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EVALUATING PROGRAM IMPACT ON CHANGE IN CARDIOMETABOLIC OUTCOMES AND IDENTIFYING SOCIO-DEMOGRAPHIC INFLUENCES OF AN OUTCOME-BASED EMPLOYEE WELLNESS PROGRAM

by

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A thesis

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Master of Public Health in the Department of Health & Nutrition Sciences

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To the Graduate Faculty:

The members of the committee appointed to examine the thesis of ANGELA KRAFT find it satisfactory and recommend that it be accepted.

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Re: IRB Determination: ***St. Luke's "Healthy U" Outcome-Based Employee Wellness Program: Evaluating Health Outcomes and Identifying Socio-Demographic Influences***

Dear Ms. Kraft,

I appreciate your request for IRB determination regarding protection of the rights and welfare of subjects involved in the above referenced project.

The project seeks to improve clinical care. While the project does seek to develop generalizable knowledge, the information gathered will not be individually identifiable. Subjects will not be randomized and the interventions fall under standard-of-care. The project does not entail greater risk to individuals than would normally be anticipated under the standard-of-care.

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Thank you again for your inquiry. If you have further questions, you may call the IRB Office for clarifications at (208)381-1406.
Sincerely,

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TABLE OF CONTENTS

List of Tables viii

List of Abbreviations ix

Abstract x

Chapter 1: Introduction 1

- Background 1
- Statement of Problem 2
- Purpose of Study 3
- Study Questions 3
- Significance of Study 3

Chapter II: Literature Review 5

- Why Wellness? 5
- Growth of Wellness in the Workplace 6
- Measuring Success 7
- Types of Programs 8
- Attitudes and Behaviors 9
- Best Practices 11
- Potential Shortcomings 12

Chapter III: Methodology 13

- Study Design 13

Procedure 13

Analysis 17

Chapter IV: Results 20

Sample 20

Results 22

Chapter V: Discussion 30

Summary of Findings 30

Significance of Findings 31

Implications for Future Evaluation 32

Limitations 32

Conclusion 34

References 36

LIST OF TABLES

Table 1 *Demographics* 21

Table 2 *Repeated Measure General Linear Model* 22

Table 3 *Pairwise Comparisons – Year 1 vs. Year 4* 23

Table 4 *Between-Subjects Effects* 23

Table 5 *Between-Subjects Effects – Gender* 24

Table 6 *Pairwise Comparisons – Gender* 24

Table 7 *Between-Subjects Effects – Job Type* 25

Table 8 *Pairwise Comparisons – Job Types, Systolic Blood Pressure* 26

Table 9 *Pairwise Comparisons – Job Types, Diastolic Blood Pressure* 26

Table 10 *Pairwise Comparisons – Job Types, Fasting Blood Glucose* 26

Table 11 *Pairwise Comparisons – Job Types, Waist Circumference* 27

Table 12 *Between-Subjects Effects – Age* 27

Table 13 *Pairwise Comparisons – Age Groups, Systolic Blood Pressure* 28

Table 14 *Pairwise Comparisons – Age Groups, Diastolic Blood Pressure* 28

Table 15 *Pairwise Comparisons – Age Groups, Fasting Blood Glucose* 29

Table 16 *Pairwise Comparisons – Age Groups, Body Mass Index* 29

Table 17 *Pairwise Comparisons – Age Groups, Waist Circumference* 29

LIST OF ABBREVIATIONS

ACA ....Affordable Care Act

BMI .... Body Mass Index

CDC ....Centers for Disease Control and Prevention

HbA1c ....Hemoglobin A1c

HRA ....Health Risk Assessment

KFF/HRT ....Kaiser Family Foundation/Health Research and Education

KHF.. Kaiser Health Foundation

KYN..Know Your Numbers

KHF.. Kaiser Health Foundation

Abstract

Employee wellness programs are an increasingly popular strategy offered by employers to help mitigate and reduce health care costs. Outcome-based employee wellness programs use financial incentives tied to health outcomes to encourage participation and improve health of employees. To date, literature is limited on the effectiveness of such programs and there is evidence that one size fit all approaches limit impact across different socio-demographic groups. Evaluation of the St. Luke's "*Healthy U*" outcome-based employee wellness program found no improvement in cardiometabolic health measures over four years time and identified age, gender, and job type to be influential in a participant's outcomes. Evaluation results suggest the need for further analysis over a longer time frame.

Chapter I: Introduction

Background

Chronic diseases such as heart disease, stroke, cancer, diabetes, and arthritis are estimated to account for up to 75% of all health care spending in the United States (Centers for Disease Control and Prevention, 2012) With more than half of American workers obtaining their health insurance through their place of work, the costs associated with chronic disease have prompted employers to take action. A growing number of organizations are sponsoring wellness programs to promote health and prevent disease among their employees (Robert Wood Johnson Foundation, 2012). Because implementation of new health care regulations as part of the Affordable Care Act will soon require more companies to provide coverage, these programs are likely to further expand (Kaiser Health Foundation [KHF], 2012).

Each year employee wellness programs grow in quantity and magnitude (“Wellness Programs”, 2012). With prevention becoming more and more prevalent in the workplace, it leads one to question the reasoning and effectiveness of these programs. Because health is not merely the absence of disease, but a “state of complete physical, mental, and social well-being,” there has been a recent push for holistic programs to improve overall employee wellness (World Health Organization, 2003). With more individuals impacted by employer-based wellness programs, it is increasingly important to evaluate these models to ensure they are effective and necessary. Organizations need to be aware of vulnerabilities and pitfalls in their programming efforts to ensure that they are advantageous to all parties involved.

Statement of Problem

As companies adopt robust wellness initiatives, a higher proportion of American workers will be affected by their impact. It is necessary to ensure that programs are as beneficial as possible to all employees. St. Luke's Health System (St. Luke's) employs over 11,000 people and is Idaho's largest private employer. In 2011, the St. Luke's wellness and benefits teams implemented a comprehensive, outcomes-based wellness program. The goals of the program were to reduce employee risk of developing chronic or life-threatening disease, minimize progression of current chronic diseases, and mitigate the cost of health insurance costs (St. Luke's Healthy U Benefits Highlight Booklet, 2012). Benefits-eligible employees are encouraged to participate in annual health screenings and online health risk analyses. Employees meeting specific targets for blood pressure, fasting blood glucose/hemoglobin A1c, Body Mass Index, and nicotine status are eligible to receive discounts off of their health care premiums. Various programs, such as weight loss classes, fitness challenges, stress management promotions, and tobacco cessation are offered throughout the year to support employee efforts to meet the specified targets. There has also been a movement to make environmental and cultural shifts within the organization to encourage healthy eating choices and increase physical activity throughout the workday. Although some evaluation has been executed on the overall impact of the program, no statistical models have been applied to assess potential predictive factors influencing the effectiveness of the program. Like many wellness initiatives, little program evaluation has been conducted to assess if the effectiveness varies among diverse socio-demographic groups.

