EVALUATING "COWBOY CHALLENGE," A WORKSITE WELLNESS PROGRAM OF OKLAHOMA STATE UNIVERSITY

By

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Title of Study: EVALUATING "COWBOY CHALLENGE," A WORKSITE WELLNESS PROGRAM OF OKLAHOMA STATE UNIVERSITY

Major Field: NUTRITIONAL SCIENCES

Objective: To evaluate the effectiveness of the Cowboy Challenge program.
Design: Cohort study with pre-/post design.
Setting: Oklahoma State University – Stillwater Campus
Participants: The program was available to all benefits eligible employees. Ninety one employees participated, ranging from 22 to 63 years old.
Intervention: 12-week team based worksite wellness program, including exercise and nutrition components. A minimum of 150 minutes of physical activity each week was required (including at least two - 45 minute sessions with a provided personal trainer). The nutrition component included 3 weeks of mandatory food journaling and 3 education meetings.
Main Outcome Measures: The effectiveness of the program was evaluated based on changes in blood lipid panel, fasting blood glucose, diastolic/systolic pressure, Body Mass Index, abdominal girth, cardiovascular fitness (measured by Rockport 1 mile walk and Modified Naughton protocol), muscular endurance (measured by YMCA bench press) and flexibility (measured by trunk flexion). An online survey was also conducted to evaluate participant perceptions of the program.
Analysis: Paired t-tests ($\alpha = .05$)
Results: At baseline, mean values for blood lipids (triglycerides, total cholesterol, LDL, and HDL) were within normal limits and 72.5% of participants were overweight or obese. After completion of the program, small but significant improvements were found in BMI ($p=.004$), and weight decreased approximately 0.7 kg ($p=.003$). Flexibility, muscular endurance and cardiovascular fitness all improved ($p<.001$ each). Diastolic blood pressure significantly decreased, systolic blood pressure tended to decrease ($p=.08$) but was not significant. Less than one third ($n=26$) of the participants responded to the survey. Almost all (25/26) reported that the Cowboy Challenge was beneficial; the most reported benefit was improved cardiovascular fitness.
Conclusions/Implications: The program effectively improved the fitness (cardiovascular fitness, muscular endurance, and flexibility) of participants and resulted in slight but significant weight loss. No changes were found in blood lipids, possibly because they were already within normal limits. These results were generally consistent with similar studies.

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CHAPTER I

INTRODUCTION

High rates of disease in America is currently a major cause for concern so many experts are investigating ways that health can be improved. One of the most obvious avenues, is that of chronic disease which makes up half of the leading causes of death in the United States (Butler, Clark, Burlis, Castillo & Racette, 2015). These chronic diseases affect people from all regions, economic statuses, religions and cultural backgrounds. The etiology of chronic diseases can be complex when thoroughly investigated but essentially comes down to unhealthy choices/behaviors.

How then, do we begin to address such a massive and ingrained issue within our culture? Perhaps changing the culture itself, encouraging healthier behaviors and educating the masses on how to make the right decision in regards to their health. The workplace has become a major vehicle to relay these types of messages to the public, and it is proving to be rather effective. Most people work, so the workplace has access to a majority of the population, employers are invested because they see an opportunity to decrease their health costs and invest in their employees, and all those involved benefit. Worksite wellness programs have been implemented all over the country and the world (Steenhuis, Van Assema, Van Breukelen, Glanz, Kok, & Vreis, 2004). There have been many different models, intervention durations, settings and populations but many have produced positive results (Anderson, Quinn, Glanz, Ramirez, Kahwati, Johnson, & Katz, 2009).

Oklahoma State University has recently been implementing their own wellness programs through the Department of Wellness and Cowboy Challenge is one of the most recent programs. It is important to show that this program is effective because there are not very many studies that examined the implementation of wellness programs in a university setting. The American Heart Association recommends that research be done evaluating worksite wellness programs in order to improve upon them (Carnethon, Whitsel, Franklin, Kris-Etherton, Milani, Pratt, & Wagner, 2009). In addition, The OSU Department of Wellness needs to know if its program is effective in order to determine whether to continue the program's funding.

The purpose of this study was to evaluate the effectiveness of the Cowboy Challenge program, a 12-week worksite wellness team based program. The program was built around 3 teams of 8 (assuming it filled up and no one dropped out) each semester. Each team had a different coach, and they were competing to be the winning team through completion of weekly challenges and the amount of exercise. At the program's conclusion there was a winning team, and a male, and a female individual winner. The purpose of the Cowboy Challenge program was to develop and encourage healthy habits.

Overall Research question: Does the Oklahoma State University (OSU) Cowboy Challenge program effectively improve the health of participants?

This was measured through its effect on blood lipid panel, fasting blood glucose, diastolic/systolic pressure, Body Mass Index, abdominal girth, cardiovascular fitness (as measured by Rockport 1 mile walk), muscular endurance (as measured by YMCA bench press) and flexibility (as measured by trunk flexion). In addition, participants provided feedback on their perceptions of the program.

CHAPTER II

REVIEW OF LITERATURE

Current State of American Health

Five of the top 10 causes of death in the United States are chronic disease related (Norman, Heltemes, & Drew, 2014). Although rates are declining, cardiovascular disease is the leading cause of death in America (Butler, et al., 2015). Cardiovascular disease and other chronic diseases such as stroke, type 2 diabetes mellitus and obesity together cause approximately 65% of American deaths despite being preventable through lifestyle modification (Norman et al., 2014). These chronic diseases can be traced back to just a few health risk behaviors, including poor nutrition, excessive alcohol intake, tobacco/drug use and lack of physical activity (Centers for Disease Control and Prevention, 2016). These behaviors are associated with cardio-metabolic risk factors such as dyslipidemia, high blood glucose, increases in weight, Body Mass Index, and waist circumference and hypertension (Radler, Marcus, Griehs, & Touger-Decker, 2015).

Increased consumption of fruits and vegetables has been associated with a reduced risk of cardiovascular disease (LeCheminant & Merrill, 2012). The consumption of fruits and vegetables has demonstrated a 4% decreased risk of cardiovascular disease and 5% decreased risk of all-cause mortality respectively for each serving increase in consumption (Wang, Ouyang, Liu, Zhu, Zhao, Bao, & Hu, 2014). Ideally, fruit/vegetable consumption should reach at least five servings

daily; reaching this level could decrease the amount of money spent on healthcare (Goldberg, Lockwood, Garg, & Kuehl, 2015). Most (75%) of the American population report low consumption of fruits and vegetables (Norman et al., 2014). As of 2010, less than one third of the American population reported eating fruit at least twice a day, and Oklahoma had the lowest fruit consumption (approximately half the national proportion) (Grimm, Blanck, Scanlon, Moore, Grummer-Strawn, & Foltz, 2010). However as of 2014, according to the Produce for Better Health Foundation, the American population is consuming 6% and 7% less of fruits and vegetables respectively compared to 2009 (Produce for Better Health Foundation, 2015). Also this region, South West Central states, has the lowest rate of vegetable consumption. Oklahoma exceeds the national average in the proportion of those who consume less than one fruit and those that consume less than one vegetable daily (Centers for Disease Control and Prevention, 2013).

Consistent physical activity is important in achieving and maintaining health (Haskell et al., 2007). The American College of Sports Medicine recommends that adults get 150 minutes of moderate cardiorespiratory exercise each week (Carnethon et al., 2009; Merrill & Hull, 2013). As of 2011, more than 50% of the American population did not meet these recommendations (Norman et al., 2014). Ever-advancing technology in the workplace has resulted in fewer and fewer people working jobs that require physical activity (Anderson et al., 2009).

A lack of exercise combined with a poor diet can lead to weight gain, overweight/obesity and increased risk of chronic disease (Centers for Disease Control and Prevention, 2015). In fact, the average working age American gains between one and two pounds each year (LeCheminant & Merrill, 2012). A healthy Body Mass Index (BMI) is between 18.5 and 24.9, and obesity is defined as a BMI over 30 or above (Centers for Disease Control and Prevention, 2016). Approximately 66% of Americans have an unhealthy BMI (Radler et al., 2015). Increasing prevalence of overweight and obesity is not only a concern for America but all over the world, continuing to be a burden on numerous countries (Mache, Jensen, Jahn, Steudtner, Ochsmann, &

Preuß, 2015). For example, the prevalence of overweight in Europe is estimated to be around 50-60%, with 20% obesity (Mache et al., 2015).

Obesity increases the risk of diabetes, cardiovascular disease, and stroke (Flynn, McNeil, Maloff, Mutasingwa, Wu, Ford, & Tough, 2006) as well as respiratory problems such as asthma (Leslie, Hughes, & Braun, 2010). Overweight also increases risk for chronic musculoskeletal pain and decreases quality of life (Christensen, Overgaard, Carneiro, Holtermann, & Søgaard, 2012). The impacts of overweight/obesity on quality of life seem to more drastic for women, this may be because women are more psychologically affected by negative body image associated with weight gain (Cash, Beresford, Henderson, McTiernan, Xiao, Wang, & Patrick, 2012). This also reveals some insight as to why in many wellness interventions, women are overrepresented.

Need for Worksite Wellness Programs

Worksite wellness programs have become increasingly common as a way to try to address these issues concerning rising healthcare costs and loss of productivity due to poor health (Baicker, Cutler & Song, 2010). A worksite wellness program is a system or program offered by an employer to employees to improve health behaviors/outcomes (Radler et al., 2015). Healthier behaviors have the potential for improving the health, safety and productivity of millions of employees while decreasing both direct and indirect expenditures for their employers (Goldberg et al., 2015). According to the CDC, worksite wellness programs should include organization wide policies and/or activities such as healh education/coaching, weight management programs, onsite fitness programs and medical screenings (CDC, 2016). When properly designed and implemented, worksite wellness programs can help bolster the financial state of a company.

