ORGANIZATIONAL INFLUENCE ON HEALTH OUTCOMES OF SCHOOL EMPLOYEES

A DISSERTATION
PRESENTED TO THE FACULTY OF THE
CALIFORNIA SCHOOL OF PROFESSIONAL PSYCHOLOGY
ORGANIZATIONAL PSYCHOLOGY PROGRAM, SAN DIEGO
ALLIANT INTERNATIONAL UNIVERSITY

In Partial Fulfillment of
The Requirements for the Degree

DOCTOR OF PHILOSOPHY
IN
INDUSTRIAL/ORGANIZATIONAL PSYCHOLOGY

By

Wendy Hileman

2014

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Dedication

To my patient and supportive partner for life, Greg.

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ABSTRACT

In the United States, since 1980, excess weight reached epidemic levels and labeled a public health crisis. Obesity rates correlated with chronic disease drive health care expenditures, absenteeism, worker compensation claims, co-morbidities, mortality rates, and more.

Many organizations offer employee wellness programs but are difficult to measure benefits and determine the most effective strategies. Wellness program effectiveness was seldom linked to organizational variables. Research questions were: (1) What organizational variable effects, such as organizational size, engagement in policies that encourage participation, and median income of the school district, determined by zip code income census data, have on school employee health outcomes, perceived health and wellness participation rates; and (2) Will the employee's residence effect health outcomes, perceived health and wellness participation rates, determined by employee's residence zip code and median income zip code census data.

Research generally focused on one organizational variable or health outcome in a variety of organizations, whereas this study examined multiple organizational variables and health outcomes within many school districts. The hypotheses were: (1) Mid-sized districts have better employee health outcomes, perceived health and participation rates than larger-sized districts; (2) Districts with better developed wellness policies using best practices have a positive effect on employee health outcomes, perceived health and participation rates; and (3) Organizational effects on employee health outcomes,

perceived and participation rates vary by where the employees' resides and works, as it links to median income zip code census data, with employees residing and working in lower/medium income areas having the worst health outcomes, perceived health and participation rates, and best results with the highest income.

This longitudinal study had several layers of organizational effects on employee wellness in Southern California School Districts. The program impacted almost 10,000 employees, self-selecting a variety wellness options, such as wellness challenges, health screenings, coaching, incentives, and staff development workshops. Data collected yearly included: (a) objective health measurements, such as body mass index and systolic/diastolic blood pressure; (b) self-reported perceived health measurements, such as health, stress, energy, confidence, self-esteem, and body image; and (c) the type of interventions. The data was archival and collected from 2005 to 2012.

Chapter 1

Introduction and Literature Review

Introduction

Obesity and excess weight have reached epidemic levels in the United States and are recognized as major national public health problems since 1980 (Flegal, Carroll, Ogden, & Curtin, 2010; Nestle & Jacobson, 2000; U.S. Department of Health and Human Services [US DHHS], 2001), which contributes to the risk of many preventable diseases (Biddle, Sallis, & Cavill, 1998; Payne, Hahn, & Lucas, 2007). In the United States, the adult rates of obesity and being overweight were 32.9% and 66.3% respectively (CDC, 2007; Flegal, Carroll, Kuczmarkski, & Johnson, 2002). One study concluded if rates continue to rise at the rate that it has been, 75% of Americans will be overweight or obese by 2015 (Wang & Beydoun, 2007).

Defining obesity and being overweight.

One can define being overweight in many different ways. One way to define an adult as overweight is one who has a Body Mass Index (BMI) between 25 and 29.9 (Centers for Disease Control [CDC], n.d.). BMI is a common measure expressing the relationship (or ratio) of weight-to-height. The equation is:

$$BMI = (703)\frac{Weight\_pounds}{Height\_inchesXHeight\_inches}$$

BMI is a common quick measurement used in doctor's offices, schools, and will soon be completed during immunization screenings in San Diego County (Live Well Initiative Public Health Meeting, 2009). However, BMI does not provide a

comprehensive snapshot of someone's health. BMI is based solely on height and weight and does not take into account that muscle is about 15% more dense than fat, so that similarly sized people can have differences in weight, with the more muscular people weighing more (Thomas, Tomlinson, Critchley, Wilson, Davis, Willett, Colditz, & Dietz, 1999). In the case of a muscular person, it is possible for that person to exceed the healthy range in BMI, yet still have a low body fat composition and have other indications of good health, such as levels exceeding or within the recommended levels for blood cholesterol, resting heart rate, and blood pressure.

Waist circumference is also another way to define being overweight, as visceral obesity is a good predictor of risk for developing risk factors for many preventable diseases, such as hypertension, dyslipidemia, insulin resistance (Ginsberg, 2000; Kahn & Flier, 2000; National Heart Lung and Blood Institute [NHLBI], n.d.). In addition, it can also lead to heart disease, type II diabetes, and other diseases. The highest at risk are men with waists over 40 inches and women over 35 inches and for those that are overweight to obese. Waist circumference was found to be more accurate at determining risk in men than waist to hip ratio (Chan, Watts, Barrett, & Burke, 2003).

The waist to hip ratio is another method to determine risks for different diseases (Lean, Han, & Morrison, 1995; Taylor, Keil, Gold, Williams, & Goulding, 1998). It is literally the waist circumference divided by the hip circumference. The recommendations are in Table 1 and are less than 0.95 for males and less than 0.80 for females. This was an effective way to determine intra-abdominal risks for women and obese children (Ferland, Despres, Tremblay, Pinault, Nadeau, Moorjani, Lupien, Theriault, & Bouchard, 1989; Owens, Litaker, Allison, Riggs, Ferguson, & Gutin, 1999).

Table 1

Hip to Waist Ratio Between Gender Within the Various Zones of Risk

Gender	Normal	Borderline	Danger
Male	≤ 0.95	0.96 to 1.0	> 1.0
Female	≤ 0.80	0.81 to 0.85	> 0.85

Note. Adapted from "Waist circumference as a measure for indicating need for weight management," by M. E. J. Lean, T. S. Han, and C. E. Morrison, July 15, 1995, *British Medical Journal*, 311, pages 159. Copyright 1995 by the British Medical Journal.

Another way to measure health is through body fat analysis. According to the American College of Sport Medicine, an adult women's body fat satisfactory for health should be between 20-32% and a man's should be between 10-22% (Lohman, 1982). More specifically, the American College of Sport Medicine (see Table 2) states that an adult women's body fat should be less than 17 percent as an athlete, between 17-22 percent if they are lean, between 22-25 if within the normal range, between 25-29 percent if above average, between 29-35 if over-fat, and 35 and over if obese (American College of Sports Medicine, 2010). A man's body should be less than 10 percent as an athlete, between 10-15 percent if lean, between 15-18 if within the normal range, between 18-20 percent if above average, between 20-25 if over-fat, and 25 and over if obese.

Table 2

Body fat categories by Body Type and Gender

Body Type	Female	Male
Athlete	<17%	<10%
Lean	17-22%	10-15%
Normal	22-25%	15-18%
Above Average	25-29%	18-20%
Over-fat	29-35%	20-25%
Obese	35+%	25+%

Note. Adapted from "*ACSM's Guidelines for Exercise Testing and Prescription* (8th Ed.)," by American College of Sports Medicine, 2010, page 59. Copyright 2010 by Wolters Kluwer/Lippincott Williams & Wilkins.

A person's weight, which is 1-19% higher than normal, as defined by a standard height/weight chart, is classified as overweight (Payne, Hahn, & Lucas, 2007). Obesity is defined as an adult who has a BMI of 30 or higher is considered obese (CDC, n.d.) or a person's weight that is 20% or more above normal weight, as defined by a standard height/weight chart (Flegal, Carroll, Kuczmarkski, & Johnson, 2002; Payne, Hahn, & Lucas, 2007). Morbid obesity is defined as a person's weight is 50-100% above normal weight, as defined by a standard height/weight chart, BMI of 40 or more with or without comorbidities, BMI of 35 or more with the presence of comorbidities, or sufficiently overweight to interfere with health or normal functioning (Gastrointestinal surgery for severe obesity: National Institutes of Health Consensus Development Conference Statement, 1992; Payne, Hahn, & Lucas, 2007; Pope, Phillips, & Olivardia, 2000).

Obesity and overweight consequences.

Obesity rates correlate with chronic disease, which drives health care expenditures, absenteeism, higher and more frequent worker compensation claims, from

income lost from decreased productivity, diminished quality of life restricted activity, bed days, co-morbidities which increase health risks exponentially, mortality rates, and more (CDC, n.d.a; USDHHS, 2001). One study found obesity linked to a 36% increase in health care spending (Rosen & Barrington, 2008, April). These cost increases costs pass through to the consumer and employer as rising costs of health insurance and health care (Levi, Vinter, St. Laurent, & Segal, 2008).

Excess weight increases the risk of many diseases and health conditions (CDC, n.d.a; Ogden, Carroll, Curtin, McDowell, Tabak, & Fegal, 2006; Payne, Hahn, & Lucas, 2007). The state of being overweight or obese increases the risk and aggravates symptoms for over 20 chronic diseases and disorders, such as cardiovascular and cardiorespiratory diseases, as seen in strokes, heart disease, and arthrosclerosis; dyslipidemia, which is high total cholesterol or high levels of triglycerides; hypertension; incontinence; increased surgical risk; type II diabetes; kidney disease; gallbladder disease; certain types of cancer, such as endometrial, breast, and colon cancers; premature death; certain musculoskeletal disorders; osteoarthritis; psychological disorders; Alzheimer's disease; dementia; sleep apnea and other disturbances; fatty liver disease; respiratory problems; and the exacerbation of other health problems (American Heart Association, 2008; Beydoun, Beydoun, & Wang, 2008; CDC, n.d.a; National Institute of Health [NIH] & National Heart Lung and Blood Institute [NHLBI], 1998; National Institutes of Diabetes and Digestive and Kidney Diseases, 2007; Ogden, Carroll, Curtin, McDowell, Tabak, & Fegal, 2006; Payne, Hahn, & Lucas, 2007; Petry, Barry, Pietrzak, & Wagner, 2008; USDHHS 2001; Wang, Chen, Song, Caballero, & Cheskin, 2008).

The contributing factors for excess body weight are energy imbalance, genetic predisposition, metabolism, behaviors, environment, culture, and socioeconomic status (Payne, Hahn, & Lucas, 2007; United States Department of Health and Human Services [USDHHS], n.d.). Even small amounts differences between energy input and output can lead to gradual weight gain over time, which lend to behavioral and environmental policy changes having the greatest opportunities for prevention and intervention actions (Hill, Wyatt, Reed, & Peters, 2003; Seeley & Woods, 2003). Lifestyle choices amount to more than 25% of the healthcare costs of employee, to include nutritional choices, sedentary behaviors, tobacco usage, sand excess stress, increasing their risks for preventable disease, resulting in a 26.1% increase in health care expenditures over a 10-year period (Anderson, Whitmer, Goetzel, Ozminkowski, Wasserman & Serxner, 2000; Leutzinger, Orminkowski, Dunn, Goetzel, Richling, Stewart, Whitmer, 2000). People spend one-third of their day at work, which creates an opportunity for the workplace to have a profound influence on employee behaviors, create healthy opportunities, and to change workplace culture. Workplace wellness programs approach changes within the Ecological Health Model, which includes changes in policy, environmental, cultural, and behavioral factors (McLeroy, Bibeau, & Steckler, 1988). This creates supportive environments that encourage and support healthy lifestyle at every level (World Health Organization, 1995). O'Donnel (1989) stated that supportive environments would have the greatest impact in producing lasting changes in health affirming behaviors (p. 5). Since workplaces have such an important opportunity to influence public health issues, it is important to understand organizational effect on health.

Statement of the problem.

Public health change traditionally targeted individuals. What we know is that in order to make effective change, strategies need to target the environment, the culture, the environment, and policies. One target that can support individual effort to live healthier lives is the workplace. The workplace can be an influence or an obstacle to people's health. This study helps to identify the organizational effects on employees' health and their participation rates in employee wellness programs.

Traditionally, worksite wellness interventions disproportionately recruited white males of higher socioeconomic status (Emmons, Linnan, Abrams, & Lovell, 1996). This study is unique in that is focused on Southern California teachers, administrators, and support staff, which has a higher number of females (60%), diversity, and greater range of socioeconomic conditions. Women, as well as minority and lower socioeconomic groups are more at risk of obesity than males and Caucasians, which makes this group of further interest.

It is more common for women to be less physically active than men and less engaged in moderate to vigorous physical activity, and declines even further with age for both (CDC, 2005, October 7, CDC, 2002, 2007; Flegal, Carroll, Kuczmarski, & Johnson, 1998; USDHHS, Public Health Service, CDC, National Center for Chronic Disease Prevention and Health Promotion, & Division of Nutrition and Physical Activity, 1999). Severe obesity estimates were 3.1% for men and 6.7% for women based on the population data in the United States between 1999-2000 (Flegal, Carroll, Odgen, & Johnson, 2002). This division increases further when race and ethnicity is added to the equation. Women of racial and ethnic groups, other than non-Hispanic white, have a

higher incidence of being overweight or obese (USDHHS, 2001), with Hispanic, African American, Native American, and Pacific Islander American women highest at risk (NIH & NHLBI, 1998; USDHHS, 2000, 2001). There is also a connection between overweight and obesity rates and lower socioeconomic status (CDC, 2002; USDHHS, 2000, 2001). Lower socioeconomic women from all racial and ethnic groups are about 50% more likely to become obese than women from a higher socioeconomic status (USDHHS, 2001).

In addition, where people live, work and play can influence individual behavioral decisions towards excessive intake and sedentary lifestyles (Booth, Pinkston, & Poston, 2005; Carlos-Poston & Foreyt, 1999; Drewnowski, 2004; Hill & Peters, 1998). This was related to access to healthy food options at affordable prices and prevalence of fast food restaurants (Rose, 2004; Swinburn, Caterson, Seidall, & James, 2004). This area of research stems from the social determinants of health (Kaplan, Lynch, & Whither, 1997; Krieger, 1994) and how environments influence health, including neighborhoods in which people reside (Diez Roux, 2001; Jones, & Duncan, 1995; Kaplan, 1996; Macintyre, Maciver, & Sooman, 1993). Lower income neighborhoods tend to have more health disparities than those in higher income areas.

The workplace should also be considered in its impact on employee health. Most wellness programs target for-profit corporations, with this program targeting non-profit school districts (Crawford, Gosliner, Strode, Samuels, Burnett, RD, Craypo, & Yancey, 2004). There is some but limited data specifically on public school employee wellness programs, but not within this framework. Public school employees tend to be long-term employees, so wellness programs have a greater potential for return on the

payer/employer, yet there remains substantial gaps in adequate school employee wellness programs (Eaton, Marx, & Bowie, 2007). The researchers concluded that more schools should implement comprehensive employee wellness programs targeting improved health behaviors and health status.

Military studies considered organizational characteristics, such as location, time, provider types, intrinsic self-motivation, and extrinsic organizational workplace factors, as predictor variables for dental wellness, readiness, and health behaviors (Chaffin, Rothfuss, Johnson, Larsen, & Finstuen, 2004; Wynd, & Ryan-Wenger, 2004). Another study linked sociocultural workplace attributes, incentives, and communication and organizational commitment level with participation in employer sponsored health assessments (McLellan, MacKenzie, Tilton, Dietrich, Comi, & Feng, 2009; Taitel, Haufle, Heck, Loeppke, & Fetterolf, 2008). It remains unclear whether the same findings would apply in a civilian organization, specifically school districts.

Another organizational characteristic to consider is the size of the organization. In a recent press release (December 6, 2012), Society of Resource Management and Alliance for a Healthier Minnesota reported that the larger the organization, the lower the rating of perceived employee health (Alliance for a Healthier Minnesota, 2012). During the State of Workplace Wellness National Survey2012, the findings were reported as a grading system on perceived health, for example, employers with 1-99 employees rated their health as a B+, employers with 100-400 employees rated their health as a B, and employers with 500+ employees rated their health as a B-/C. Obesity and being overweight were of greater concern to employers in larger organizations than small or

mid-sized organizations. Larger organizations were more likely to have wellness initiatives.

This group similarly mimics other long-term public servant employees, such as non-profit, government, and career military employees, who tend to stay within the field and tend to be more intrinsically motivated, since these jobs are often lower pay than corporate competitors (Benz, 2005). Therefore, the research findings with this group have the potential to be similar for non-profit, government, and potentially career military.

School district employees, at least within the San Diego County area, tend to have higher obesity rates, depression, and diabetes and other preventable disease than the general populations within San Diego County (Rott, 2011). This illustrates a great public health need to determine variables that impact employee participation in wellness programs and overall health outcomes, to possibly influence organizational behaviors when implementing employee wellness strategies.

Research generally focused on one organizational variable or health outcome in a variety of organizations, whereas this study examines multiple organizational variables and health outcomes within school districts and different locations. The hypothesis is that organizational variables will correlate with health outcomes, perceived health and participation rates in wellness activities.

Understanding the organizational effect on employee wellness programs can help educate and promote organizational change which supports employees in their quest to better health. Potential cost benefits of such a program have been well documented in research as its potential in lowering health care costs, lowering participant disease risk,

and impact on employee productivity (NIH, 1990; Levi, Vinter, St. Laurent, & Segal, 2008, August; Stein, Shakour, & Zuidema, 2000).

The problem is that we do not know what variables correlate with employee health outcomes and if there is a combination of variables that have a greater influence than others. In addition, very little research has been conducted in this area within school settings.

Purpose of the study.

The purpose of this study is to identify the effect of organizational variables, such as size of the organization, whether policies have been established that incentivize and or encourage participation in employee wellness programs, and if effects vary by where the employees' resides and works, as it related to median income zip code census data, on employee health outcomes, perceived health and participation rates. The health outcomes come from measured biometric data, and perceived health is self-reported. The participation rates are in a variety of wellness programs options.

Self-reported data included perceived levels of health, stress, energy, confidence, self-esteem, and body image. Biometric data are objective health measures that included body mass index (BMI) and systolic/diastolic blood pressure.

Literature Review

Obesity and overweightness.

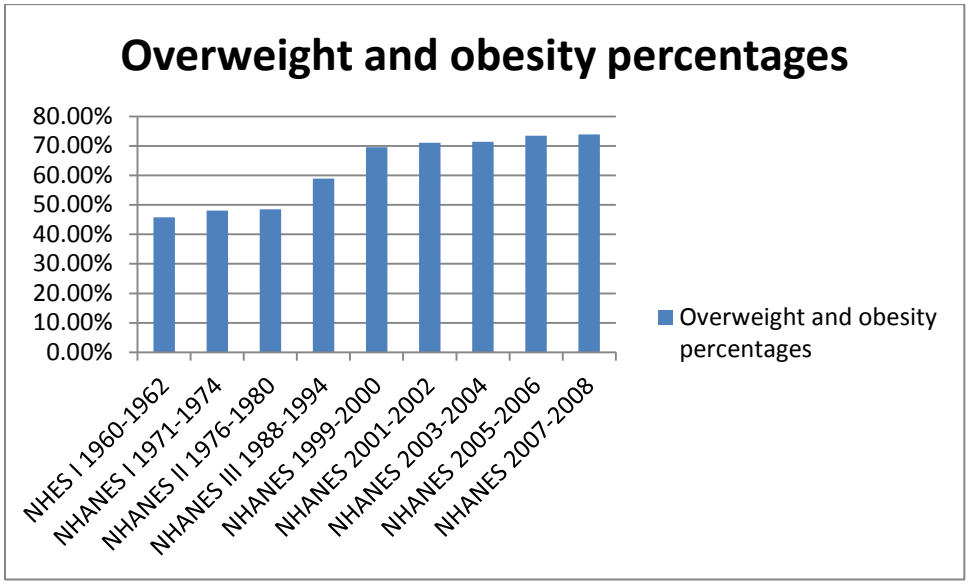
Trends of obesity and the state of being overweight.