Purpose of Study

The purpose of this study was to appraise the effectiveness of the St. Luke's *Healthy U* wellness program on all participants and identify predictive factors that may influence health outcomes. The objective was to determine how an employee's socio-demographic profile influenced the impact of the program. By identifying any specific socio-demographic factors that impact program efficacy, the wellness initiative can be improved by removing barriers in future iterations of program design. Program improvement will ideally lead to improved health outcomes and employee well-being.

Study Questions

1. How does participation in an outcome-based employer wellness program influence cardiometabolic measures among participants?
2. Which, if any, socio-demographic variables act as predictive factors of cardiometabolic measure outcomes?

It was hypothesized that participation in an outcome-based employer wellness program would have a positive impact on biometric measures among participants. In addition, it was surmised that socio-demographic factors would have a direct impact on participants' cardiometabolic measures. Specifically, that race/ethnicity and job class (clinical, administrative, non-professional, etc.) would have the most predictive influence on outcomes.

Significance of Study

As the U.S. moves forward with the Affordable Care Act [ACA], St. Luke's plans to adapt its current employee wellness model toward a population health management approach.

This approach will strive to keep healthy people well; promote behavior change in at risk individuals; and mitigate complications in those with chronic disease. Offering adaptations of current wellness models to other employers and community groups will impact the health of an increased number of people. Population health management efforts will enhance diversity and the number of Idaho residents served. Social determinants of health and barriers to health care will be important to identify and overcome. Evaluating the people St. Luke’s currently serves will influence future efforts. Understanding how to mitigate socio-demographic challenges related to wellness will foster prevention efforts that are valuable and effective.

Chapter II: Literature Review

Why Wellness? Employee wellness programs are health promotion and disease prevention strategies offered by employers as a way to maintain the health of their labor force (Gourevitch, Cannell, Boufford, & Summers, 2012). Wellness programs utilize both primary and secondary prevention efforts to prevent or detect disease early before complications occur (Mattke, et al., 2013). U.S. companies are making many efforts to improve the health of their employees, because inferred benefits of a healthier workforce include lower health care costs, reduced losses from absenteeism, and increased productivity (Baicker, Cutler, & Song 2010; Chapman, 2012; Finkelstein, Linnan, Tate, & Leese, 2009).

Employee wellbeing and productivity are impacted by chronic disease, most of which can often be prevented or controlled. Approximately 133 million (1 in 2) Americans live with at least one chronic condition (Centers for Disease Control and Prevention [CDC], 2012). Chronic conditions include heart disease, stroke, cancer, diabetes, and arthritis. It is estimated that as much as 75% of all health care spending in the US is spent on people with chronic, preventable diseases (CDC, 2012). The Centers for Disease Control and Prevention identify four modifiable health behaviors responsible for the majority of chronic illness in the United States. These health risks are lack of physical activity, poor nutrition, tobacco use, and alcohol consumption. Influencing these preventable factors before they become problems is one way to reduce medical costs from hospitalization and long-term care (Buttar, Li, & Ravi, 2005). Adopting lifestyle modifications to alter these four recognized health behaviors could lead to improved health and quality of life, decreased suffering, and overall cost savings to our healthcare system. Wellness programs are one such option for avoiding and easing the financial impacts of preventable disease.

The growth of wellness in the workplace. Many organizations, including The Center for Disease Control and Prevention, The American Heart Association and The American Diabetes Association promote employee wellness programs as a critical approach to preventing risk factors for chronic disease (Camethon, Whitsel, Franklin, Kris-Etherton, Milani, & Pratt, 2009; “Guidance for a Reasonably Designed Employer-Sponsored Wellness Program”, 2013). Workplace wellness programs have grown in number and scope over the last decade and the trend is forecasted to persevere as the ACA continues to unfold. Implementation of the ACA has influenced companies to take action for the health and health care costs of their employees.

There is a logical connection between the workplace and the benefit of keeping employees healthy since over a third of health care costs in the United States are covered by employer-sponsored health insurance (Phillips, 2009). Employers take responsibility for employee health care payments and hire insurance companies to handle plan coverage and administration. Health insurance companies have also become proponents of wellness with nearly 59% offering wellness packages with their insurance plans in 2012 (Kaiser Family Foundation/Health Research and Educational Trust [KFF/HRT], 2012).

More than half of Americans under the age of 65 obtain health insurance through their employer and 63% of companies that offer coverage to their employees also offer at least one wellness program (Kaiser Family Foundation [KFF], 2012). Employer-sponsored health insurance is voluntary; employers are not required to offer a health care plan and employees do not have to enroll. However, implementation of the ACA will require larger companies to pay penalties for not offering sufficient coverage and offering a competitive health care package is a tool used by employers to recruit and retain a qualified workforce (KFF, 2012).

Measuring success. There are many factors that the influence success of wellness programs. It is important to evaluate these programs to understand if the time and financial investments provide a valuable return for employers' bottom line and employees' health. There has to be some benefit or perceived advantage for companies to invest in wellness programs. The gain of better health for employees is positive, but usually not enough incentive to prompt company investment in robust wellness services. The ultimate goals of wellness and prevention programs are to save the company money in the long-term, increase productivity, and/or mitigate absenteeism. Some voluntary wellness programs have been shown to save companies an average of $3.27 on medical costs and $2.73 on absentee costs for every $1.00 spent on wellness initiatives (Baicker et al., 2010). While this return on investment is significant and offers encouragement to employers, Baicker and his team only evaluated results of a voluntary program. There is a chance that the participants in the program were at a stage of readiness for change that may not be applicable to the general employee population. In order to understand the true implications of wellness return, evaluation of an all-inclusive participant pool is needed.

Return on investment can be measured in more than just dollars. Productivity is another valuable determinate of program success. Productivity can be difficult to objectively measure, but can be gauged with specialized assessments (Shi, et al, 2013). A meta-analysis of 56 published studies on health promotion revealed about a 25% reduction in sick leave, health care, workers compensation, and disability costs (Chapman, 2005). Employers have generally adopted the assumption that wellness programs reduce costs and improve productivity. In 2012, over half of all employers that offered wellness programs believed they had a positive impact on both of these areas (KFF/HRT, 2012). Data from the RAND Employer Survey revealed that more than 60% stated that their program reduced health care costs and close to 80% observed decreased absenteeism and increased productivity. Despite this remarkable employer feedback, only 2% of respondents were able to provide actual savings estimates (Mattke, et al., 2013). This highlights the need for further program evaluation performed by employers to measure program impact.

