

5-16-2014

# A Systematic Review of the Health Impact of Employer-sponsored Wellness Programs

Anna Buseman-Williams

Follow this and additional works at: [http://scholarworks.gsu.edu/iph\\_theses](http://scholarworks.gsu.edu/iph_theses)

---

## Recommended Citation

Buseman-Williams, Anna, "A Systematic Review of the Health Impact of Employer-sponsored Wellness Programs." Thesis, Georgia State University, 2014.

[http://scholarworks.gsu.edu/iph\\_theses/317](http://scholarworks.gsu.edu/iph_theses/317)

This Thesis is brought to you for free and open access by the School of Public Health at ScholarWorks @ Georgia State University. It has been accepted for inclusion in Public Health Theses by an authorized administrator of ScholarWorks @ Georgia State University. For more information, please contact [scholarworks@gsu.edu](mailto:scholarworks@gsu.edu).

A SYSTEMATIC REVIEW OF THE HEALTH IMPACT OF EMPLOYER-SPONSORED  
WELLNESS PROGRAMS

By

ANNA BUSEMAN-WILLIAMS

B.S., GEORGIA INSTITUTE OF TECHNOLOGY  
M.S., GEORGIA INSTITUTE OF TECHNOLOGY  
M.P.H, GEORGIA STATE UNIVERSITY

A Capstone Project Submitted to the Graduate Faculty  
of Georgia State University in Partial Fulfillment  
of the  
Requirements for the Degree  
MASTER OF PUBLIC HEALTH

ATLANTA, GEORGIA

2014

A SYSTEMATIC REVIEW OF THE HEALTH IMPACT OF EMPLOYER-SPONSORED  
WELLNESS PROGRAMS

by

ANNA BUSEMAN-WILLIAMS

Approved:

---

Committee Chair

---

Committee Member

---

Date

ANNA BUSEMAN-WILLIAMS

A systematic review of the health impact of employer-sponsored wellness programs  
(Under the direction of Dr. Bruce Perry)

### **ABSTRACT**

The CDC has identified the four modifiable health risk behaviors of physical activity, poor nutrition, tobacco use, and alcohol use as being responsible for much of the illness and early death associated with chronic disease. The purpose of this review is to analyze the literature on existing employer sponsored lifestyle management wellness programs targeted at these risk factors and their associated biometric measures, the characteristics of these programs, and the demonstrated health impact. A literature review was conducted using PUBMED and CINAHL for studies published from 2009-2013 within the United States. The employer characteristics, characteristics of the wellness program, incentives used within the wellness program, employee characteristics of those who participated in the wellness program, and outcome of the intervention were extracted from the studies. The review yielded five relevant studies with a total of 47 outcomes assessed. The studies indicated that employer sponsored wellness programs can be successful with the proper level of resources, incentivizing, and commitment by the employer, however additional future studies with comparison groups are recommended.

INDEX WORDS: workplace, wellness program, employer, corporate, health

## **AUTHOR'S STATEMENT PAGE**

In presenting this capstone project as a partial fulfillment of the requirements for an advanced degree from Georgia State University, I agree that the Library of the University shall make it available for inspection and circulation in accordance with its regulations governing materials of this type. I agree that permission to quote from, to copy from, or to publish this thesis may be granted by the author or, in his/her absence, by the professor under whose direction it was written, or in his/her absence, by the Associate Dean, College of Health and Human Sciences. Such quoting, copying, or publishing must be solely for scholarly purposes and will not involve potential financial gain. It is understood that any copying from or publication of this dissertation which involves potential financial gain will not be allowed without written permission of the author.

---

Signature of Author

## NOTICE TO BORROWERS

All theses deposited in the Georgia State University Library must be used in accordance with the stipulations prescribed by the author in the preceding statement.

The author of this thesis is:

Anna Buseman-Williams  
4403 Urbana Drive Apt 210  
Orlando, FL 32837

The Chair of the committee for this capstone is:

Bruce C. Perry, MD, MPH  
School of Public Health  
College of Health and Human Sciences  
Georgia State University  
P.O. Box 3995 Atlanta, Georgia 30302-3995

Users of this thesis who not regularly enrolled as students at Georgia State University are required to attest acceptance of the preceding stipulation by signing below. Libraries borrowing this thesis for the use of their patrons are required to see that each user records here the information requested.

<b>Name of User</b>	<b>Address</b>	<b>Date</b>	<b>Type of Use (Examination Only or Copy)</b>

## CURRICULUM VITAE

**Anna Buseman-Williams**

4403 Urbana Dr Apt 210

Orlando, FL 32837

610-306-3046

Anna.busemanwilliams@gmail.com

---

### Education

- 2014      **Master of Public Health**  
Georgia State University
- 2007      **Master of Science in Civil and Environmental Engineering**  
Georgia Institute of Technology
- 2005      **Bachelor of Science in Civil and Environmental Engineering**  
Georgia Institute of Technology
- 

### Experience

- 04/14-Current **PepsiCo – Pepsi North America Beverages (PNAB)**  
Health, Safety, and Environmental (HSE) Manager
- 08/12-04/14 **PepsiCo – Pepsi North America Beverages (PNAB)**  
Health, Safety, and Environmental (HSE) Supervisor
- 03/12-10/13 **Georgia Department of Public Health, Environmental Health  
Healthy Homes and Lead Poisoning Prevention Program**  
Practicum
- 06/10-07/12 **Environmental Resources Management**  
Staff Consultant/Associate Engineer
- 09/09-06/10 **The Epsten Group**  
LEED Certification Reviewer
- 05/07-06/09 **Kimley-Horn and Associates**  
Water Resources Analyst
- 

### Honors

- Georgia Health Foundation Scholarship, Georgia State University, 2010  
GEM Fellow, Georgia Institute of Technology, 2006

## ACKNOWLEDGEMENTS

I would like to thank Delvin Huffman, Tracy Geisel, Bruce C. Perry, and Nicole Holloway for support throughout the process.



## TABLE OF CONTENTS

LIST OF TABLES.....	ix
LIST OF FIGURES.....	x
CHAPTER 1 - INTRODUCTION.....	1
Chronic Disease in the United States.....	1
Workplace and Public Health.....	2
Purpose of Study.....	5
CHAPTER II - REVIEW OF THE LITERATURE.....	6
History and Background of Workplace Wellness Programs.....	6
Characteristics and Prevalence of Workplace Wellness Programs.....	7
Barriers to Establishment and Utilization of Workplace Wellness Programs.....	10
CHAPTER III - METHODS .....	14
Data Sources .....	14
Inclusion/Exclusion Criteria.....	14
Study Selection.....	14
Data Collection.....	15
Quality Assessment.....	15
CHAPTER IV – RESULTS/FINDINGS.....	17
Search Results.....	17
Study Range and Characteristics.....	18
Study Overview.....	21
CHAPTER V – DISCUSSIONS AND CONCLUSIONS	
Summary.....	27
Study Strengths and Limitations .....	28
Recommendations.....	29

REFERENCES..... 30

## LIST OF TABLES

Table 1: Search Strategy for Databases.....	14
Table 2: The QUADAS Tool.....	15
Table 3: Quality Assessment Tools.....	18
Table 4: Employer and Workplace Wellness Program Characteristic.....	19
Table 5: Overview of Study Findings.....	21

## LIST OF FIGURES

Figure 1: Social-Ecological Model.....	2
Figure 2: Summary of Wellness Programs Surveyed in the 2013 Kaiser/HRET Survey.....	8
Figure 3: Study Flow Diagram.....	17

## **CHAPTER I – Introduction**

### **Chronic Disease in the United States**

Chronic diseases are the leading cause of death and disability in the United States. According to the Centers for Disease Control and Prevention (CDC), 7 out of 10 deaths among Americans are attributed to chronic disease each year (2012). Heart disease, cancer, and stroke alone account for more than fifty percent of all deaths each year in the U.S (CDC 2012).