Taking a look at the historical data trends of obesity and those overweight, the numbers are staggering. Between the years 1960-1962, 45.80% of adults as overweight or obese, 69.50% between 1999–2000, and 73.9% between 2007-2008 (see Figure 1)

(Odgen & Carroll, 2010). Between 1990 and 1998, the average body weight increased by 3.4 kg in 1990 and an additional 3.9 kg in 1998 (Mokdad, Ford, Bowman, Nelson, Engelgau, Vincor & Marks, 2000).

Figure 1

Historical Trends of the Percentage of Adults Overweight and Obese in the United States



Note. Abstracted from "Prevalence of Overweight, Obesity, and Extreme Obesity Among Adults: United States, Trends 1960–1962 Through 2007–2008 (National Health and Examination Survey (NHANES))," by Cynthia L. Ogden, Ph.D., and Margaret D. Carroll, M.S.P.H., Division of Health and Nutrition Examination Surveys (2010, June), Health E-Stats, page 5.

Healthy People 2000 expounded on this trend of increase, which identified obesity as considerable public health importance and identified physical activity and fitness as top priority areas of behavior change (Nestle & Jacobson, 2000; USDHHS, 1990, 2000). Again, in Healthy People 2010, physical activity and overweight issues were on the top ten leading health indicators list (USDHHS, 2000, 2001a). The increase

in obesity is primarily due to a decrease in physical activity and high-energy diets (Zimmet, Alberti, & Shaw, 2001). These factors combined were additional contributors to the increased risk of many preventable diseases (Biddle, Sallis, & Cavill, 1998). Even with this knowledge, health care practitioners are not attending to the weight crisis with the intensity or diligence this crisis requires (NIH & NHLBI, 2000), which will soon pass smoking as the biggest risk factor for premature death, reduced quality of life and increased health care costs (Freedman, 2011). Prevention and intervention of excess weight and obesity must be on-going, expand across one's lifetime, include all family members, and have adequate levels of support to increase the likelihood of success (CDC, 2002; Payne, Hahn & Lucas, 2007; Trotto, 1999; USDHHS, 2001).

Causes of obesity.

Excess body weight at the individual level can be a result of many factors. Some of these factors link to genetic and metabolic causes, while other factors have roots that dig deeply into behavioral, environmental, cultural, social, and socioeconomic issues (Nestle & Jacobson, 2000; Payne, Hahn, & Lucas, 2007; United States Department of Health and Human Services [USDHHS], n.d.; USDHHS, 2001). Environments can either foster or hinder healthy lifestyles, which dramatically influences obesity trends (Nestle & Jacobson, 2000).

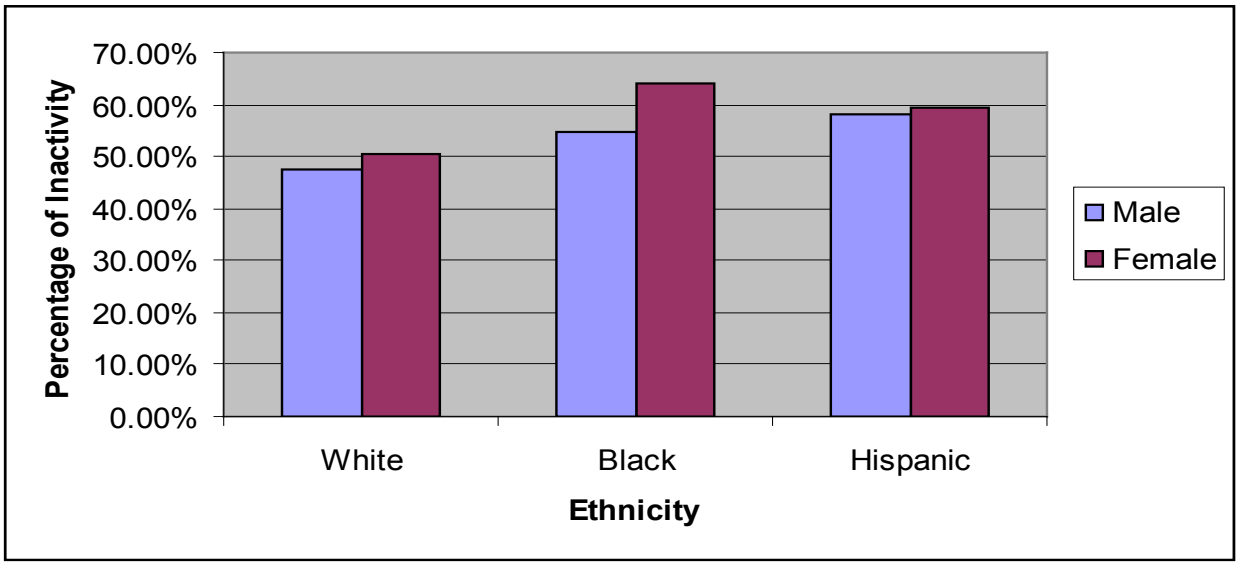
Significant health disparities exist among racial and ethnic minorities, which also holds true with obesity rates (Ogden, Carroll, Curtin, McDowell, Tabak, & Fegal, 2006). By looking at the following obesity rates among adults of different racial and ethnic groups, we find evidence of disparities: Caucasian 29.7%, African American 44.9%, and Mexican Americans 36.9% (Ogden, Carroll, Curtin, McDowell, & Fegal, 2007).

While one of the contributors of the disparities is environmental, other factors linked to dietary habits and physical activity (USDHHS, 2000, 2001), as well as energy imbalance (Payne, Hahn, & Lucas, 2007; United States Department of Health and Human Services [USDHHS], n.d.). Even small amounts differences between energy input and output can lead to gradual weight gain over time, for example 10 extra calories per day over 10 year can be as much as 10.4 pounds of weight gain (Hill, Wyatt, Reed, & Peters, 2003; Seeley & Woods, 2003). Behavioral and environmental policy changes have the greatest opportunities for prevention and intervention actions.

African American are greatest at risk of not meeting minimum nutritional requirements for fruits, vegetables and whole grains, which Latinos being the greatest at risk of a high fat diet (USDHHS, 2000). African American and Hispanic adults are more likely to be physically inactive (see Figure 2.) (CDC, 2002, 2007; USDHHS, Public Health Service, CDC, National Center for Chronic Disease Prevention and Health Promotion, & Division of Nutrition and Physical Activity, 1999).

Figure 2

Inactivity Levels of Adults



Note. Abstracted from "Prevalence of regular physical activity among adults - United States, 2001 and 2005," by Centers for Disease Control and Prevention, 2007, *Morbidity and Mortality Weekly Report,* 56(46), page 1209.

It is more common for women to be less physically active than men and less engaged in moderate to vigorous physical activity, which in turn, puts them higher risk of being overweight or obese (CDC, 2002, 2007; Flegal, Carroll, Kuczmarski, & Johnson, 1998; USDHHS, Public Health Service, CDC, National Center for Chronic Disease Prevention and Health Promotion, & Division of Nutrition and Physical Activity, 1999). This decline in physical activity increases with age for both men and women (CD, 2005, October 7).

Severe obesity estimates were 3.1% for men and 6.7% for women based on the population data in the United States between 1999-2000 (Flegal, Carroll, Odgen, & Johnson, 2002). This division increases further when race and ethnicity is added to the equation. Women of racial and ethnic groups, other than non-Hispanic white, have a

higher incidence of being overweight or obese (USDHHS, 2001), with Hispanic, African American, Native American, and Pacific Islander American women highest at risk (NIH & NHLBI, 1998; USDHHS, 2000, 2001).

There is also a connection between overweight and obesity rates and lower socioeconomic status (CDC, 2002; USDHHS, 2000, 2001). The majority of the states with the highest obesity rates also have the highest poverty rates (Levi, Vinter, St. Laurent, & Segal, 2008). This may be due to an increased risk of lower socioeconomic groups being less likely to meet minimum dietary and physical activity requirements (CDC, 2002; USDHHS, 2000). Lower socioeconomic women from all racial and ethnic groups are about 50% more likely to become obese than women from a higher socioeconomic status (USDHHS, 2001).

Not surprising, with the higher obesity rates, poorer nutrition, and decreased physical activity levels, preventable diseases were higher among various members of racial-ethnic minorities compared with whites (American Obesity Association, n.d.). When comparing the rates of adult type II diabetes based on race and ethnicity, the disparities were alarming; 22.6% of American Indians/Alaska Natives, 13.3% of African Americans, 9.5% of Hispanics, compared to 8.7% of whites (American Diabetes Association, n.d.).

Environmental causes of obesity and being overweight.

The United States has evolved into a sedentary society that is "toxic" to the health of the nation (Battle & Brownell, 1996). We have become a society that thrives, or perhaps is dying, thanks to over-consumption, over-productivity, and under-activity (Nestle & Jacobson, 2000). All of this, combined with a constant bombardment of media

campaigns, which encourage excessive intake of high calorie and low nutritional value foods, has created an imbalance of input and output activities. U.S. employees work 50% more hours per week and take less time off than most European nations, putting people in over-productivity mode (Prescott, 2004). Cell phones, emails, and cell phones equipped with computers have made us more accessible for work than any other time in history.

In addition, modern day technologies have brought us time saving devices, such as automobiles, cell phones, computers, housing environmental temperature controls, online banking and purchasing, point-of-sale transactions, and more, which have contributed to the all-time low activity levels. As a result, the rates of those who are overweight and obese are now at critical levels.

Health risks associated with obesity or being overweight.

Excess weight increases the risk of many diseases and health conditions (CDC, n.d.a; Ogden, Carroll, Curtin, McDowell, Tabak, & Fegal, 2006; Payne, Hahn, & Lucas, 2007). The state of being overweight or obese increases the risk and aggravates symptoms for over 20 chronic diseases and disorders, such as cardiovascular and cardiorespiratory diseases, as seen in strokes, heart disease, and arthrosclerosis; dyslipidemia, which is high total cholesterol or high levels of triglycerides; hypertension; incontinence; increased surgical risk; type II diabetes; kidney disease; gallbladder disease; certain types of cancer, such as endometrial, breast, and colon cancers; premature death; certain musculoskeletal disorders; osteoarthritis; psychological disorders; Alzheimer's disease; dementia; sleep apnea and other disturbances; fatty liver disease; respiratory problems; and the exacerbation of other health problems (American Heart Association, 2008; Beydoun, Beydoun, & Wang, 2008; CDC, n.d.a; National

Institute of Health [NIH] & National Heart Lung and Blood Institute [NHLBI], 1998; National Institutes of Diabetes and Digestive and Kidney Diseases, 2007; Ogden, Carroll, Curtin, McDowell, Tabak, & Fegal, 2006; Payne, Hahn, & Lucas, 2007; Petry, Barry, Pietrzak, & Wagner, 2008; USDHHS 2001; Wang, Chen, Song, Caballero, & Cheskin, 2008).

Cardiovascular disease.

Cardiovascular disease is still the number one cause of deaths in the US, with 1 in 4 having some form of heart disease (American Heart Association, 2008; Kung, Hoyert, Xu, & Murphy, 2008). Cardiovascular disease linked often with other controllable risk factors, such as hypertension, dyslipidemia, and type II diabetes (Payne, Hahn, & Lucas, 2007). Multiple diagnoses of several preventable risk factors, obesity, hypertension and/or type II diabetes, known as Syndrome X, linked closely with cardiovascular disease (Abrass, 2004; DeFronzo & Ferrannini, 1991). Controlling these risk factors weakened the association with cardiovascular disease, but when people still remained overweight, it did not eliminate the risk (Manson, Colditz, Stampfer, Willett, Rosner, Monson, Speizer, & Hennekens, 1990).

Overweight people are more likely to have cardiovascular disease, which can lead to myocardial infarctions, strokes, congestive heart failure, and other vascular abnormalities (American Diabetes Association, n.d.; Payne, Hahn, & Lucas, 2007). Obesity has been linked to coronary heart disease, independent of other risk factors (Burton, Foster, Hirsch, & Van Itallie, 1985; Chapman, Coulson, Clark, & Borun, 1971; Feinleib, 1985; Garrison & Castelli, 1985; Rabkin, Mathewson, & Hsu, 1977; Hubert, Feinleib, McNamara, & Castelli, 1983; Van Itallie, 1985). However, even mild to

moderate overweight increased the risk for coronary heart disease, as seen when risks for heart disease were compared between different BMI (Manson, Colditz, Stampfer, Willett, Rosner, Monson, Speizer, & Hennekens, 1990), with central fat distribution associated with the greatest risk (Donahue, Abbott, Bloom, Reed, & Yano, 1987; Ducimetiere & Richard, 1989; Higgins, Kannel, Garrison, & Pinsky, 1988; Lapidus, Bengtsson, Larsson, Pennert, Rybo, & Sjostrom, 1984; Larrson, Svardsudd, Welin, Wilhelmsen, Bjorntorp, & Tibblin, 1984). Risk went from 1.0 for a BMI less than 21, 1.3 of BMI 21-24.9, 1.8 for BMI 25-28.9, and 3.3 for BMI greater than 29.

Dyslipidemia.

Dyslipidemia was defined as abnormal levels of at least one of the serum lipids, which includes higher than recommended low-density lipoprotein-cholesterol (LDL-C), lower than recommended high-density lipoprotein-cholesterol (HDL-C), or higher than recommended triglycerides (TG) (Ito, Nakasuga, Ohshima, Sakai, Maruyama, Kaji, Harada, Jingu, & Sakamoto, 2004). Dyslipidemia is related to cardiovascular disease, such heart disease, peripheral artery disease, and strokes.

Dyslipidemia was more prevalent in those with a higher BMI but also for those with a normal BMI but a higher body fat (Denke, Sempos, & Grundy, 1994; Ito, Nakasuga, Ohshima, Sakai, Maruyama, Kaji, Harada, Jingu, & Sakamoto, 2004). Higher level of HDL-C lowers the risk of cardiovascular disease, but HDL-C tends to be lowering in obese, especially when the fat deposits are centrally distributed (Despres, Allard, Tremblay, Talbot, & Bouchard, 1985; Glueck, Taylor, Jacobs, Morrison, Beaglehole, & Williams, 1980; Gordon, Castelli, Hjortland, Kannel, & Dawber, 1977). Similarly, TG were higher with weight gain and obesity (Albrink, Meigs, & Granoff,

1962; Stamler, 1979). Another study found with every 10% increase in relative weight increased cholesterol levels by 12 mg/dL (Kannel & Gordon, 1979).

Hypertension.

Like dyslipidemia, hypertension was more prevalent in those with obesity, higher BMI, and also for those with a normal BMI but a higher body fat (Hall, 2003; Ito, Nakasuga, Ohshima, Sakai, Maruyama, Kaji, Harada, Jingu, & Sakamoto, 2004). Weight gain is the best predictor of hypertension, with about 65-75 percent of the hypertension diagnoses directly related to excess weight (Alexander, Dustan, Sims, & Tarazi, 1976; Garrison, Kannel, Stokes, & Castelli, 1987; Hall, 2000; Hall, Crook, Jones, Wofford, & Dubbert, 2002; Hall, Hildebrandt, & Kuo, 2001; Jones, Kim, Andrew, Kim, & Hong, 1994). Another study found that nearly 1 in 3 Americans have hypertension, with about 30-60% of the cases attributed to obesity (American Heart Association, 2008; Kung, Hoyert, Xu, & Murphy, 2008; MacMahon, Blacket, MacDonald, & Hall, 1984; USDHHS, 2000).

The best approach to addressing hypertension is prevention, as overtime, hypertension treatments are costly (Weinstein, Stason, & Blumenthal, 1976), and worse yet, hypertension is closely related to renal dysfunction and heart disease (Hall, 2003). With chronic excess weight, there are is an increase in arterial pressure, renal vasodilation, and glomerular hyper filtration, which may cause glomerular injury, which causes more severe hypertension and a gradual loss of kidney function (Hall, 1997; Hall, Crook, Jones, Wofford, & Dubbert, 2002).

One study found links between individuals with higher BMI at both 18 years and midlife and the risk of developing hypertension, with a much greater risk in midlife

(Huang, Wllett, Manson, Rosner, Stampfer, Speizer, & Colditz, 1998). Another study found that risk for hypertension to 2.9 higher in those that were overweight (Van Itallie, 1985), while another study found that risk to be 5.6 higher in overweight adults between the ages of 20-44 year (Burton, Foster, Hirsch, Van Itallie, 1985). The BMI cut-off for this increased risk was 27.8 in men and of 27.3 in women (Van Itallie, 1985).

Weight loss was association with a reduced risk for hypertension, whereas, weight gain was associated with an increased risk. To illustrate the dangers of weight gain in midlife and its relationship to hypertension; an increase in BMI of 1 kg/m2 was associated with a 12% increase in risk (Huang, Wllett, Manson, Rosner, Stampfer, Speizer, & Colditz, 1998). The risk was also present for 18 year olds, though smaller, with an increase in BMI of 1 kg/m2 associated with an 8% increase risk.

It has been widely established worldwide that blood pressure increases are linked to gains in weight. A cross-sectional general population study in Norway and in Michigan found that for every 4.5 pound of excess body weight had a corresponding increase of 3 mm Hg in systolic and 2 mm Hg in diastolic pressures (Boe, Humerfelt, & Wedervang, 1957; Epstein, Francis, Hayner, Johnson, Kjelsberg, & Napier, 1965). The Framingham Study found in men for every 10% increase in weight corresponded with an increase in blood pressure by 6.5 mm Hg or a 15% weight gain associated with an 18% systolic pressure gain (Kannel, Brand, Skinner, Dawber, & McNamara (1967), and an eightfold risk for those person 20% overweight (Kannel, Gordon, Offutt, & Left, 1969). Another study found the risk for hypertension in those 20% overweight to be twice that of normal weight persons (Havlik, Hubert, Fabsitz, & Feinleib, 1983). Similarly to risk factors for high blood cholesterol levels and cardiovascular disease, hypertension risk

increases with central and upper body fat deposits (Despres, Tremblay, Theriault, Perusse, Leblanc, & Bouchard, 1988; Gillum, 1987; Weinsier, Norris, Birch, Berstein, Wang, Pierson, & Van Itallie 1985).

Type II diabetes.

Type 2 diabetes in adults rose from 5.2% in 1980 to more than 8% in 2005 (Gregg, Chen, Cadwell, Imperatore, Williams, Flegal, Narayan & Williamson, 2005). This is not a recent trend. From 1976 to 1988, adults with type II in the 40-74 year age group increased from 11.4 to 14.3% (Harris, Flegal, Cowie, Eberhardt, Goldstein, Little, Wiedmeyer, & Byrd Holt, 1998). The American Diabetes Association (ADA) attributed $92 billion in direct medical expenditures to diabetes in 2002 (Shetty, Secnik, & Oglesby, 2005) or 11% of all health care expenditures (CDC, n.d.c; CDC, 2005a). In a Washington Post interview, Frank Vinocur, the director of the diabetes division at the Centers for Disease Control and Prevention, stated that diabetes effected about 17 million Americans, was the fifth-deadliest disease, and was the leading cause of blindness, kidney failure and amputations, with the annual cost of diabetes at $100 billion and expected to double or triple by 2025 (Connolly, 2002).

Not surprising, the majority of the states with the highest obesity rates, also had the highest rates of adult diabetes and hypertension (Levi, Vinter, St. Laurent, & Segal, 2008). Abdominal obesity promotes the development of insulin resistance and dysmetabolic syndrome, which eventually leads to the development of type II diabetes (Bosello & Zamboni, 2000; DeFronzo, 1997; DeFronzo, Bonnadonna, & Ferrannini, 1992; Laaksonen, Lakka, Niskanen, Kaplan, Salonen, & Lakka, 2002). This contributes to the value of using abdominal girth measurements as a possible measurement of health

for wellness programs, but also as a non-clinical tool for identifying potentially high-risk participants to encourage them to see their health care provider for diabetes evaluation.