Types of programs. There are a variety of wellness models used by employers in the US. Regardless of the method employed, the purpose of any employee wellness program is to improve the health of employees. Use of general health promotion and educational materials are widely reported. Typical features of a wellness program include health screenings; health risk assessments; behavior modification programs, such as tobacco cessation, weight management or fitness classes; health education; health coaching; adaptations to work environment to promote health, such as standing desks; or other benefits to encourage physical activity and healthy food choices. (James, et al., 2013; Allen, Lewis, & Tagliaferro, 2012; Blake, Zhou, & Batt 2013; Colkesesn, Niessen, Peek, Vosbergen, Kraaijenhagen, Van Kalken & Peters, 2011; Loeppke, Edington, & Beg 2010; & Sacks, Cabral, Kazis, Jarret, Vetter, Richlmond & Moore, 2009). Other programs have attempted more inventive efforts to impact health including increasing exposure to nature with more outdoor breaks, natural light, and indoor plants; altering nutrition choices by color-coding and reorganizing cafeteria choices; and applying targeted intervention programs to high-risk groups (Largo-Wright, Chen, Dodd & Weiler 2011; Levy, Riis, Sonnenberg, Barraclough, & Thorndike, 2012; Loeppke, et al., 2010; & Schmittdiel, Brown, Neugebauer, Adams, Adams, Wiley & Ferrara, 2013).

In addition to simply trying to engage employees in wellness measures, companies have increased their efforts to improve outcomes by adding a layer of enticement to their programs. A wellness trend that is increasing in popularity is offering financial incentives. The number of US companies using rewards or penalties for health improvement jumped from 57% in 2009 to 74% in 2014 (Miller, 2014). Companies are spending more and more on wellness every year. According to a survey conducted by the non-profit National Business Group for Health, corporate employers are forecasted to spend an average of 15% more on wellness incentives in 2014 than in 2013. This is more than double that spent on such programs just five years ago (Miller, 2014). These incentives can be coupled with anything from simple participation in a health education event to compliance with established biometric targets such as blood pressure, blood glucose, and Body Mass Index. The two basic types of wellness programs, participatory and outcomes-based, determine how incentives are delivered. Participatory programs are made available to everyone and do not require employees to meet any health-related standard. Individuals are rewarded for partaking, regardless of outcome or result (James, et al., 2013). Outcomes-based programs, also known as health-contingent programs, require a person to meet health status targets to acquire an incentive. ("Guidance for a Reasonably Designed Employer-Sponsored Wellness Program", 2012 & James, et al., 2013). The latter program design is thought to allure increased participation and adherence, and have greater influence health outcomes since there is a direct financial incentive (Volpp, Asch, Galvin, & Loewenstein, 2011). There is limited research on the effectiveness of outcomes-based programs. Some researchers debate whether or not tying such incentives to health insurance premiums is fair or valuable (Volpp, et al., 2011). More analysis is needed for these specific types of programs, as well as how to most effectively use outcomes-based wellness to improve health of all participants.

Attitudes and behaviors. Behavior changes that result in improved health outcomes cannot occur if interventions are not meaningful or feasible to the targeted population. While each company and organization has different cultural norms, there are general attitudes, perceptions, and beliefs related to wellness that are held by certain populations. For example, a large-scale survey of public and private employers and employees found that 71% of people in management positions agreed that it is appropriate for employers to provide obesity and wellness-related services to employees (Gabel, Whitmore, Pickreign, Ferguson, Jain, & Scherer, 2009). While most employees agreed "programs related to weight management or healthy lifestyles belong in the workplace", employee income influenced opinions. Employees earning less than $25,000 annually were less likely to agree with this attitude (Gabel, et al., 2009). It is likely that low-income workers come from different social and cultural backgrounds than their higher-earning co-workers or managers. This is evidence that sensitivity should be exercised when considering all facets of wellness programs. Depending on the company and the diversity of employees, different approaches may be needed to impact varying levels of socioeconomic status and perceptions of health.

Management support is a defining influence of increasing reach of wellness interventions. Companies with strong socio-ecological models of health promotion, including managerial engagement, have displayed better participation and health outcomes (Della, DeJoy, Goetzel, Ozminkowski, & Wilson, 2008). The archetype of "lead by example" has proven to be an effective component in changing wellness attitudes within an organization. Perceived barriers to health, which can be addressed at the managerial level, can also impact attitudes related to employee wellness programs. Whether it is time, money, motivation, or support, if employees do not feel like they have the resources they need to be successful, their health outcomes will not improve (Blackford, Jancey, Howar, Ledger, & Lee, 2013). Cultural and environmental shifts at all levels within an organization are necessary to improve health outcomes. Understanding attitudes, perceptions and beliefs from entry-level positions to executive leadership is strategically beneficial in moving forward with impactful wellness initiatives.

Best Practices. It is prudent for employers to consider best practices and implement evidence-based approaches when initiating wellness programs. A reasonably designed program is defined as providing the participant a “reasonable chance of improving health or preventing disease” (“Guidance for a Reasonably Designed Employer-Sponsored Wellness Program”, 2012). A study published in the Harvard Business Review concluded a successful employee wellness program should be based on the following six pillars of effectiveness: multilevel leadership; alignment of firms’ identities and aspirations; scope, relevance, and quality; accessibility of low- or no-cost services; partnerships with internal and external associates; and communication that is sensitive, creative, and media diverse (Berry, Mirabito, & Baun, 2010). The complexity of wellness is portrayed in these six guidelines. Successful programs need to be thoughtfully planned with a comprehensive design.

Similar concepts of high-quality wellness approaches are echoed in other publications (“Biometric Health Screening”, 2013; “Guidance for a Reasonably Designed Employer-Sponsored Wellness Program”, 2012; Carnethon et al., 2009). One specific reoccurring strategy includes the benefit of offering screenings in conjunction with health risk assessments. Biometric screenings are measures of physical characteristics and can include height, weight, Body Mass Index, blood pressure, blood cholesterol, and blood glucose (“Biometric Health Screening”, 2013). Health risk assessments can be offered in different formats including paper or electronically and can range in sophistication. Regardless of method, the main goal of a health risk assessment is to identify risk, increase participant awareness, and promote initiation of health behavior change (Colkensen, et al., 2011). The combination of screening and risk assessments provides information to the employee. The data collected can also be used in aggregate or individually to help the employer tailor programming to specific health needs.