Ever since the passage of the Affordable Care Act, employers with 50 or more full-time employees have been required by law to offer adequate health insurance (Blumenthal & Collins, 2014). It is estimated that 25 to 30% of medical costs accrued by employers are associated with cardiovascular disease and stroke (Carnethon et al., 2009). In 2012, America spent approximately $2 trillion on health care and 75% of the costs were related to chronic disease (Mishra, Xu, Agarwal, Gonzales, Levin, & Barnard, 2013). A 2010 study found that obesity is responsible for an estimated $73.1 billion, mainly through medical expenses, as well as absenteeism and reduced productivity (Mishra et al., 2012). This means that much of the money spent on health care would be unnecessary if people made healthier choices regarding their lifestyle and diet (Goldberg, 2015). This major financial burden (accompanied with its predicted increase) has caught the attention of many employers and interested them in the prospect of prevention (Baicker et al., 2010). This prevention comes in the form of worksite wellness programs, which have been estimated to save employers somewhere between $1.65 (Naydeck, Pearson,

Ozminkowski, Day, & Goetzel, 2008) and $3.25 (Baicker et al., 2010) for every $1 spent. The benefits of these worksite wellness programs are not solely monetary.

Worksite wellness programs can also benefit the employees by improving the state of their health. Among people with known risk factors for chronic disease such as cardiovascular disease, evidence suggests intensive counseling (nutrition education combined with behavioral counseling) produces meaningful changes regarding fruit/vegetable intake as well as the consumption of fiber and saturated fat (Anderson et al., 2009). Wellness programs that include elements of both nutrition education and regular exercise have been found to be effective in helping promote healthier behaviors (Person, Colby, Bulova, & Eubanks, 2010). Although the effects on individual outcomes are usually modest (averaging approximately 3 pounds net weight loss) when incorporated throughout the working population, these programs could help address the obesity epidemic (Anderson et al., 2009). These programs have demonstrated their efficacy in increasing awareness, changing health behaviors and decreasing body weight (Mache et al., 2015). There is also evidence of worksite wellness programs increasing the quality of life for the participants (Cash et al., 2012).

The efficacy of these programs may be due to the fact that working adults spend much of their time at work (Johnson, Turner, Carter, Kelly, & Ewell, 2015), with the average worker spending 1/3 of their time working (Newman et al., 2015). The time present at work combined with pre-existing social networks/support systems present in the workplace makes it a plausible environment for wellness program implementation (Leslie et al., 2010). Additionally, many employees already receive health information at work and make dietary/lifestyle choices there increasing the ability for the worksite to affect the health of its employees (Mishra et al., 2012). The workplace has pre-existing social support, common culture, and the potential for effective communication and complementary individual and company goals (LeCheminant & Merrill, 2012). This social support has been found to have a beneficial long-term effect on employees'

health (exercise and fiber intake increased; and blood pressure, cholesterol, drinking and tobacco use decreased) (Ozminkowski et al., 2002). And because the workplace is a relatively controlled environment, it is an ideal setting for study (Mache et al., 2015).

The level of success of worksite wellness programs varies but most of the studies evaluating similar programs reviewed were successful in bringing improvements in health behaviors (e.g. increased vegetable/fruit consumption) (LeCheminant & Merrill, 2012) and/or outcomes (e.g. lowering blood pressure, decreasing weight) (Radler et al., 2015). For example, Radler et al. (2015) evaluated the effectiveness of a university worksite wellness program to reduce cardiovascular disease risk factors using a pre-post-intervention design. This wellness program focused on overweight employees, so inclusion criteria included BMI above 25 or abdominal obesity determined by waist circumference. The 12-week intervention included access to educational materials, both online and on campus with the Registered Dietitian (topics included food label, physical activity, shopping and dining out), as well as one-on-one consultation with a Registered Dietitian at baseline and at the end of program. Approximately 66% of participants lost a significant amount of weight, and although not significant, small positive changes were seen in blood pressure, glucose, cholesterol and HDL.

Although randomized controlled trials are generally considered the gold standard for research, Maes et al. (2012) suggest that they might not necessarily be appropriate in this setting because the focus on internal validity minimizes its external validity. Essentially, the more effort to control each possible variable the less relatable it is to an ordinary worksite wellness program (Maes et al., 2012).

Maes et al. (2012) reviewed studies evaluating worksite programs in Europe for overweight workers. The quality of the studies was assessed based on involvement of stakeholders, implementation of activities by management, prior analysis of the needs of the

worksite; ten were identified as weak and seven as moderate in strength (Maes et al., 2012). Six of the seven multi-component studies (including both educational and environmental changes), focusing on dietary behavior reported positive changes and three attained long-term success (Maes et al., 2012). For example, Steenhuis et al. (2004) was one of the more recent multi-component studies reviewed. In this pre/post test controlled intervention study, 17 large Dutch worksites were randomly assigned to one of four intervention groups. The food label program labeled low fat food products, the educational program consisted of brochures, self-help posters and table tents, and the food supply program increased the availability of low fat food products. Self-administered food frequency questionnaires revealed the food label program produced a reduction in fat consumption in those who believed they ate a high fat diet (Steenhuis et al., 2004).

Mishra et al. (2012) conducted a multicenter randomized controlled trial that used a vegan diet in an attempt to reduce body weight and risk factors for cardiovascular disease. In this 18-week study, participants were asked to follow a low fat vegan diet (whole grains, vegetables, legumes and fruits), to minimize added oils (suggested no more than 3 g of fat per serving) with no calorie restriction. The cafeteria offered (low-fat) vegan options to accommodate them, they were provided group support (weekly lunch classes led by RD, MD or cooking instructor). Classes included group discussions, and cooking demonstrations. The intervention produced decreases in total cholesterol, LDL, and weight. This study was strong because it was a randomized controlled trial, with a geographically diverse population, sufficient power and a reproducible intervention. Although this study was not without its limitations: males were under-represented and it lacked data on physical activity.

In a similar, but longer term study, LeCheminant and Merrill's (2012) program began with an online personal health assessment (a questionnaire concerning physical activity, health status, dietary patterns and demographics). This study employed the *WellSteps* Wellness Program,

a two-year customizable program consisting of a series of 6 behavior change campaigns annually, each lasting 3-8 weeks (topics included physical activity, improved sleep habits, stress management, and diet). The amount of fruits and vegetable consumed increased (122% increase of the proportion of participants consuming 5+ fruits or vegetables), and the amount of exercise increased and these increases were maintained over two years. These behavior changes were accompanied by significant decrease in participants reporting high blood pressure (LeCheminant & Merrill, 2012).

Christensen et al. (2012) also conducted a 12-month intervention. The purpose of this single blind randomized control trial was to investigate changes in body weight after a workplace intervention that included exercise, diet and Cognitive Behavioral Therapy training among 98 overweight female health care workers. Participants were placed at a 1000-1200 calorie deficit to encourage weight loss (Christensen et al., 2012). The intervention was 1 hour per week; the first three months focused on weight loss (cardio/strength exercise, calorie counting, goal setting, etc.) after that the focus was placed on weight maintenance. The first 6 months included 12 minutes of exercise in weekly sessions, afterwards a fitness gym was provided for circuit training (jump rope, leg curls, dumbbells, and machines). There was a spirit of comradery, employees would meet on a daily basis and served as each other's support, which the researchers felt reduced the dropout rate. There was an average weight loss of six kilograms, body fat decreased three percent and BMI decreased over two units. The main limitation of this study is that multiple interventions were used simultaneously so this data cannot identify a single source of change, but the study is still very strong due to its high retention rate, long length of study and a control group.

It may be more effective to address the employee population as a whole as opposed to focusing on those who are overweight or those who are willing to participate in a wellness program (Mache et al., 2015). With that in mind, Mache et al. designed this twelve-month program under the modified ecological framework – targeting environmental changes within the

worksite and its culture. Eight hundred and ninety employees from a German logistics company served as the intervention group with another 859 from comparable work environments for the control group. Consenting participants answered questionnaires at baseline, there was follow up at 6 months and 1 year. Three hundred and seventy-seven from the intervention group and 298 from the control group answered baseline and a follow up. The intervention included one-on-one coaching, nutrition counseling/motivational interviewing to promote positive dietary changes. Free fruits and vegetables were provided and physical training sessions were approximately thirty minutes per week with a five-minute warm-up and included back extensions, and shoulder/arm exercises. Weight loss found was comparable to what other studies have found (0.5 kg) but not significant. Although this study had a large sample and long length of study, it was not randomized and the data was self-reported.