For every diagnosis of type II diabetes, one goes un-diagnosed (Dunstan, Zimmet, Welborn, de Courten, Cameron, Sicree, Dwyer, Colagiuri, Jolley, Knuiman, Atkins, & Shaw, 2002). In fact, 8% of apparently healthy elderly between the ages of 70-79 years had un-diagnosed type II diabetes. Those who had a myocardial infarction (12%) (Rathmann, Icks, Haastert, Giani, Lowel, & Mielck, 2002) or were awaiting angioplasty (17.9%) had higher percentages of un-diagnosed type II diabetes than the general population; reiterating the link between type II diabetes and cardiovascular disease (Taubert, Winkelmann, Schleiffer, März, Winkley, Gök, Klein, Schneider, & Boehn, 2003).

Obesity is the great risk factor for Type II diabetes (Bierman, Bagdade & Porte, 1968). Type II diabetes risk doubled with even a moderate weight gain between eleven to eighteen pounds, with eighty percent of people with diabetes being overweight or obese (USDHHS, 2001). The risk for diabetes was approximately twofold in mildly obese, fivefold in moderately obese, and 10-fold in severely obese (U.S. Department of Health, Education and Welfare, US National Commission on Diabetes, 1975). The risk of Type II diabetes was 2.9 times higher for obese persons between the ages of 20 to 75 years old (Van Itallie, 1985). Another study found a 10-fold diabetes risk for moderately obese with a steep increased risk with even more excess weight (Westlund & Nicolaysen, 1972).

With diabetics, excess weight or body fat, especially centrally concentrated (Hartz, Rupley, Kalkhoff, & Rimm, 1983; Haffner, Stern, Hazuda, Rosenthal, Knapp, &

Malina (1986), aging, and a sedentary lifestyle can increase blood glucose levels and worsen dyslipidemias (Bennett, Rushforth, Miller, & LeCompte, 1976; Hartz, Rupley, Kalkhoff, & Rimm, 1983; Kalkhoff, Hartz, Rupley, Kissebah, & Kelber, 1983; NIH & NHLBI, 2000; Ramlo-Halsted & Edelman, 2000; Zimmet, Taft, Guinea, Guthrie, & Thoma, 1977). In addition, diabetes can lead to other microvascular complications (Ramlo-Halsted & Edelman, 2000). The complementary treatments routinely prescribed to help improve glucose and insulin homeostasis are physical activity and good nutritional habits (Alcazar, Ho, & Goodyear, 2007; Franklin, 1997; Katzmarzyk & Janssen, 2004; Pescatello, Franklin, Fagard, Farquhar, Kelley, & Ray, 2004; Kohl, 2001; Ramlo-Halsted & Edelman, 2000).

Another issue with type II diabetes has been non-compliance in blood sugar testing and medication. A city in North Carolina ran a program to increase compliance by having the pharmacist be the liaison between the patient and the physician to educate the patients monthly on the importance of physical activity, proper nutrition, stress reduction, testing, and medication compliance (Connolly, 2002). In addition, they offer free testing supplies and medication, as incentives to those patients participating in the program. They had a 4 to 1 return on their investment.

Cancer.

Excess fat stored in the body increases the risk of certain cancers, with approximately 20% of cancer in women and 15% of cancer in men linked to obesity (CDC, 2005a, May 25). The cancer mortality ratio for men who were 40% or more overweight was 1.33, especially in colorectal and prostate cancers, and for women it was 1.55, with the highest rates with endometrial, gallbladder, cervical, ovarian, and breast

cancers (Garfinkel, 1985). The cancers linked to obesity are as follows: breast in postmenopausal women, colon and rectum, endometrium, esophagus, gall bladder, kidney, prostate and uterine (deWaard, 1975; Hill & Austin, 1996; Hunter & Willet, 1996; Kolonel, 1996; Lubin, Ruder, Wax & Modan, 1985; National Institutes of Diabetes and Digestive and Kidney Diseases, 2007; Paffenbarger, Kampert, & Chang, 1980; Potter, 1996; USDHHS, 2001; Wolk, Lindblad, & Adami, 1996). Physical activity can counteract the risk of some cancers, either directly, as demonstrated with the correlated effect of increased physical activity and a decreased risk of colon and rectal cancers in men, or indirectly through a reduction in excess weight and its positive effects on hormonal levels (Albanes, 1990; Friedenreich & Rohan, 1995; Shepard, 1993).

Premature death.

There is a higher risk of premature death with those who are overweight (Kung, Hoyert, Xu, & Murphy, 2008; USDHHS, 2001), especially with central deposits of excess fat (Donahue, Abbott, Bloom, Reed & Yano, 1987; Ducimetiere & Richard, 1989; Higgins, Kannel, Garrison, Pinsky & Stokes, 1988; Lapidus, Bengtsson, Larsson, Pennert, Rybo, & Sjostrom, 1984; Larsson, Svardsudd, Welin, Wilhelmsen, Bjorntorp, & Tibblin, 1984). Mortality rates for men who were morbidly obese was 12 times higher in the 25 to 34 year aged group, and 6 times higher in the 35 to 44 years aged group when compared with men with healthy weights in equivalent aged groups (Drenick, Bale, Seltzer, & Johnson, 1980).

Currently, there are approximately three hundred thousand deaths per year nationwide attributed to obesity (Allison, Fontaine, Manson, Stevens, & VanItallie, 1999; USDHHS, 2001). Thirty thousand of those deaths are in California alone may be linked

to a combination of unhealthful eating and lack of physical activity. Within the top fifteen causes of death in the United States, most of them are associated with being overweight; heart disease, some cancers, stroke, diabetes, and hypertension (CDC, 2002; Kung, Hoyert, Xu, & Murphy, 2008).

The interesting thing about these specific causes of death in the United States was that they have controllable risk factors linked back to lifestyle choices, with excess weight being just one (USDHHS, 1991). With the levels of people in the overweight and obese in epidemic proportions in the U.S., there was a ripple-effect increased risk of preventable and post-ponable diseases (Ogden, Carroll, Curtin, McDowell, Tabak, & Fegal, 2006; Payne, Hahn, & Lucas, 2007).

Musculoskeletal disorders.

Musculoskeletal disorders add significant cost to over healthcare expenditures and employer related expenses. In fact, musculoskeletal disorders contribute more cost and loss of resources than any other disease group, in the way of absenteeism and disability (Badley, Rasooly, & Webster, 1994; Feeney, North, Head, Canner, & Marmot, 1998; Leijon, Hensing, & Alexanderson, 1998; Pope, Andersson, Frymoyer, & Chaffin. 1991; Punnett & Wegman, 2004; Rempel & Punnett, 1997; Riihima, 1995). Obesity contributes to the cost of musculoskeletal disorders in the amount of an additional 7.8% in overall expenses (Colditz, 1992).

Psychological disorders.

Overweight and obesity can lead to an increased risk of psychological and neurological disorders, such as Alzheimer's disease, anxiety, dementia, depression, discrimination, distorted body image, eating disorders, mood disorders, poor body image,

and decreased self-esteem due to social stigmatization (Beydoun, Beydoun, & Wang, 2008; NIH & NHLBI, 1998; USDHHS, 2001). Physical activity can be used as a complementary treatment of depression, to improve self-confidence, and to decrease stress or sadness due to the release of 3-endorphin and increased levels of serotonin, which could possibly reduce the risk of suicide (NIH & NHLBI, 2000; Trotto, 1999). Physical activity can indirectly reduce risk for many psychological and neurological diseases through weight loss (Beydoun, Beydoun, & Wang, 2008).

Respiratory problems.

Respiratory disorders can include asthma, chronic bronchitis, emphysema, and others. Excess weight can cause fat deposits in the chest wall and abdomen, which can affect the respiratory function by reduced lung volume and capacity, respiratory patterns, decreased efficiency of the respiratory system, and ventilation-perfusion, which can lead to hypoxia (Barrera, Hillyer, Ascanio, & Bechtel, 1973; Douglas & Chong, 1972; Holley, Milic-Emili, Becklake, & Bates, 1967; Naimark & Cherniack, 1960; Waltemath & Bergman, 1974). The greater the obesity issues, the more frequent that sleep apneas occur, which can lead to a multitude of other diseases, such as hypertension, myocardial ischemia, stroke (Dyken, Somers, Yamada, Adams, & Zimmerman, 1992; Kales, Cadieux, Shaw III, Vela0Bueno, Dixler, Schneck, Locke, & Soldatos, 1984; Koskenvuo, Kaprio, Partinen, Langinvanio, Sarna, & Heikkila, 1985; Lavie, Ben-Yosef & Rubin, 1984; Palomaki, Partinin, Juvela, & Kaste, 1989), kidney disease, and increased cardiovascular morbidity and mortality (Bliwise, Bliwise, Partinen, Pursley, & Dement, 1988; He, Kryger, Zorick, Conway, & Roth, 1988). Regular exercise can improve

endurance and feelings of dyspnea for those with chronic lung disease (American College of Chest Physicians, 1997).

Exacerbation of other health problems.

As we have seen from the sections above, excess weight can be an associated risk with many preventable diseases but can also exacerbate the symptoms of the disease. Excess weight seems to have the greatest impact on other health problems proportional to time; the longer the excess weight on, the more impact it has on health problems and mortality risks (Bjorntorp, 1990; Feinleib, 1985; Garrison & Castelli, 1985; Rabkin, Mathewson, & Hsu, 1977). In addition, though central distribution was linked to disease risk, disease risk increased more with visceral fat (Fujioka, Matsuzawa, Tokunaga, & Tarui, 1987; Kissebah, Peiris, & Evans, 1986).

Economic consequences of obesity and being overweight.

Between 1995-1998, it was estimated that between 6-9.1% of the total health care expenditures, or $78.5-$99 billion, resulted from costs associated with obesity and being overweight (Finkelstein, Fiebelkorn, & Wang, 2003; USDHHS, 2001; Wolf & Colditz, 1998), and another study estimate those expenditures to be around $51.6 billion (Colditz, 1992). Between 2000-2002, those costs exceeded more than a quarter of the nation's health care costs or range from $92.6-$131 billion, which were directly related to obesity and physical inactivity (CDC, n.d.b; Finkelstein, Fiebelkorn, & Wang, 2003; USDHHS, 2001). Another study found obesity linked to a 36% increase in health care spending (Rosen & Barrington, 2008, April). These cost increases costs pass through to the consumer and employer as rising costs of health insurance and health care (Levi, Vinter, St. Laurent, & Segal, 2008).

Economic consequences stemming from those who were overweight or obese came from both direct and indirect expenses, with most of the cost arising from type II diabetes, cardiovascular disease, and hypertension (CDC, n.d.a; Wolf, 1998; Wolf and Colditz, 1998; USDHHS, 2001). In California alone, the conservative estimates of health care costs relating to excess weight and obesity were around twelve billion dollars or higher per year (Wolf, 1998; Wolf and Colditz, 1998).

The direct costs were associated with preventive, diagnostic, and treatment services associated with chronic disease, whereas indirect costs stemmed from morbidity and mortality costs (CDC, n.d.a; USDHHS, 2001). Morbidity costs came from income lost from decreased productivity, diminished quality of life restricted activity, absenteeism, and bed days. Lifestyle choices amount to more than 25% of the healthcare costs of employee, to include nutritional choices, sedentary behaviors, tobacco usage, sand excess stress, increasing their risks for preventable disease, resulting in a 26.1% increase in health care expenditures over a 10-year period (Anderson, Whitmer, Goetzel, Ozminkowski, Wasserman & Serxner, 2000; Leutzinger, Orminkowski, Dunn, Goetzel, Richling, Stewart, Whitmer, 2000). Mortality costs came from the value of future income lost by premature death (CDC, n.d.a; USDHHS, 2001; Wolf & Colditz, 1998).

History of interventions that failed.

Early interventions were largely ineffective due to their focus on the individual behavior change; between 1970-1990 the focus was on increasing physical activity levels (Nestle & Jacobson, 2000). If we look at past interventions, in 1952, the American Heart Association identified obesity as a preventable cardiac risk factor and suggested a good diet and exercise. In 1969, the White House Conference on Food, Nutrition, and Health

created a media campaign to increase mild to moderate physical activity. In 1977, the Senate's second edition report's solution was to suggest that people could avoid becoming overweight by consuming only as much energy as is expended. In 1980, the Promoting Health / Preventing Disease campaign launched to reduce the prevalence of overweight adults. In 1990, Healthy People 2000 intended to decrease the number of overweight adults and adolescents (Nestle & Jacobson, 2000; USDHHS, 1990). Healthy People 2010 continued in the efforts by addressing the mission of the nation to (a) increase the prevalence of a healthy weight in adults, adolescents, and children; (b) to educate in the areas of nutrition; (c) to emphasize the benefits of physical activity; and (d) to increase the proportion of primary care providers who provide weight reduction services (Nestle & Jacobson, 2000; USDHHS, 2000, 2001a).

Intervention is critical to slow down the health crisis, however, the intervention should be a shared responsibility between individuals, families, groups, communities, schools, employers, businesses, insurers, and government (Levi, Vinter, St. Laurent, & Segal, 2008; Nestle & Jacobson, 2000). Results will not be quick, so it is crucial to attack the problem from all angles, with a variety of strategies, and with the expectation that is may take years to show any kind of results (Institute of Medicine, 2007).

Ecological model of health.

The ecological model of health focuses change on all levels of society structure, which links the behavior-environment interaction and includes efforts at the individual, interpersonal, organizational, community, and policy (McLeroy, Bibeau, & Steckler, 1988; Sallis & Owen, 2002). Another study used the same concept under the coined term called the "Chameleon Theory," which was to illustrate the concept of changing the

environment and the culture in order to change health behaviors and overall health (Golaszewski, Barr, & Pronk, 2003).

This creates supportive environments that encourage and support healthy lifestyle at every level (World Health Organization, 1995). In addition, the Precede-Proceed Model considers influences in the environment that impacts behaviors, which includes predisposing, enabling and reinforcing factors (Green & Krueter, 1999). Predisposing factors may include information and/or tools necessary to change behaviors, enabling factors are the skills needed to change behaviors, and reinforcing factors are supporting values and social norms needed to maintain new behaviors (Newes-Adeyi, Helitzer, Caulfield, & Bronner, 2000).

One strategy is to target communities instead of individuals, which easily translates into the work group (Harachi, Ayers, Hawkins, Catalano, & Cushing, 1996; Shea & Basch, 1990). The Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity 2001 report identifies families and communities as the foundation to a solution of overweight and obesity (USDHHS, 2001). Any intervention program should emphasize the importance of communicating with families and the community and using a sensitive approach when educating and trying to guide healthful behaviors.

A shift in focus is aiming at environmental change with full support of government interfaces at all levels, with changes in policy, the environment and community interventions. This is not a problem solved and then forgotten. It will take many generations and strong commitment to change to stop the perpetuation of this problem (Hileman, 2002). Any delays in action will continue to cost quality of life, hurt

the nation's overall productivity level, and allow health care costs to continue to real out of control. The solution will not be simple and must be tackled from all angles of wellness, in order for solutions to be effective, such as behavioral, cultural, economic, environmental, familial, occupational, spiritual, emotional, and social (Payne, Hahn & Lucas, 2007).

The public health approach was as follows: (a) define the problem, (b) identify the cause and protective factors, (c) develop and test intervention strategies, (d) implement interventions, (e) evaluate the impact of interventions and surveillance monitoring, and (f) redefine the problem, reevaluate the cause, and refine the interventions (USDHHS, 2001). Consideration should be given to individuals and organizations and the different levels of influence they have on addressing the obesity crisis.

A public health approach should utilize active promotion as one of its strategies, which consists of targeted and specific outreach (USDHHS, 2001). Active promotion consists of objectives, such as the following: (a) creating a consistent message regarding the risks of being overweight or obese and providing the tools for a healthy lifestyle, (b) identifying the target population and tailoring the intervention programs to be culturally appropriate for that population, (c) empowering the target population role as a consumer in making the best food and activity choices, and (d) improving the psychosocial condition of being overweight or obese (USDHHS, 2001). For example, a way to improve the psychological condition of being overweight is to change the perception of being overweight and to re-direct the focus on health instead of appearance.

Wellness programs.

Wellness defined.

Wellness comes in many different definitions. The Random House Dictionary defines wellness as "the quality or state of being healthy in body and mind, esp. as the result of deliberate effort and an approach to healthcare that emphasizes preventing illness and prolonging life, as opposed to emphasizing treating diseases" (Random House Dictionary, 2010).

The National Wellness Institute (NWI) defines wellness as "a conscious, self-directed and evolving process of achieving full potential," with "a multi-dimensional and holistic, encompassing lifestyle, mental and spiritual well-being, and the environment," as well as being positive and affirming (NWI, 2010). Dr. Bill Hettler, founder of the NWI, created a model, known as the Six Dimensional Model of Wellness, which include social, physical, occupational, emotional, spiritual, and intellectual, which he believed gave a more comprehensive view of health (Hettler, 1980; NWI, 2010a; Payne, Hahn, & Lucas, 2007). Successful wellness strategies should include a biopsychosocial model and the entire wellness continuum (Matarazzo, Weiss, Herd, Miller, & Weiss, 1984; Taylor, 1990). Wellness programs may target one or several wellness dimensions and should be an active process that includes self-responsibility, choices, recognizing body signals, and responding to those signals (Leafgren, 1986; Ryan & Travis, 1981).

Wellness programs.

Behavioral and environmental factors may lead to the greatest opportunity for prevention of a lifetime of being overweight or obese (USDHHS, 2001). As early as 1989, the U.S. Prevention Services Task Force concluded that influencing health-related

behavior was more likely to reduce incidence of disease more than any other category of clinical intervention (U.S. Preventive Services Task Force, 1989). Wellness programs approach changes in both behavioral and environmental factors.

Wellness programs based on the concepts of health promotion intended to enhance the quality of life and achieve optimal health (Alonzo, 1993; Elias & Murphy, 1986; Epp, 1986; Herbert, 1995; Sullivan, 1991) with reduced inpatient hospital days and mental health and outpatient visits (Ozminkowski, Davina, Goetzel, Bruno, Rutter, Isaac, & Wang, 2002). Even in the early stages of wellness development, Pelletier (1979) stated that conditions that lead to disease be addressed rather than only dealing with the symptoms of the disease and current conditions. This is more of a preventative and progressive approach than the traditional intervention approaches used today. Often times, it is critical to change the environment in order to accomplish this. O'Donnel (1989) stated that supportive environments would have the greatest impact in producing lasting changes in health affirming behaviors (p. 5).

Workplace wellness programs.

Wellness strategies can be carried over into work environments as a key element in employee overall wellness, which can be developed in worksite wellness programs. Workplace wellness programs fall under the category of work-life benefits, which focus on helping the balance of work, family and personal needs (Bond, Galinsky and Swanberg, 1998). Programs such as these can focus employee well-being and lifestyle, by focusing on improving employee mental, physical and fiscal health through education, physical fitness, stress reduction and retirement planning programs.