Potential shortcomings. The benefits of employee wellness are touted in many publications. However, like any health program, it is important to be aware of potential pitfalls and unintended negative consequences. There is argument that outcome-based wellness programs disproportionately harm vulnerable populations (Volpp, et al., 2011; Horwitz, Kelly, & DiNardo 2013; James, et al., 2013 & Mattke, et al., 2013). Vulnerable populations can include minorities, chronically ill individuals, and socioeconomically disadvantaged groups. There is evidence that tying financial rewards to health outcomes and wellness activities, can disproportionately burden those who have less education, money, and resources if they do not qualify to receive the incentive (Volpp, et al., 2011). Type of work may also influence program impact. Individuals that work shift or part-time hours tend to have less flexibility in their schedules and may be less likely to attend programming and classes designed for a more traditional nine-to-five position (Mattke, et al., 2013). These socio-demographic determinants are extremely important factors to consider, especially in large organizations that employ a diverse range of employees from janitorial staff to executive directors. Disadvantaged populations may end up paying more in the long term. More investigation is needed to evaluate to what extent specific socio-demographic factors influence effectiveness of programming and impact health outcomes.

Chapter II:. Methodology

Study Design

The study was a quantitative, longitudinal retrospective design. The purpose was to determine if the impact of *Healthy U*, the St. Luke's outcome-based employee wellness program, in improving cardiometabolic markers for blood pressure, fasting blood glucose, BMI, and waist circumference over four years time. This evaluation also examined socio-demographic factors, such as age, gender, race/ethnicity, and job class, to determine if these were predictors of the wellness program outcomes. The following two questions were established to evaluate in this study:

1. How does participation in an outcome-based employer wellness program influence cardiometabolic measures among participants?
2. Which, if any, socio-demographic variables act as predictive factors of cardiometabolic measure outcomes?

Procedure

The sample consisted of over 10,000 St. Luke's employees who participated in the *Healthy U* outcome-based wellness program between 2011 and 2014. Participation in *Healthy U* was voluntary and offered health insurance premium discounts to benefits-eligible employees, although all employees were welcome to participate without receipt of discounts. Annual enrollment criterion consisted of a "Know Your Numbers" [KYN] biometric screening and online health risk assessment [HRA]. Both conditions must have been met in order to qualify for any insurance premium incentives. Program participation was defined by successful completion of a KYN and HRA. Throughout the program years wellness resources were offered to all participants to promote achievement of the biometric targets. Available resources included health coaching, weight loss and fitness classes, stress management promotions, and tobacco cessation programs. Additional health promotion efforts were directed toward at-risk populations identified through biometric screenings. Individuals with out-of-range screening results were put on disease registries and received condition-specific education and health coaching opportunities. Because of St. Luke's diverse localities and varying work schedules, more energy, specifically in the last two years, was focused on making environmental and cultural changes within the organization. This social-ecological shift included healthier, clearly labeled, food choices in the cafeterias; promotion of physical activity breaks for sedentary employees; and organization of employee-led team challenges that encourage healthy behaviors.

The biometric screenings were performed by *Healthy U* staff at centralized KYN screening locations, at clinic locations from auxiliary staff trained by *Healthy U* team members, and through one's primary care provider verification from an office visit within the last 6-months. All staff performing KYN screenings at centralized locations and auxiliary clinics were trained with specific *Healthy U* protocols. Primary care providers who complete a screening verification form for their patients were required to sign affirming that the measures were taken to the specifications detailed on the form.

Participants were required to have data points for four target areas: blood pressure, fasting blood glucose (or Hemoglobin A1c, if diabetic), Body Mass Index [BMI], and nicotine status to qualify for program incentives. Blood pressure was taken using an automatic blood pressure monitor. If the participant's reading was above target (2014 Target <140/90 mm Hg), it was retaken using a manual cuff and stethoscope. Fasting blood glucose was taken using a finger-stick blood sample and a portable blood glucose monitor. It was preferable that the participants fast for 6-8 hours, although 2 hour postprandial fasts were accepted. If the blood glucose result was higher than the target (2014 Target <106 mg/dL), participants were given a lab requisition for a fasting serum draw. Lab requisitions were also given to participants with diabetes for a hemoglobin A1c [HbA1c]. If a participant with diabetes had an HbA1c lab draw within the last 6 months, they may have used those results in lieu of having another lab drawn (2014 Target <8%). BMI was calculated after measuring participant's height to the nearest half-inch and weight to the nearest tenth of a pound. Because BMI does not take into account muscle mass, waist circumference was used in conjunction to provide an alternative target and allow for variance among body composition. A participant must only have met BMI (2014 Target <33) or waist circumference (2014 Target <35 for females, <40 for males) to qualify for this target. Nicotine status was verified by a cotinine-detecting oral collection device. This target was self-reported during the first three years of the program, but use of the oral test was adopted in 2014 to ensure consistency throughout the Health System.

After completing a KYN screening, participants were required to enter their screening results, as well as respond to lifestyle and behavior questions, in an online HRA. The results of the HRA did not have any bearing on their incentive amount. However, it had to have been completed to qualify for the program discounts. As long as they completed both a KYN screening and an HRA, they were automatically enrolled in the *Healthy U* program and qualified for incentives. The targets were established by evidence-based, best practice standards established by the American Heart Association, American Diabetes Association, and the National Quality Forum. The targets were reevaluated each program year and adjusted to comply with national guidelines and St. Luke's outcome goals.

Participants received an insurance premium credit for each biometric target they met. It was not required to have company insurance to participate, so some non-benefits-eligible employees opted to participate without receipt of insurance premium discounts.

Participants who successfully enrolled in *Healthy U,* but did not meet one or more of the established targets, had the opportunity to return for a mid-year screening 6-months after their initial KYN screening. If they met the target for blood pressure, blood glucose, HbA1c, or nicotine, and/or lose 2.5% of their body weight, they qualified to earn partial discounts back. If by the following year's screening, they maintained their target and/or lose an additional 2.5% of body weight, they qualify to earn the remainder of their discount back. This mid-year incentive was added in the third year of the program. The goal of the extra screening period was to provide motivation to achieve the biometric targets throughout the program year.

The cardiometabolic data used for analyses was taken from the *Healthy U* database, which archived all KYN screening information since the program's implementation. Only blood pressure, fasting blood glucose, BMI, and waist circumference were evaluated. Tobacco status was not used as a variable due to the difference in reporting and screening between program years. Hemoglobin A1c results were not evaluated since those were only recorded for a small subgroup of individuals with diabetes. Results from HRA's were also not utilized. The same HRA tool has not been used consistently throughout the program's tenure. The information was not archived uniformly and comparisons between years would have been illogical.

Demographic information was used from Human Resource records, as the *Healthy U* database did not include race/ethnicity or job class, both of which were considered potentially predictive factors of program outcomes. *Healthy U's* "IT Solutions Developer" downloaded deidentified, aggregate reports from the *Healthy U* database and Lawson, the Human Resources online employee database. Microsoft Excel was used for data organization and management and SPSS was used for statistical analysis.