The CDC has identified the four modifiable health risk behaviors of lack of physical activity, poor nutrition, tobacco use and excessive alcohol use as being responsible for much of the illness and early death related to chronic diseases. The statistics clearly demonstrate that Americans struggle with these behaviors. For example, approximately 1 in 5 Americans smoke. Excessive alcohol consumption contributes to over fifty four different disease and injuries yet binge drinking, consuming more than four or five drinks on an occasion for women or men respectively and the most dangerous form of drinking, is reported by 17% of U.S. adults. 23% of Americans report no leisure-time physical activity at all in the preceding month on the 2008 Physical Activity Guidelines for Americans. These behaviors are now being passed along to the next generation. For example, in 2007, less than 22% of high school students and only 24% of adults reported eating 5 or more servings of fruit and vegetables per day (CDC 2012).

Chronic disease prevention is clearly a major public health issue in the United States. In addition to the health impacts, this magnitude of disease translates into significant costs. Treatment of people with chronic conditions account for more than 75 percent of the more than \$2.5 trillion spent on medical care costs in the America and approximately \$147 billion of medical bills were weight-related alone in 2008 (CDC 2013).

## The Workplace and Public Health

According to the CDC (2013), prevention strategies should include a continuum of activities that address multiple levels of the model in order to sustain prevention efforts over time versus any single intervention. The social-ecological model recognizes this and serves as a framework of health promotion and prevention. Grzywacz and Fuqua (2000) further explain that the ecological model is characterized by some of the following principles: health is an outcome of the quality of the person-environment fit, certain individual or environmental conditions exert a disproportionate amount of influence on health and well-being, and a comprehensive understanding of health results from multidisciplinary approaches. The model addresses the fact that although an individual is responsible for implementing and maintaining a healthy lifestyle, there are many aspects of an individual's environment that have the potential to determine and influence an individual's behavior.

Figure 1 displays a five-level model social-ecological model. As previously discussed,

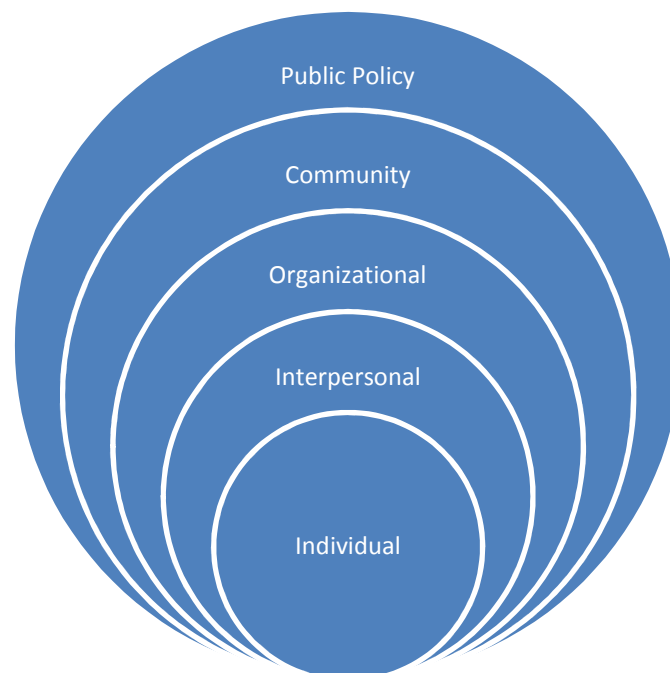


Figure 1. Socio-Ecological Model

the most effective approach to address health is addressing all levels of the model. The workplace falls under the organizational level and has the potential to greatly impact one's healthy lifestyle behaviors as according to the Department of Labor, the average workday for employed Americans between 25 to 54 years old is 8.8 hours (2013) or approximately 37% of one's day. In addition to the time that one spends at work, Goetzel and Ozminkowski (2008) points out that the nature of the workplace setting is useful for health promotion. The workplace contains a concentrated group of people, in a small number of geographic sites who share common purpose and culture. Additionally, goals are aligned within the workplace and a method communication and information exchange with employees is already established. Grzywacz and Fuqua further explain that the social aspects of the work environment underlie worker health and well-being. The authors point out that workplace policies and programs provide examples of the social aspects of a job that can have significant influence, such as a smoking ban as well as worksite health promotion programs which can promote and reinforce healthy lifestyle choices among employees.

To further support its importance, health promotion in the workplace supports two of the four overarching goals of *Healthy People 2020* of "creating social and physical environments that promote good health for all" and "eliminating preventable disease, disability, injury, and premature death" (2013 ). *Healthy People* provides science-based, ten-year national objectives for Americans and drive the health agenda for our country by identifying health improvement priorities. In addition to achieving the overall goals of *Healthy People*, both the 2010 and 2020 objectives specifically address workplace wellness programs in the objectives of increasing the proportion of worksites that offer an employee health promotion program to their employees and increasing the proportion of employees who participate in employer-sponsored health promotion

activities. While the 2020 goals are still in the developmental phase, there is 2010 objective of 75% of worksites offering a worksite health promotion program (2010).

Not only does health promotion in the workplace have the potential to influence public health, it can also have many additional positive effects for an employer. Many indirect costs of poor health are passed along to employers, such as absenteeism, disability, and reduced work output, that causes employers to have a vested interest in employee's health. In many instances, these indirect costs can be much higher than the actual medical costs. Productivity loss related to both personal and family health problems costs U.S. employers \$1,685 per employee per year or \$225.8 billion annually (CDC 2014). The fact that worker health has the potential to impact a company financially further strengthens the case for workplace wellness programs

It is important to note that employers have the opportunity to implement programs that focus on primary, secondary and/or tertiary prevention (Goetzel 2008). Primary prevention efforts are directed at employees who are generally healthy. Secondary prevention can be achieved by targeting employees that demonstrate risk factors for chronic disease through programs. Primary and secondary programs are referred to as lifestyle management programs and most commonly target the risk factors of nutrition, smoking, physical activity and weight. Tertiary prevention can be achieved by improving disease control in employees who already have chronic diseases, such as diabetes, heart disease, asthma, depression, and cancer. These programs are referred to as disease management programs. Because primary and secondary prevention focuses on the complete avoidance of diseases and therefore eliminates the impacts that come along with those diseases, this review will focus on lifestyle management workplace wellness programs.