The American Psychological Association (APA) and the National Institutes of Occupational Safety and Health partnered to research psychosocial issues in relation to worker health (Keita & Sauter, 1992; Quick, Murphy, & Hurrell, 1992). Worksite wellness programs strategies include many components, such as: health-risk screenings and assessments, periodic tracking, personalized interventions, on-site health coaching, medical data analyzing, risk-reduction suggestions, smoking cessation, weight management and weight loss programs, annual physicals, fitness programs, injury prevention programs, maternal health, cancer and diabetes prevention, stress management, nutrition programs, and health club discounts, and discounts for preventative services (Kaiser Family Foundation & Health Research and Educational Trust, 2006; Palmateer, 2007; Rivkin, 2007; Shea, 2007; Levi, Vinter, St. Laurent, & Segal, 2008, August). In addition, they also include environmental strategies that work towards improving overall working conditions, which improves employee health (Karasek & Theorell, 1990; Stokols, 1992), through quality of work-life strategies (Sonnenstuhl, 1988). With evidence to support that environment is the driving force behind the obesity crisis, it is important that workplace wellness strategies put much emphasis in organization culture change in how it approaches a healthier lifestyle (Hill, Wyatt, Reed, & Peters, 2003). Some of the organizational strategies should be leader role modeling of healthy lifestyle choices, physical activity participation, participation during paid times, etc., which all demonstrate a commitment to change at an organizational and societal level (Hammond, Leonard, & Fridinger, 2000; Pohjonen & Ranta, 2001; Yancey, Miles, & Jordan, 1999; Yancey, Raines, McCarthy, Gewa, Weber, & Fielding, 2004).

Wellness programs were more likely to be successful if the corporate culture supported and committed to the program fully, included leadership support, had on-going employee communication, and locally driven (Anonymous, 2007; Leafgren, 1986; Rivkin, 2007). Pepsi Bottling's culture supports the program through its on-site, free-to-employee, and nurse-staffed clinics, which routinely screen for high blood pressure, high cholesterol, and obesity (Rivkin, 2007). The clinic nurses diagnose, treat, and make referrals, based on the needs of the employees. Other ways to demonstration corporate support of a healthy culture is to provide opportunities during the day for employees to be active, encourage the use of stairs versus elevators, provide on-site health food options, and replace smoke breaks with fitness breaks (Levi, Vinter, St. Laurent, & Segal, 2008, August).

Johnson and Johnson (J&J) set a good example for worksite wellness programs and included them in their corporate strategic planning (J&J, n.d.). J&J understands that promoting employee health and wellness makes good business sense and makes J&J a more attractive place to work for employees. In 2008, the wellness programs saved J&J an estimated $15.9 million in health care costs, by creating a culture of health, targeting health risk factors, and managing occupational health risks. They created smoke-free workplace policies, offered smoking cessation resources at no cost, encouraged physical activity through pedometer distribution, and offered healthy foods at each worksite's cafeteria, within vending machines, and from vendors providing food options to their employees.

More and more, wellness programs have become popular, with as much as 27% of all employers offering at least one wellness program offering (Kaiser Family

Foundation & Health Research and Educational Trust, 2006; Rivkin, 2007). Another study found that 90% of worksites offer at least one health promotion type activity, however, when you eliminated the mandated safety programs, that number dropped to 50.1% (McMahan, Wells, Stokols, Phillips, and Clitheroe, Jr., 2001). Of all the companies offering wellness programs, large firms make up 62%, while smaller firms makes up 26% (Kaiser Family Foundation & Health Research and Educational Trust, 2006). Of the wellness programs or health promotion activities offered, the most common was mandated safety related programs, but others offered more traditional wellness activities, such as 6% have a weight loss program, 9% have a smoking cessation program, 10% have a fitness program, and 19% have an injury prevention program (Kaiser Family Foundation & Health Research and Educational Trust, 2006; Rivkin, 2007).

Wellness programs are important for several reasons: (a) promoting excellence; (b) reaching out to employees, as the majority of employees have at least one of the major preventable risk factors for cardiovascular disease; (c) disease prevention; (d) promoting good health by targeting controllable risk factors; (e) boosting employee morale; (f) getting more for your health care dollars; (g) reducing absenteeism; (h) wellness programs were identified as a fringe benefit, which helped to attract and retain a quality workforce; (i) increasing productivity; (j) creating healthy role models for the customers and clients the organizations serve, and (k) more and more companies were offering wellness programs, so it may eventually become an industry standard, though it is still very low in not-for-profit organizations (NIH, 1990; Levi, Vinter, St. Laurent, & Segal, 2008, August; Stein, Shakour, & Zuidema, 2000). Wellness programs created

more desirable workplaces for employees, with some organizations being recognized by the business community as leaders in employee wellness, such as Anthem Blue Cross and Blue Shield, Reader's Digest Association and Xerox Corporation, which were recognized in Fairfield County as wellness innovators (Anonymous, 2007).

Creating a national forum for employers to share best practices in worksite wellness and to foster connections between smaller employers to promote economies of scale to offer wellness benefits was suggested (Levi, Vinter, St. Laurent, & Segal, 2008, August). It is also a way to have strength in numbers, so employers can demand collectively that their insurance plans support their physicians in prescribing preventive care for patients with chronic diseases, as well as offer preventive and intervention programs for nutrition, weight loss/management programs, and complementary designed to decrease obesity and preventative chronic diseases. These collaborative efforts can provide a significant return on their investment, in regards to health and monetary return.

Maintaining a healthy workforce is a bottom line driven initiative, as a way to help curb the ever rising health care benefits costs (Shea, 2007; Rivkin, 2007), lowering health care increases and the need for accessing health care benefits, increasing productivity, and ultimately improving business results (Anonymous, 2007; Rivkin, 2007). From 2000 to 2006, insurance premiums went up 87% (Rivkin, 2007). However, they did not stop there. The cost for health care benefits increased for employers by 6% in 2006, another 6% in 2007, and yet another projected increase of 6% in 2008 (Shea, 2007). Currently, 70% of medical costs are spent on 10% of the population, and most expenses are generated from usually preventable and most certainly health problems that could be potentially postponed, such as Type II diabetes, high cholesterol, hypertension,

heart disease, strokes, and more (Palmateer, 2007). The average medical expense for employees with a PPO was $5,736, with the employee responsible for 15% in payroll deductions, 21% out of pocket, and the employer paying 64% (Shea, 2007).

Studies justifying the extra expense that overweight and obese employees cost employers and society are plentiful. One study reported obese individuals cost an employer an extra $460 to $2,500 a year in medical expenses and absenteeism, while another reported an average additional annual cost of $285,000 for a company with 1,000 employees (Finkelstein, Fiebelkorn & Wang, 2005; Rivkin, 2007). Another study found that obese employees costs private employers approximately $45 billion a year in medical expenses and absenteeism (Rosen & Barrington, 2008, April) with the total cost of medical expenses associated with obesity estimated at $147 billion (Finkelstein, Trogdon, Cohen, & Dietz, 2009). Increased medical costs for obese individuals, paid by third-party payors, were $1,429 higher than those of normal weight. When researched looked at differences of lost workdays between 100 obese and 100 normal weight employees, they found the 100 full-time obese employees lost 183.6 days, whereas the 100 normal weight employees lost 14.2 days (Ostbye, Dement, & Krause, 2007). As BMI increases, so does the number of sick days, medical claims, and health care costs (Robert Wood Johnson Foundation, American Stroke Association, & American Heart Association, 2005). Research also concluded that excess weight and physical inactivity reduces the quality and quantity of work performed, as well as overall job performance (Pronk, Martinson, Kessler, Beck, Simon, & Wang, 2004).

Studies found obese workers have higher workers' compensation claims (Aldana & Pronk, 2001; Pronk, Martinson, Kessler, Beck, Simon, & Wang, 2004; Wang,

McDonald, Champagne, & Edington, 2004; Xiang, Smith, Wilkins, Chen, Hosteltler, & Stallones, 2005; Gordian Health Solutions, 2007; Relationship Ostbye, Dement, & Krause, 2007). When researched looked at differences of workers' compensation claims between 100 obese and 100 normal weight employees, they found that obese employees had an average of 11.7 claims, whereas the normal weight employees had an average of 5.8 claims (Ostbye, Dement, & Krause, 2007). The costs per claims were also higher between 100 obese and 100 normal weight employees, which found that obese employees had an average claim of $51,091 and indemnity class of $59,178, whereas the normal weight employees had an average claim of $7,503 and indemnity claim of $5,396.

There is still hope, though. For example, when the number of health risks increase across a group, such as a group of employees, health care costs increased, as did the likelihood of a major medical event, such as a myocardial infarction (Riedel, Lynch, Baase, Hymel, & Peterson, 2001). The opposite held true, as well. Workplace wellness programs provide a way for the employer and employee to be part of the solution. If the group made efforts to reduce their risk factors, health care costs declined. Another study found that including physical activity in their worksite wellness programs followed with a reduction in health care costs by 20-55 percent, sick leave by 6-32 percent and increased productivity by 2-52 percent by (Lynch, Golaszewski, Clearie, Snow, & Vickery, 2002). In addition, the greatest return on money invested into wellness programs is from those who are highest at risk (Stevens, Kothari, Adler, Stratton, & Holman, 2001).

Wellness programs for educators.

Worksite wellness programs are more prevalent in for-profit settings than in non-profit (Crawford, Gosliner, Strode, Samuels, Burnett, RD, Craypo, & Yancey, 2004).

Yet non-profit organizations have just as much need for wellness programs, with an increased benefit to the public that may not be as obvious in for-profit organizations.

By educating the people who work in education, it gives employees the opportunity to develop their self-efficacy in wellness and health issues, which will determine whether behavior will be initiated, how much effort will be expended, and whether the effort will be sustained (Bandura, 1977). Those who are confident in these topics are more likely to share the information with the clients, customers, and/or students they serve. They are also more likely to become better role models for healthy behaviors, which gives them the opportunity to proliferate the information and behaviors at great numbers to the public; even disclosing healthy self-habits by physicians increased the ability to motivate patients to make healthy lifestyle changes (Breyan & Elon, 2000). Studies found that health workers were more likely to promote the healthy behaviors they participated in and were more likely to broach the topic with their clients (Abramson, Stein, Schaufele, Frates, & Rogan, 2000; Martin, Holcomb, & Mullen, 1987; Crawford, Gosliner, Strode, Samuels, Burnett, Craypo, & Yancey, 2004, September).

People who work in education are also not as likely to switch jobs outside of education, so the employer is more likely to see more return on the dollar, which has been more of an obstacle for more transient career fields. Therefore, there is a built in social support network within education, since people are more likely to stay. Success breeds success, so as employees succeed within the wellness program, they are likely to tell others. This increases recruitment overtime, builds momentum for the wellness programs, and increases the likelihood of sustainability (Marcus, Dubbert, Forsyth,

McKenzie, Stone, Dunn, & Blair, 2000). The best sales people are the people who believe the most in the product (Connolly, Gulanick, Keough, & Holm, 1997).

Components of a wellness program.

Letting employees choose the strategies they feel most comfortable, and giving them plenty of option, as well as letting them work on all important wellness dimension, may be more beneficial.

Physical activity.

Physical activity benefits include: improved strength and endurance; healthy bones, muscles, and joints; controlled weight; simultaneous increased lean muscle and decreased body fat; reduced anxiety and stress; increased self-esteem and self-confidence; improved cardiovascular health; better blood pressure and cholesterol levels; and improved energy levels (CDC, 2000, 2002; NIH & NHLBI, 2000). Physical activity, even without weight loss, can decrease health risks and improve health conditions (Alcazar, Ho, & Goodyear, 2007; Katzmarzyk & Janssen, 2004; Pescatello, Franklin, Fagard, Farquhar, Kelley, & Ray, 2004; Kohl, 2001).

Active individuals have about half the risk of experiencing cardiovascular disease as sedentary persons (Lee, Paffenbarger, & Thompson, 2001; USDHHS, 2002), and in a study completed in 1995, regular leisure time physical activity for men 35 and older saved roughly $38,000 per participant per year (Tengs, Adams, Pliskin, Safran, Siegel, Weinstein, and Graham, 1995). Risk is reduced due to physical activity's benefits: (a) increased oxygen supply, (b) decreased oxygen demand, (c) improved contractions, (d) improved electrical impulse stability, (e) improved blood pressure, (f) lowered lipid levels, (g) inhibited platelet aggregability, and (h) enhanced cerebral metabolic demands

(Alcazar, Ho, & Goodyear, 2007; Katzmarzyk & Janssen, 2004; Kohl, 2001; Pescatello, Franklin, Fagard, Farquhar, Kelley, & Ray, 2004; Saltin, 1990; Roger, Meyer, & Mortel, 1992). All of these benefits may reduce the risk of vascular disease, such as strokes, and may act as a preventive or delaying factor of cognitive impairment in women (Laurin, Verreault, Lindsay, MacPherson, & Rockwood, 2001). It is possible to reduce blood pressure with exercise, with a decrease in blood pressure by an average of 11 mm HG systolic and 9 mm HG diastolic (CDC, 2002; Franklin, 1997).

Also emphasized is that obesity is a chronic disease, so any intervention should stress lifelong behavior changes (NIH & NHLBI, 2000). Increased physical activity enhances the energy expenditure or output, which helps for weight control and decreasing body fat (NIH & NHLBI, 2000; USDHHS, 2001). The problem is that many people have few or no skills in physical activity (NIH & NHLBI, 2000). Consequently, any intervention program should promote lifetime physical activity skills, healthful eating behaviors, social support, and increased supervision to ensure compliance (CDC, 2002; NIH & NHLBI, 2000).

Thirty minutes or more of moderate physical activity for adults on most days of the week is recommended for primary prevention of cancer, reduction the risk of chronic disease, and overall health (American Cancer Society (ACS) 1996 Advisory Committee on Diet, Nutrition, and Cancer Prevention, 1996; CDC, n.d.d.; USDHHS, 2000, 2001; USDHHS & U.S. Department of Agriculture, 2005). The American College of Sports Medicine's recommendation for exercise is 20-60 minutes 3-5 days (Haskell, Lee, Pate, Powell, Blair, Franklin, Macera, Heath, Thompson, & Bauman, 2007).

The U.S. Department of Health and Human Services and Department of

Agriculture furthers their recommendations by suggesting about 60 minutes of moderate physical activity most days of the week to manage and prevent weight gain (USDHHS & U.S. Department of Agriculture, 2005). For weight loss, they suggested 60 to 90 minutes of daily moderate intensity.

Despite the benefits, the readily available research and information, people are not exercising at the recommended levels. More than 22% of adults in the U.S. do not engage in any physical activity (CDC, 2006), more than half do not participate in physical activity at the recommended levels (CDC, 2005), and 60 % of adults are not sufficiently active to achieve health benefits (USDHHS, Public Health Service, CDC, National Center for Chronic Disease Prevention and Health Promotion, & Division of Nutrition and Physical Activity, 1999).

Worksite wellness programs that include physical activity significantly lowered overall medical care costs and improved worker productivity (Leutzinger, Orminkowski, Dunn, Goetzel, Richling, Stewart, & Whitiner, 2000). By using forecasting health care costs within worksites that offer health promotion programs, they were able to estimate a cost savings of almost 3 percent. In addition, worksite wellness programs build on themselves by reducing the health risk factor by 1 percent per year, which eliminates about 5.8 percent in health care costs.

Nutrition.

Healthful nutrition and an increase in physical activity reduce the risk of many diseases, some cancers, and premature death at all stages of life (ACS 1996 Advisory Committee on Diet, Nutrition, and Cancer Prevention, 1996; McGinnis & Foege, 1993).

They remain some of the most important lifestyle factors that people can modify in order to lower their risk of many diseases.

The nutritional recommendations are as follows: (a) eat a variety of nutrient rich foods from the basic food group that limit saturated and trans fats, cholesterol, added sugars, sodium, and alcohol; (b) eat the bulk of your foods from plant sources, to include vegetables, fruits, and whole grains and cereals; (c) use low-fat dairy products; (d) 2,000 calorie diet for moderate active women and 2,500 calorie diet for a moderately active man; (e) maintain a balance between energy input and energy output; and (f) eat foods that are high in fiber (Payne, Hahn, & Lucas, 2007; USDHHS & U.S. Department of Agriculture, 2005).

Weight loss programs.

Weight loss programs need to address a wide variety of components in order to increase the likelihood of success and sustainability. For example, weight loss programs that do not include a physical activity component have a low-level of effectiveness and tend to be very costly (Payne, Hahn, & Lucas, 2007). An estimated 50 million Americans go on diets each year but fewer than 5% maintain any long-term weight loss (FDA, n.d.).

With only a 5-10% reduction in weight, an individual can have positive health benefits (Kohl, 2001), with modest weight loss (10%-15%) eliminating the uses of some medications and reducing absenteeism in those who were previously morbidly obese (Deitel, 2001; Martin, Tan, Horn, Bixler, Kaufman, Becher, & Hunter, 1995). It is important to focus on research-based solutions, increasing physical activity, improving nutritional choices, and setting realistic weight-loss goals that include realistic,

incremental changes and support strategies for helping sustain lifestyle changes (Levi, Vinter, St. Laurent, & Segal, 2008, August).

Teams support.

VSM Abrasives started a contest encouraging its employees to participate in a weight loss program, with cash incentives at the end of the competition, and then quarterly follow-up incentives for sustained weight loss (Ellin, 2003). The program has saved the company approximately 10-15% on annual insurance claims.

Contests offered higher individual participation when used in conjunction with wellness programs (Wong, Bauman, & Koch, 1996). Team competitions were often times selected, due sociological theory that infers group competition as most effective (Heckathom, 1990).

Support groups.

There is evidence linking obesity with mental health issues, such as depression, anxiety disorders, personality disorders, and mood disorders (Kilmer, Roberts, Hughes, Li, Valluru, Fan, Giles, Mokdad, & Jiles, 2008; Petry, Barry, Pietrzak, & Wagner, 2008). Therefore, wellness programs should address both the mental and physical health of the individual (Strine, Mokdad, Dube, Balluz, Gonzales, Berry, Manderscheid, & Kroenke, 2008). One way to do this is through support groups. These groups can work on various strategies of wellness activities, provide a built-in support system, work on underlying issues that have prevented previous success in wellness activities, provide team and peer guidance, and accountability. They also manage stress by talking to others with similar issues.

One study found a direct correlation between stress and the obesity rates in mice when they fed stressed and non-stress mice the same diet, only to observe that the stressed mice gain twice as much fat (NIH, 2007, July 9). Combined stress with a high fat and high sugar diet may lead to obesity and metabolic syndrome symptoms (Kuo, Kitlinska, Tilan, Li, Baker, Johnson, Lee, Burnett, Fricke, Kvetnansky, Herzog, & Zukowska, 2007). Stress reduction methods can facilitate better results.

Health coaching.

In order for the greatest level of success, the wellness program must be optimal for the individual, which lends credibility towards individualized programming and coaching that offers choices and support for the participant's efforts to change (Leafgren, 1986). New behaviors are more likely to stay when the rewards from the new behaviors is greater than the rewards from the old behaviors (Ardell, 1977). Lewin (1948) suggested active participation and involvement in new patterns of behavior encouraged a change in attitude, maintained over time for long-term success.

Healthy People 2010 listed several objectives for physical activity for adults (USDDH, 2000). Coaches can assist employees trying to meet these objectives, if they are having trouble meeting them on their own. The objectives of Healthy People 2010 were: (a) reduce the proportion of adults who engage in no leisure-time physical activity; (b) increase the proportion of adults who engage regularly, preferably daily, in moderate physical activity for at least 30 minutes per day; (c) increase the proportion of adults who engage in vigorous physical activity that promotes the development and maintenance of cardiorespiratory fitness 3 or more days per week for 20 or more minutes per occasion; (d) increase the proportion of adults who perform physical activities that enhance and

maintain muscular strength and endurance; and (e) increase the proportion of adults who perform physical activities that enhance and maintain flexibility.

Incentives.

Incentives are to motivate employees to adopt and maintain healthier lifestyles (Finklestein & Kosa, 2003). Incentives can be financial incentives, cash bonuses, paid vacation days, health insurance rebates, gift certificates, paid time off, and prizes. Forty percent of major employers in the US offer incentives for wellness programs (Hewitt Association, 2002). Keeping in line with economic theories, incentives either lower the cost or increase benefits (Finklestein & Kosa, 2003).