LaCaille et al. (2016) conducted another more recent long-term study (LaCaille, Schultz, Goei, LaCaille, Dauner, de Souza, Nowak, & Regal, 2016). This 12-month multi-component worksite obesity prevention intervention was done in a quasi-experimental fashion. There were 500 participants split into intervention (n= 407) and control (n= 93) groups. The groups were not randomized in order to not disturb pre-existing social networks and due to lack of resources. Participants were recruited via email, mail, intranet and newsletter (LaCaille et al., 2016). Upon completion of baseline questionnaires (physical activity, food frequency, anthropometrics, knowledge and program perception) employees received a free pedometer and $10, they were incentivized to continue participation with $20 for both the 6 month and 12 month follow up, the control group did not get the pedometer. Many changes were made in the cafeteria such as labeling foods with calories, step equivalents and a stop light), offering half portions for half price, reducing all portions, and placing dessert in a less visible area, and posters were also placed around the facility to encourage employees to take the stairs. The retention rate for this program was very high; 85.6% in the intervention group and over 96% in the control group (completed the

baseline and 6 month and/or 12-month evaluation). The amount of high fat/ high sugar foods decreased substantially. Although there was not a significant difference between groups, both groups had lower levels of weight gain than expected. One disappointment within this study is the consumption of fruits/vegetables/fiber actually decreased, the researchers hypothesized employees may have simply reduced their caloric intake without distinguishing between sources. There was more walking (22 more minutes in intervention group), positive behavior changes, and discussion of health reported and participants were found to be "highly satisfied" with the intervention. Some limitations of this study include the difference in group size as well as self-report bias and changes that were likely to be upsetting (reduced dessert portions) were implemented gradually. The strengths include the length of the study, the multiple components and availability to all employees.

One of the things that makes Cowboy Challenge stand out from many of these above-mentioned programs is the team aspect. There has been some research specifically investigating team-based interventions. Thorndike et al. (2012) conducted a ten-week intervention that split 150 employees into six teams (Thorndike, Sonnenberg, Healey, Myint-U, Kvedar, & Regan, 2012). Each week 30 minute rallies were held where all participants gathered, additionally teams met separately with a Registered Dietitian (Thorndike et al., 2012). Teams competed on weekly goals regarding weight loss, steps, food logs or exercise. After the ten-week program there was on online maintenance program for nine months. The ten-week program effectively promoted weight loss and behavior changes. The maintenance program did not further improve outcomes; it was hypothesized that after the ten-week program participants lost interest and/or motivation and were not engaged in the less rigorous maintenance intervention.

Goldberg et al. (2015) conducted a more recent team-based worksite health promotion program. This twelve-session intervention was developed at the Oregon Health and Science University. It included an interactive curriculum which focused on specific topics regarding

health, exercise and nutrition. The program encompassed health behaviors/activities, mood improvement, sleep quality/quantity, stress reduction and safety. An online platform helped provide consistent usage among multiple sites and included resources such as exercise and cooking videos. Each session followed the same structure: a team meeting addressing health knowledge, behavior skills/norms, and goal setting (with feedback). This longitudinal design used a pre/post-intervention design and a booster twelve-session intervention was available for those who completed the first session. The results support the effectiveness of thesis program, improvements were found in blood pressure, weight, Body Mass Index, diet, physical activity (frequency and intensity), stress levels, mood, fruit/vegetable intake and sleep quality/quantity. The researchers suggested this study was so successful partially because the teaching relevant knowledge and skills was incorporated in addition to healthy activities, this transfer of knowledge helped allow for long lasting changes in the participants' lifestyles.

There have also been other worksite wellness programs that have taken place at Oklahoma State University, the most recent of which is the Building a Healthy Lifestyle on Activity, Nutrition, Confidence and Energy (B.A.L.A.N.C.E.) program, which was a 14-week program including nutrition and physical activity, available for employees with metabolic syndrome (Manni, 2016). This program demonstrated improvements in BMI, abdominal girth, triglycerides, blood pressure, and physical fitness (flexibility, muscular strength, and VO2 max). The B.A.L.A.N.C.E. program was well received by its participants according to the perceptions survey sent afterwards.

Only one published report of a worksite wellness program that did not produce benefits was found, but it was poorly implemented; instructors were poorly prepared and employees did not have time to participate (Resnicow et al., 1998). There have not been very many randomized controlled studies on the effects of worksite wellness programs and due to the nature of these

programs, selection bias is inevitable but the results suggest that properly designed/implemented worksite wellness programs yield positive benefits.

Recommended Components of a Worksite Wellness Program

It seems that the success or failure of worksite wellness programs is largely based on how they are implemented; there must be support from leadership, and the activities should be at times and places that allow the desired participation (Elliot, Mackannon, Kisbu-Sakarya, DeFrancesco, Coxe, & Favorite, 2012). The American Heart Association recommends that programs incorporate health screening, physical activity, nutrition education, stress management, weight/disease management; focus on developing skills in participants; and research the efficacy of the program (Carnethon et al., 2009).

The program should be designed to meet the needs of both those at risk and those who are healthy (Eng, Moy, & Bulgiba, 2016). Evidence suggests that organizations that only target high risk individuals do not significantly decrease their health costs (Goldberg et al., 2015). The more employees who are involved, the larger the impact on culture of the company. Although evidence shows the workplace is an ideal environment to reach high risk individuals, programs

that focus only on weight loss see modest results at best (Christensen et al., 2012). An effective worksite wellness should encompass more than weight loss alone.

The program must ensure the participants are learning, as increasing knowledge is critical in long-lasting change in both behavior and health outcomes (Goldberg et al., 2015). Each of the things taught through a worksite wellness program need to be evidenced based, ensuring that information/instruction given to participants is accurate (Elliot et al., 2012). However, education alone is not sufficient, participants must be shown how to implement these lifestyle changes and encouraged to do so. The physical activity component serves as a simple way to do just that. It is important to tailor the program to the target population, it has been suggested that those who are at the highest risk do better when activity is integrated into their already established routine, for example, encouraging standing instead of sitting (Mache et al., 2015).

Once employees start to participate it is important that they remain involved and motivated; the setting of small goals help with positive short-term feedback and keep participants motivated towards reaching their longer-term goals (weight loss, healthy lifestyles etc.) (Goldberg et al., 2015). It is also important that everyone buys in to the ideas/goals of the program; to ensure this it is good to get feedback on the goals/concerns of both the employees and management and incorporate them into the development of the program (Afanuh, Lee, & Hudson, 2015). Participants must receive social support from fellow participants, management and/or program staff as the amount of social support one has is associated with that individual's diet and physical activity level (Tamers, Beresford, Cheadle, Zheng, Bishop, & Thompson, 2011). This means that while social support can be a great motivator and help to improve fruit/vegetable intake and physical activity; lack of social support acts as an additional obstacle and increases risk of a program's failure (Tamers et al., 2011).

In addition to the education component and the activity component, many successful programs also include some sort of environment modification such as adding more healthy food

options, walking meetings or posters that encourage stair usage (Afanuh, Lee, & Hudson, 2015). These changes in the environment are sometimes called “push” or “nudge” strategies, they are so effective because they better engage those who lack motivation (often those with the highest risk) before they are ready to initiate their own behavior change (Hopkins, Glenn, Cole, McCarthy, & Yancey, 2012).

Overcoming Barriers

There are bound to be barriers that must be overcome regarding worksite wellness programs, such as unwillingness to change, lack of resources, competing demands and incongruence with current company culture (Hopkins et al., 2012). These obstacles may impede the implementation of a program or reduce participation/retention rates, but proper organization and planning can go a long way in reducing the amount of problems encountered. The primary issue with these programs is that they typically have a relatively low rate of participation/completion (below 50%) (Person, Colby, Bulova, & Eubanks., 2010).

In order to maximize participation, it is important to overcome or prevent as many barriers to participation as possible. The first thing is to allow the employees the opportunity to participate, which may require scheduling flexibility by management and good communication (Carnethon et al., 2009). Some barriers to program success are sporadic work schedules and job stress. In order to help ensure success of a program, management must be invested in it, letting the employees know about the program and willing to manage schedules to allow for consistent

participation (Afanuh, Lee, & Hudson, 2015). Person et al. (2010) investigated why participation was so low and found the three major barriers to employee participation were location, time, and lack of incentives; other barriers included marketing, and disinterest in topic(s) discussed. Each of these barriers were related to program implementation. If employees know about the program, management supports participation, and the topics are interesting, then participation comes down to motivation.

Participation is motivated by incentives, according to the behavioral economic theory, extrinsic motivators such as financial incentives help make it easier for people to align their short term actions with their long term goals (Norman et al., 2014). Norman et al. compared participation in two similar companies using the same wellness program and different incentive amounts and designs, to find out that the more immediate the incentive reward, the higher the perceived value (as opposed to a larger financial incentive given at a later time) (Norman et al., 2014). Once a program has maximized participation and retention, the only thing left is to ensure that the participants are benefitting from it. It is important that what is being taught is accurate and be able to affect one's health state.

Nutrition Education Topics Included in the Cowboy Challenge

In the Cowboy Challenge program the major topics included macronutrient distribution, portion control, and dining out. According to the Institute of Medicine, an acceptable macronutrient distribution range for diets is as follows: carbohydrate should provide 45%-65% of calories, protein should provide 10%-35% of calories), and fat should provide 20%-35% of calories (Institute of Medicine, 2005). Some researchers have investigated if there are macronutrient distributions that are better or worse for weight loss or weight maintenance. A 2009 study by Sacks et al. split subjects into four diet groups with different compositions of protein, fat and carbohydrates and found no significant differences in long term weight loss (Sacks, Bray, Carey, Smith, Ryan, Anton, & Leboff, 2009). Other research before and after the Sacks study found different results. Neacsu and colleagues found that high protein diets (over 30% calories from protein) were highly satiating and "reduce ad libitum food intake over a 4 week period" (Neacsu, Fyfe, Horgan, & Johnstone, 2014). A 2010 study found similar results, in that a high protein/ low glycemic index diet demonstrated increased weight loss (Larsen,

Dalskov, Van Baak, Jebb, Papadaki, Pfeiffer, & Stender, 2010). Although self-reported satiety levels were not significantly different, it was hypothesized that the difference may be very subtle and therefore unnoticeable to the subjects (Larsen et al., 2010).