## **Purpose of Study**

The purpose of this study is to review the literature for studies related to established workplaces lifestyle management programs, specifically those targeting the risk factors previously discussed, and the resulting health outcomes. The health outcomes of these programs will be extracted and a trend analysis will be performed based on the characteristics of the programs. Based on these trends, strengths and limitations of the studies will be evaluated, recommendations for future workplace wellness programs will be made to aid in further increasing participation and effectiveness of these programs, and recommendations for future studies to further aid in closing gaps in workplace wellness programs will be made.

## **CHAPTER II – Review of the Literature**

### **History and Background of Workplace Wellness Programs**

According to the Call et al (2009), employers first began assisting employees with the health-related issues, such as alcoholism and mental health, in the 1950s in form of employee assistance programs (EAPs). Throughout the years, EAPs evolved into comprehensive benefits for employees to address broader issues. To complement EAPs, wellness programs began to emerge in literature in the early 1980s. While EAPs helped employees address personal problems that had the potential to negatively impact work performance and health, wellness programs are designed to improve employees' and dependents' health status by modifying health risk behaviors to positively impact work performance. The occupational safety and health movement of the 1970s and the worksite health promotion are cited by Dejoy and Southern (1993) as the driving forces behind workplace wellness programs. The sustainability of these programs is aided by the increasing burden of health care costs on employers.

While a consistent definition of a workplace wellness program was not located in the literature, the CDC defines a workplace wellness program as a health promotion activity or organization-wide policy designed to support healthy behavior and improve health outcomes while at work (CDC 2013). As previously stated, workplace wellness programs can be both lifestyle and disease management programs and may be delivered through a group health plan or administered separately by the employer. The programs can consist of a variety of activities including health education and coaching, weight management programs, health fairs, screenings, policies intended to facilitate employee health, such as lunch and learns, providing on-site kitchens, healthy food options in vending, and offering incentives for participation. Typically a health risk assessment (HRA) serves as the cornerstone of many wellness programs. The HRA is a questionnaire that addresses behaviors and characteristics, such as physical activity, diet,

weight, smoking, blood pressure, and cholesterol levels, and gives the employer an opportunity to identify risk factors to target within a workplace wellness program (Mattke 2012).

### **Characteristics and Prevalence of Workplace Wellness Programs**

Several organizations have conducted national surveys to establish trends in employer-sponsored wellness programs. Among these organizations are the Kaiser Family Foundation/Health Research and Educational Trust (Kaiser/HRET) in their 2013 Employer Health Benefits Survey and the RAND Corporation in a 2013 Workplace Wellness Programs Study sponsored by the U.S. Department of Labor and the U.S. Department of Health and Human Service.

The Kaiser/HRET Survey was conducted with 2,067 private and public employers selected using random sampling techniques. The survey was conducted via telephones to firms had at least three employees. The survey found that 77 percent of firms offering health benefits offer at least one wellness program in the form of weight loss programs, biometric screenings, gym membership discounts or on-site exercise facilities, smoking cessation program, lifestyle coaching, classes in nutrition or healthy living, web-based resources for healthy living, flu shot, employee assistance program (EAP), or wellness newsletters. Large employers offering health benefits and at least one wellness program are more likely than smaller employers to use one of the following strategies to promote wellness (79% vs. 55%): assigning an employee to promote wellness, access to a benefits counselor, incentives, personalized communication, team competitions, and social media tools, with personalized communication being the most common with both large and small employers. Figure 2 displays a graph summarizing the characteristics of the wellness programs surveyed.

## Among Firms Offering Health Benefits, Percentage Offering a Particular Wellness Program to Their Employees, by Firm Size, 2013

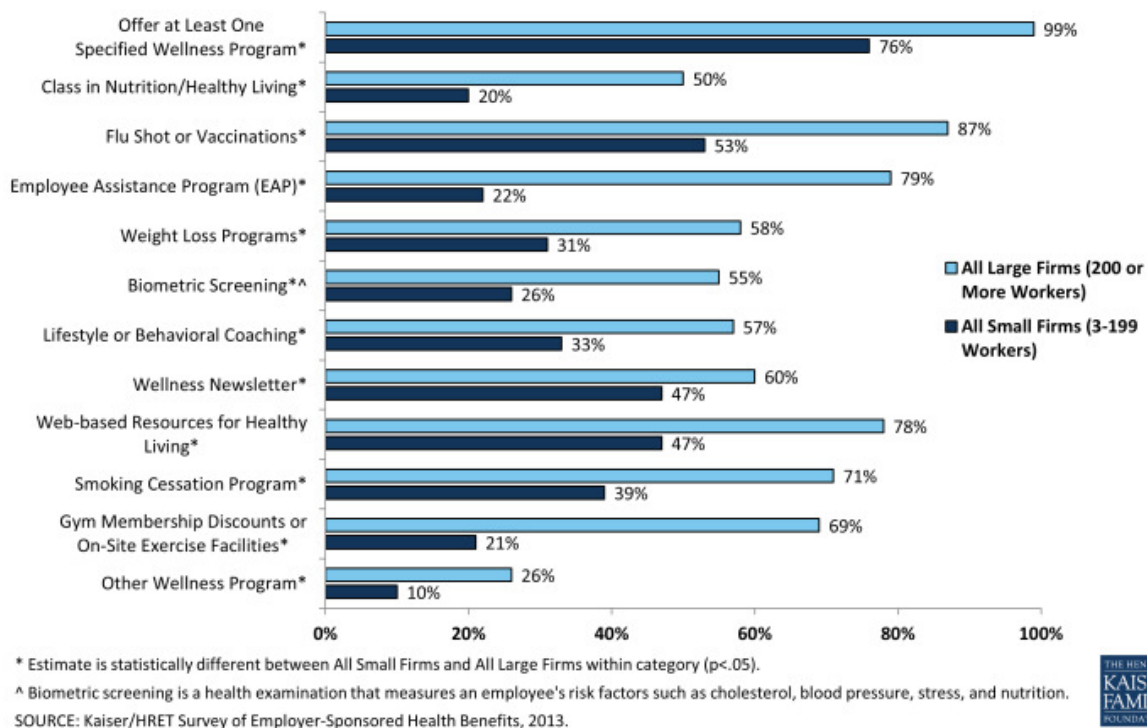


Figure 2. Summary of Wellness Programs Surveyed in the 2013 Kaiser/HRET Survey

For large firms offering health benefits and at least one wellness benefit, employee participation (65%) is the most common metric to evaluate wellness programs, while employee satisfaction (47%) and health outcomes (34%) are the second and third most common metrics for evaluation. Other metrics for both large and small firms are employee retention and return on investment. Eight percent of firms offering health benefits and at least one of the listed wellness programs offer incentives in the form of gift cards, travel, merchandise, or cash to workers who participate in wellness programs. Large firms (200 or more workers) are more likely to offer these incentives than smaller firms (26% vs. 7%).