Approval from both the St. Luke's and Idaho State University Institutional Review Boards was obtained prior execution and this project did not meet the criteria for a human subjects study.

Questions #1 Analysis

To answer the first study question of how participation in an outcome-based wellness program influenced changes in cardiometabolic measures among participants, Repeated Measures General Linear Models (GLM's) were completed on each health outcome. These analyses were used to evaluate if there was a significant relationship between progression of program years and change of the continuous health outcome variables from participants that had four years worth of program data. A separate analysis was run using a different within-subjects variable each time. These variables were systolic blood pressure, diastolic blood pressure, fasting blood glucose, BMI, and waist circumference. Each variable was evaluated separately to determine how they changed independently over time.

Question #2 Analysis

To evaluate the second study question and to determine which, if any, demographic variables acted as predictive factors on wellness program outcomes, additional Repeated Measures GLM's were performed with the same within-subjects variables of systolic blood pressure, diastolic blood pressure, fasting blood glucose, BMI, and waist circumference. The model was performed using all health outcomes entered as within-subject variables and all demographic variables included as covariates to determine with demographic factors had significant relationships with the cardiometabolic outcomes. Additional Repeated Measures GLM models were performed for each demographic factors identified as statistically significant.

Location variable. Location was based on where the employee works within the Health System. These were divided based on territories determined by the Health System and how they identify facilities. The variables were Magic Valley, consisting of Gooding, Jerome, and Twin Falls; McCall; Mountain Home; Treasure Valley, consisting of Boise, Caldwell, Eagle, Meridian, and Nampa; Wood River; and Other, consisting of all other small, outlying locations including Fruitland and Baker City, Oregon.

Race/ethnicity variable. Race/ethnicity was self-disclosed by employees to Human Resources upon hire. The categories identified in were Black/African American, Asian, Hispanic/Latino, Native Hawaiian or Pacific Islander, Multiple Ethnicities, American Indian/Native American, White, and Not Disclosed.

Job type variable. Job type was determined from the data exported from the Human Resources data base and originally included over 200 specific job categories. To simplify and allow for a better picture of overall demographics, these specific categories were condensed into six main groups. These included administration and leadership; physicians; professional clinical staff such as nurses and respiratory therapists; clinical assistants such as nursing assistants and technicians; professional non-clinical staff such as office personnel in finance and human resources; and non-professional, non-clinical staff such as those in environmental services and food services.

Age variable. Age groups were combined into ten-year subgroups which included under 19, 20-29, 30-39, 40-49, 50-59, and 60 years old and older. The age variable did not account for the aging over four program years. The age indicated in the database was the current age of the participant and the time their information was exported from the *Healthy U* database (April 2014). This was considered when interpreting the analysis and providing justification for reasoning.

Gender. Participants were identified as male or female based on KYN screening records.

Chapter IV: Results

Sample

A total of 13,833 participants were listed in the deidentified dataset. This number included any individual who completed a KYN screening between 2011 and 2014 but did not account for benefits eligibility, employment tenure, or supplementary program participation. There was also missing or incomplete demographic information reported in the database and not all subjects had demographic variables listed. The following participant information lists valid percentages of only those with recorded data. The sample was 77.6% (n=8,226) female. The average age of participants was 42.9 years old (SD=12.41).

There were also gaps in the screening data in which there was a cardiometabolic measure missing in some subjects and the number of individuals with four years of screening values was not consistent. There were 4,497 with BMI’s recorded in 2011, 2012, 2013, and 2014; 4,503 participants with blood pressures recorded for all for years; 4,328 with waist circumferences; and 4,284 with fasting blood glucose results. Although there was not a control group to compare cardiometabolic results to, the database did include demographic information of non-participants. This information was used to ensure that the sample group had similar characteristics to their non-participating colleagues. The overall percentages of different variables were similar in both groups indicating that there were no large discrepancies between the characteristics of participants versus non-participants. See Table 1 for specific demographics of program participants compared to non-participants, including additional factors like race/ethnicity, job type, and location.

Table 1 *Demographics*

		Participants		Non-Participants	
		%	**n**	**%**	**n**
Age	30-39 yrs	27.2	628	25.2	579
	50-59 yrs	22.0	509	23.1	530
	40-49 yrs	23.4	541	22.2	509
	20-29 yrs	16.3	378	17.7	407
	> 59 yrs	10.7	247	11.6	265
	< 20 yrs	.4	9	.2	4
	Total	100.0	2312	100.0	2294
Gender	Female	77.6	8226	70.0	1607
	Male	22.4	2370	30.0	687
	Total	100.0	10596	100.0	2294
Race/ethnicity	White	90.5	9585	90.9	2086
	Hispanic/Latino	5.6	594	4.5	102
	Asian	1.6	165	1.1	25
	Multiple ethnicities	1.2	130	1.8	42
	Black/African American	.7	73	.8	18
	American Indian / Native American	.2	22	.4	9
	Native Hawaiian or Pacific Island	.1	14	.2	5
	Not disclosed	.1	13	.3	7
	Total	100.0	10596	100.0	2294
Location	Treasure Valley	72.7	7703	61.7	1416
	Magic Valley	19.5	2067	29.9	686
	Wood River	3.2	340	3.8	86
	Mt. Home	2.3	241	3.5	81
	McCall	2.0	209	1.0	23
	Other	.3	36	.1	2
	Total	100.0	10596	61.73	2294
Job Type	Professional Clinical	38.6	4095	34.5	791
	Non-Professional / Non-Clinical	20.3	2149	19.8	453
	Professional, Non-Clinical	20.1	2127	18.0	413
	Clinical Assistant	16.7	1770	20.9	479
	Physician	3.5	376	6.3	145
	Administration	.7	79	.6	13
	Total	100.0	10596	100.0	2294

Study Question #1 Results

Five different Repeated Measures GLMs were performed using systolic blood pressure, diastolic blood pressure, fasting blood glucose, BMI, and waist circumference as within subjects factors. All outcome measures showed statistically significant differences in means over four years. See Table 2. They all had large F values, indicating the likelihood that the difference in means throughout each program year was not due to chance. Additional pairwise comparisons indicated statistically significant increases in the mean differences of all cardiometabolic measures between Year 1 and Year 4. See Table 3.

These results suggest that the wellness program intervention has not had the intended impact of improving health outcomes over four years of program implementation. In fact, the very opposite appears to be true, because all health outcome measures have increased at statistically significant rates.