Higher protein intake may be more satiating than the other macronutrients (Paddon-Jones, Westman, Mattes, Wolfe, Astrup, & Westerterp-Plantenga, 2008). It seems to modulate gut hormones associated with satiety such as ghrelin, Peptide YY, Glucagon Like Peptide (Veldhorst, Smeets, Soenen, Hochstenbach-Waelen, Hursel, Diepvens, Leejune, Luscombe-Marsh, & Westerterp-Plantenga, 2008). Glucagon Like Peptide and Peptide YY are increased while ghrelin (the hunger hormone) is decreased after protein containing meals.

Portion Control

It has been established that larger portions are one of the driving forces contributing to weight gain, and therefore the obesity epidemic (Spence, Lähteenmäki, Stancu, Livingstone, Gibney, & Dean, 2015). Recent research suggests that larger portion sizes lead to drastic increases in energy intake (Rolls, 2014). Based on a study focusing on the amount of food people ate, subjects were unaware of the portions they consumed. They ate more when more was provided without realizing the difference. The effects also were sustained, people ate more as the amount of food available to them increased for spans of time up to two months (Rolls, 2014).

There are numerous strategies to reduce the portions one consumes, such as using smaller plates/bowls (Spence et al., 2015). One study investigated social, psychological and behavioral factors related to the usage of portion control strategies (Spence et al., 2015). Portion control strategies can be categorized into purchasing strategies (buying healthier food and/or buying less food), eating strategies (filling up on water) and measurement strategies (measuring food in grams/ounces). The measurement strategy was least used, because many people did not fully

understand portion sizing. Eating strategies were used the most, likely because they required no planning and little effort and this strategy were not affected by value-based pricing (unlike the purchasing strategy) (Spence et al., 2015). Eating strategy scale scores were inversely associated with BMI suggesting that these strategies are useful for losing/maintaing weight. However the message is not as simple, as "eat less" because the amount of low energy, nutrient dense foods such as vegetables should be increased (Rolls, 2014). Although there are many tools and strategies, there is not one that will work perfectly for everyone.

Dining Out

Food outside of the home "is a major contributor to excess calories consumed" (Cohen & Story, 2014). Over the past few decades the amount of food consumed outside of the home has steadily increased (Kant, Whitley & Graubard, 2015). These foods tend to be high in calories, sodium and fat and low in nutrients. Kant et al. used data from the 2005-2010 NHANES, and found that more than half of Americans reported eating meals away from home at least 3 times per week, and approximately 1 out of 3 eat fast food at least 2 times each week. Americans tend to eat out quite often but how much is too much?

The Institute of Medicine recommends 640 calories for lunch/dinner for the average 2000 calorie diet, but often times meals outside of the home exceed this level (Cohen & Story, 2014). One study reviewed approximately 250 restaurant chains to find entrees averaging 674 calories, appetizers averaging 813 calories, drinks averaging 419 calories, sides averaging 260 calories and desserts averaging 429 calories. Most of the time when people go out, multiple items are

consumed whether an entrée and a drink, entrée and a dessert etc. When consuming multiple items (considering these averages), one is likely to exceed the IOM recommendations. Also there is no standard serving size when it comes to restaurants so it is difficult for customers to know how many calories they are consuming (Cohen & Story, 2014). The combined poor nutritional value of these foods, how often they are consumed in the U.S, and the portions provided have shown to have negative outcomes on our health. As a population we should choose to eat out less. When eating out, strategies can be used to decrease portion sizes, such as ordering reduced sized portions or even sharing food (Spence et al., 2015).

Summary

After reviewing many sources, it is evident that worksite wellness programs are taking place all over the world. Their popularity has increased as effective worksite wellness programs have helped employees to lose/maintain weight, improve health outcomes, while simultaneously saving money for their employers. The programs may vary in their structure, focus, size, duration and effectiveness but each have common goals: helping employees to lead healthy lifestyles. There is sufficient evidence that these programs have been able to promote healthy behaviors. The Cowboy Challenge program is no different; providing nutrition education through an on-site Registered Dietitian along with a regimented physical activity program in order to promote a healthy lifestyle for the employees of Oklahoma State University. The purpose of this study was to assess the effectiveness of the program.

CHAPTER III

METHODOLOGY

For this study, data were collected for 91 participants in the Fall 2014 to Spring 2016. The Cowboy Challenge program was advertised to OSU Stillwater employees and employees who were eligible were able to participate without any fees. In order to be eligible for this program, participants must not have any injuries or surgeries in the last 6 months or could not have participated in the past Building a Healthy Lifestyle on Nutrition, Confidence and Energy (B.A.L.A.N.C.E). or Naturally Slim programs. Applicants were required to be a benefits-eligible employee of the Stillwater campus of Oklahoma State University, complete all waivers/releases by the Department of Wellness, be available for the entire 12-week program, and be willing to submit medical/ biometric data (such as weight, cholesterol and blood pressure). In the event of more than 24 people signing up, they were admitted on a first come – first served basis. However, potential participants were evaluated based on past exercise, health status, injuries and mental status and if deemed unsuitable, were encouraged to find another program that met their needs better. Although, the potential participant had the final decision. Participants also agreed to attend two mandatory meetings (at the beginning and end of the program), and commit to a certain amount of physical activity, specified below.

Participants committed to at least 8 weeks of physical activity with a minimum of 150 minutes of physical activity each week. Activity included at least two - 45 minute sessions with a provided personal trainer at specified times each week. Exercise was recorded and turned in to each team's coach every week.

The program also included nutrition guidance during weeks 3 through 9, from a Registered Dietitian. There were three group meetings, and one team consultation. In the meetings participants received sample meal plans, recipes, and instruction on healthy eating habits. Participants committed to recording and submitting food journals for at least 3 weeks of the program and attending at least 2 of the 3 offered group nutrition meetings. Topics in the group meetings included nutrition options, hydration, healthy snacking, mindful eating, dining out portion control and macronutrient distribution.

There was a non-compliance fee of $150 that was assessed if the required amount of physical activity was not maintained for at least 8 of the weeks, required food journals were not kept, or the participant failed to attend at least two of the nutrition group meetings. If a nutrition group meeting was missed, the participant had the option to schedule an individual meeting with the dietitian for a fee of $25 to avoid paying the non-compliance fee. Partial non-compliance fees were assessed under special circumstances such as personal injury. Participants in the winning team each semester were given fit-bits, and two free massages were awarded ($55 value each).

The program included mandatory pre and post assessments of both health and fitness, which took place in the first and final weeks. These assessments included a fasting Health Risk Assessment which measured total cholesterol, LDL cholesterol, HDL cholesterol, triglycerides, glucose, blood pressure, Body Mass Index, and abdominal circumference. The blood lipid panel values were taken using a finger stick test using the CardioChek PA and PTS panel test strips. Fasting blood glucose was taken using a finger stick test from a glucometer. Blood pressure

values were taken using a manual cuff. The abdominal girth of participants was measured under their clothing and values were recorded in inches.

The Physical Fitness assessment included the YMCA Bench Press to measure muscular endurance, the Rockport 1-Mile Walk or the Modified Naughton Treadmill Protocol to measure cardiovascular fitness and the Trunk Flexion [sit and reach] to measure flexibility. For the YMCA Bench Press Test a metronome was set a 1:1 tempo and the participant continued until he or she was no longer able. The weight was set at 35 pounds for females and 80 for males. The more reps reached the better the muscular endurance of the individual (Campbell, Richmond, & Dawes, 2016). Cardiovascular fitness was assessed using the Rockport 1-mile walk test starting in Fall 2015. The speed of the treadmill was determined by the participant, and the time measured how long it took for the participant to reach the 1-mile goal. The shorter the time, the faster the participant reached the goal which indicated better cardiovascular fitness (Kim, Lee, Lee, & Nam, 2015). Prior to Fall 2015 a protocol similar to the Naughton Treadmill Protocol was used. It was a stage based rather than time based assessment. As the participant continued on the treadmill, the speed was increased after a set amount of time and the participant continued to the next stage of difficulty. In this protocol, the longer the time, the higher the stage the participant reached which indicated better cardiovascular fitness (Thomas, Glassner-Kolmin, & Gomberg-Maitland, 2013). Finally, flexibility (trunk flexion) was measured using the sit and reach test. The numbers indicated the distance in centimeters the participant was able to reach. A higher the number indicated better flexibility. However, in order to engage the measuring device, participants must be able to reach 9 cm otherwise their flexibility was too low to be identified and a value of zero was recorded (Mayorga-Vega, Merino-Marban, & Viciana, 2014).

As this study involves human subjects, it is very important that the rights and best interests of the participants be respected. No contact was made with subjects and no data was

requested until after going through the proper channels. The study protocol was approved as exempt by the Institutional Review Board at Oklahoma State University (Appendix A).

The participants were surveyed after completing the program on their perceptions of the Cowboy Challenge program, and its effectiveness in relation to their goals. The survey was administered online via Survey Monkey, See the attached survey in Appendix B.

The health risk assessment and physical fitness data collected at the program's conclusion were compared to the beginning data using paired t-test. The survey responses were analyzed using descriptive statistics. Open-ended questions were analyzed by identifying common themes in the responses.

Research Questions

What is the difference in employees' blood lipid profile (total cholesterol, HDL, LDL, triglycerides) before and after Cowboy Challenge?

What is the difference in employees' diastolic and systolic blood pressure before and after Cowboy Challenge?

What is the difference in employees' fasting blood glucose before and after Cowboy Challenge?