Organizational change is more effective when employers and employees view wellness incentives as a joint initiative (Kossek, Ozeki, & Kosier, 2001). Incentives can be used as way to shift cultural change, driven from the top down. A benefit of wellness is a decrease in absenteeism. Decreased absenteeism can indicate a higher job satisfaction level and perceived fairness, which can lead to higher participation in wellness activities. Current strategies often target employees, however, if organizational readiness was better understood, greater effort could be made to offer targeted strategies based on organizational readiness. This could lead to more organizational support of individual change, a healthier wellness culture, more opportunities to participate in healthy choices, and policies that include employee health.

Pepsi Bottling offered incentives to employees who participated in their fitness and wellness programs, through small grants to start employee driven wellness initiatives, as well as cash incentives to fill out the personal health risk assessment and to complete a

wellness course (Rivkin, 2007). These cash incentives may have influenced the 70% compliance rate for the initial personal health risk assessment.

Adventist Media Center gave employees pedometer and two daily 15 minutes breaks to encourage walking (Ellin, 2003). Employees earned one day paid vacation for every 1,000 miles they walked, and as an added bonus lost as much as 40 pounds.

Cigna HealthCare offered a virtual walking challenge, in which participants actually walked to cover the distance from Chicago to Santa Monica, receiving incentives at key milestones. About 67% completed the trip, exercising 2-5 days per week, averaging 6.5 pounds, and 99% willing to participate again (Pont, 2003).

Some companies offered cash or bonus incentives based on participation in wellness (Fisher, 2004; Atkinson, 2003). Other companies offered a cash credits or rebates towards health insurance premiums to employees that met certain health criteria (Brotherton, 1998; Goetzel, Ozminkowski, Bruno, Rutter, Isaac & Wang, 2002; Stein, Shakour, & Zuidema, 2000; Vandewater, 2003). We Energies in Wisconsin implemented an interesting approach that allowed for flexibility in choosing physical activity participation, offered progressive incentive levels based on participation, and built in accountability (Atkinson, 2003). There was $1.50-$4.00 return on every dollar spent, with up to 50% participation rates (Atkinson, 2003; Stanford University, 2004).

Companies were able to cut annual medical costs by $225 or 28% (Stein, Shakour, & Zuidema, 2000; Vandewater, 2003). In addition, added incentives to wellness programs dramatically raised participation rates dramatically (Goetzel, Ozminkowski, Bruno, Rutter, Isaac & Wang, 2002; Stein, Shakour, & Zuidema, 2000).

Organizational effect on health.

Full-time employees spend almost one-third of their lives at work, almost as much as they spend sleeping. This creates a great opportunity to create healthy and supportive environments in the workplace. Supportive environments have the greatest impact in producing lasting changes in health affirming behaviors (Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008).

A supportive workplace for wellness within a school environment has criteria, which has been well established from the Center for Disease Control. The Center for Disease Control conducts a study every six years on school wellness called the School Health Policies and Programs Study. The latest study was conducted in 2006, which identified 6 characteristics of effective employee wellness programs: 1) Health promotion activities that focus on skill development and lifestyle behavior change; 2) Safe and supportive environments that promote health; 3) Integration of the school employee wellness program within the school or school district; 4) Worksite screening programs (e.g., blood pressure or cholesterol screening; 5) Educational resources that enable school employees to make decisions about health and health care; and 6) An evaluation and improvement plan (Eaton, Marx & Bowie, 2007). The components of a comprehensive school employee wellness program were: 1) A systematic approach to implementing a school employee wellness program, including health education and health-promoting activities – coordinated efforts; 2) Screenings to identify chronic disease risk factors; 3) Organizational policies that support employee wellness programs; 4) Employee assistance programs; 5) Health risk assessment with follow-up interventions to support behavior change for health risks that are identified; 6) The provision of education and

resources to inform health care decision making; 7) A mechanism for evaluating effectiveness and efficiency; 8) Incentives; and 9) Include a variety of wellness strategies for all risk levels.

Organization may have additional effects on health based on the organizational characteristics, such as location, type of organization, number of employees, etc. Within school settings, the variables may be the school districts, size of the organization, and policies designed to encourage participation in employee wellness programs. The correlation they may have could be on employee health outcomes, both perceived through self-report and/or biometric data, and participation rates.

Studies (2004) conducted with the military used organizational characteristics, such as location, time, provider types, intrinsic self-motivation, and extrinsic organizational workplace factors, as predictor variables for dental wellness, readiness, and health behaviors (Chaffin, Rothfuss, Johnson, Larsen, & Finstuen, 2004; Wynd, & Ryan-Wenger, 2004). A presentation, as a result of Center for Disease Control, Health Protection Research Initiative, described the sociocultural workplace attributes on participation in employer sponsored health assessments (McLellan, MacKenzie, Tilton, Dietrich, Comi, & Feng, 2009). Another study (2008) indicated that incentive value and Communications and Organizational Commitment Level (Com/Org Level) were the strongest predictors of health productivity assessment participation (Taitel, Haufle, Heck, Loeppke, & Fetterolf, 2008).

Organizational capacity for organizational change and innovation can have an impact on individual and community outcomes, in relation to patient care and health outcomes (Stockdale, Mendel, Jones, Arroyo, & Gilmore, 2006). Though this research focused on

mental health and substance abuse, the model and measurement framework could be applicable in a variety of health-related interventions.

Wellness program evaluation.

Employers are seeking ways to lower their total share of cost, and wellness programs are boasting they can solve some of the issues. Though there has been some research, much of the claims about what a wellness programs is based on testimonials and anecdotal evidence (Matteson & Ivancevich, 1988; Terborg, 1986; Warner, 1987). Lawley-Duffy Associates, a wellness company targeting organizations regardless of their health insurance carriers, guaranteed a 2:1 return in 12 to 15 months on wellness program investments, through analyzing claims data, comparing client data to benchmarks, and determining opportunities (Palmateer, 2007). Worksite wellness program are often very diverse in program content and scope, which makes it extremely difficult to compare programs and their outcomes (Terborg, 1988).

Other issues in proper evaluation is the difficulty in experimental control, to standardize data control procedures, and to rule out rival hypotheses (Terborg, 1988; Conrad, Conrad, & Walcott-McQuigg, 1991); Warner, Wickizer, Wolfe, Schildroth, & Samuelson, 1988). Another common issue is the limitation of time and resources, lack of organizational cooperation with research requirement, and the biases of involved personnel in finding favorable outcomes (Matteson & Ivancevich, 1988; Terborg, 1986).

Employee participation is usually voluntary, which makes it difficult to proper evaluation on the programs, since not all employees participate. There is an inherent bias in self-selection. Some of the obstacles are employee's worry about privacy, which may limit some participation. Some companies have financial incentives to secure greater

participation, which can also introduce bias in the data (Draper, Tynan, & Christianson, 2008).

Most of the early studies on work-site wellness programs suffered from significant methodological and practical weaknesses, by testing only those who self-select to participate and low participation rates (Abrams, Emmons, Linnan, & Biener, 1994; Glasgow, McCaul, & Fisher, 1991; Terborg & Glasgow, 1997). In addition, often the studies lacked sufficient treatment and control worksites and if they did have them, they lacked sufficient quantity or were too cumbersome to replicate. This is often due to work sites not permitting the use of the work site as the unit of analysis in the study. This limitation ignores potential intraclass or intrasite correlations, usually overestimates the statistical significance of the intervention effect, and makes it difficult to differentiate intervention effects from other variable. Another problem is that the interventions are usually too short to facilitate the employee into long-term maintenance of employee behavior change.

Some of the criterion used for wellness program evaluation is based on absenteeism, insurance premiums, health risk assessments, self-reports, participation rates, changes in job performance, and satisfaction reports on the wellness activities (Davis, Rosenberg, Iverson, Vernon, & Bauer, 1984). However, many companies do not keep basic records on measurable items, such as absenteeism, turn over, or job performance.

Several researches suggested using program theory in evaluation (Bickman, 1987; Chen, 1990; Lipsey, 1993; Lipsey & Pollard, 1989). Some advantages noted were: (a) a basis for informed choices about method; (b) the ability to distinguish between the

validity of program implementation and the validity of program theory; (c) careful definitions and operationalization of the independent variables; (d) to identify pertinent variables and the details of measurement; (e) to permit sources of extraneous variance to be identified and controlled; (f) to identify potential interactions, mediators, and moderators; (g) determine the proper statistical model for data analysis and assumptions required; (h) to complete an analysis of the validity of evaluation research in a specific context; and (i) to add to the pool of research. In the past, evaluation research has focused on maximizing internal validity at the cost of compromising other validity issues (Chen & Rossi, 1987). Researchers are now suggesting a more flexible approach using model specification and program theory, while potential threats to internal, statistical conclusion, construct, and external validity.

One study developed The Workplace Wellness Appraisal looked at worksite wellness as a complex system made up of social and physical environmental conditions that impacts employee health (McMahan, Wells, Stokols, Phillips, and Clitheroe, 2001). The error has been a lack of comprehensiveness in a variety of methods to evaluate improved employee health, workplace health, and the success level of the programs. A comprehensive program would include and evaluate the following: individual lifestyle change, health risk appraisal, employee counseling and support groups, medical interventions, environmental enhancement, health supportive facilities, awareness of the wellness programs, types of wellness programs offered, health benefits and claims history, compliance with occupational safety and health legislation, the healthfulness of physical facilities, the organization's structure and management style, employee attitudes and morale, and demographic information (McMahan, Wells, Stokols, Phillips, and

Clitheroe, 2001; O'Donnell & Harris, 1994; Stokols, Pelletier, & Fielding, 1995; Wilson, Holman & Hammock, 1996). A limitation of the Workplace Wellness Appraisal is only directed at employers and management, not at the employee level. There could potentially be differences in perspective from management to employees.

The most important thing with wellness program evaluation is to determine which activities have the highest opportunity to improve health, while simultaneously containing costs. It also requires the employees to buy-in to the wellness programs, as it doesn't matter how effective the program if the employee won't use what is being offered. Their participation brings legitimacy to the program (Draper, Tynan, & Christianson, 2008).

To address many of the concerns with evaluating wellness programs, this proposed study will consider self-reported data, as well as health outcome data, which may eliminate the bias introduced by self-reported data. A systematic review to determine whether health promotion interventions targeting employee diets had an impact on changing nutritional habits determined that self-reported assessment introduced a substantial risk of bias, suggesting a need to link self-reported assessments with objective health outcomes to reduce the risk of bias (Ni Mhurchu, Aston, & Jebb, 2010).

The data being utilized is archival and collected over a seven-year period, which will assist on testing the culture of wellness within the organization. The data lacks a controlled scientific scenario, however, the information may be valuable in a real-life community-based school setting. The data was collected from voluntary participants through a variety of surveys and health surveys throughout the years, without a regimented schedule and with variations in the types of survey questions asked of

participants. There remains a need for more research that evaluates the effectiveness of worksite environmental interventions (Ni Mhurchu, Aston, & Jebb, 2010).

This study is unique in that is focused on Southern California teachers, administrators, and support staff, which has a higher number of females (60%), diversity, and greater range of socioeconomic conditions. While most wellness programs target for-profit corporations, this study will expand research with respect to targeting non-profit and government wellness programs, with traditionally long-term employees. And finally, school employees, at least within the San Diego County area, tend to have higher obesity rates, depression, and diabetes and other preventable disease than the general populations within San Diego County (Rott, 2011).

The overarching goal of wellness programs was to reduce obesity, in order to reduce preventable diseases (cardiovascular diseases and Type II diabetes) and, thereby, reduce costs. The objectives were to: (a) increase the membership awareness regarding all aspects of excess weight and obesity; (b) increase the awareness of the health impacts of excess weight; (c) provide tools for managing and controlling weight; (d) provide a practical and fun way to lose weight; and (e) provide a mechanism to maintain weight loss. In addition, introducing costs of obesity to both the employer and the employee links behaviors with health outcomes impacts participation rates in wellness programs. The costs to the employer were increased health care premiums, loss of productivity, and absenteeism. The cost to the employee was a loss of quality and quantity of life, as well as additional financial expenses, such as increased health care premiums and annual medical expenses through non-covered items.

Many organizations are offering wellness programs for their employees but it is often difficult to measure the benefits of such programs and their individual components, as well as determine the most effective strategies. Employee wellness programs are evaluated usually at the individual or aggregate group level to determine effectiveness of the strategies, often because the strategies target at the individual level. Even if we determine the health outcomes or self-report data is not favorable, can we say the strategies were ineffective? Could effectiveness of wellness programs outcomes be linked to organizational characteristics?

If organizational variables can affect employee health outcomes and their participation levels in wellness activities, perhaps more wellness efforts should be directed at the organizational level, in conjunction with the efforts directed at the employee level. This might allow for a more comprehensive approach for organizational and behavioral change towards more healthy and productive workforce. Understanding the organizational effect on employee wellness programs can help educate and promote organizational change which supports employees in their quest to better health.

Changes in the environment were the driving force behind efforts to stop the obesity crisis (Hill, Wyatt, Reed, & Peters, 2003). Environmental and work-life strategies that work towards improving overall working conditions improved employee health with supportive environments having the greatest impact in producing lasting changes in health affirming behaviors (Karasek & Theorell, 1990; Sonnenstuhl, 1988; Stokols, 1992; Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008). Do organizational characteristics make up the environment, thereby influencing changes in health outcomes or participation in wellness programs?

Studies on military personnel demonstrated organizational characteristics, such as location, time, provider types, intrinsic self-motivation, and extrinsic organizational workplace factors, as predictor variables for dental wellness, readiness, and health behaviors (Chaffin, Rothfuss, Johnson, Larsen, & Finstuen, 2004; Wynd, & Ryan-Wenger, 2004). Another study linked sociocultural workplace attributes, incentives, and communication and organizational commitment level with participation in employer sponsored health assessments (McLellan, MacKenzie, Tilton, Dietrich, Comi, & Feng, 2009; Taitel, Haufle, Heck, Loeppke, & Fetterolf, 2008). It remains unclear whether the same findings would apply in a civilian organization, specifically school districts.

Financially, organizations cannot ignore wellness programs as a viable way to improve employee health, productivity, and to decrease costs. However, the question remained which was were there other external factors that influence the level of success of wellness programs. From an organizational standpoint, previous research generally focused on one organizational variable or health outcome in a variety of organizations. This study examined multiple organizational variables and health outcomes within school districts.

Research questions.

To consider the potential effects that an organization may have on its employees' health and willingness to participate in employee wellness programs, there were several research questions and areas of research to explore.

RQ1: What organizational variable effects, such as organizational size, engagement in policies that encourage participation, and median income of the school

district, determined by zip code income census data, have on school employee health outcomes, perceived health and wellness participation rates?

RQ2: Will the employee's residence effect health outcomes, perceived health and wellness participation rates, determined by employee's residence zip code and median income zip code census data?

Hypotheses.

Several hypotheses are that organizational variables correlated with health outcomes, perceived health and participation rates in wellness activities.

H1: The size of districts may have an effect on employee health outcomes and participation rates. The larger the organization, the more likely they were to have wellness initiatives, be more worried about obesity issues, yet still had a lower the rating of perceived employee health (Alliance for a Healthier Minnesota, 2012). The hypothesis is that mid-sized districts will have better employee health outcomes, perceived health and participation rates than large-sized districts.

H2: If districts have wellness policies designed to encourage participation in wellness programs, then there may be a positive effect on employee health outcomes, perceived health and participation rates. Environmental and work-life strategies that work towards improving overall working conditions improved employee health with supportive environments having the greatest impact in producing lasting changes in health affirming behaviors (Karasek & Theorell, 1990; Sonnenstuhl, 1988; Stokols, 1992; Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008). Studies linked sociocultural workplace attributes, incentives, and communication and organizational commitment level with participation in employer sponsored health assessments (McLellan,

MacKenzie, Tilton, Dietrich, Comi, & Feng, 2009; Taitel, Haufle, Heck, Loeppke, & Fetterolf, 2008). It is possible that wellness policies that include staff may indicate a commitment to wellness, which encourages employees to participate in wellness activities. The hypothesis is that districts with better developed wellness policies using best practices have a positive effect on employee health outcomes, perceived health and participation rates compared to districts with lesser developed wellness policies.

H3: Employee potential socioeconomic status has an effect on employee health outcomes and participation rates; employees living and working in lower income zip codes having the worst health outcomes, perceived health and participation rates, improving with medium income zip codes, and best results with higher income zip codes. There was a relationship between overweight and obesity rates and lower socioeconomic status (CDC, 2002; USDHHS, 2000, 2001). The majority of the states with the highest obesity rates also have the highest poverty rates (Levi, Vinter, St. Laurent, & Segal, 2008). This may be due to an increased risk of lower socioeconomic groups being less likely to meet minimum dietary and physical activity requirements (CDC, 2002; USDHHS, 2000). Lower socioeconomic women from all racial and ethnic groups are about 50% more likely to become obese than women from a higher socioeconomic status (USDHHS, 2001). Since this group in majority women, it is possible that they would be more likely to be overweight and that this trend would have an inverse relationship with income level; the lower the pay scale, the higher the risk of obesity.

Chapter 2

METHODS

Motivation and Rationale

With obesity rates on the rise, considering the workplace potential impact on employee's health remains an interesting area to consider. It is important to determine in what ways the organizational characteristics effect impacts employee health, in order to better design wellness strategies to combat the rising rate of obesity and the subsequent rising rates in health care in response.

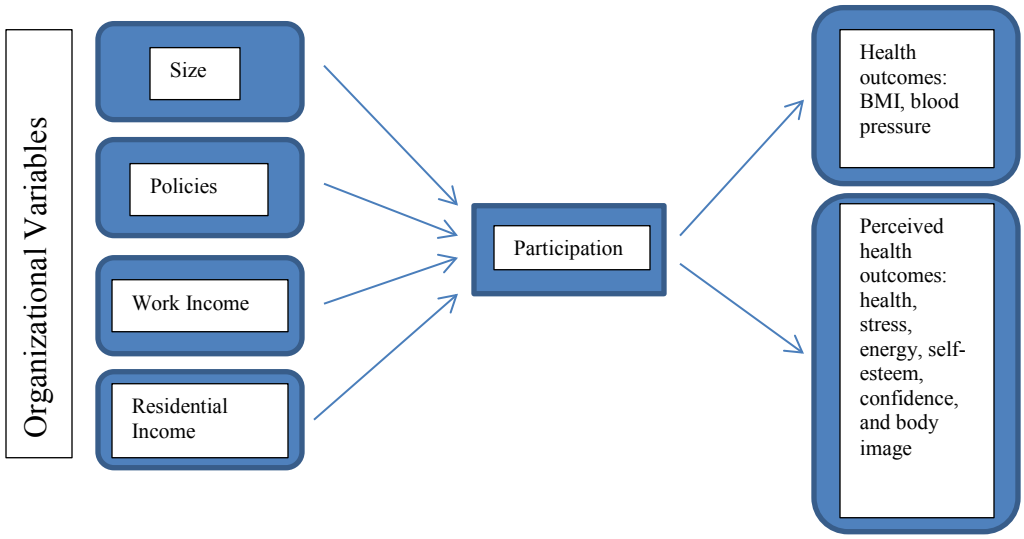
Measurement Plan

Research design.

This longitudinal study is a correlational design using archival data that had several layers to consider when looking at organizational characteristics and their effect on employee health outcomes, perceived health and participation rates in wellness programs in public educational settings within Southern California School Districts, specifically with a managed trust under California Schools Voluntary Employee Benefits Association (VEBA) between the years of 2005-2012 (see Figure 3). This is a within-participants study looking at the relationship of organizational variables with employee health over time and across situations. In addition, it is a consideration as to whether those variables can predict health outcomes. The application for the Internal Review Board (IRB) application is located in Appendix A.