Table 2 *Repeated Measure General Linear Model*

Cardiometabolic Measure	**Wilks' Lambda**	**F value**	**Hypoth *df***	**Error *df***	***p*-value**
Systolic Blood Pressure	0.97	49.73	3	4500	.000*
Diastolic Blood Pressure	0.91	28.68	3	4500	.000*
Fasting Blood Glucose	0.86	237.19	3	4281	.000*
BMI	0.98	22.18	3	4494	.000*
Waist Circumference	0.99	18.33	3	4325	.000*

**significant $p<.05$*

Table 3 *Pairwise Comparisons – Year 1 vs. Year 4*

Cardiometabolic Measure	Mean Difference (Yr1 – Yr4)	Std. Error	*p*-value	95% CI for Difference	
				Lower Bound	Upper Bound
Systolic Blood Pressure	-1.941	0.188	.000*	-2.437	-1.445
Diastolic Blood Pressure	-0.907	0.142	.000*	-1.280	-0.533
Fasting Blood Glucose	-1.591	0.206	.000*	-2.160	-1.021
BMI	-0.327	0.46	.000*	-0.283	-0.105
Waist Circumference	-0.242	0.53	.000*	-0.382	-0.101

**significant p<.05*

Question #2 Results

To determine if any socio-demographic variables acted as predictive factors for health outcomes, an additional Repeated Measures GLM was preformed combining each of the five cardiometabolic outcomes used in Question #1 into one model. The five socio-demographic variables, age, gender, race/ethnicity, job type, and location, were then added as covariates to see if there was any significant relationships. The covariates of significant effect job type, gender, and age. See Table 4.

Table 4 *Between-Subjects Effects*

Socio-demographic Variable	Type III Sum of Squares	df	Mean Square	F	*p*-value
Race/ethnicity	293.054	1	293.054	.698	.404
Job type	19248.853	1	19248.853	45.860	.000*
Gender	38700.719	1	38700.719	92.203	.000*
Location	1077.120	1	1077.120	2.566	.109
Age	44911.806	1	44911.806	107.001	.000*

**significant p<.05*

The factors identified as statistically significant variables of interest in the all-inclusive GLM were then evaluated separately in a model with one of the five previously evaluated health outcomes at a time to see which specific predictive factors, if any, the socio-demographic variables held.

Gender. Gender showed significant between-subject effects on all cardiometabolic outcomes except for BMI. The significant variables of systolic blood pressure, diastolic blood pressure, fasting blood glucose, and waist circumference all have large F values, indicating that difference in means is not due to chance. A difference between genders was to be expected since health outcomes are not completely equal between sexes. This analysis was consistent with the fact that men tend to have higher health metrics in most areas including blood pressure, and waist circumference. The fact that there is not a statistically significant effect of gender on BMI is surprising, as it would be suspected that being male would also influence increase in BMI.

Table 5 *Between-Subjects Effects – Gender*

Cardiometabolic Measure	Type III Sum of Squares	df	Mean Square	F	*p*-value
Systolic Blood Pressure	129565.03	1	129565.03	385.56	.000*
Diastolic Blood Pressure	60158.28	1	60158.28	376.27	.000*
Fasting Blood Glucose	18428.35	1	1842.35	77.34	.000*
BMI	507.15	1	507.15	3.54	.060
Waist Circumference	37918.58	1	37918.58	312.10	.000*

**significant p<.05*

Table 6 *Pairwise Comparisons – Gender*

Cardiometabolic Measure	Mean Difference (Male - Female)	Std. Error	*p*-value	95% CI for Difference	
				Lower Bound	Upper Bound
Systolic Blood Pressure	6.58	0.335	.000*	5.926	7.240
Diastolic Blood Pressure	4.49	0.231	.000*	4.032	4.939
Fasting Blood Glucose	2.55	0.290	.000*	1.982	3.119
BMI	0.41	0.219	.060	-0.017	-0.841
Waist Circumference	3.62	0.205	.000*	3.222	4.026

**significant p<.05*

Job type. Significant effects were found for all health measures, except BMI, evaluated when job type was included as a between-subject variable. This aligns with previous predications and literature support that an individual's career may be a barrier in wellness program performance. While BMI was not significant to a *p-value<.05*, it was close with a *p-value <.06* and a large F value. See Table 7.

Mean differences indicated that the most significant relationship between job type variables was with Professional, Non-Clinical and Non-Professional, Non-Clinical participants with all other groups. With the exception of diastolic blood pressure, in which only Non-Professional, Non-Clinical groups showed significant mean differences, all other cardiometabolic measures displayed significant inverse relationships with the other job type categories. See Tables 8-11. This implies that individuals working in either Professional, Non-Clinical settings and Non-Professional, Non-Clinical settings are more likely to have their health outcomes impacted by their job type. These groups tend to have poorer cardiometabolic measures by significant margins.

Table 7 *Between-Subjects Effects – Job Type*

Cardiometabolic Measure	Type III Sum of Squares	df	Mean Square	F	*p*-value
Systolic Blood Pressure	32417.39	5	6483.48	18.10	.000*
Diastolic Blood Pressure	10407.19	5	2081.44	12.15	.000*
Fasting Blood Glucose	14485.11	5	2897.02	12.10	.000*
BMI	27200.29	5	5440.06	39.66	.060
Waist Circumference	23454.78	5	4690.96	37.53	.000*

**significant p<.05*

Table 8 *Pairwise Comparisons – Job Types, Systolic Blood Pressure*

(I) Job Type	(II) Job Type	Mean Difference (I-II)	Std. Error	*p*-value	95% CI for Difference Lower Bound	95% CI for Difference Upper Bound
Prof NonClin	Admin	2.370	.833	.067	-.077	4.817
	Phys	3.284	.499	.000*	1.818	4.749
	Prof Clinical	1.699	.232	.000*	1.019	2.379
	Clinical Ass	1.158	.298	.002*	.283	2.032
	NonProf, NonClin	-1.337	.282	.000*	-2.165	-.508
NonProf, NonClin	Admin	3.707	.839	.000*	1.242	6.171
	Phys	4.620	.509	.000*	3.125	6.115
	Prof Clinical	3.036	.252	.000*	2.295	3.776
	Clinical Ass	2.494	.314	.000*	1.573	3.416
	Prof NonClin	1.337	.282	.000*	.508	2.165

**significant p<.05*

Table 9 *Pairwise Comparisons – Job Types, Diastolic Blood Pressure*

(I) Job Type	(II) Job Type	Mean Difference (I-II)	Std. Error	*p*-value	95% CI for Difference Lower Bound	95% CI for Difference Upper Bound
NonProf NonClin	Admin	.093	.938	1.000	-2.660	2.847
	Phys	1.712	.567	.038*	.047	3.378
	Prof Clinical	1.918	.281	.000*	1.092	2.744
	Clinical Ass	1.227	.350	.007*	.199	2.256
	Prof NonClin	.517	.315	1.000	-.407	1.441