Some firms give their employees the opportunity to complete a health risk assessment to identify potential health issues. Health risk assessments (HRA) generally include questions

about medical history, health status, and lifestyle. Overall, 24% of firms offering health benefits ask their employees to complete a health risk assessment. Large firms (200 or more workers) are more likely than smaller firms to offer employees this option (55% vs. 23%). Fifty-four percent of large firms (200 or more workers) offering health benefits and health risk assessments give financial incentives to employees who complete a health risk assessment. Five percent of large firms (200 or more workers) who offer health benefits and health risk assessments require employees to complete a health risk assessment in order to enroll in a health plan. Nine percent of large firms (200 or more workers) that offer health benefits and provide employees the opportunity to complete a health risk assessment penalize employees with identified health risks factors who do not complete a wellness program. In summary, the Kaiser survey found that large firms are more likely than small firms to offer wellness programs, as well as incentives for completion of these programs and HRAs as a component of these programs.

The 2013 RAND Employer Survey is a national survey of employers with at least 50 employees in both public and private sections, including federal and state agencies. The survey was conducted as part of a research report sponsored by the U.S. Department of Labor (DOL) and the U.S. Department of Health and Human Services. The researchers utilized the Kaiser/HRET survey for sample size and data sources, however this survey included more detailed questions on wellness program components and the use of incentives. In addition, the survey was web-based and as previously noted, included employers with more than 50 employees rather than the threshold of 3 used in the Kaiser/HRET survey. The total sample size of the survey was 3,149 with a response rate of 19 percent.

According to the RAND Employer Survey, 51% of employers with 50 or more employees offer a wellness program. While just approximately half of these employers offer

wellness programs, 79 percent of employees working for firms with 50 or more employees have access to a wellness program. These figures indicate that larger companies are more likely to have wellness programs and because they employ a greater share of the workforce, more Americans have access to wellness programs. The survey did not find a statistical difference between the industries and the location of the employer included in the survey as a determining factor of offering a wellness program.

The majority of employers (72%) characterize their wellness programs as a combination of screening activities and interventions with health risk assessments (HRA) being the most common of these screening methods. Of the employers offering lifestyle management programs, 79 percent offer programs related to nutrition/weight, 77 percent related to smoking, and 72 percent related to fitness, with other common programs relating to alcohol/drug abuse (52%), stress management (52%), and health education (36%). The survey indicated that 69 percent of employers with at least fifty employees use financial incentives and ten percent of these employers use incentives tied to health-related standards. According to the survey, the most common programs to trigger incentives are completion of HRA and participation in lifestyle management intervention with thirty percent being offered by employers with a wellness program. The survey found that incentives are more often presented as rewards rather than penalties with 84 percent of employers using rewards and 16 percent using penalties. Gym discounts (42 percent) and cash incentives (21 percent) were noted as the most common methods to reward employees for participating and/or completing health-related behaviors.

### **Barriers to Establishment and Utilization of Workplace Wellness Programs**

The size of an employer impacts many areas of workplace wellness programs. As demonstrated by the results of Kaiser/HRET Survey, of employers offering health benefits, large firms are more likely than small firms to offer some type of wellness program (99% vs. 76%). In

addition, small firms are more likely than larger firms to report that most wellness programs are provided by the health plan (81% vs. 56%). Larger firms are also more likely than smaller firms to offer wellness benefits to spouses or dependents (65% vs. 47%). These figures demonstrate that the small size of the firms act as a barrier for implementation and participation in wellness programs most likely due to the greater resources that are available to larger firms.

Resources available can also impact the use of incentives, which in turn can affect participation. The RAND survey found that employers who use incentives for screening activities report significantly higher participation rates than those employers who did not (63 percent vs. 29 percent for HRA completion and 57 percent vs. 38 percent for clinical screenings).

Lack of availability of resources as barrier to workplace wellness program is further supported by other responses from the survey. The RAND survey noted that of the 49 percent of employers that did not offer a wellness program, 91 percent had not offered a program in the past five years. These firms indicated the following reasons not offering a wellness program: absence of cost-effectiveness, lack of resources, and low interest from both management and employees. Seventy-five percent of the employers who had recently discontinued their program noted lack of resources as an important reason for cancellation. Alternatively, Person et al (2010) studied an employee wellness program implemented at East Carolina University for ARAMARK employees (n=481) to determine barriers for employee utilization. The researchers found that the most common barriers to participation reported were insufficient incentives, inconvenient locations, and time limitations. Others noted included no interest in topics presented, schedule, marketing, health beliefs, and not interested in the program. The authors noted that employee disinterest and information presented not relevant are supported by previous findings, however

the top three barriers of incentives, location, and time had not been previously reported and may be unique to the physical spread of the work environment of a college campus.

To further support the importance of workplace wellness programs and mitigate the barriers for establishing these programs, the Affordable Health Care Act (ACA) contains several provisions related to these wellness programs. The proposed rules were effective for plan years starting on January 1, 2014 and expand upon existing wellness program policies as well as create new incentives. The ACA seeks to remove barriers for small employers by providing additional resources. Beginning on fiscal year 2011, the ACA began to provide grants for up to five years to small employers to establish wellness programs (Kaiser 2013). Two hundred million dollars are dedicated to wellness program start-up grants for businesses with fewer than 100 employees (Mattke 2012). The ACA also provides technical assistance and other resources through the CDC to evaluate employer-based wellness programs, as well as conduct a national worksite health policies and programs survey to assess employer-based health policies and programs (Kaiser 2013). The Department of Health and Human Services will award \$10 million from the ACA's Prevention and Public Health Fund to organizations with expertise in working with employers to develop and expand workplace wellness programs (Mattke 2012). Additionally, the ACA allows for greater incentives for health-contingent wellness programs, which could mitigate barriers to utilization. Health contingent wellness programs in which individuals must meet a specific standard related to their health to obtain a reward. The rule increases the maximum permissible reward under a health contingent wellness program from 20 percent to 30 percent of the cost of health coverage, and further increase the maximum reward to as much as 50 percent if it is determined to be appropriate (DOL 2014). The ACA also continues to support participatory wellness programs which are available without regard to an individual's health status, such as



rewards for completion of a health risk assessment and discounted/free gym memberships.

Finally, the ACA includes prevention and wellness services and chronic disease management in its list of health benefits that certain health plans are required to offer as of 2014 and specifies 45 recommended preventive services that must be covered without cost-sharing as of September 23, 2010. This increase in regulation should aid in the further expansion of workplace wellness programs and the mitigation of barriers to currently existing programs.

## CHAPTER III – Methods

### Data Sources

A keyword search was conducted using PUBMED and CINAHL (EBSCO) for studies published within a five year time period from January 2009 to December 2013. Additional studies were identified through searches of recent literature reviews. Table 1 displays the search strategy employed for each database.