Figure 3

Conceptual Framework



Note. Organizational variables may impact participation in employee wellness programs, which may have effects on health outcomes and perceived health outcomes.

Archival Data Plan

Participation in wellness programs.

This study is unique in that is focused on Southern California teachers, administrators, and support staff, with a higher number of females (60%), diversity, and greater range of socioeconomic conditions. The age range was 18-65 years with the majority of the participants in the 45-55 year range. In addition, this program targeted non-profit school districts, with long-term employees.

The wellness programs were available to 90,000 employees and their benefited family members that received their benefits through the California School VEBA trust. Approximately 10% of the all the employees participated in the wellness programs that were offered. Participation included a self-selected a variety wellness options, such as

wellness challenges, health screenings, health coaching, exercise classes, and staff development/educational workshops.

Participants provided information, voluntarily, on gender, ethnicity, age, and job classification. Other information that was collected was district and work site in which they worked. Participation in the wellness activities was encouraged both during and after work hours.

Organizational participation.

The organizations that employ the participants were public school districts that include: pre-schools; elementary, middle, and high schools; community colleges and County Office of Education. There were up to 54 school districts during the data collection period. All the organizations purchased their benefits through the California School VEBA trust. Wellness programs were provided by Healthy Adventures Foundation as a perk to the organizations of having benefits through California School VEBA. Employee counts and wellness policies (engagement policies and best practices in Appendix B) were verified through California Department of Education, district websites, and California School VEBA trust.

Recruitment.

Wellness program marketing information was provided to the benefits administrators within all VEBA districts to send out to the employees. Direct outreach from the wellness program providers occurred when employees participated in at least one wellness activity.

Participation and involvement in the wellness programs, both at the employee and organizational level was voluntary. Participation was voluntary, which introduced a bias

into the data set, as those who participated would have been those more interested in wellness activities and general health.

Organizational criterion was a minimum of 45 employees that participated in wellness activities over a minimum period of two calendar years. This eliminated many of the districts, leaving 20 out of 54 districts as part of the final data set.

Data.

The purpose of this study is to consider the organizational effect on employee health outcomes, perceived health and participation rates in wellness programs. Data was collected through self-reported survey data, health screenings, participation rates, and audits of school district policies on employee health and wellness strategies. Data was aggregated by district, district size, organizational policies and practices in employee wellness, residence and work zip codes median income census data, and by year.

The data included was quantitative. Data collected was self-reported on employee's perception on variety of health items, such as health, stress, energy, confidence, self-esteem, and body image, all to be considered dependent variables measured over time. These were rated by the employee on a Likert-type scale.

Biometric data was also collected, that included body mass index (BMI) and systolic/diastolic blood pressure. These dependent variables were measured over time.

Participation rates in the wellness activities were the final dependent variable. The various activities that were considered in the participation rates were health coaching sessions and follow up emails, wellness challenges, exercise classes or workshops, and/or biometric / health screenings.

The independent variables considered were size of the organization, whether organizational wellness policies and best practices encouraged participation in wellness programs, and employees' resident and work zip code median income census data, in order to consider potential socioeconomic effects.

Data collection.

Data collected, annually or more based on individual choice and participation, included a wide variety of information: 1) health measurements, such as blood levels for cholesterol and glucose, vitals, and body composition, to include weight, body mass index (BMI), girth measurements, waist-to-hip ratios, body composition (body fat/skeletal muscle percentages), and 2) self-reported measurements, such as health, stress, energy, confidence, self-esteem, and body image. However, a method to evaluate the data was not designed prior to program implementation, therefore, some gaps and inconsistencies exist in the data. Despite the gaps and inconsistencies the data, there is an opportunity to explore the data and how the program worked in a real-life setting, often lacking in controlled scientific scenarios (Starfield, 1998).

Surveys were conducted in conjunction with wellness challenges throughout the year. Wellness challenges were offered three to nine times per year in order to generate interest in wellness activities that provided higher quality interactions, such as coaching. The challenges were short-term efforts, usually 6-8 weeks, targeting quick changes in behaviors.

The data was collected over a sustained period of time, which gives insight into wellness programs that are well-grounded into the culture. To investigate this further, organizational wellness policies and practices, as well as employee participation rates by

organization and worksite were explored. Data was collected over surveys, at work sites, Healthy Adventures Foundation, California Schools VEBA and at the participants' homes. Health measurements were collected through self-reported data from doctor visits, or biometric data or surveys conducted by health coaches from Healthy Adventures Foundation.

Limitations.

Despite this high volume of participation, consistent participation, pre-/post-data, and long-term health screening data was inconsistent due to voluntary nature of the program, with employees dropping in and out of the wellness programs throughout the years. Surveys and health screening data evolved over time to gather more information and to obtain a higher compliance to follow-up surveys and health screenings. Wellness challenges usually had pre/post surveys. Pre-surveys were more likely to be completed by participants than post-surveys, so much of the survey data were pre-surveys over time. The tools also evolved overtime to collect data and advance the wellness strategies, emulating current validated and non-validated tools of commonly measured items.

Biometric data collected may have inter-rater reliability issues between health coaches and tools used to conduct the measurements. In addition, survey and self-reported data may contain inflated results intended to not disappoint the client's health coach, similar to the Hawthorne effect, which may affect the external validity (Hart, 1943).

Data Analysis Plan

Independent variables.

The independent variables consisted organizational variables individually, as well as combined and interactive effects on the dependent variables. The independent variables were the size of the districts; engagement, defined as the implementation of wellness policies and best practices designed to encourage participation in wellness programs and/or healthy lifestyles; and employees' residence/work zip code median income census data to determine if the effects vary considering potential socioeconomic influences.

School districts were considered a single organization made up of several worksites. The size of the organization was categorized within three levels: medium, large, or extra-large. There were no small districts within the final data set (small districts were 1-99 employees). Medium were 100-499 employees, large were 500-2000, and extra-large districts were greater than 2000 employees. Engagement was whether the district had wellness policies and was demonstrating the use of best practices designed to encourage participation in wellness programs and/or healthy lifestyles (see Appendix B).

Organizational wellness policies and best practices designed to encourage participation in wellness programs were selected based on well-established best practices for designing, implementing, and maintaining wellness programs (Directors of Health Promotion and Education , nd; Eaton, Marx, & Bowie, 2007). The nine major requirements for a sustainable wellness program were: administrative support, identified resources, identify a leader, organize a committee, gather and analyze data, develop a plan, implement the plan, evaluate and adapt the plan, and sustain the program. Under

each of the nine requirements, the following objectives are used to determine whether they have met each of the requirements (Eaton, Marx, & Bowie, 2007). See Appendix B, which is an example of how the scoring system for level of engagement is used to determine the organizational policies and support for employee wellness programs.

For administrative support, develop a plan that helps the district achieve its mission, reviews health care claims data to justify need, and identify and achieve leadership support. Identify what resources are needed and what resources and strengths are already available. Determine what skills and what is necessary in order to be a wellness advocate for wellness. Decide on who should be represented on the wellness committee and define what active engagement means and when the committee will meet. The higher the score, the more policies and practices in place within the district.

For gathering and analyzing data, identify what baseline data is needed for monitoring, evaluating and adapting the program, and how often should the data be evaluated. Get staff input through a staff survey. Set a schedule for evaluation.

When the group develops a plan, it should answer why, how, when and by whom activities will be accomplished. Each district should set a yearly calendar of health campaign strategies, host a health fair or kick-off event, hold health screenings with insurance plan open enrollments or outside of open enrollments, run a health risk assessment campaign, have district specific challenges, host wellness workshops and/or exercise classes, and create a marketing and communications plan to ensure proper information dissemination.

Evaluate and adapt the plan by identifying how well objectives were met, what the outcomes of the programs have been and identify ways to improve the program.

Determine who will evaluate and what is being measured. Lastly, a successful program includes a sustainable plan. This will need leadership, board, and administrative support. Representation and collaboration is important.

All the level of engagement points are added up to determine the level of support that the organization is providing that would encourage better health outcomes, perceived wellness and higher employee participation in wellness programs.

To determine whether socioeconomic factors of the employee impacted their health outcomes and participation rates, median income levels were obtained using data from the United States Census Bureau's American Community Survey 2007-2011compiled by Michigan Population Studies Center (2013). The data was matched by the employees' zip of residence and district (work). Low, medium and high income standards were based on 2011 California criteria for food stamp (SNAP) eligibility, which was 130% poverty level (<$29,064), medium income was up to the median income level for California ($29,065-$61,632), and high income was defined as income levels above the median (>$61,632) (California Guide to the Food Stamp Program, 2011; United States Census Bureau; 2011). Based on these income classifications, there were participants that fell within the 3 residential income classifications, however, there were no low-income districts based on this criterion.

Dependent variables.

The dependent variables consisted of health outcome measurements through biometric data, self-reported responses to surveys, and participation rates. The biometric data included health measurements, such as blood pressure and body mass index (BMI).

Self-reported measurements through surveys included perceived levels of health, stress, energy, confidence, self-esteem, and body image. These were rated by the employee on a Likert-like scale.

Participation rates in the wellness activities are the final dependent variable. The various activities that were considered in the participation rates were health coaching, wellness challenges, exercise or presentations, or biometric / health screenings.

Confounding factors.

Potential confounding factors may have included age, gender, ethnicity, and specific socioeconomic data for individual employees, which also could have impacted whether an employee participated and health outcomes. Specific individual incomes were not used, as this was unknown. Individual variations in household income within the same zip code could have impacted participation that could not be verified or tested in this study. The demographic data was unavailable and therefore, not considered in the analysis.

Data analysis.

The overall assumption was that organizational variables correlated with health outcomes, perceived health and participation rates in wellness activities. The first step was to clean the data to correct any errors in data entry and to compile the data into three data sets with one unique identifier in order to link the data sets together: data set 1 included all organizational variables, zip code median income data, and participation rates; data set 2 included health outcome data over time periods; and data set 3 included perceived health data over time periods. The data sets were set up as .csv files using

Microsoft Excel 2010. Data was merged by common identifier using R Statistics (Rx64 2.15.3) via R Studio.

Exploratory data analysis was conducted, which included a quality assurance check on the data in order to identify the variables of interest so the methodology could be adapted to the data set. The variables of interest were various biometric results and perceived health survey results. This helped to minimize bias and to identify missing data strategies, such as censoring or an ad hoc strategy (e.g. using median data to fill in missing data). It was important to go through the data to determine the best way to evaluate the employee health outcomes, both perceived through self-report and/or biometric data, and participation rates for each participant.

For H1, mid-sized districts will have the most favorable effect on health outcomes, perceived health and participation rates. The effect of size on participation rates was accomplished by looking at generalized linear models, specifically Poisson. The effect of size on health outcomes and perceived health was analyzed using repeated measures ANOVA. The overall change in health data was analyzed using linear regressions.

H2, if districts have wellness policies and best practices designed to encourage participation in wellness programs (engagement), the higher the engagement, the more positive effect on employee health outcomes, perceived health and participation rates. This would be analyzed similarly to H1, using generalized linear models, specifically Poisson, between engagement and participation rates. The engagement effect on employee health outcomes, both perceived through self-report and/or biometric data, was

analyzed using repeated measures ANOVA. The overall change in health data was analyzed using linear regressions.

For H3, organizational effects may have varied effects on employee health outcomes, perceived health and participation rates depending on the employee residence and work median income zip code census data. This was an interaction model effect of residence and work median income zip code census data. Generalized linear models, specifically Poisson, were conducted to consider the effect of income on participation rates, in order to determine if organizational variables were predictive for employee health outcomes based the assumption that staff living and work in lower median income areas had the lowest participation rates. And again, using repeated measure ANOVAs, considering whether there were poorer health outcomes and perceived health for those working and residing in lower income areas.

Were there certain variables or combination of variables or models, which are more predictive of participation rates, perceived health or health outcomes in employee-based wellness programs? Will those effects vary depending on income level of an area that an employee resides or works?

For the third data set that considered the perceived health, an exploratory analysis was completed to help determine variables that had the greatest possible contribution to the effect. This helped identify what was and what was not important by clarifying what variables have more or less of an impact.

Chapter 3

RESULTS

The results of the quantitative analysis presented in this chapter were a result of the extensive exploration of the archival data. The results are presented from exploratory analyses to detailed analyses of various models that best explains that data results. The results were intended to address the research questions and hypotheses.

RQ1: What organizational variable effects, such as organizational size, engagement in policies that encourage participation, and median income of the school district, determined by zip code income census data, have on school employee health outcomes, perceived health and wellness participation rates? H1: The hypothesis was: mid-sized districts have better employee health outcomes, perceived health and participation rates than larger-sized districts. H2: Districts with better developed wellness policies using best practices have a positive effect on employee health outcomes, perceived health and participation rates.

RQ2: Will the employee's residence effect health outcomes, perceived health and wellness participation rates, determined by employee's residence zip code and median income zip code census data? H3: Organizational effects on employee health outcomes, perceived and participation rates vary by where the employees' resides and works, as it links to median income zip code census data, with employees residing and working in lower/medium income areas having the worst health outcomes, perceived health and participation rates, and best results with the highest income.

Data Related to Purpose of Study

Data set 1 contained organizational variables, census zip income data, and participation data. Out of 54 school districts, the criteria for the districts to remain within the final data set was based on a minimum of 2 years participation in wellness programs and a minimum of 45 employees participating in wellness programs from their district. This left 20 school districts that met the minimum criterion for the purpose of the study. Within the 20 remaining districts, there were 4,772 participants within those districts eligible for study.

Data set 2 contained health outcome data for body mass index, systolic blood pressure, and diastolic blood pressure data. Body mass index, systolic pressure, and diastolic pressures were selected if the participant had at least 2 measurements over a 4-year period for BMI and 3-year period for blood pressure. There was a lot of missing data. Body mass index data existed for 224 participants. Blood pressure data existed for 75 participants.

Data set 3 contained perceived health outcome data for health, stress, energy, self-esteem, confidence, body image, productivity, mixed support, family support, friend support, and work support. Similarly to the health outcome data, there was a lot of missing data. Individuals were selected if the participant had at least 2 measurements over a 4-year period for any of the perceived health outcome data. This criterion only left the variables available for analysis: work support, health, stress, energy, and productivity. Perceived health data existed for 210 participants within only 5 of the possible variables.

Years exposed to wellness programs.

The 20 districts used for the purpose of this study all had exposure to wellness strategies for a minimum of 6 years. Therefore, the number of years the organization and its employees exposed to wellness was homogenous for this group and was not considered a variable.

Preliminary Analyses

District overall participation percentages basic statistics.

The district overall participation rate percentages were calculated based on the number of participants divided by the number of employees with insurance benefits. The percentage of participants within each of the 20 organizations ranged from 19.63% - 74.91%, with a target goal of 30% or higher, based on the minimum number to impact health care utilization rates set by the third party administrator (California Schools VEBA). The results for the basic statistical analysis were reviewed in Table 4. The group results were skewed to the right, and kurtosis score of <3, at 1.1069, the lower and broad curve slightly platykurtic, with shorter and thinner tails (negative kurtosis with more variance).

Table 3

Basic Statistical Analysis for Dependent and Independent Variables

	M	SD	Median	Skewness	Kurtosis
Dependent Variables					
District Participation	25.61%	0.16	23.21%	1.16	1.11
Individual Participation	7.85	2.34	1	7.67	88.36
Health Outcome Change					
Body Mass Index	0.14	3.47	-0.1	1.67	10.56
Systolic Blood Pressure	-1.92	15.62	2	0.24	0.27
Diastolic Blood Pressure	-0.77	10.45	1	-0.12	0.93
Independent Variables					
District Engagement	33.26%	0.27	22%	1.13	0.02
Size	NA	NA	NA	NA	NA
Work Median Income	$60,845	10,685	$60,670	1.37	3.31
Residential Median Income	$68,603	19,704	$65,635	0.87	0.9

Note. The basic statistical analysis results included means, standard deviations, median, skewness and kurtosis for each of the dependent and independent variables. For size, it was categorical, so these measurements did not apply.

Individual participation basic statistics.

There were 4,772 participants. Participation, which is the number of employee participations or interactions in wellness activities, ranged from 1-455 wellness interactions, which represented how many times each individual participated in a wellness activity. Participation basis statistics can be seen in Table 4. The median was 1 and third quartile was 3, with the majority between 1-3 interactions. The data is skewed to the left, due to such a high prevalence of participants that had 1 wellness interaction, keeping in mind that if the 1 wellness interaction was a wellness challenge, it could mean that they participant engaged for 6-8 weeks, but it still counts as 1 interaction. Total participation by individuals over the time period was 37,455, with 10,902 of those participation points in non-coaching activities.

District engagement score basic statistics.

Each district received an engagement score, which was the score the district received based on their participation in supporting wellness efforts (see Appendix B). Each district was given 0-25 points, for each demonstration of policies and best practices. This score was then converted into a percentage of total possible points. The range of percentage of engagement was between 0.00-92.00%. The basic statistics can be found in Table 4. The group results were skewed to the right, and a kurtosis score of <3, with a lower and broad curve is platykurtic, with shorter and thinner tails.

The engagement scores were re-coded into low, medium, high, and very high engagement scores. They were re-coded based on the quartile data with the first quartile 0-20% (low), second quartile 21-22% (medium), third quartile 23-52% (high), and fourth quartile 63-92% (very high). Each district was assigned a classification depending on the score they were assigned, in regards to demonstrating support for wellness based on best practices (see Appendix B).

There were 9 districts in the low engagement, 2 districts in the medium engagement, 5 districts in the high engagement and 4 districts in the very high engagement. There were 1,239 participants in the low engagement, 1,335 participants in the medium engagement, 1,154 participants in the high engagements, and 1,044 participants in the very high engagement.

Size of the organizations.

The 20 districts were further classified by the size of the district. The classifications of the districts by size were no small districts, 7 medium districts with 595

participants, 10 large districts with 2018 participants, and 3 were extra-large districts with 2,159 participants.

Work Median Income from Zip Code Census Data.

The work median income was acquired by zip code census data from United States Census Bureau's American Community Survey 2007-2011compiled by Michigan Population Studies Center (2013). The range of income was $37,181-$97,802. The median income basic statistics results are in Table 4. The group was skewed to the right, with a kurtosis >3 leptokurtic with fat tails.

Work median income based on zip code census data was categorical data because there were only 20 possibilities based on 20 organizations. The income data was re-coded and groups into low, medium and high income. Categories were based on low (<$29,064), medium ($29,065-$61,632), and high income (>$61,632).

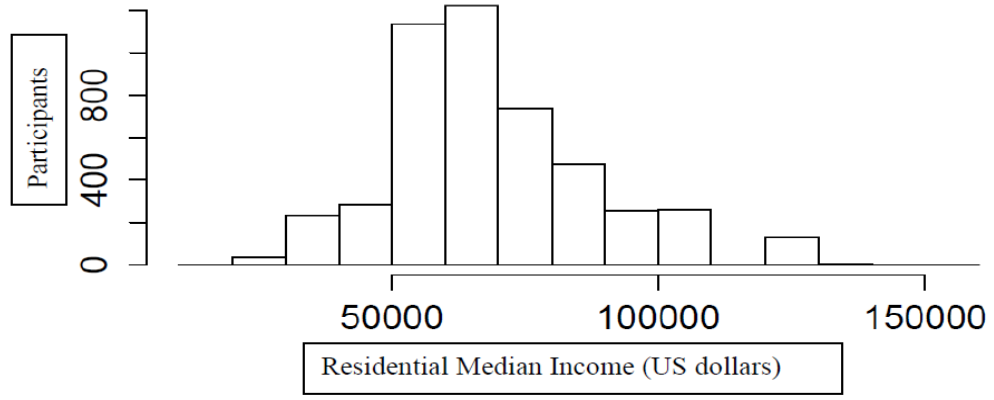
There were no districts that fit under the low income criterion, 11 districts were medium income and 9 districts were high income. There were 2,960 participants that worked in a medium income district and 1,812 participants that worked in a high income district.