What is the difference in employees' Body Mass Index before and after Cowboy Challenge?

What is the difference in employees' abdominal girth before and after Cowboy Challenge?

What is the difference in employees' muscular endurance (YMCA bench press) before and after Cowboy Challenge?

What is the difference in employees' cardiovascular fitness (Rockport 1 mile walk) before and after Cowboy Challenge?

What is the difference in employees' flexibility (trunk flexion) before and after Cowboy Challenge?

What are the employees' perceptions of the Cowboy Challenge program?

CHAPTER IV

FINDINGS

A total of 91 Oklahoma State University employees took part in the Cowboy Challenge Program. Each semester between Fall 2014 and Spring 2016 there were approximately 22 participants. The participants included a majority of females (78%); there were 20 male participants (22%). Their age ranged from 22 to 63 years of age (mean 39.7 $\pm$ 11.2). Nine participants (9.9%) were non-compliant, meaning they did not take part in the entirety of the program.

Blood tests taken before and after the program revealed no significant difference in glucose, cholesterol, HDL, LDL or triglyceride levels (Table 1). Regarding blood pressure, systolic blood pressure tended ($p = 0.08$) to decrease but the decline was not significant. The decrease in diastolic blood pressure was significant ($p < .001$).

There was no significant change in abdominal girth but weight ($p = .003$) and BMI ($p = .004$) both decreased slightly but significantly.

The scores on the Bench Press, Sit and Reach, and Rockport 1-Mile tests improved significantly ($p < .001$ each) but there was no significant change in the results of the Modified Naughton Treadmill Protocol.

Table 1. Objective participant data before and after Cowboy Challenge Program (n=91)

Objective data	Pre - Test	Post - Test	P value
	Mean ± SD	Mean ± SD	
Glucose (mg/dl)	100.6 ± 21.2	98.4 ± 18.3	.210
Cholesterol (mg/dl)	168.8 ± 37.4	172.6 ± 34.7	.203
HDL (mg/dl)	56.1 ± 15.7	55.0 ± 15.7	.318
LDL (mg/dl)	87.8 ± 30.4	91.7 ± 30.8	.213
Triglycerides (mg/dl)	122.6 ± 63.5	131.8 ± 79.4	.269
Systolic Blood Pressure (mmHg)	116.5 ± 11.7	114.3 ± 11.9	.080
Diastolic Blood Pressure (mmHg)	78.8 ± 8.9	75.6 ± 8.0	<.001
Weight (#)	184.5 ± 41.3	183.0 ± 40.4	.003
BMI (kg/m^2)	29.7 ± 5.9	29.5 ± 5.8	.004
Abdominal Girth (inches)	35.8 ± 5.8	35.5 ± 5.5	.119
Bench Press (reps)	23.0 ± 13.0	30.6 ± 16.7	<.001
Flexibility (Sit and Reach) (cm)	20.7 ± 8.7	23.5 ± 9.4	<.001
Rockport 1-Mile Test Time (Fall 15/ Spring 16, n=44) (minutes)	17.4 ± 2.3	15.9 ± 2.0	<.001
Modified Naughton Treadmill Protocol Time (Fall 14/Spring 15, n=41) (minutes)	19.2 ± 4.6	20.6 ± 5.6	.110

At baseline, 72.5% of Cowboy Challenge participants were overweight or obese. The Obesity category had the largest number of participants (41), more than twice the amount of the normal weight category. Upon completion of the program the overweight category increased and the obesity category decreased by two participants. There was no change to the number of those considered normal or underweight (Table 2).

Table 2. BMI classification of participants before and after Cowboy Challenge

Weight Category	Pre - Test	Post - Test
	n (%)	n (%)
Underweight (BMI less than 18)	1 (1.1%)	1 (1.1%)
Normal weight	20 (22%)	20 (22%)
Overweight	25 (27.5%)	27 (29.7%)
Obese	41 (45%)	39 (42.9%)

Survey Results

An online survey was emailed to 91 participants in order to evaluate the perceptions of the Cowboy Challenge program. Five participants no longer work at the university and three did not have valid email addresses. Of the remaining 83 participants, 26 participants (31.3%) responded to the survey. They were given the opportunity to skip questions so note the response number varies depending on the question. Although the majority of the survey was multiple choice, there were the opportunities for open response.

Participants from the Fall 2015 program were the best represented in this survey with 37.5% (n=9) of participants from Fall 2015 participating in the survey. About 5 participants from the other three cohorts responded (Table 3).

Table 3. Date of participation in the Cowboy Challenge Program

Session of Participation	Number of participants	Number of Participants Who Responded to the Survey
Fall 2014	21	5
Spring 2015	22	5
Fall 2015	24	9
Spring 2016	24	6

Almost all (25 out of 26) respondents agreed or strongly agreed that participation in the Cowboy Challenge program was beneficial. One person disagreed with this statement (Table 4).

Table 4. Belief that participation in the Cowboy Challenge program was a beneficial experience. (n=26)

Response Option	Participant Responses
Strongly Agree	21
Agree	4
Neutral	0
Disagree	1
Strongly Disagree	0

Most (77%, or 20 out of 26) responders agreed that they improved their understanding about nutrition. Five respondents neither agreed nor disagreed with this statement, and one disagreed (Table 5).

Table 5. Improved understanding about nutrition after completing the Cowboy Challenge program. (n=26)

Response Option	Participant Responses
Strongly Agree	5
Agree	15
Neutral	5
Disagree	1
Strongly Disagree	0

Most (88%, 22 out of 25) of responders agreed that they improved their understanding about exercise. Three neither agreed nor disagreed with this statement, and no one disagreed (Table 6).

Table 6. Improved understanding about exercise after completing the Cowboy Challenge program (n=25)

Response Option	Participant Responses
Strongly Agree	10
Agree	12
Neutral	3
Disagree	0
Strongly Disagree	0

A majority (73%, 18 out of 26) of responders agreed the program helped them to develop healthy habits. Five respondents neither agreed nor disagreed with this statement and two disagreed (Table 7).

Table 7. Development of healthy habits. (n=26)

Response Option	Participant Responses
Strongly Agree	6
Agree	13
Neutral	5
Disagree	2
Strongly Disagree	0

Respondents varied in their responses to the consistency of their food choices since participating in the program (Table 8). Ten of responders agreed that they have been making healthier food choices consistently, 10 respondents neither agreed nor disagreed with this statement and 6 disagreed.

Table 8. Consistently making healthier food choices since participating in the Cowboy Challenge program (n=26).

Response Option	Participant Responses
Strongly Agree	3
Agree	7
Neutral	10
Disagree	6
Strongly Disagree	0

Half (13 out of 26) of responders agreed that they have been consistently exercising since participating in the program. Five respondents neither agreed nor disagreed with this statement and 8 disagreed (Table 9).

Table 9. Exercising consistently since participating in the Cowboy Challenge program. (n=26)

Response Option	Participant Responses
Strongly Agree	8
Agree	5
Neutral	5
Disagree	8
Strongly Disagree	0

Table 10 provides the benefits respondents believe they received from participating in the Cowboy Challenge program. Participants could select as many benefits as they wished. Most (81%) of respondents (n=21) indicating seeing "increased cardiovascular fitness," making it the most popular of the ten listed benefits. Other common responses were "feeling better/healthier" as well as increases in strength, energy and flexibility. The least indicated benefit was decreased cholesterol with 5 respondents. Five respondents entered a response of "other," two of these responses are very similar to provided options, for example "…more conscientious eater" is similar to the provided "make healthier food choices." The other responses included increased "blood sugar control," "weight maintenance," and a "better understanding of cross training." Only one respondent stated he or she perceived no benefit.

Table 10. Benefit(s) received from the Cowboy Challenge program. (n=26)

Response Option	Participant Responses
Increased Cardiovascular Fitness	21
Feel Better / Healthier	18
Increased Strength	17
Increased Energy	16
Increased Flexibility	16
Increased Motivation to Make Healthier Choices	15
Make Healthier Food Choice	11
Weight Loss	9
Reduced Stress	9
Decreased Cholesterol	5
Other (Please specify)	5
No benefit	1

The question about the most helpful aspects of the program was an open response format. Five response themes were found (Table 11). The most popular themes were the personal trainers and the mandatory scheduling aspect which each received five responses; comments included "(training with the) personal trainers," "forced participation," and "…scheduling." The nutrition aspect and the group/team accountability aspect each received four of the responses; example comments include "nutrition meeting/classes" and "team environment/…working out in a group." Two responses were related to the exercise component (without mentioning personal trainers), an example comment is "variability of exercises."

Table 11. Most helpful aspect(s) of the Cowboy Challenge program (n=20)

Response Theme	Participant Responses
(Mandatory) Scheduling	5
Personal Trainer / Coach	5
Nutrition	4
Group / Team Accountability	4
Exercise / Fitness	2

Participants were asked their overall satisfaction with the Cowboy Challenge program. Almost all (25 out of 26) of responders were satisfied with the Cowboy Challenge program. One respondent was not satisfied (Table 12).

