., Weel, A. N. H., Hulshof, C. T. J., & van Mechelen, W. (2009). Design of the Balance@Work project: systematic development, evaluation, and implementation of an occupational health guideline aimed at the prevention of weight gain among employees. *BMC Public Health, 9*(461). doi:10.1186/1471-2458-9-461
- Viestar, L., Verhagen, E., Proper, K. I., van Dongen, J. M., Bongers, P. M., & van der Beek, A. J. (2012). VIP in construction: systematic developments and evaluation of a multifaceted health programme aiming to improve physical activity levels and dietary patterns among construction workers. *BMC Public Health, 12*(89). doi: 10.1186/1471-2458-12-89
- Wisconsin Department of Health Services (May 15, 2015). Worksite Wellness Resource Kit. Retrieved from <https://www.dhs.wisconsin.gov/physical-activity/worksite/kit.htm>

APPENDIX A.
STUDY SURVEY

**Health Beliefs, Eating Behavior, Dietary Intake, and the
Healthcare Workplace: An Employee Questionnaire**

Please choose one answer that best reflects your typical routine and current beliefs about your health.

1. Please rate the following:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Maintaining my health is important to me	1	2	3	4	5
What I eat affects my health	1	2	3	4	5
What I weigh affects my health	1	2	3	4	5
How active I am affects my health	1	2	3	4	5
I am in good health	1	2	3	4	5

2. How would you best describe your current body weight:

- Underweight Just right Overweight

3. In thinking about your USUAL habits, rate the following statements based on how important each is to you:

	Not important	Less important	More Important	important	Very important
What I eat is	1	2	3	4	5
Eating 3 meals a day are	1	2	3	4	5
Eating breakfast is	1	2	3	4	5
Eating lunch is	1	2	3	4	5
Eating fruits and vegetables are	1	2	3	4	5
Eating whole grains are	1	2	3	4	5
Eating low fat dairy foods is	1	2	3	4	5
Drinking water is	1	2	3	4	5
Daily exercise is	1	2	3	4	5

4. Please rate each of the following statements:

	Not applicable	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
What I eat is influenced by:						
...the type of food offered in the workplace	0	1	2	3	4	5
...the food my colleagues are eating	0	1	2	3	4	5
...the food my spouse/partner eats	0	1	2	3	4	5
...the food my children eat	0	1	2	3	4	5
...the food my friends eat	0	1	2	3	4	5
I am confident that I know how to make healthy food choices	0	1	2	3	4	5

5. The next set of questions asks about your daily intake of specific foods.

How many servings of FRUIT do you typically eat EACH DAY?

Each of the following is an example of ONE serving, so **ADD** up the number of servings you eat in one day and write it in the box:

- 1 medium piece of fruit (e.g. apple, orange, banana, peach) OR
- ½ cup fresh fruit (e.g. watermelon, cantaloupe, strawberries, pineapple, blueberries) OR
- ½ cup (4 ounces) 100% fruit juice OR
- ½ cup frozen or canned fruit OR
- ¼ cup dried fruit

(Example: If you eat 1 banana, 1 cup of strawberries, and 1 cup of orange juice you have eaten 5 servings.)

6. How many servings of VEGETABLES (excluding fried potato products) do you typically eat EACH DAY?

Each of the following is an example of ONE serving, so **ADD** up the number of servings you eat in one day and write it in the box:

- 1 cup raw vegetables (e.g. carrots, tomatoes, mushrooms, broccoli) OR
- ½ cup cooked vegetables in soup, stew, stir fry or other vegetable dishes OR
- ½ cup vegetable juice OR
- 1 cup salad greens (e.g. lettuce, spinach)

(Example: If you have eaten a salad with 2 cups of lettuce and ½ cup of raw carrots, and ½ cup of cooked vegetables in soup you have eaten 3½ servings.)

7. How many servings of GRAINS do you typically eat EACH DAY?

Each of the following is an example of ONE serving, so **ADD** up the number of servings you eat in one day and write it in the box:

- 1 slice of bread OR
- ¼ of a large bagel OR
- 1 small tortilla OR
- ½ of a hamburger bun OR
- 1 cup of dry cereal OR
- ½ cup of cooked rice, pasta, noodles or cereal OR
- 3 cups of popped popcorn

(Example: If you eat 1 cup of oatmeal, 2 slices of bread with a sandwich, and 2 cups of pasta you have eaten 8 servings.)