Resident Median Income from Zip Code Census Data.

The resident median income was acquired by zip code census data from United States Census Bureau's American Community Survey 2007-2011compiled by Michigan Population Studies Center (2013). The range of residential median income based on zip code census data ranged from $12,076-$152,697. The median residential income basic statistics are in Table 4. The group was skewed to the right, and the kurtosis was <3, the lower and broad curve is platykurtic, with shorter and thinner tails (see Figure 4).

Figure 4

Histogram of Residential Median Income



Note. Frequencies of participants of residential median income, based on US dollars, displayed in the histogram.

Residential median income analysis was conducted based on actual incomes and categorical income levels. The income data was re-coded into groups based on low (<$29,064), medium ($29,065-$61,632), and high income (>$61,632). There were 34 participants in low income, 1,872 participants in medium income, and 2,866 participants in high income.

Health outcomes.

Repeated measures ANOVA was conducted to test the equality of the means over a period of 3 to 4 years for body mass index, systolic blood pressure, and diastolic pressure as the dependent variables and a variety of independent variables: size, work median income, district engagement, and residential median income. There was no statistical significance using repeated measures ANOVA for any combination of the independent or dependent variables.

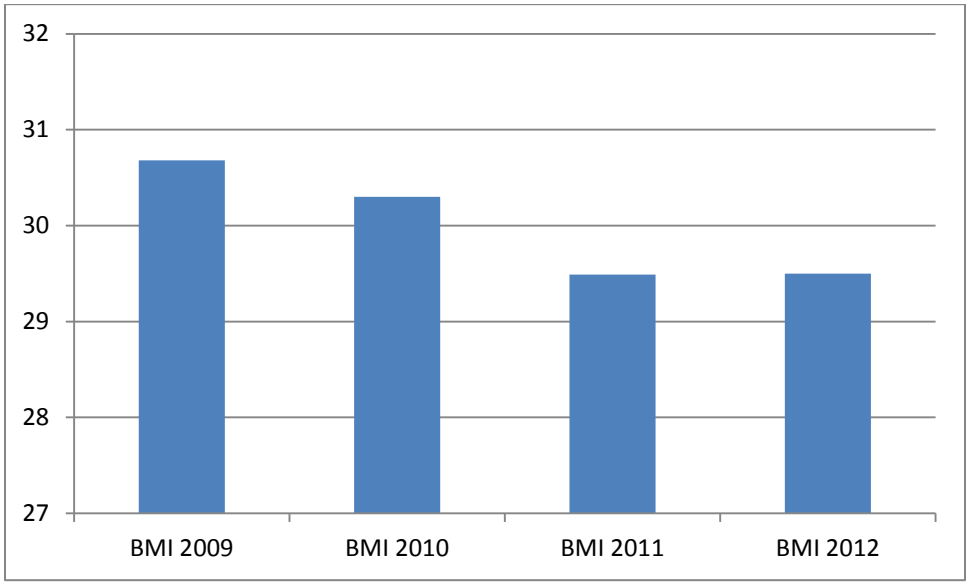
Since there was not statistical significance using the repeated measure ANOVA for any of the dependent or independent variable combination, the data was examined to determine if a pairwise test could be conducted to look at a before/after effect. It was determined that this was not possible due to the data points starting and stopping during different years. There were not enough data points to do a pairwise before/after analysis that had the same start and stop years.

The final consideration was to conduct a regression analysis using change data between the earlier and latest time points, understanding that this would introduce serious limitations. The set of measurements were from different time periods.

The body mass index means had a downward trend over the 4-year period (see Figure 5), which was not statistically significant. The mean body mass index change was determined from earliest to latest body mass index differences. The earliest point of measurement could have been from 2009-2011 and the latest point of measurement could have been from 2010-2012, which introduced a limitation since the time period of change was not the same for every participant.

Figure 5

Body Mass Index Mean Trends

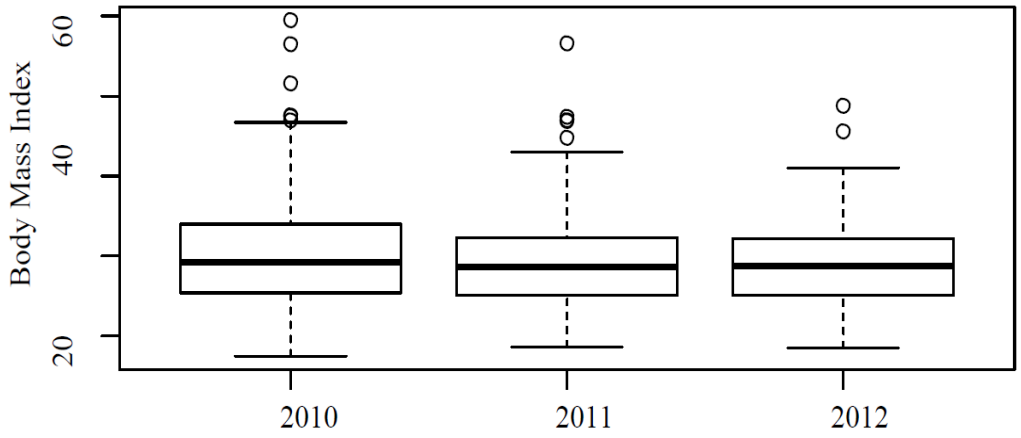


Note. Body mass index mean trends over a 4-year period from 2009-2012.

In addition, the range body mass index possibilities narrowed between the earliest and latest year (see Figure 6). There was no notable change between years, however, the outliers narrowed between the years. The range of change was a gain of 15.70 to a loss of 18.9. The basic statistics can be found in Table 4. The distribution was skewed to the right, and the kurtosis was >3 leptokurtic with fat tails.

Figure 6

Body Mass Index Boxplots

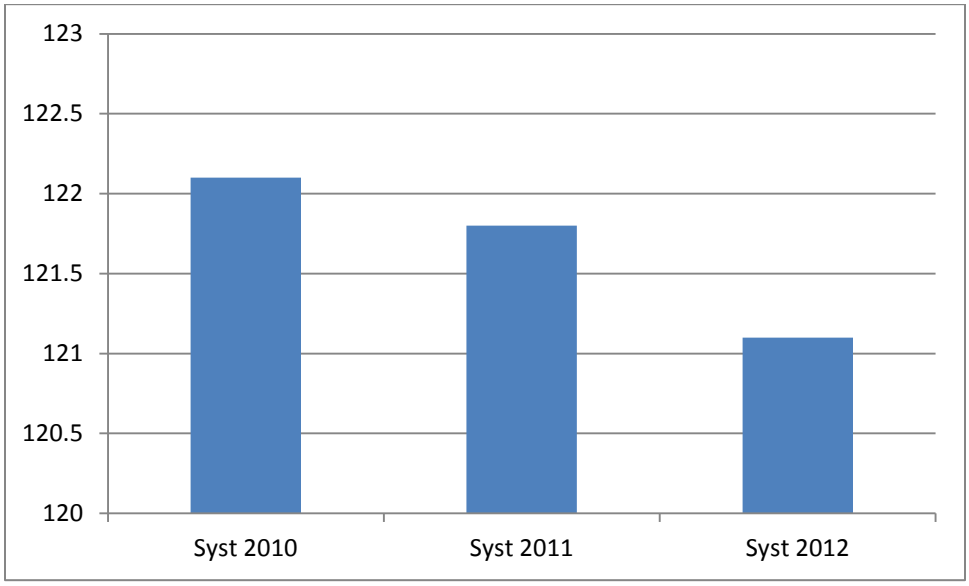


Note. Boxplot body mass index trends over a 3-year period from 2010-2012.

Systolic and diastolic blood pressure data existed for 75 participants. The systolic blood pressure means had a downward trending over the 3-year period (see Figure 7), but not statistically significant. The mean systolic blood pressure change was determined from earliest to latest systolic blood pressure differences. The limitation was similar to that of the analysis with body mass index; since this was not a pairwise before/after test, as the earliest and latest time point was not the same for every participant.

Figure 7

Systolic Blood Pressure Mean Trends

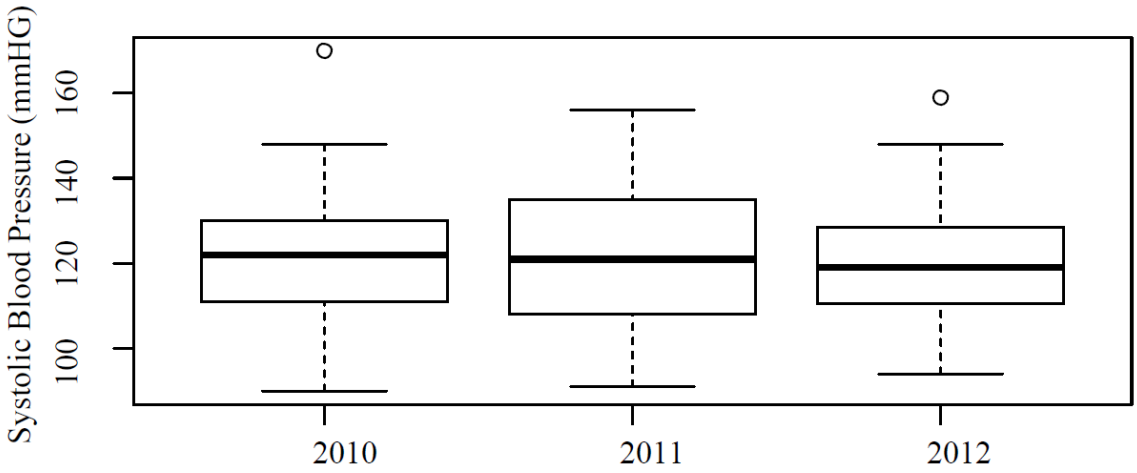


Note. Systolic blood pressure mean trends over a 3-year period from 2010-2012.

The systolic blood pressure mean was a decrease of 1.92. The range of change was a -32-48 mmHg (see Figure 8). The basic statistics can be found in Table 4. The data was skewed to the right and the kurtosis was <3 leptokurtic with lower and broad curve is platykurtic, with shorter and thinner tails.

Figure 8

Systolic Blood Pressure Boxplots

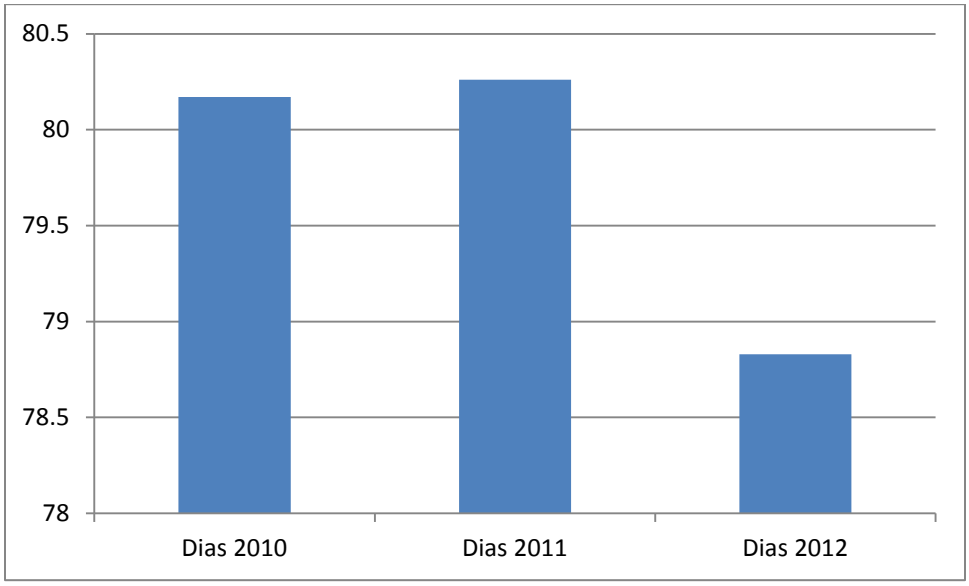


Note. Systolic blood pressure trends over a 3-year period from 2010-2012.

The diastolic blood pressure means had a downward trending over the 3-year period (see Figure 9). The mean diastolic blood pressure change was determined from earliest to latest systolic blood pressure differences. The limitation of this was that the earliest and latest time point was not the same for every participant.

Figure 9

Diastolic Blood Pressure Mean Trends



Note. Diastolic blood pressure mean trends over a 3-year period from 2010-2012.

The diastolic blood pressure mean was a decrease of 0.7733. The basic statistics can be found in Table 4. The range of change was a -36-32 mmHg (see Figure 10). The skewness was a normal distribution, and the kurtosis was <3 leptokurtic with lower and broad curve is platykurtic, with shorter and thinner tails.

Figure 10

Diastolic Blood Pressure Boxplots

Note. Diastolic blood pressure trends over a 3-year period from 2010-2012.

Perceived health outcomes.

Repeated measure ANOVA was conducted on health, stress, energy, self-esteem, confidence, and body image were the dependent variables selected. The ratings were based on a Likert-type scale with stress being the only variable that had an inversed relationship, with the highest score being the worse outcome. The independent variables were size, district engagement, work median income, and residential median income.

The data did not support before/after analysis because the participants did not have the same start and stop points during the 4-year period, due to missing data and a sufficient number of participants that had at least two measurements over a 4-year period. Therefore, a change between the first and last measures was considered for analysis, understanding that this presented significant limitations in explaining results.

Exploratory analysis was conducted to determine what variables had the most promise. The variables explored were health, stress, energy, self-esteem, confidence, body image, productivity, mixed support, family support, friend support, and work support. There was a lack of consistent data points between individuals, with at least 2 points of data for each year. The variables that were selected for analysis that met this criterion were health, stress, energy, self-esteem, confidence, and body image were the variables had consistency between variables over time between individuals. The ratings were based on a Likert-type scale with stress being the only variable that had an inversed relationship, with the highest score being the worse outcome.

The perceived health outcomes had normal distributions. For repeated measures ANOVA, there was no statistical significance. Pairwise tests were not possible due to inconsistent before/after data point between years. When considering change data, all of the changes were very slight and not statistically significant. In additional, the data lacked any noticeable trends.

Primary Analysis

Generalized linear modeling, specifically Poisson regression, was used to conduct the analysis. Poisson was selected as the analysis of choice for 2 main reasons: trying to predict the probability of wellness activities occurring based on the characteristics of the employer, and because the participation data was skewed (to the right) count data based on number of times a participant utilized wellness activities. Binomial distribution was not an appropriate option, because the goal was not to determine an exact probability, nor was the Poisson model over-dispersed.

Poisson was used to analyze a variety of independent variables effect on dependent variable, participation rates, which also had a high number of one-time utilization of wellness activities. The variety of independent variables included: size, district engagement levels, work median income categories, and residential median income, based on census zip code incomes and categorical income levels. In addition, interactions between variables were explored with the generalized linear modeling.

Generalized linear model analyses were conducted with health outcomes and perceived health outcomes as the dependent variables. A variety of independent variables included: size, district engagement levels, work median income categories, and residential median income, based on census zip code incomes and categorical income levels. In addition, interactions between variables were explored.

Hypothesis 1

Size effects on participation.

For H1, the size of districts may have an effect on employee health outcomes, perceived health outcomes, and participation rates, with the prediction that mid-sized districts would have the most favorable effect on health outcomes, perceived health and participation rates. The effect of size on participation rates was accomplished by looking at generalized linear models, specifically Poisson. The effect of size on health outcomes and perceived health was analyzed using repeated measures ANOVA, comparing the average means over the period of years. There was no statistical significance.

With the generalized linear modeling, the organizational size effect, in every category was statistically significant, see Table 4, and therefore, the null hypothesis was rejected. The greatest effect size was the large organization in its effect on participation,

followed by extra-large. The medium size organization had a negative effect on participation.

Table 4

Effects of Organizational Size on Participation

Independent Variable - Size	Coefficients
Small	NA
Medium	-0.09***
Large	1.96***
Extra-large	0.2283***

Note. The organizational size effects on participation in wellness activities. Statistically significant identified as $p < .001$***.

Size effects on health outcomes.

Since there was no statistical significance in the repeated measures ANOVAs on the size effect on measured health outcomes: body mass index, systolic blood pressure and diastolic blood pressure over a period between 3-4 years. Further exploration was conducted using generalized linear modeling with size as the independent variables and overall change between the earliest and latest health outcome measurements (see Table 5). There was no statistical significance using this method either. Therefore, the analysis results failed to reject the null hypothesis.

Table 5

Effects of Organizational Size on Health Outcomes

	Body Mass Index	Systolic Blood Pressure	Diastolic Blood Pressure
Medium Effect	0.2240	-3.229	0.8143
Large Effect	-0.1799	3.371	0.9714
Extra-large Effect	0.6118	-2.448	-1.0099

Note. Size effects on health outcomes with no statistical significance.

Effects of organizational size on perceived health outcomes.

There was no statistical significance in the repeated measures ANOVAs on the size effect on perceived health outcomes: health, stress, energy, self-esteem, confidence, and body image over a period of 4-years. Further exploration was conducted using generalized linear modeling with the independent variable, size, and overall change between the earliest and latest perceived health or body image outcome measurements (see Table 6), as the dependent variables. There was no statistical significance, therefore failed to reject the null hypothesis. There was not a statistically significant effect from medium or extra-large organizations on stress, energy, self-esteem and confidence.

Table 6

Effects of Organizational Size on Perceived Health

	Health	Stress (inverse effect)	Energy	Self-Esteem	Confidence	Body Image
Medium Effect	0.7452	-0.0129	0.1226	-0.12258	-0.2677	-0.07097
Large Effect	-0.1452	1.1129***	-0.3226*	0.32258*	-0.5323**	-0.12903
Extra-large Effect	0.2984	0.1572	-0.2176	-0.07441	-0.3656	-0.07535

Note. Size effects on perceived health (*significant ($p < 0.05$), ** significant ($p < 0.01$), *** ($p < 0.001$)).

There was only statistically significant results were large organizations effects on perceived stress, energy, self-esteem, and confidence. The effect on perceived stress was significant, the effect on confidence was moderately significant, and the effect on energy and self-esteem was significant. The effect was positive for stress and self-esteem, and negative for energy and confidence.

Hypothesis 2

Engagement effects on participation.

H2, if districts have wellness policies and best practices designed to encourage participation in wellness programs (engagement), the higher the engagement, the more positive effect on employee health outcomes, perceived health and participation rates. This was analyzed similarly to H1, using generalized linear models, specifically Poisson, between engagement and participation in wellness activities. The engagement effect on employee health outcomes, both perceived through self-report and/or measured biometric data, was analyzed using repeated measures ANOVA.

Relationship between engagement and participation.

The district engagement effect on participation was statistically significant at all levels of engagement (see Table 7). High levels of engagement had the greatest effect, with high and medium engagement having a positive effect. Low and very high engagement had a negative effect on participation. There appears to be an optimal level of engagement, high level, which produces the desired outcomes, perhaps the balance between employer support without it feeling too pushy or intrusive by the employer. The null hypothesis is rejected.

Table 7

Effects of Organizational Engagement on Participation on Participation

Engagement	Coefficients
Low	(0.12)***
Medium	0.14***
High	2.06***
Very High	(0.06)***

Note. The engagement effects on participation in wellness activities were significant in every category ($p < 0.001$)***.

Engagement effects on health outcomes.