Table 12. Satisfaction with the Cowboy Challenge program. (n=26)

Response Option	Participant Responses
Strongly Agree	19
Agree	6
Neutral	0
Disagree	1
Strongly Disagree	0

Finally, participants were asked to provide their feedback on the Cowboy Challenge experience and how it could be improved. Sixteen participants responded to this question. The question regarding feedback and recommendations was also open response. Four people provided comments without recommendations. The content of these responses were primarily positive

including “loved it,” and “wish I could do it again.” One respondent admitted to not continuing to exercise but states that he does not fault the program for that. Twelve of the respondents provided recommendations. Five of the twelve recommendation responses were regarding the nutrition portion. Four of the respondents thought the nutrition component could be improved, either by providing more structure or simply incorporating more nutrition content and one stated they already had healthy eating habits so the nutrition content was not helpful. Three respondents expressed that they would like a way to continue/repeat the program. Two recommendations regarded logistical things such as additional times/places of the workout sessions. One person thought that (some) of the fitness regimen was too advanced/difficult for people who were out of shape, and one simply stated that injured participants should not be charged for non-compliance.

CHAPTER V

DISCUSSION

There is an obesity epidemic affecting the United States and similarly affecting the world at large. Obesity and the chronic diseases that accompany it are costing billions of dollars in healthcare, and more importantly taking lives (Mishra et al., 2013). Many employers have started various worksite wellness programs in order to try and help alleviate this issue. Those investing in the development of these programs want to ensure their efficacy, so evaluations are carried out in order to see what makes an effective program.

The Cowboy Challenge program did not target any particular disease state. Although most participants were overweight or obese (n=66, 72.5%), the goal of this program was not weight loss, but to promote healthy lifestyles among the employees of Oklahoma State University through physical activity and nutrition education. However, the Cowboy Challenge program did demonstrate a slight but significant weight loss (approximately 1.5 pounds (0.7 kg)). The weight loss found was consistent with similar programs typically demonstrating between 0.5 kg – 4.0 kg (Mache et al., 2012). The Healthy Team Health U (HTHU) program, another university team-based worksite wellness program (n=3780), also found changes in both weight (2.02-2.9 kg) and BMI with greater weight loss demonstrated in those who were overweight/obese (Goldberg et al., 2015). The Be Fit program found a weight loss of 1.9 kg and 3.6 cm decrease in abdominal girth

after ten weeks of intervention (Thorndike et al., 2011). At baseline, 63% of Be Fit participants (n=794) were overweight or obese compared to the 72.5% of Cowboy Challenge participants (Thordike et al., 2011). In the Cowboy Challenge program, this weight loss was accompanied by a slight but significant improvement in BMI, but there was no change in abdominal girth.

Blood tests completed before and after the program did not show a significant change in glucose, total cholesterol, LDL, HDL or triglyceride levels. The mean values of the blood lipids taken pre-intervention were all within normal limits, and glucose was borderline high at 100.6 mg/dl. These results are different than the GEICO study in which total cholesterol, LDL, HDL, and hemoglobin A1c were decreased significantly (Mishra et al., 2013). However, the GEICO program targeted only those who were overweight (BMI $\geqslant$ 25 kg/m2) and/or diagnosed with type 2 diabetes mellitus (Mishra et al., 2013). The study also had a much larger population, the program occurred for a longer duration and the intervention included a vegan diet (Mishra et al., 2013). The Rutgers program was a 12-week program (similar to Cowboy Challenge) that, like the GEICO program, only allowed participants who were overweight or obese and also reported significant improvements in glucose, weight, BMI, abdominal girth as well as diastolic blood pressure (Radler et al., 2015). Be Fit was a similar short term (10-week) program that, like Cowboy Challenge, used a team-based intervention with both nutrition and physical activity components (Thorndike, Healey, Sonnenburg, & Regan, 2011). Most (63%) Be Fit participants demonstrated elevated blood pressure and cholesterol levels, which may explain why this program found a significant decrease in total cholesterol of approximately 8 mg/dL and the Cowboy Challenge program saw no significant decrease (Thorndike et al., 2011).

The Cowboy Challenge participants had a change in blood pressure. Although not significant, systolic blood pressure tended to decrease ($p = 0.08$) and there was a significant decrease in diastolic blood pressure ($p < .001$) . These results were similar to other worksite

wellness programs such as the HTHU program, the Be Fit program, and the Rutgers program (Goldberg et al. 2015; Radler et al., 2015; Thorndike et al., 2011). The Rutgers program's results regarding blood pressure were the most similar to the Cowboy Challenge program, in that both demonstrated significant improvements in diastolic but not systolic blood pressure (Radler et al., 2015). HTHU found decreases of 2.4/1.6 mm Hg for systolic and diastolic blood pressure respectively and even greater decreases in those with hypertension (Goldberg et al., 2015). In the Be Fit program decreases of 2.6/1.9 mm Hg were reported (Thorndike et al., 2011).

An additional goal of the Cowboy Challenge program was improved physical fitness. Fitness was broken into the following categories: muscular endurance, flexibility and cardiovascular fitness. Muscular endurance was measured using the YMCA Bench Press Test, flexibility was measured using the Sit and Reach Test, and cardiovascular fitness was originally tested using a modified version of the Naughton Treadmill Protocol, however, more recently the Rockport 1-Mile Test was used. Significant improvements were found in each physical fitness category (although the participants who were measured using the Modified Naughton Treadmill Protocol did not demonstrate significant improvements). Although the other studies may have differed from the Cowboy Challenge program in what was measured, similar improvements in physical activity were found. For example, In the HTHU program and Go! programs, questionnaires were provided which included questions about the amount and intensity of physical activity (Goldberg et al., 2015; LaCaille et al., 2016). The HTHU program demonstrated an increase of approximately 19% in self-reported daily physical activity (Goldberg et al., 2015).

After completing the program, participants were sent an online survey in order to obtain follow up data and program feedback. Less than one out of three participants responded, but based on their responses, the majority of participants believed the Cowboy Challenge program was beneficial and were satisfied. The respondents claimed it helped improve their knowledge of exercise and nutrition and helped them develop healthy habits, these results are consistent with

other programs. The HTHU and Go! programs also collected surveys regarding the perception of their program. The Go! study did not state the number of respondents but as for the HTHU program, only 131 of the 986 participants completed both pre and post intervention surveys (13.3%) (Goldberg et al., 2015; LaCaille et al., 2016). Both of these programs received positive feedback regarding perceived efficacy (Goldberg et al., 2015; LaCaille et al., 2016).

Participants in the Cowboy Challenge program attributed their successes with the program to the personal trainers, the mandatory scheduling and group accountability aspects of the program. Some had difficulty with consistently exercising and/or eating healthy after the program ended. The two most common recommendations for improvement were regarding a more in-depth nutrition component (more content) and an ability to continue or repeat the program.

This was not the first examination of its kind for Oklahoma State University, the most recent study was the B.A.L.A.N.C.E program, a 14 – week program which also included nutrition and physical activity (Manni, 2016). This program was slightly different in its duration and its focus was specific to those with metabolic syndrome, it also had more emphasis on nutrition. However, the design, methods, interventions, measures, and survey of the B.A.L.A.N.C.E program were similar to the Cowboy Challenge program. The B.A.L.A.N.C.E program demonstrated significant improvements in abdominal girth, weight/BMI, triglycerides, both systolic and diastolic blood pressure, fasting blood glucose and each of the physical fitness measures (Manni, 2016). Both programs found improvements in physical fitness, weight/BMI, and diastolic blood pressure. The significant changes in blood glucose, systolic blood pressure, and triglycerides seen in the B.A.L.A.N.C.E study may be related to differences in populations targeted in these two programs and/or the differences in nutrition education.

An effective program should include/target the healthy population as well as the overweight, because prevention is just as important as treatment of overweight and chronic disease (Mache et al., 2015). The participants must have the opportunity to begin participation and the support/motivation to keep going. It is important that participants are learning but also that they are encouraged to implement lifestyle changes. Some programs include incentivizing participants and/or environmental changes (LaCaille et al., 2016). Not all programs will have each of the mentioned components but many well designed programs will have the majority of them. The Cowboy Challenge program is one such program. It did not exclude potential participants based on weight, nutritional status, or medical diagnosis. Participants were allowed to participate for free, there was a non-compliance fee, and the fit-bits awarded to winners served as incentives. Because this program was competitive in nature, that competition itself may have also improved motivation for participants. Learning took place in the nutrition meetings as well as the exercise sessions guided by personal trainers. The food journals and required exercise of the Cowboy Challenge program helped to encourage lifestyle changes in participants. However, there were no environmental changes put into place.

Due to the nature of the intervention, a randomized controlled trial was not feasible, so a pre-post-intervention method was used. This design was also used in similar programs such as the Be Fit program, the Rutgers Program and the HTHU program (Goldberg et al., 2011; Radler et al., 2015; Thordike et al., 2011). The design of the Cowboy Challenge program also has similarities with other programs regarding the duration and outcomes measured. The duration of the Be Fit, Rutgers, and B.A.L.A.N.C.E programs ranged from 10 to 14 weeks and used blood tests to measure blood glucose and lipids (Manni, 2016; Radler et al., 2015; Thorndike et al., 2011).

Limitations

The largest limitation of this study was the issue of number of participants. The total of 91 participants was modest. There was a much higher number of female participants than male participants, although that seems to be the norm amongst similar worksite wellness programs (LaCaille et al., 2016; Radler et al., 2015). The amount of participants who responded to the survey was also low (n=26, 31.3%) and therefore may not reflect the perceptions of the entire program. This survey was the only form of follow up after the conclusion of the program.

There were also limitations regarding the measurements themselves. The biochemical measures (blood glucose and lipid profile) were taken with finger prick tests which may not be accurate enough to detect changes if test strips were not stored in proper conditions (regarding the temperature, amount of light and humidity) (Klug, Raal, Marais, Taskinen, Dalby, Schamroth, Rapeport, Jankelow, Blom, Catsicas, Webb, 2015). Finger prick tests use whole blood and glucose is unstable in whole blood, and multiple factors such as patient medications, hydration and other metabolic factors can impact the readings (Tonyushkina & Nichols, 2009).