8. How many servings of MILK and Dairy Products do you typically eat EACH DAY?

Each of the following is an example of ONE serving, so **ADD** up the number of servings you eat in one day and write it in the box:

- 1 cup (8 ounces) milk, yogurt, or pudding made with milk OR
- 1.5 ounces or 2 slices of cheese (e.g. cheddar, Swiss, jack) OR
- 2 ounces processed cheese (cheese spread, American cheese) OR
- 1 cup of ice cream or frozen yogurt

(Example: If you eat 1 cup of yogurt and 2 slices of swiss cheese on a sandwich you have eaten 2 servings.)

Of the servings of MILK and DAIRY PRODUCTS, how many are LOW FAT or FAT FREE?

9. How many REGULAR, sugar-sweetened (NON-DIET) sodas/energy drinks do you typically drink each day?

10. Rate each of the following thinking about your overall FOOD PURCHASE decisions both at work and at home?

	Not important	Less important	Important	More important	Very important
How the food tastes	1	2	3	4	5
How the food looks	1	2	3	4	5
That the food is fresh	1	2	3	4	5
Avoiding food that is highly processed	1	2	3	4	5
Convenience (eg. food is already cut and washed)	1	2	3	4	5
Where food is grown (local vs. far away)	1	2	3	4	5
Whether the food is organic	1	2	3	4	5
How much the food costs	1	2	3	4	5
The health benefits of the food	1	2	3	4	5

Is there something else that influences your food purchases? Please explain:

11. In thinking about making changes to improve your health: How ready are you to make a change to improve your health at the time of completing this questionnaire?

- ┆ I don't have any changes to make
- ┆ I won't make any changes
- ┆ I might make a change but I am not sure
- ┆ I am thinking about making a change soon
- ┆ I have already started making a change
- ┆ I have already made a change and it is now habit

12. What is your age?

13. What is your gender? Male Female

14. What is your height?

15. What is your weight?

16. Are you watching what you eat to maintain or lose weight?

- Yes No

If Yes, please explain.

17. Have you participated in any health promotion opportunities available through the VA? For example, web-based WIN: VA Employee Health and Wellness program or holiday maintain?

- Yes No

**If YES, please describe how you participated and include any other comments below.
If NO, please provide any reason(s) why you may not have participated and include any other comments below.**

Thank you for participating.

APPENDIX B.

Cover letter

Dear Colleagues,

I am a Primary Care Dietitian at the Milo C. Huempfner Green Bay VA Clinic and graduate student at Mount Mary University. I am interested in studying the healthcare workplace and its role in employee health promotion and wellness. As part of my research, I have developed a questionnaire for Green Bay VA clinic employees that asks about:

- health beliefs and attitudes
- perceptions of food and social environments
- eating behavior
- weight status and readiness for change

The purpose of this project is to better understand employee food choices and health behavior in the workplace. You are invited to participate because you are an employee of the Green Bay VA clinic.

The procedure involves completing a questionnaire that will take approximately 5 to 10 minutes. Your responses will be anonymous and identifying information that could be linked to your completed questionnaire, such as your name or email address, will not be collected.

The results of this questionnaire will be used for scholarly purposes and may be shared with personnel at the Green Bay VA clinic in the spirit of quality improvement/quality assurance. All data from the survey will be grouped together so that no information that could identify you will be included. I hope you take a few minutes to complete this questionnaire. Without your help and participation, this project could not be completed.

If you have any questions about the study, please contact Sarah Breitrack, RD, CD at sarah.breitrack@va.gov, sbreitrack@gmail.com or (920) 562-3452 or Tara LaRowe, PhD, RD, CD at larowet@mtmary.edu or (608) 577-0840. This project has been reviewed according to Mount Mary University IRB procedures. Questions about your rights as a participant may be presented to Institutional Review Board Chair, Marmy Clason PhD, Communications Department, Mount Mary University, (414) 258-4810, ext. 471.

Sincerely,

Sarah Breitrack, RD, CD
Primary Care Dietitian
Green Bay VA Clinic

APPENDIX C.

E-mail Announcement

Attention VA Employees!



Please complete an anonymous questionnaire about your health-related beliefs and behaviors to be entered into the drawing! At the end of March, one winner will be selected to receive a prize!

Thank you for your participation! Without your help this Graduate School project could not be completed.