**significant p<.05*

Table 10 *Pairwise Comparisons – Job Types, Fasting Blood Glucose*

(I) Job Type	(II) Job Type	Mean Difference (I-II)	Std. Error	*p*-value	95% CI for Difference Lower Bound	95% CI for Difference Upper Bound
Prof NonClin	Admin	1.843	1.112	1.000	-1.424	5.111
	Phys	.126	.664	1.000	-1.823	2.075
	Prof Clinical	1.264	.313	.001*	.345	2.184
	Clinical Ass	1.229	.403	.034*	.047	2.412
	NonProf, NonClin	-1.157	.386	.041*	-2.291	-.024
NonProf, NonClin	Admin	3.001	1.122	.113	-.295	6.296
	Phys	1.283	.679	.885	-.712	3.279
	Prof Clinical	2.422	.345	.000*	1.407	3.436
	Clinical Ass	2.387	.428	.000*	1.129	3.645
	Prof NonClin	1.157	.386	.041*	.024	2.291

**significant p<.05*

Table 11 *Pairwise Comparisons – Job Types, Waist Circumference*

(I) Job Type	(II) Job Type	Mean Difference (I-II)	Std. Error	*p*-value	95% CI for Difference	
					Lower Bound	Upper Bound
Prof NonClin	Admin	1.006	.835	1.000	-1.447	3.459
	Phys	1.729	.485	.006*	.303	3.154
	Prof Clinical	1.813	.225	.000*	1.153	2.472
	Clinical Ass	1.117	.290	.002*	.266	1.969
	NonProf, NonClin	-1.30*	.273	.000*	-2.104	-.498
NonProf, NonClin	Admin	2.307	.841	.092	-.163	4.776
	Phys	3.030	.495	.000*	1.576	4.484
	Prof Clinical	3.114	.245	.000*	2.394	3.833
	Clinical Ass	2.418	.306	.000*	1.520	3.317
	Prof NonClin	1.301	.273	.000*	.498	2.104

**significant p<.05*

Age. Age showed a significant between-subject effect on all cardiometabolic measures except for BMI. See Table 12. The most notable mean differences occurring in the age groups of 50-59 years old and 60 years old and older with all other, younger, groups. See Tables 14-17.

Table 12 *Between-Subjects Effects – Age*

Cardiometabolic Measure	Type III Sum of Squares	df	Mean Square	F	*p*-value
Systolic Blood Pressure	44807.759	4	11201.940	31.601	.000*
Diastolic Blood Pressure	7385.125	4	1846.281	11.677	.000*
Fasting Blood Glucose	22979.761	4	5744.940	26.237	.000*
BMI	2369.907	4	592.477	3.842	.004*
Waist Circumference	2564.181	4	641.045	4.625	.000*

**significant p<.05*

Table 13 *Pairwise Comparisons – Age Groups, Systolic Blood Pressure*

(I) Age Group	(II) Age Group	Mean Difference (I-II)	Std. Error	*p*-value	95% CI for Difference Lower Bound	95% CI for Difference Upper Bound
50-59 years	20-29 years	4.375	1.031	.000*	1.477	7.274
	30-39 years	5.453	.736	.000*	3.381	7.524
	40-49 years	3.458	.742	.000*	1.371	5.545
	60+ years	-3.429	.897	.001*	-5.951	-.908
60+ years	20-29 years	7.805	1.157	.000*	4.551	11.059
	30-39 years	8.882	.905	.000*	6.337	11.427
	40-49 years	6.887	.909	.000*	4.330	9.445
	50-59 years	3.429	.897	.001*	.908	5.951

**significant p<.05*

Table 14 *Pairwise Comparisons – Age Groups, Diastolic Blood Pressure*

(I) Age Group	(II) Age Group	Mean Difference (I-II)	Std. Error	*p*-value	95% CI for Difference Lower Bound	95% CI for Difference Upper Bound
50-59 years	20-29 years	3.172	.688	.000*	1.237	5.108
	30-39 years	2.811	.492	.000*	1.428	4.194
	40-49 years	1.862	.496	.002*	.468	3.255
	60+ years	.413	.599	1.000	-1.271	2.097
60+ years	20-29 years	2.760	.773	.004*	.587	4.933
	30-39 years	2.398	.604	.001*	.698	4.098
	40-49 years	1.449	.607	.172	-.259	3.157
	50-59 years	-.413	.599	1.000	-2.097	1.271

**significant p<.05*

Table 15 *Pairwise Comparisons – Age Groups, Fasting Blood Glucose*

(I) Age Group	(II) Age Group	Mean Difference (I-II)	Std. Error	*p*-value	95% CI for Difference Lower Bound	95% CI for Difference Upper Bound
50-59 years	20-29 years	5.734	.821	.000*	3.426	8.042
	30-39 years	3.473	.593	.000*	1.805	5.142
	40-49 years	1.963	.603	.012*	.267	3.658
	60+ years	-1.992	.734	.067	-4.056	.072
60+ years	20-29 years	7.726	.927	.000*	5.117	10.334
	30-39 years	5.465	.734	.000*	3.402	7.529
	40-49 years	3.955	.742	.000*	1.869	6.040
	50-59 years	1.992	.734	.067	-.072	4.056

**significant p<.05*

Table 16 *Pairwise Comparisons – Age Groups, Body Mass Index*

(I) Age Group	(II) Age Group	Mean Difference (I-II)	Std. Error	*p*-value	95% CI for Difference Lower Bound	95% CI for Difference Upper Bound
50-59 years	20-29 years	2.056	.680	.025*	.144	3.967
	30-39 years	1.153	.486	.178	-.213	2.519
	40-49 years	1.285	.489	.087	-.090	2.660
	60+ years	.056	.593	1.000	-1.611	1.723
60+ years	20-29 years	2.000	.764	.090	-.149	4.148
	30-39 years	1.096	.598	.670	-.586	2.778
	40-49 years	1.229	.601	.411	-.461	2.918
	50-59 years	-.056	.593	1.000	-1.723	1.611

**significant p<.05*

Table 17 *Pairwise Comparisons – Age Groups, Waist Circumference*

(I) Age Group	(II) Age Group	Mean Difference (I-II)	Std. Error	*p*-value	95% CI for Difference Lower Bound	95% CI for Difference Upper Bound
50-59 years	20-29 years	2.159	.665	.012*	.290	4.029
	30-39 years	1.059	.471	.248	-.266	2.384
	40-49 years	.991	.468	.345	-.325	2.306
	60+ years	-.421	.569	1.000	-2.020	1.178
60+ years	20-29 years	2.580	.745	.005*	.486	4.674
	30-39 years	1.480	.578	.106	-.147	3.106
	40-49 years	1.411	.576	.144	-.208	3.031
	50-59 years	.421	.569	1.000	-1.178	2.020

**significant p<.05*

Chapter V: Discussion

Summary of Findings

The overall trend of the health outcomes of blood pressure, fasting blood glucose, BMI, and waist circumference showed statistically significant mean changes over four years of program implementation. All of the cardiometabolic targets evaluated displayed increasing averages. Unfortunately, these upward trends oppose the initial intent of the Healthy U program, which was to improve health outcomes and keep already healthy individuals in healthy ranges.