Table 1. Search Strategy for Databases

PUBMED	employ*[ti] OR workplace[ti] OR worksite[ti] OR corporate[ti] AND
	AND
	wellness program[ti]
CINAHL (EBSCO)	TI employ* OR TI workplace OR TI worksite OR TI corporate
	AND
	TI wellness programs

### Inclusion/Exclusion Criteria

Inclusion criteria included peer-reviewed articles and studies that evaluated a health impact of a lifestyle management component of a workplace wellness program as the primary outcome.

Studies outside of the United States, those published before 2008, and those studies that focused solely on disease management were excluded.

### Study Selection

After the initial search, duplicates were removed. Following the removal of duplicates, a review of the title and abstract was completed to remove studies that were not relevant to this review. Potentially relevant studies were then reviewed in full and additional studies were removed based on the inclusion and exclusion criteria.

## Data Collection

The employer characteristics including size and classification, employee characteristics, wellness program characteristic including incentives, time period of the study, and the outcome of the intervention were extracted from the studies.

## Quality Assessment

The QUADAS tool illustrated in Table 2 was used to assess the quality of the studies (Whiting 2003). While the tool does not establish a final quality score, as the developers determined this is not necessary for systematic reviews, it provides a method to ensure only quality research is included in the review. Only applicable questions will be used for the assessment per the methods established by Whiting. The results of the quality assessments will be used to determine if the study will be rejected from the review.

Table 2. The QUADAS Tool

Item		Yes	No	Unclear
1	Was the spectrum of patients representative of the patients who will receive the test in practice?			
2	Were selection criteria clearly described?			
3	Is the reference standard likely to correctly classify the target condition?			
4	Is the time period between reference standard and index test short enough to be reasonably sure that the target condition did not change between the two tests?			
5	Did the whole sample or a random selection of the sample, receive verification using a reference standard of diagnosis?			
6	Did patients receive the same reference standard regardless of the index test result?			
7	Was the reference standard independent of the index test (i.e. the index test did not form part of the reference standard)?			
8	Was the execution of the index test described in sufficient detail to permit replication of the test?			
9	Was the execution of the reference standard described in sufficient detail to permit its replication?			
10	Were the index test results interpreted without knowledge of the results of the reference standard?			
11	Were the reference standard results interpreted without			

	knowledge of the results of the index test?			
<b>12</b>	Were the same clinical data available when test results were interpreted as would be available when the test is used in practice?			
<b>13</b>	Were uninterpretable/ intermediate test results reported?			
<b>14</b>	Were withdrawals from the study explained?			

## CHAPTER IV – Results/Findings

### Search Results

Fifty five studies were identified from the database search. There were two duplicate studies identified after an initial review. Thirty seven studies were excluded after a title and abstract review leaving eighteen studies for a full review. Thirteen studies were excluded due to various reasons related to inclusion and exclusion criteria. Five studies remained to be included in the qualitative review. Figure 3 displays the flow of the identification of studies for this review.

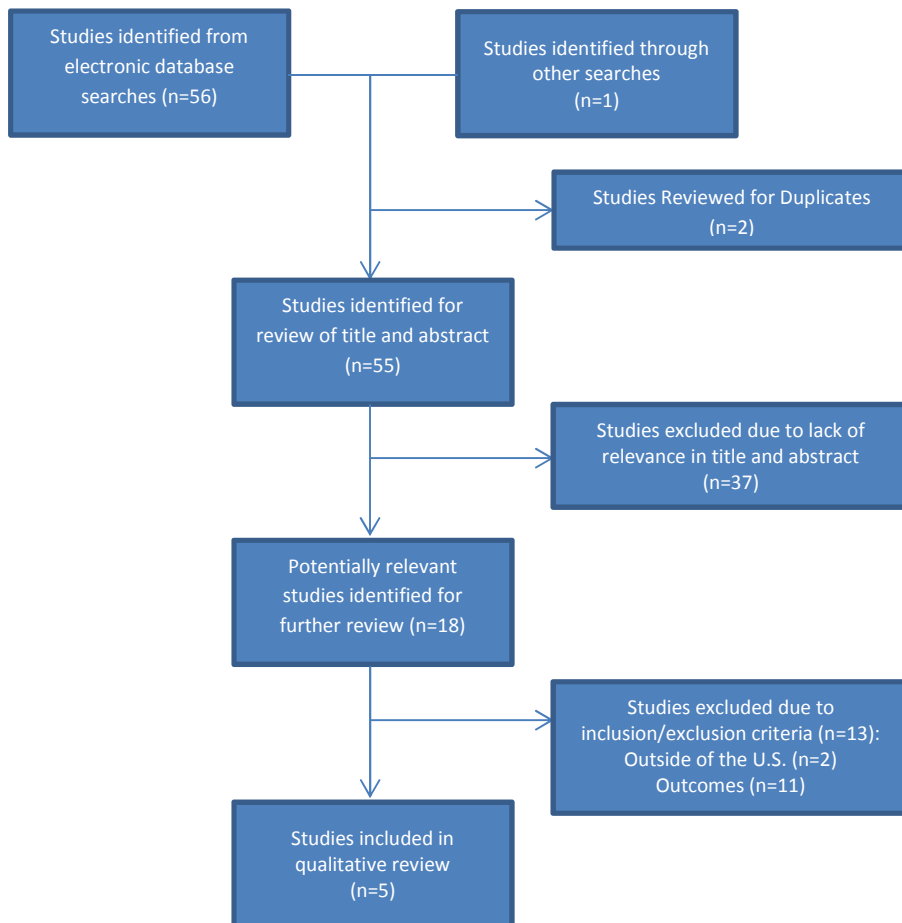


Figure 3. Study Flow Diagram

A quality assessment was then performed on the remaining five studies. Table 3 displays the results of this assessment.

Table 3. Quality Assessment Results

	Representative spectrum	Selection criteria described	Acceptable Reference standard	Acceptable Time Period	Differential Verification Avoided	Index Test Results Blinded	Un-interpretable Results	Withdrawals
LeCheminant/ 2012	●	●	●	●	●	●	●	●
Merrill/ 2011	●	●	●	●	●	●	●	●
Neville/ 2010	●	●	●	●	●	●	●	●
Perez/ 2009	●	●	●	●	●	●	●	●
Scoggins/ 2011	●	●	●	●	●	●	●	●

All studies were found to be of adequate quality to be included in this review.

### Study Range and Characteristics

The employers in the studies have a variety of characteristics in terms of size and type. The population studied by LeCheminant et al study (2012) was at an engineering, science, and operations company with 267 employees continuously employed at the company during the two-year study period. The researchers assessed the WellSteps wellness program. The Merrill et al study (2011) is based on the Reaping Rewards wellness program at Syngenta, a company that produces crop protection products and employed 3,737 individuals continuously during the two-year study period. Neville et al (2010) studied the Salt Lake County’s Healthy Lifestyle Incentive Program (HLIP). The Salt Lake County Government employs approximately 3,200 people. The population studied in Perez et al (2009) was of Arkansas’ state health and human services department. The Healthy Employee Lifestyle Program (HELP) intervention targeted the department’s 10,000 employees. Scoggins et al (2011) studied the King County, Washington

government’s Healthy Incentives wellness program which employees 13,000 employees. The wellness program also offers the program to spouses and partners of these employees. Table 4 summarizes the characteristics of the employers included in the study.