Abdominal girth was measured in inches, however, due to the modest nature of the weight change, inches may have been too large of a unit to see a change, centimeters may have been more accurate. There is also the possibility of human error, for example, perhaps the person taking this measurement may have pulled the measuring tape with a different tightness each time therefore getting each measurement slightly different.

Future Directions

Although some success was seen in this program, there is always room for improvement. Perhaps increasing the duration of the program would provide more improvement in the blood test results and/or build upon the positive changes attributed to the Cowboy Challenge Program. A maintenance program or follow up program similar to the Be Fit study or the HTHU study also may have been helpful to produce more long lasting results. In these cases, an additional program was designed with the goal of enhancing healthy behaviors and a digital medium was used to present unique content building upon what was taught in the original program (Goldberg et al., 2015; Thorndike et al., 2012). Simply following up on participants after a longer period of time, would help demonstrate whether or not these short term programs can have long terms effects on health behaviors and/or outcomes.

The Cowboy Challenge program combined nutrition and physical activity components, but did not directly address stress management. The addition of a stress management component might increase the efficacy of the program. Also, because the nutrition and physical activity interventions were done simultaneously, we do not know whether to attribute these positive changes to nutrition, physical activity, or both. It may be beneficial to conduct separate programs but split participants into groups: control, nutrition intervention only, physical activity intervention only, and mixed intervention. However, some of these ideas may not be feasible due to staffing limitations of the department of wellness.

REFERENCES

Afanuh, S., Lee, M., & Hudson, H. (2015) Using Total Worker Health™ concepts to enhance workplace tobacco prevention and control. Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. DHHS (NIOSH) Publication No. 2015–202.

Anderson, L. M., Quinn, T. A., Glanz, K., Ramirez, G., Kahwati, L. C., Johnson, D. B., & Katz, D. L. (2009). The effectiveness of worksite nutrition and physical activity interventions for controlling employee overweight and obesity: a systematic review. *American Journal of Preventive Medicine*, *37*(4), 340-357.

Baicker, K., Cutler, D., & Song, Z. (2010). Workplace wellness programs can generate savings. *Health Affairs, 29*(2), 304-311.

Blumenthal, D & Collins, S. (2014). Health Care Coverage under the Affordable Care Act – A Progress Report. *The New England Journal of Medicine. 371,* 275-281.

Butler, C., Clark, B. R., Burlis, T., Castillo, J., & Racette, S. (2015). Physical activity for campus employees: a university worksite wellness program. *Journal of Physical Activity Health, 12*(4), 1-15

Campbell, B. I., Richmond, J. L., & Dawes, J. J. (2016). The effects of a commercial, pre-exercise energy drink supplement on power, muscular endurance, and repeated sprint speed. *International Journal of Exercise Science*, *9*(2), 205-213

Carnethon, M., Whitsel, L. P., Franklin, B. A., Kris-Etherton, P., Milani, R., Pratt, C. A., . . . Committee, A. H. A. A. C. (2009). Worksite wellness programs for cardiovascular disease prevention a policy statement from the American Heart Association. *Circulation, 120*(17), 1725-1741.

Cash, S. W., Beresford, S. A., Henderson, J. A., McTiernan, A., Xiao, L., Wang, C. Y., & Patrick, D. L. (2012). Dietary and physical activity behaviors related to obesity-specific quality of life and work productivity: baseline results from a worksite trial. *The British Journal of Nutrition*, *108*(6), 1134–1142.

Centers for Disease Control and Prevention. (2016). Chronic Disease Overview. Retrieved April 12, 2016, from http://www.cdc.gov/chronicdisease/overview/

Centers for Disease Control and Prevention. (2016). Defining Adult Overweight and Obesity. Retrieved April 12, 2016, from https://www.cdc.gov/obesity/adult/defining.html

Centers for Disease Control and Prevention. (2013). Preventing Weight Gain. Retrieved from https://www.cdc.gov/healthyweight/prevention/

Centers for Disease Control and Prevention. State Indicator Report on Fruits and Vegetables. (2013). Retrieved from https://www.cdc.gov/nutrition/downloads/state-indicator-report-fruits-vegetables-2013.pdf

Centers for Disease Control and Prevention. (2015, July 7). Wellness at Work. Retrieved April 12, 2016, from http://www.cdc.gov/features/workingwellness/

Christensen, J.R., Overgaard, K., Carneiro, I.G., Holtermann, A., & Søgaard, K. (2012). Weight loss among female health care workers- a 1-year workplace based randomized controlled trial in the FINALE-health study. *BMC Public Health, (12),* 625.

Cohen, D. A., & Story, M. (2014). Mitigating the health risks of dining out: the need for standardized portion sizes in restaurants. *American Journal of Public Health, 104*(4), 586-590.

Elliot, D., MacKinnon, D., Mabry, L., Kisbu-Sakarya, Y., DeFrancesco, C., Coxe, S., . . . Favorite, K. (2012). Worksite wellness program implementation: a model of translational effectiveness. *Translational Behavioral Medicine*, 2, 228-235.

Eng, J. Y., Moy, F. M., & Bulgiba, A. (2016). Impact of a workplace health promotion program on employees' blood pressure in a public university. *PLOS ONE, 11*(2), 1-14. doi:10.1371/journal.pone.0148307

Flynn, M., McNeil, D., Maloff, B., Mutasingwa, D., Wu, M., Ford, C., & Tough, S. (2006). Reducing obesity and related chronic disease risk in children and youth: a synthesis of evidence with 'best practice'recommendations. *Obesity Reviews, 7*(s1), 7-66.

Grimm, K., Blanck, H., Scanlon, K., Moore, L., Grummer-Strawn, L., & Foltz, J. (2010). State-specific trends in fruit and vegetable consumption among adults-United States, 2000-2009. *Morbidity and Mortality Weekly Report, 59*(35), 1125-1130.

Goldberg, L., Lockwood, C., Garg, B., & Kuehl, K. S. (2015). Healthy Team Healthy U: a prospective validation of an evidence-based worksite health promotion and wellness platform. *Frontiers in Public Health, 3*(188), 1-12

Haskell, W. L., Lee, I.-M., Pate, R. R., Powell, K. E., Blair, S. N., Franklin, B. A., & Bauman, A. (2007). Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Circulation, 116*(9), 1081-1090.

Hopkins, J. M., Glenn, B. A., Cole, B. L., McCarthy, W., & Yancey, A. (2012). Implementing organizational physical activity and healthy eating strategies on paid time: process evaluation of the UCLA WORKING pilot study. *Health Education Research, 27*(3), 385-398.

Institute of Medicine. 2005. Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids (Macronutrients). Washington, DC: The National Academies Press. doi:https://doi.org/10.17226/10490.

Johnson, P., Turner, L., Carter, M., Kelly, R., & Ewell, P. (2015). Metabolic syndrome prevalence and correlates in a worksite wellness program. *Workplace Health & Safety, 63*(6), 245-252. doi:10.1177/2165079915576920

Kant, A. K., Whitley, M. I., & Graubard, B. I. (2015). Away from home meals: associations with biomarkers of chronic disease and dietary intake in American adults, NHANES 2005–2010. *International Journal of Obesity*, *39*(5), 820-827.

Kim, K., Lee, H. Y., Lee, D. Y., & Nam, C. W. (2015). Changes in cardiopulmonary function in normal adults after the Rockport 1 mile walking test: a preliminary study. *Journal of Physical Therapy Science*, *27*(8), 2559-2561

Klug, E., Raal, F., Marais, A., Taskinen, M., Dalby, A., Schamroth, C., Rapeport, N., Jankelow, D., Blom, DJ., Catsicas, R., & Webb, D. (2015). South African Dyslipidaemia Guideline Consensus Statement. *South African Family Practice*, *57*(2), 22-31. doi:10.1080/20786204.2013.10874296

LaCaille, L. J., Schultz, J. F., Goei, R., LaCaille, R. A., Dauner, K. N., de Souza, R., Nowak, A., & Regal, R. (2016). Go!: results from a quasi-experimental obesity prevention trial with hospital employees. *BMC Public Health*, *16*(1), 1-16.

Larsen, T. M., Dalskov, S. M., van Baak, M., Jebb, S. A., Papadaki, A., Pfeiffer, A. F., & Stender, S. (2010). Diets with high or low protein content and glycemic index for weight-loss maintenance. *New England Journal of Medicine*, *363*(22), 2102-2113.

LeCheminant, J., & Merrill, R. (2012). Improved health behaviors persist over two years for employees in a worksite wellness program. *Population Health Management, 15*(5). 261-266

Leslie, J. H., Hughes, C. K. U., & Braun, K. L. (2010). Engaging participants in design of a Native Hawaiian worksite wellness program. *Progress in Community Health Partnerships: Research, Education, and Action, 4*(2), 121-130.

Mache, S., Jensen, S., Jahn, R., Steudtner, M., Ochsmann, E., & Preuß, G. (2015). Worksite health program promoting changes in eating behavior and health attitudes. *Health Promotion Practice 16(6),*826-836 doi: 10.1177/1524839915596310

Maes, L., Van Cauwenberghe, E., Van Lippevelde, W., Spittaels, H., De Pauw, E., Oppert, J.M., Van Lenthe, F.J., Brug, J., & De Bourdeaudhuij, I. (2012). Effectiveness of workplace interventions in Europe promoting healthy eating: a systematic review. *European Journal of Public Health 22(5),* 677-682

Manni, M. (2016). *B.A.L.A.N.C.E.: Evaluating The Effectiveness Of A 14-Week Worksite Wellness Program On Reducing Metabolic Syndrome Risk Factors* (Unpublished master's thesis). Oklahoma State University.