Of the socio-demographic variables evaluated, gender, age, and job type showed significant between-subject effects on cardiometabolic outcomes for participants in an outcome-based employee wellness program. Age and gender were likely predictors of changes in cardiometabolic outcomes as differences among these groups are almost always displayed in health measures. Like gender differences, age as a predictive factor was not surprising, because as individual's age, it is expected that their health outcomes become poorer than those who are younger. It is likely that this trend is one that cannot be dramatically impacted by just four years of a wellness program, since age-related factors are compounded year after year. Longer-term evaluation of individuals in the 20-29 and 30-39 age groups over time is necessary. Continued participation in the program of these younger groups would be more indicative of true relationship of the effect of health outcomes and age as influenced by a wellness initiative.

The significant predictive value of job type may be the most noteworthy finding of this evaluation and uncovered opportunity for additional evaluation of employee-based wellness programs. This relationship could be caused by a variety of reasons. One such explanation is that Professional, Non-Clinical staff tend to have sedentary office jobs which could negatively influence health measures. Alternately, while in Non-Clinical, Non-Professional areas tend to have more labor-intensive work requirements such as housekeeping, facility maintenance, and food service, they may have poorer health outcomes due to other factors. Since these sectors tend to draw lower-educated and economically disparate groups, it could be assumed that those factors influence the relationship between job and health outcomes.

Significance of Findings

Participation in an outcome-based employee wellness program was not shown to improve health outcomes in this evaluation. In fact, the opposite was true, and average health measures were slightly poorer after four years of implementation. However, this did not take into account health outcomes if no intervention had been made. It is quite possible that the decline in cardiometabolic measures was slowed as a result of this outcome-based program.

Based on the findings in this evaluation, it can be assumed that there is a significant relationship between some socio-demographic variables and an individual's resulting health outcomes in an outcome-based wellness program. Gender and age held predictive powers and they proved to be significant over time. Job type was a significant predictor and particularly noteworthy to consider since this evaluation was performed on an employer operated program. The relationship between job type and cardiometabolic outcomes indicate that different approaches may need to be applied to different categories of employees to best improve health. Many different factors contribute to how and why an individual is in the line of work they are in. If wellness program planners are better able to understand how these factors influence participation, and ultimately health, more effective programs can be implemented.

Implications for Future Evaluation

It would also be beneficial to use the results of this evaluation for further analysis for more specific details on how job type influences cardiometabolic outcomes. Additional review of other significant influential factors that contribute to why job type affects health. Once there is a better understanding of these relationships, further evaluation could be performed using various methods of intervention. These interventions could be used to determine how to counteract the negative relationship of job type on outcomes, and ultimately, improve health.

Additional evaluation could benefit from a control group to account for outcomes without intervention. Future studies are also needed to analyze the long-term implication of program implementation. For example, age was a significant predictor of health outcomes in this study, however that would be expected in any large group of people of varying ages. For more concrete determinations of whether or not an outcome-based wellness program is beneficial in preventing or delaying decline in health outcomes, it would be necessary to perform a longitudinal study of participants who started the program earlier in life and participated for many years.

Limitations

The sample size was large enough to produce statistically significant results because an estimated 90% of benefits-eligible employees participated in the *Healthy U* program. However, the extremely large sample size could have been a factor that clouded the results by adding power to the overall significance of this model. The more subjects in the model, the greater the ability is to detect smaller differences. The statistically significant differences detected, may or may not truly be clinically relevant.

There was no cardiometabolic data available for employees who have not participated in the program, and thus, there was no control group. Other factors contributing to changes in health outcomes may not have been accounted for. It was inferred that it was the wellness program that caused change but there was nothing conclusive that determined that others who had not participated would not have experienced the same or similar results. Even with a nearly 90% participation rate, it is possible that the program has still not engaged the most ill and at risk people. If a participant knew they will not qualify for any discounts based on their cardiometabolic measures, they may have been less likely to enroll. It also may be that people who were already healthy or currently engaged in health changes were more likely to participate. This had the potential to skew the data because the participation group would seem healthier than the population in entirety.

There was also no consistent record of people that participated in the additional programming efforts, such as classes, or health coaching. Therefore, there was no way to appraise if the types, locations, and amount of classes and additional resources available, influenced participation of different socio-demographic profiles. The analysis only utilized cardiometabolic outcomes and assumed that the monetary incentives were the driving motivation for program adherence.

Program changes throughout its four year tenure may have caused inconsistency with results. For example, height and weight have always been measured, but BMI was only added as an incentivized target in Year 3. The mid-year screening incentive was also not added to the program during until the third year. These discrepancies between program years may have influenced results and caused imprecise program outcomes.

Another potential limitation was the small timeframe from which we were examining data. At four-years old, the *Healthy U* program was still relatively new. It cannot be definitively determined exactly how it had impacted changes in cardiometabolic outcomes. It may be likely that the enticement of financial incentives was still novel enough to motivate healthy behaviors. There was no supporting evidence that this model will be able to sustain long-term impact or influence. The analysis only identified variance in short-term outcomes based on time and socio-demographic differences of the participants. A full program evaluation that includes environmental and organizational changes might be needed for future analysis of the long-term impact on employees' health, potential disparities, and overall program validity.

The socio-demographic data pool was somewhat limited in scope. For a more accurate representation of how socio-demographics influence health outcomes, it would be necessary to include additional factors, such as primary language, education level, and household income.

Conclusion

This evaluation appraised cardiometabolic outcomes and the influence of socio-demographic variables to ultimately improve performance of an outcome-based employee wellness program. As employee wellness becomes more prevalent with the continued implementation of the Affordable Care Act, constant and consistent evaluation will be needed to ensure program success and identification of potential barriers. Despite the fact that no health improvement was observed in this snapshot of data, it is possible that health decline was slowed as a result of the intervention. Outcome-based employee wellness programs like these are a relatively new approach in healthcare and their true effect will not be determined for years to come. This was a good first-step in analyzing program impact, understanding limitations, and identifying opportunities for future assessment.

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