Table 4. Employer Characteristics

Characteristics	Number of Companies (n) and %
<b>Company Size</b>	
1-500 employees	n=1 (20%)
500-9,999 employees	n=2 (40%)
Greater than 10,000 employees	n=2 (40%)
<b>Industry Description</b>	
Services	n=1 (20%)
Manufacturing	n=1 (20%)
Government	n=3 (60%)

The wellness programs offered by the employers had many similarities with a few differences. The WellSteps Program evaluated by LeCheminant consisted of employees completing a personal health assessment (PHA) and six behavior change campaigns. Employees could participate in any or all of the six campaigns over a year period, and participation was defined as completing at least one campaign and the PHA. The campaigns had a total of 30 weekly tasks and to complete a task an employee had to finish the behavior change required during that week. The following outlines the six campaigns within the WellSteps Program: 1) The Culprit and the Cure and the Fast Food Guide are designed to improve nutrition and healthy lifestyle behaviors. 2) The *Move It* campaign encouraged participants to achieve 30 minutes of physical activity at least three days per week. 3) The *Good Night* campaign targeted improvement of sleep habits. 4) *Maintain Don’t Gain* focused on managing body weight. 5) *Food Makeover* focused on changing the types of food available within the home to healthier options, and 6) *Stress Free* focused on stress management. Throughout the course of the

campaign, participants received materials, such as handouts, pedometers, and books. Randomly selected participants had the chance to win rewards and receive recognition.

The Reaping Rewards Program studied by Merrill et al includes monetary incentives for completing good health behaviors. By completing activities such as a health risk appraisal (HRA), screening results, aerobic classes, dental cleanings, attending educational lunch programs, and physical examinations, employees earned points which could be exchanged for up to \$250 per year. Similar to the Reaping Rewards Program, the Healthy Lifestyle Incentive Program (HLIP) reviewed in the Neville study allows participants to redeem points earned throughout the year for cash typically between \$75 to \$250 per employee. In this program, employees complete a HRA and a blood pressure/cholesterol screening at initial enrollment. Based on this, each participant was counseled individually, and throughout the year, participants could earn points through activities such as completing monthly logs showing 20 days of exercise, achieving health indicators in healthy range during the initial screenings, and completing a pap smear.

The Healthy Employee Lifestyles Program evaluated by Perez et al also utilizes a points program as a participation program. Employees enrolled in the program by creating an account in a web-based program and completing a HRA. Upon completion of the HRA, the employees received an overall wellness report that described the employee's current state of health, risk factors and healthy living tips. Enrollees could then earn points by reporting progress through the web-based system on activities such as health screenings, physical activity, and self-reporting fruit and vegetables consumption. Points could be redeemed for items such as water bottles, t-shirts, and up to three days paid leave.



Finally, the Healthy Incentives program evaluated by Scoggins et al required participants to complete a web based or paper HRA upon enrollment. The participants in this program included employees as well as their spouses and partners. Similar to the other programs, participants then received a report identify their risk factors based on the HRA. Individual action plans were then developed based on these risk factors. Reductions in out-of-pocket expenses for medical benefits were earned annually through completion of the program. The highest out-of-pocket option was for those who did not participate, the middle out-of-pocket option was for completing a HRA, and the lowest out-of-expense option was for those completing a HRA and the 10-week individual action plans developed from the HRA completion.

### Study Outcomes

Table 5 summarizes each of the studies and the outcomes of the wellness programs with the specific follow-up time.

Table 5. Overview of Study Findings

Study	Sample Size (experiment/comparisons)	Intervention	Outcomes	Longest Follow-Up (Months)	Findings	Research Design
LeCheminant /2012	116	<p>WellSteps Program</p> <ul style="list-style-type: none"> <li>• PHA</li> <li>• Wellness Programs</li> <li>• Health Promotion Materials</li> <li>• Modest reward and recognition program</li> </ul>	Nutrition, exercise, smoking, various biometric measures	24	<p><b>Nutrition:</b> 122% increase in at least 5 fruits and vegetables servings/day for 24 months; 15% increase in at least 5 servings per week of whole grains</p> <p><b>Exercise:</b> 61% increase in at least 4 days/week at 12 months, maintained for 24 months; 45% increase in at least 90 min of exercise/week; maintained for 24</p>	Pre-post observational design with no control

					<p>months</p> <p><b>Smoking:</b> No difference</p> <p><b>Biometric Measures:</b> elevated blood pressure decreased after 12 months (-10%) and maintained after 24 months; elevated cholesterol and glucose remained unchanged</p>	
Merrill/2011	2954 (no control)	<p>Reaping Rewards Program</p> <ul style="list-style-type: none"> <li>• HRA</li> <li>• Classes</li> <li>• Screenings</li> <li>• Health Promotion Programs</li> <li>• Incentives for healthy behavior</li> </ul>	Nutrition, exercise, smoking, various biometric measures	24	<p><b>Nutrition:</b> significant improvements in dietary variables</p> <p><b>Exercise:</b> Changes not statistically significant</p> <p><b>Smoking:</b> Changes not statistically significant</p> <p><b>Biometric Measure:</b> Mean increase in BMI; Significantly greater improvements among poorest classified scores at baseline in blood pressure, cholesterol, lipoprotein, glucose</p>	Pre-post observational design with no control
Neville/2010	308/57	<p>Healthy Living Incentive Program (HLIP)</p> <ul style="list-style-type: none"> <li>• HRA</li> <li>• Biometric Screenings</li> <li>• Counseling Based on HRA</li> </ul>	Nutrition, exercise, smoking, various biometric measures	96	<p><b>Nutrition:</b> increase in eating 5 or more servings of fruit and vegetables per day (19% vs. 26%), and eating foods high in fiber (93% vs. 98%); no significant changes in dietary plan or eating foods high in cholesterol</p> <p><b>Exercise:</b> Increase in exercising at least three times per week (74% vs. 85%)</p> <p><b>Smoking:</b> No significant changes</p>	Quasi-experimental longitudinal study

					<b>Biometric Measure:</b> Greatest improvements in BMI, blood pressure, and cholesterol found in those at highest levels at baseline	
Perez/2009	214 (no control)	<p>Healthy Employee Lifestyle Program (HELP)</p> <ul style="list-style-type: none"> <li>• HRA</li> <li>• Wellness report</li> <li>• Education</li> <li>• Incentives for healthy behavior</li> </ul>	Nutrition	12	<p><b>Nutrition:</b> Increase in participants eating 3 or more servings of vegetables and fruits per day (13.6% vs. 26.2% and 10.8% vs. 17.3% respectively); No significant consumption differences in proteins, grains, dairy, sweets, fats, fried foods and processed meats</p>	Pre-post observational design with no control
Scoggins/2011	19559 (1 year) 10432 (5 year)/ 8,103 (control - MEPS)	<p>Healthy Incentives Program</p> <ul style="list-style-type: none"> <li>• HRA</li> <li>• Actions plans</li> <li>• Wellness culture</li> <li>• Incentives – out of pocket expenses</li> </ul>	BMI/Weight	60	<p><b>Weight:</b> 1 year participant lost weight (-0.80%), while MEPS gained (0.31%); 5 year participants lost weight (-0.47%)</p> <p><b>BMI:</b> 1 year growth rates become more negative with category (normal: -0.59%; overweight -1.24%; obese: -1.74%); growth rate of 5 year participants is larger than 1 year participants (1.17%)</p>	Comparison longitudinal study

The five studies selected evaluated 47 outcomes. The most common outcomes were nutrition (n=18) and biomarkers (n=16) followed by exercise (n=5), smoking (n=3), sleep (n=2), alcohol (n=1), sick days (n=1), and seat belt usage (n=1).