Mayorga-Vega, D., Merino-Marban, R., & Viciana, J. (2014). Criterion-related validity of sit-and-reach tests for estimating hamstring and lumbar extensibility: A meta-analysis. *Journal of Sports Science & Medicine,* 13(1), 1-14

Merrill, R., & Hull, J. (2013). Factors associated with participation in and benefits of a worksite wellness program. *Population Health Management, 16*(4), 221-226. doi:10.1089/pop.2012.0064

Mishra, S., Xu, J., Agarwal, U., Gonzales, J., Levin, S., & Barnard, N. D. (2013). A multicenter randomized controlled trial of a plant-based nutrition program to reduce body weight and cardiovascular risk in the corporate setting: the GEICO study. *European Journal of Clinical Nutrition, 67*(7), 718-724.

Naydeck, B., Pearson, J., Ozminkowski, R., Day, B., & Goetzel, R. (2008). The impact of the Highmark employee wellness programs on 4-year healthcare costs. *Journal of Ocupational and Environmental Medicine 50*(2), 146-156. doi:10.1097/JOM.0b013e3181617855

Neacsu, M., Fyfe, C., Horgan, G., & Johnstone, A. M. (2014). Appetite control and biomarkers of satiety with vegetarian (soy) and meat-based high-protein diets for weight loss in obese men: a randomized crossover trial. *The American Journal of Clinical Nutrition, 100*(2), 548-558.

Newman, L., Stinson, K., Metcalf, D., Fang, H., Brockbank, C., Jinnett, K., & Goetzel, R. (2015). Implementation of a worksite wellness program targeting small businesses. *Journal of Ocupational and Environmental Medicine 57*(1), 14-20. doi:10.1097/JOM.0000000000000279

Norman, G., Heltemes, K., & Drew, J. (2014). Examining incentive design strategies for worksite wellness program engagement. *Population Health Management, 17*(6), 324-331. doi:10.1089/pop.2014.0008

Ozminkowski, R. J., Ling, D., Goetzel, R. Z., Bruno, J. A., Rutter, K. R., Isaac, F., & Wang, S. (2002). Long-term impact of Johnson & Johnson's Health & Wellness Program on health care utilization and expenditures. *Journal of Occupational and Environmental Medicine, 44*(1), 21-29.

Paddon-Jones, D., Westman, E., Mattes, R. D., Wolfe, R. R., Astrup, A., & Westerterp-Plantenga, M. (2008). Protein, weight management, and satiety.*The American Journal of Clinical Nutrition, 87*(5), 1558S-1561S.

Person, A. L., Colby, S. E., Bulova, J. A., & Eubanks, J. W. (2010). Barriers to participation in a worksite wellness program. *Nutrition Research and Practice, 4*(2), 149-154.

Produce for Better Health Foundation. State of the Plate, 2015 Study on America's Consumption of Fruit and Vegetables, Produce for Better Health Foundation, 2015. Web. http://www.PBHFoundation.org.

Radler, D., Marcus, A., Griehs, R., & Touger-Decker, R. (2015). Improvements in cardiometabolic risk factors among overweight and obese employees participating in a university worksite wellness program. *Health Promotion Practice, 16*(6), 805-813. doi:10.1177/1524839914558515

Resnicow, K., Davis, M., Smith, M., Baranowski, T., Lin, L. S., Baranowski, J., Doyle, C., & Wang, D. T. (1998). Results of the TeachWell worksite wellness program. *American Journal of Public Health, 88*(2), 250-257.

Rolls, B. J. (2014). What is the role of portion control in weight management. *International Journal of Obesity*, 38, S1-S8.

Sacks, F. M., Bray, G. A., Carey, V. J., Smith, S. R., Ryan, D. H., Anton, S. D., ... & Leboff, M. S. (2009). Comparison of weight-loss diets with different compositions of fat, protein, and carbohydrates. *New England Journal of Medicine, 360*(9), 859-873.

Spence, M., Lähteenmäki, L., Stancu, V., Livingstone, M. B. E., Gibney, E. R., & Dean, M. (2015). Quantifying consumer portion control practices. *Appetite*, *92*, 240–246.

Steenhuis, I., Van Assema, P., Van Breukelen, G., Glanz, K., Kok, G., & Vreis, H. (2004). The impact of educational and environmental interventions in Dutch worksite cafeterias. *Health Promotional International*, *19*, 335-43.

Tamers, S. L., Beresford, S. A., Cheadle, A. D., Zheng, Y., Bishop, S. K., & Thompson, B. (2011). The association between worksite social support, diet, physical activity and body mass index. *Preventive Medicine*, *53*(1), 53-56.

Thomas, I. C., Glassner-Kolmin, C., & Gomberg-Maitland, M. (2013). Long-term effects of continuous prostacyclin therapy in adults with pulmonary hypertension associated with congenital heart disease. *International Journal of Cardiology*, *168*(4), 4117-4121.

Thorndike, A. N., Sonnenberg, L., Healey, E., Myint-U, K., Kvedar, J. C., & Regan, S. (2012). Prevention of weight gain following a worksite nutrition and exercise program: a randomized controlled trial. *American Journal of Preventive Medicine, 43*(1), 27-33.

Thorndike, A. N., Healey, E., Sonnenberg, L., & Regan, S. (2011). Participation and cardiovascular risk reduction in a voluntary worksite nutrition and physical activity program. *Preventive Medicine, 52*(2), 164-166. doi:10.1016/j.ypmed.2010.11.023

Tonyushkina, K., & Nichols, J. H. (2009). Glucose meters: A review of technical challenges to obtaining accurate results. *Journal of Diabetes Science and Technology, 3*(4), 971-980. doi:10.1177/193229680900300446

Veldhorst, M., Smeets, A. J. P. G., Soenen, S., Hochstenbach-Waelen, A., Hursel, R., Diepvens, K., Leejune, M., Luscombe-Marsh, M. & Westerterp-Plantenga, M. (2008). Protein-induced satiety: effects and mechanisms of different proteins. *Physiology & Behavior, 94*(2), 300-307.

Wang, X., Ouyang, Y., Liu, J., Zhu, M., Zhao, G., Bao, W., & Hu, F. B. (2014). Fruit and vegetable consumption and mortality from all causes, cardiovascular disease, and cancer: systematic review and dose-response meta-analysis of prospective cohort studies. *British Medical Journal. 349*, 1-14.

APPENDICES

APPENDIX A

IRB Approval

Oklahoma State University Institutional Review Board

Date:	Wednesday, June 15, 2016
IRB Application No	HE1630
Proposal Title:	Evaluation of Cowboy Challenge: 12 -week Worksite Wellness Program
Reviewed and Processed as:	Exempt

Status Recommended by Reviewer(s): Approved Protocol Expires: 6/24/2019

Principal Investigator(s):

Andrew Hooks
Stillwater, OK 74078

Gail Gates
301 HES
Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

☒ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1.Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval. Protocol modifications requiring approval may include changes to the title, PI advisor, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms
2.Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3.Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of the research; and
4.Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Dawnett Watkins 219 Scott Hall (phone: 405-744-5700, dawnett.watkins@okstate.edu).

Sincerely,

Hugh Crethar, Chair
Institutional Review Board

APPENDIX B

Survey Questions:

1. When did you participate in the Cowboy Challenge program?
2. I believe that participating in the Cowboy Challenge program was a beneficial experience.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree

3. I understand more about nutrition and exercise after completing this program.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree

4. This program helped me to develop healthy habits.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree

5. I have consistently been making healthier food choices since participating in this program.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree

6. I have continued to exercising consistently since participating in this program.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree

7. Please indicate the benefit(s) you received from this program. Check all that apply.

Increased Strength	Increased Energy
Increased Flexibility	Increased Cardiovascular Fitness
Weight Loss	Decreased Cholesterol
Reduced Stress	Make Healthier Food Choices
Feel Better/ Healthier	Increased Motivation to make healthy choices
Other (please specify in comments)	No benefit

8. What aspect(s) of the program was most helpful to you?

9. I am satisfied with the Cowboy Challenge program.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree

10. Please provide feedback on your experience with Cowboy Challenge and how it can be improved.

VITA

Andrew Hooks

Candidate for the Degree of

Master of Science

Thesis: EVALUATING "COWBOY CHALLENGE," A WORKSITE WELLNESS PROGRAM OF OKLAHOMA STATE UNIVERSITY

Major Field: Nutritional Sciences

Biographical:

Education:

Completed the requirements for the Master of Science in Nutritional Sciences at Oklahoma State University, Stillwater, Oklahoma in August, 2017.

Completed the requirements for the Bachelor of Science in Culinary Nutrition at Johnson & Wales University, Providence, Rhode Island in 2015.

Experience:

Nutrition Graduate Assistant at Seretean Wellness Center, Stillwater, OK
2015-2016

Student Intern at Regional Medical Center, Orangeburg, SC
Summer 2015

Student Volunteer at Naval Health Clinic New England, Newport, RI
2014-2015

Orientation Leader at Johnson & Wales University, Providence, RI
Summer 2014

Cook Intern at Kiawah Island Golf Resort, Kiawah Island, SC
Summer 2013

Professional Memberships:

Academy of Nutrition and Dietetics

Dietitians in Nutrition Support Dietary Practice Group