**Nutrition:** Four studies evaluated 18 outcomes related to diet and nutrition. 50% of the outcomes related to nutrition showed improvements. The LeCheminant study found improvements in all three outcomes related to nutrition in the study: whole grain consumption, fruit intake and vegetable intake. The Merrill study found statistically significant improvements among obese participants in the two health outcomes related to nutrition: change in fat intake and change in fruit and vegetable consumption. In the Neville study, the percentage of participants eating five or more servings in fruits and vegetables per day (19% to 26%) and eating foods high in fiber (93% to 98%) significantly increased, however there were no significant changes in the percentage of employees with a dietary plan or eating foods high in cholesterol in this study. The Perez study found no significant difference between the baseline and follow-up in intake frequency of fat, sweet/desserts, protein, grains, dairy, processed meats, and fried foods. However, more participants ate three or more servings of vegetables and fruits per day than at the baseline (26.2% vs. 13.6% and 17.3% vs. 10.8% respectively). It is important to note that fruit and vegetable consumption was the only dietary behavior rewarded by the program, while the other behaviors had no reward associated with them.

**Biomarkers:** Four of the five studies evaluated outcomes related to various biomarkers in different ways. LeCheminant study examined changes from baseline levels to 12 months to 24 months. There was little to no change in those reporting borderline high or high cholesterol and borderline high to high glucose levels within the study period. The level of those reporting borderline high to high blood pressure decreased from 24% to 14% after 12 months and was decreased slightly to 12% after 24 months. The Merrill study examined the change in eight biomarkers according to the baseline classifications of each indicator: body mass index (BMI), systolic blood pressure, diastolic blood pressure, total cholesterol, low-density lipoprotein, high-

density lipoprotein, triglycerides, and glucose. For example, BMI classifications of underweight, normal, overweight, and obese were presented for the measure. Significant differences across the levels of each classification of the measures were found. Although BMI increased for each classification level, the increase was significantly lower for obese employees. Additionally for each of the other measures, significantly greater improvements took place within the poorest classifications at baseline. The Scoggins study examined changes in BMI and the percentages of those participants in the program who lost 5% and 10% of BMI were compared for first-year participants, five-year participants, and respondents to the Medical Expenditures Panel Survey (MEPs). The difference in BMI growth rates between the first year participants and the MEPS respondents become more negative with BMI category (normal: -0.59%; overweight -1.24%; obese: -1.74%). With the exception of obese participants, the BMI growth rate of five year participants is larger than the growth rate for the first year participants except for obese participants. More overweight and obese first-year participants lost at least 5% of their body weight than did the MEPS respondents (28.5% vs. 23.25). Finally, the Neville study evaluated BMI, percent body fat, blood pressure and cholesterol levels. It was found that percentage of participants that these biomarkers over the eight year study period were significantly greater for those with higher baseline classifications of these risk factors. The mean change in each risk factor tended to be more negative with higher baseline levels of the risk factors.

**Exercise:** Three studies evaluated five outcomes related to physical activity. Forty percent of the outcomes related to physical activity showed improvements. The Neville et al study found that participants engaging in three or more physical activity per week increased from 74% to 85% within the study period. The LeCheminant study found an increase in both the frequency and duration of exercise. The number of days and minutes of exercise increased by 61 and 45 percent

respectively within 12 months and was sustained through 24 months. The Merrill study found that changes in bodily pain, health limitations, and exercise among obese participants were not statistically significant.

**Smoking:** Three studies evaluated smoking as a health outcome. All three studies found no significant change in smoking. LeCheminant found that the number of cigarettes/cigars smoked per day began low and remained low with no difference over the duration of the study.

**Other:** Other health outcomes evaluated in a total of the two of the studies reviewed included sleep (n=2), alcohol use (n=1), seat belts (n=1), and sick days (n=1). There was no statistically significant change in seat belt usage or sick days. While the Merrill study found that change in sleep was not statistically significant, the LeCheminant study found the number of participants reporting sufficient sleep for four or more days increase from 36% to 42% in the first 12 months of the study and sustained through 24 months. The Merrill study found a statistically significant change in alcohol drinking in obese participants.

## **CHAPTER V – Discussions and Conclusions**

### **Summary**

In summary, the authors of all of the studies reviewed concluded that the workplace wellness programs being evaluated proved to be an effective method of influencing healthy behaviors. Furthermore, the LeCheminant study demonstrated that not only can employees make improvements in health behaviors, but they can also maintain these behaviors after 12 months. The studies noted success within specific demographics. The Merrill study had a greater level of participation within the program among females and people within the age range of 30 through 59. The authors noted these findings are consistent with other studies in the literature. The Scoggins study noted that the program was most successful for women, members older than 60 years, African Americans, and those who did not graduate from college, while the program was least successful for men, members younger than 30 years, Asian Americans, and those who did graduate from college. African Americans have the highest mean BMI and the highest BMI growth rate in the country, yet in this study African Americans lost weight at almost three times the rate of white participants. The trend of the programs reaching higher risk employees was seen throughout almost all studies. For example, the Perez study noted that 75% of HELP enrollees reported BMIs in the overweight or obese ranges indicating this intervention was able to recruit and reach the desired population. Similarly, the Merrill study concluded that significant improvements in blood pressure, cholesterol, triglycerides, and glucose scores occurred in those participants with higher baseline classifications of these risk factors. The study pointed out that improvement within the highest risk levels was likely achieved due to providing reward points for modified selected high-risk behaviors. Alternatively, a program that may wish to increase

participation in the already-healthy population would reward employees for activities such as completion of a 10K or triathlon and consistent intake of 5 fruits or vegetables per day.

### **Study Strengths and Limitations**

In general, the strengths of the studies reviewed were the length of the interventions and their comprehensive nature. All studies reviewed changes in health outcomes after at least a year and almost all of the workplace wellness programs targeted several health behaviors using various methods of health promotion.

Several limitations were noted within the studies. Self-reporting bias presents a limitation of all studies evaluated due to the fact that participants were using HRAs to report data, such as weight, height and behaviors. The Neville study pointed out that adult males and females underreport their weight by 3.5 pounds and 4-4.6 pounds, respectively, however one would expect the same bias at baseline and follow-up so this underreporting may not be relevant. The method in which incentives are rewarded may have an impact on self-reporting bias. Both the Scoggins and Perez study noted that because the reward was solely based on participation in the program rather than achieving certain results over time, the emphasis was placed on healthy behaviors rather than encouraging the falsification of reporting information therefore mitigating this limitation. In addition, the long period between HRA completions, most often at least a year, mitigated self-reporting bias as participants were not likely to recall their previous responses.

Self-selection bias was also noted in most studies. The Scoggins study noted that due to nearly 80% of the workforce being included in the study, this study did not suffer self-selection bias to the degree of most. The high level of participation was able to be achieved due to the involvement of the labor unions in the program. The self-selection bias of these studies leads to limited ability to generalize the studies. People who were motivated to remain in the programs for the period of times studied are likely systematically different from those who failed to stay in



the programs. Additionally, as stated, particular demographics of employees tend to have greater participation in workplace wellness programs therefore the sample in the study is likely not reflective of the greater population. For example, in the Neville study, women were overrepresented in the program where 60% of participants were women compared to just 48% of the Salt Lake County workforce.

Additionally, the lack of a comparison group was a limitation for most studies with the exception of the Scoggins study, in which the use of MEPS as a comparison group was noted as a strength. Merrill et al point out that without a comparison group, behavioral change may have been influenced by more than just the wellness program. For example, in the Neville study, during the study period, the authors noted that the state of Arkansas reformed policies related to health programs and several sources attributed improvement in nutrition to this reform.

## **Recommendations**

Lessons learned from the studies include wellness programs must be convenient for participants and employers must be willing to commit significant resources to the program, to incentivize program participation that seeks employee buy-in, and to seek the cooperation of labor unions. It was found that the use of HRAs and specific behavior campaigns were effective in influencing behavior. Additionally, multifaceted and comprehensive intervention activities were shown to be effective, perhaps to mitigate lack of employee interest and lack of relevance as a barrier to utilization. Incentives also proved to be essential to the success of a wellness program, particularly small rewards to reinforce behavior change for interventions aimed at the target population.

Future studies are recommended evaluating workplace wellness programs with high levels of participation to aid in generalizability. Additionally screening results should be used to eliminate reporting bias, as well as comparison groups.

## REFERENCES

The Affordable Care Act and Wellness Programs. *Employee Benefits Security Administration*. United States Department of Labor. 2014. Web. Accessed March 5, 2014.

Call, Catherine, Gerdes, Robyn, and Robinson, Kristen. Health and wellness research study: corporate and worksite wellness programs: a research review focused on individuals with disabilities. *U.S. Department of Labor*. 27 March 2009.

Chronic Diseases and Health Promotion. *Centers for Disease Control and Prevention*. National Center for Chronic Disease Prevention and Health Promotion, 13 Aug. 2012. Web. Accessed February 27, 2014.

Charts from the American Time Use Survey. *Bureau of Labor Statistics*. United States Department of Labor. 23 October 2013. Web. Accessed. February 27, 2014.

Comprehensive Workplace Health Programs to Address Physical Activity to Address Physical Activity, Nutrition, and Tobacco Use in the Workplace. *Centers for Disease Control and Prevention*. National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health, 23 October 2013. Web. Accessed February 27, 2014.

DeJoy M and Southern J. An integrative perspective on worksite health promotion. *Journal of Occupational Medicine*. 1993; 35 (12); 1221-1229.

Goetzel RZ, Ozminkowski, RJ. The health and cost benefits of work site health-promotion programs. *Annu Rev Public Health*. 2008; 29:303-323.

Grzywacz, JG, Fuqua, J. The social ecology of health: leverage points and linkages. *Behavioral Medicine*. 2000; 26: 101-115.

Kaiser Family Foundation, Health Research & Educational Trust. Employer Health Benefits 2013 Annual Survey. <http://ehbs.kff.org/2013.html>. Accessed September 30, 2013.

LeCheminant, James, D. and Merrill, Ray M. Improved health behaviors persist over two years for employees in a worksite wellness programs. *Population Health Management*. 2012; 15: 261-266.

Mattke, Soeren, Hangsheng Liu, John Caloyeras, Christina Y. Huang, Kristin R. Van Busum, Dmitry Khodyakov and Victoria Shier. Workplace Wellness Programs Study: Final Report. Santa Monica, CA: RAND Corporation, 2013. [http://www.rand.org/pubs/research\\_reports/RR254](http://www.rand.org/pubs/research_reports/RR254). Accessed September 30, 2013.

Mattke, Soeren, Schnyer, Christopher, and Van Busum, Kristin. A Review of the U.S. Workplace Wellness Market. RAND Corporation, 2012.

Neville, Beverly Hyatt, Ray M. Merrill, and Karol L. Kumpfer. Longitudinal Outcomes of a Comprehensive, Incentivized Worksite. *Eval Health Prof.* 2011; 34: 103-123.

Perez, Amanda P., Martha M. Phillips, Carol E. Cornell, Glen Mays, and Becky Adams. Promoting dietary change among state health employees in Arkansas through a worksite wellness program: the healthy employee lifestyle program (HELP). *Preventing Chronic Disease* 2009; 6(4); 1-8.

Person, Ashley Lynne, Colby, Sarah Elizabeth, Bulova, Jessica Ann, and Eubanks, Janie Whitehurst. Barriers to participation in a worksite wellness program. *Nutrition Research and Practice.* 2010; 4(2): 149-154.

Scoggins, John F., Karleen N. Sakumoto, Kerry S. Schaefer, Brooke Bascom, Donald J. Robbins, and Caroline L. Whalen. Short-term and long-term weight management results of a large employer-sponsored wellness programs. *Journal of Occupational and Environmental Medicine.* 2011; 53: 1215-1220.

Secretary's Advisory Committee on Health Promotion and Disease Prevention Objectives for 2020. Healthy People 2020: An Opportunity to Address the Societal Determinants of Health in the United States. July 26, 2010. Available from: <http://www.healthypeople.gov/2010/hp2020/advisory/SocietalDeterminantsHealth.htm>

The Social-Ecological Model: A Framework for Prevention. Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. December 27, 2013. Available at <http://www.cdc.gov/violenceprevention/overview/social-ecologicalmodel.html>. Accessed March 5, 2014.

Summary of the Affordable Care Act. The Henry J. Kaiser Family Foundation. 2013 April 25. Available at <http://kff.org/health-reform/fact-sheet/summary-of-new-health-reform-law/>. Accessed March 5, 2014.

U.S. Department of Health and Human Services. Office of Disease Prevention and Health Promotion. Healthy People 2020. Washington, DC. 2013 August 28. Available at <http://www.healthypeople.gov/2020/default.aspx>. Accessed March 5, 2014.

Wellness in the Workplace. *Centers for Disease Control and Prevention.* National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health, 4 February 2013. Web. Accessed March 5, 2014.

Whiting P, Rutjes AW, Reitsma JB, Bossuyt PM, Kleijnen J: The development of QUADAS: a tool for the quality assessment of studies of diagnostic accuracy included in systematic reviews. *BMC Med Res Methodol* 2003, 3:25.