There was no statistical significance in the repeated ANOVAs on the engagement effect on measured health outcomes: body mass index, systolic blood pressure and diastolic blood pressure over a period of 3 or 4-years. Further exploration was conducted using generalized linear modeling with engagement effects on the overall change between the earliest and latest health outcome measurements.

There was no significance with low, medium, high, or very high engagement on body mass or systolic pressure (see table 8). There was a statistically significant effect of engagement on diastolic blood pressure. High engagement had a positive effect on diastolic blood pressure of and low engagement had a negative effect on diastolic blood pressure of, the latter of which is the desired effect. There was no statistically significant effect for medium or very high engagement on diastolic blood pressure.

Table 8

Effects of Organizational Engagement on Participation on Health Outcomes

	Body Mass Index	Systolic Blood Pressure	Diastolic Blood Pressure
Low Engagement Effect	-0.5614	-5.568	-8.932*
Medium Engagement Effect	-0.8793	3.750	-2.083
High Engagement Effect	0.8477	5.000	6.500 *
Very High Engagement Effect	-1.7112	-4.375	-4.625

Note. Engagement effects on health outcomes were statistically significant ($p<0.05$)* for diastolic blood pressure, with low engagement having the desired effect.

Engagement effects on perceived health outcomes.

There was no statistical significance in the repeated measure ANOVAs on the engagement effect on perceived health, stress, energy, self-esteem, confidence, and body image over a period of 4-years. Further exploration was conducted using generalized linear modeling with effect of engagement on the overall change between the earliest and latest health outcome measurements.

There were no statistical significant results on the effects of engagement on health, self-esteem, or body image (see Table 9). There was also no statistical

significance for low, medium or very high engagement on any those three perceived health variables.

Table 9

Effects of Organizational Engagement on Participation on Perceived Health

	Health	Stress (inverse effect)	Energy	Self-Esteem	Confidence	Body Image
Low Engage-ment Effect	0.05971	0.1264	0.1420	-0.1748	-0.1412	-0.4875
Medium Engagement Effect	-0.16388	0.3746	0.1472	-0.2809	-0.3478	-0.6455
High Engage-ment Effect	0.08696	1.0870*	-0.6087**	0.4348	-0.6522*	0.2609
Very High Engagement Effect	-0.48696	-0.1870	0.6087	-0.1348	0.2522	-0.2609

Note. Engagement effects on perceived health coefficients were statistically significant for stress and confidence ($p<0.05$)* and moderately significant for energy ($p<0.01$)**.

High engagement effects on perceived stress, energy and confidence were significant. There was a positive effect on perceived stress, negative effect on perceived energy and negative effect on perceived confidence for every unit of high engagement.

Hypothesis 3

Participation.

For H3, organizational effects may have varied effects on employee measurable health outcomes, perceived health outcomes and participation rates depending on the employee residence and work median income zip code census data. This was an interaction model effect of residence and work median income zip code census data.

Generalized linear modeling analysis, specifically Poisson, was conducted to consider the effect of median income on participation in wellness activities, in order to determine if organizational variables were predictive for employee health outcomes based on the zip code and the median income within those zip codes from where employees live and work.

The purpose was to determine if organizational variables were predictive for employee health outcomes based the assumption that staff living and working in zip codes with the lowest median incomes will have the poorest health outcomes, lower perceived health and lower participation rates than those living and working in high median zip codes that would have the highest socioeconomic status. Repeated measure ANOVAs were used to compare means of health outcomes, both measured and perceived, over a period of years with no statistical significance. The final analysis was to determine if there were there certain variables or combination of variables, which are more predictive of health outcomes in employee-based wellness programs?

Generalized linear modeling was used to analyze the income effects on participation. Work median income had a statistically significant effect ($p < .001$) on participation for both the medium and high income zip codes school districts (see table 10). There were no low income zip code school districts. Both medium and high income zip code areas had a positive effect on participation, though high income zip code school districts a greater effect.

Table 10

Work Median Income Effects on Participation

	Coefficients
Work Median Income – Medium	0.185257***
Work Median Income – High	1.941485***

Note. Work median census income data effects on participation were statistically significant ($p<0.001$)***.

Residential median income had a statistically significant ($p < .001$) effect on participation (see table 11). In addition, a combined effect of work and residential income on participation was considered.

Table 11

Residential Median Income Effects on Participation

	Coefficients
Intercept	2.149***
Residential Median Income	0.000001291***

Note. Residential median census income data on participation was statistically significant ($p<0.001$)***.

Combined Variable Effects

Work and residential income effects.

Generalized linear modeling was used to analyze the combined work and residential income effects on participation. The interactions between work and residential median income zip code data effects on participation were statistically significant ($p < .001$) (see table 12). The combined categories of interactions were statistically significant.

Table 12

Combined and Interaction Effects of Work and Residential Income

	Coefficients
Intercept	2.423***
Work Median Income	(0.4723)***
Residential Median Income	(0.0000067)***
Interaction Effect Between Work & Residential Income	(0.00000937)***

Note. Interactive effects of work and residential income zip code census data on participation was statically significant ($p<0.001$)***.

Combined effects of size and work income.

Generalized linear modeling was used to analyze the combined effects between size and work income effects on participation. The interactions between size and work median income zip code data effects on participation were statistically significant (see Table 13). Each category in the size and income levels was significant (see Table 3 for means and standard deviations).

Table 13

Combined Effects between Size and Work Income

	Coefficients
Intercept	1.7752***
Size Medium	(0.16272)***
Size Extra-large	0.50035***
Work Median Income	0.29563***
Interaction Effect Between Medium Size & Work Income	0.32174***
Interaction Effect Between Extra-large Size & Work Income	(0.41717)***

Note. The interactions between size and work median income zip code data effects on participation was statistically significant ($p<0.001$)***.

Combined effects of size and residential income.

Generalized linear modeling was used to analyze the combined effects between size and residential income effects on participation. The interactions between size and residential median income zip code data effects on participation were statistically significant (see Table 14). Each category in the size and income levels was statistically significant (see Table 3 for means and standard deviations).

Table 14

Combined Effects between Size and Residential Income

	Coefficients
Intercept	2.11***
Size Medium	0.538***
Size Extra-large	-0.0622
Residential Median Income	(0.0000022)***
Interaction Effect Between Medium Size & Residential Income	(0.0000083)***
Interaction Effect Between Extra-large Size & Residential Income	0.00000431***

Note. The interactions between size and residential median income zip code data effects on participation was statistically significant ($p < .001$)***.

Combined effects of engagement and residential income.

Generalized linear modeling was used to look at the interactive effects of engagement and residential income zip code census data on participation. The interactions between engagement and residential median income zip code data effects on participation were statistically significant (see Table 15). The combined category that was statistically significant ($p < .001$) was very high engagement and residential median income effects on participation.

Table 15

Combined Effects of Engagement and Residential Income

	Coefficients
Intercept	1.993***
Low Engagement	-0.08154
Medium Engagement	1.294**
Very High Engagement	5.872***
Residential Median Income	0.000001003
Interaction Effects Between Low Engagement and Residential Income	-0.0000006095
Interaction Effects Between Medium Engagement and Residential Income	0.0000001315
Interaction Effects Between Very High Engagement and Residential Income	(0.000009393)***

Note. Interactive effects of engagement and residential income zip code census data on participation were statistically significant ($p < .001$)*** for very high engagement only.

Combined effects of engagement and work income.

Generalized linear modeling was used to look at the interactive effects of engagement and work income zip code census data on participation. The interactions between engagement and work median income zip code data effects on participation were statistically significant (see Table 16). The combined category that was statistically significant ($p < .001$) was very high engagement and work median income effects on participation. The interaction model was not a viable model.

Table 16

Combined Effects of Engagement and Work Income

	Coefficients
Intercept	2.01362***
Low Engagement	(0.13762)***
Medium Engagement	0.02337
Very High Engagement	(0.14370)***
Work Income & Engagement	0.16206***

Note. Interactive effects of engagement and work income zip code census data on participation were statistically significant ($p < .001$)***.

Combined effects of size and engagement.

Generalized linear modeling was used to look at the interactive effects of size and engagement effect on participation. The interactions between size and engagement effects on participation were statistically significant (see Table 17). The combined categories of size and engagement effects on participation were statistically significant ($p < .001$).

Table 17

Size and Engagement Effects on Participation

	Coefficients
Intercept	1.93155***
Low Engagement	-0.02559
Medium Engagement	0.01939
Very High Engagement	0.09213***
Medium Size & Engagement	(0.09123)***
Extra-large Size & Engagement	0.24811***

Note. Size and engagement effects on participation was statistically significant ($p<0.001$)***.

Combined effects between size, engagement and work income.

Generalized linear modeling was used to look at the interactive effects of size, engagement and work income zip code census data on participation. The model was statistically significant with all the interactions between variables also statistically significant (see Table 18). There was no interaction between variables.

Table 18

Combined Effects of Size, Engagement and Work Income

	Coefficients
Intercept	1.8787***
Size Medium	(0.0474)*
Size Extra-large	0.2614***
Low Engagement	(0.0553)***
Medium Engagement	(-0.1092)***
Very High Engagement	-0.0047
Work Medium Income, Engagement & Size	0.1681***

Note. Interactive effects of size, engagement and work income zip code census data on participation was statistically significant ($p<0.001$)***.

Combined effects of size, engagement, and residential income.

Generalized linear modeling was used to look at the interactive effects of size, engagement and residential income zip code census data on participation. The model was statistically significant with all the interactions between variables also statistically significant (see Table 19). There was no interaction between variables.

Table 19

Combined Effects of Size, Engagement and Residential Income

	Coefficients
Intercept	1.9633***
Size Medium	(0.0934)***
Size Extra-large	0.25109***
Low Engagement	(0.0331)*
Medium Engagement	0.0091
Very High Engagement	(0.0873)***
Residential Medium Income, Engagement & Size Medium	(0.0786)***
Residential Medium Income, Engagement & Size Large	0.3554***

Note. Interactive effects of size, engagement and residential income zip code census data on participation was statistically significant ($p<0.001$)***.

Combined effects between size, work income and residential income.

Generalized linear modeling was used to look at the interactive effects of size, work and residential income zip code census data on participation. The model was statistically significant with all the combined and interactive effects between variables also statistically significant (see Table 20).

Table 20

Interactive Effects of Size, Work and Residential Income

	Coefficients
Intercept	2.119***
Size Medium	0.3756***
Size Extra-large	0.2664**
Residential Median Income	0.000005***
Work Median Income	(-0.0437)
Interaction Effects Between Size Medium, Work Income and Residential Income	0.000017***
Interaction Effects Between Size Extra-large, Work Income and Residential Income	0.0000003

Note. Interactive effects of size, work and residential income zip code census data on participation was statistically significant for medium sized organizations ($p<0.001$)***.

Combined Effects of Size, Engagement, Work and Residential Income.

Generalized linear modeling was used to look at the interactive effects of size, engagement, work and residential income zip code census data on participation. The model with all the combined effects between variables was statistically significant (see Table 21). There was no interaction between variables.

Table 21

Combined Effects of Size, Engagement, Work and Residential Income

	Coefficients
Intercept	1.9143***
Size Medium	(0.0395)*
Size Extra-large	0.2702***
Low Engagement	(0.0737)***
Medium Engagement	(0.1551)***
Very High Engagement	(0.0360)
Residential Medium Income, Engagement & Size Large	0.3365***
Residential Medium Income, Engagement & Size Medium	(0.1183)***
Residential, Work Medium Income, Engagement & Size	0.2098***

Note. Interactive effects of size, engagement, work and residential income zip code census data on participation was statistically significant ($p<0.001$)***.

Health outcomes.

There was no statistical significance using the repeated measure ANOVA on the measured health outcomes. In addition, there were no statistical significance using generalized linear modeling with both residential and work income effects on body mass index, systolic blood pressure and diastolic blood pressure (see Table 22). The model for residential income effects on body mass index, systolic blood pressure and diastolic blood pressure was a poor model due to there being too many different zip codes, and therefore, too small of numbers to compare trends.

Table 22

Work Median Income Effects on Health Outcomes

	Body Mass Index	Systolic Blood Pressure	Diastolic Blood Pressure
Work Median Income Effect - Medium	0.15419	1.6690	-0.7014
Work Median Income Effect - High	0.04345	0.8519	1.2222

Note. Work median income (census income data by zip code) effects on measured health outcomes with no statistical significance.

Perceived health outcomes.

There was no statistical significance in the repeated measures ANOVAs on the zip code income data effect on health, stress, energy, self-esteem, confidence, and body image. Further exploration was conducted using generalized linear modeling with effect of zip code income data on the overall change between the earliest and latest health outcome measurements. The model for residential income effects on perceived health measurements was a poor model due to there being too many different zip codes, and therefore, too small of numbers to compare trends.

There were no statistical significant results on the effects of work income on health, self-esteem or body image (see Table 23). High work income organizations seem to have more of an effect on the perceived health variables, with the exception of stress, which was statistically significant ($p < 0.05$) positive effect for both medium and high work income. Medium had a greater effect than high work income on perceived stress.

Table 23

Work Median Income Effects on Perceived Health

	Health	Stress (inverse effect)	Energy	Self-Esteem	Confidence	Body Image
Medium-level Median Income Effect	0.0741	0.7930*	-0.1300	0.0018	-0.2357	-0.0914
High-level Median Income Effect	0.0333	0.6500*	-0.3667**	0.2667	-0.6167***	-0.1167

Note. Work median income (census income data by zip code) effects on perceived health (*significant (0.05), ** significant (0.01), *** (0.001)).

High work income effect on energy and confidence was a statistically significant negative effect. For perceived energy, high level work median income was moderately significant ($p < 0.01$). There was no statistical significance at the medium level of work median income.

For perceived confidence, high level work median income was statistically significant ($p < 0.001$). There was a decrease in perceived confidence for every unit of high level of work median income. There was no statistical significance at the medium level of work median income.

Supplemental Analysis

Supplemental analyses were conducted using participation, the number of coaching participation activities employees engaged in, and a Boolean scoring for participation in coaching. The participation data set was manipulated to determine if low

participation rate employees versus high participation rate employees would generate differences in the outcomes. Five test groups were used: the original data set with participation engagement ranging 1-455, 2 or more participation in wellness activities, 3 or more, 7 or more, and those with 10 or more participation in wellness activities. The concern with eliminating those participants with only a single participation was that it dramatically changed the make-up of the group from overall participants to a higher and higher level of coaching participants (see Table 24). However, conducting the same GLM models with these various groups produced the same results, which was helpful to vet out coaching as a possible moderating effect. The model that best explained the data still remained with the variables size, residential income and work income (model 14 in Table 30).

Table 24

Modifications to Participation Data Set

	Original data	2 or more	3 or more	7 or more	10 or more
Participants	4,772	2,340	1,508	785	630
Percentage Receiving Coaching	17.88%	35.81%	53.12%	87.52%	94.92%

Note. The more activities participants engaged in (2 or more), the more likely they were to have been involved in coaching. This dramatically changes the population of study from wellness participants to mostly coaching participants.

In table 25, we can see that the coefficients remain very closely the same. In addition, with 7 or more participation in wellness activities, it becomes clear that coaching is having a moderating effect. Changing the data set in this way does change the group being studied from wellness participants to coaching participants.

Table 25

Generalized Linear Model Effects on Modified Participation Data

	Coefficients	
	Original data	7 or more
Intercept	2.119***	4.655***
Interaction Effects Between Size Medium, Work Income and Residential Income	0.00001715***	0.000008395***
Interaction Effects Between Size Extra-large, Work Income and Residential Income	0.0000002886	(0.00001253)***

Note. Interactive effects of size, work and residential income zip code census data on participation, comparing the original data to only participants with 7 or more participation activities (significant *** (0.001)).

Generalized linear model was used to analyze the relationships between participation and coaching and health outcomes. Participation effects on perceived health outcomes were considered (see Table 26). Participation effect on stress and self-esteem were statistically significant. The more someone participated in wellness activities, the less perceived stress.

Table 26

Participation Effects on Perceived Health

	Health	Stress (inverse effect)	Energy	Self-Esteem	Confidence	Body Image
Intercept	0.1036	1.4552***	-0.5003 ***	0.4426***	-0.8014***	-0.1269
Participation	-0.0003	-0.0042*	0.0007	-0.0031**	0.0003	-0.0010

Note. Participation effect on perceived health (*significant (0.05), ** significant (0.01), *** (0.001)).

Combined effects on participation.

Generalized linear model was used to analyze the interactive effects of coaching activities. A Boolean value was given if the individual employee participated in coaching at any time, regardless of how many times they participated. Coaching had no statistical significance on body mass index or systolic blood pressure (see Table 27). Coaching activities did have a moderately statistically significance negative effect on diastolic pressure, which is the desired effect.

Table 27

Coaching Effects on Health Outcomes

	Body Mass Index	Systolic Blood Pressure	Diastolic Blood Pressure
Intercept	-0.0082	4.342	3.895*
Coaching Effect	0.2631	-4.910	-6.327**

Note. Coaching effects on health outcomes coefficients were moderately significant ($p<0.01$) for diastolic blood pressure, with the desired negative effect.

Coaching had no statistical significance on health, self-esteem and body image (see Table 28). Coaching activities did have a statistically significance ($p < 0.001$) effect on stress and confidence, and a moderately statistically significance ($p < 0.01$) effect on energy.

Table 28

Coaching Effect on Perceived Health

	Health	Stress (inverse effect)	Energy	Self-Esteem	Confidence	Body Image
Intercept	-0.0159	1.2222***	-0.3651**	0.2698	-0.7937 ***	-0.0952
Coaching	0.1460	-0.0099	-0.1349	-0.0027	0.0128	-0.1239

Note. Coaching effect on perceived health ((p<0.01)** and (p<0.001)***).

Level of engagement was also explored for its potential as a dependent variable when looking at the other independent variables effect on engagement: size, work median income and residential median income. There was no statistical analysis noted.

Comparing Quality of Models

Akaike information criterion (AIC) was used to consider the relative quality of statistical models, in order to compare the various models ran through generalized linear models, specifically using Poisson. These models used participation as the dependent variable.

The model that best explained the results was an interactive model using size, residential census zip code data and work census zip code data (see table 29). There was more than 2 criterion points between that best model and the next best model, which was the interactive model between size and work census zip code data. However, with the gap being so large between the two models, the second model was not considered as a secondary best fit model.

Table 29

AIC Model Comparison Table

Model Number	Model	AIC	Delta AIC	Number of parameters	Model weight
14	Interaction between size, residential income, and work income	119818.6	0	12	1
6	Interaction between size and work income	120072.5	253.92	6	0
7	Interaction between size and residential income	120516.3	697.74	6	0
11	Combined effect of size, engagement, and work income	120591.2	772.63	7	0
13	Combined effect of size, engagement, residential income and work income	120591.9	773.37	8	0
12	Combined effect of size, engagement and residential income	120712.1	893.58	7	0
5	Combined effect of size and engagement	120720.8	902.27	6	0
1	Size	120772.5	953.95	3	0
9	Interaction between engagement and residential income	120798.2	979.61	8	0
10	Interaction between work and residential income	120814.7	996.11	4	0
8	Combined effect of engagement and work income	120874.5	1055.93	5	0
15	Combined effect of engagement, residential and work income	120874.6	1056.00	6	0
2	Engagement	121004.2	1185.59	4	0
3	Work income	121086	1267.48	2	0
4	Residential income	121354.9	1536.39	2	0

Note. Akaike information criterion was used to consider the relative quality of statistical models.

Explanation of Findings

Hypothesis 1.

The generalized linear model analysis demonstrated a negative effect in participation with medium sized organizations and a positive effect with large and extra-large sized organizations, with the greatest effect with large organizations (see Table 30). All size categories were statistically significant, and therefore, the null hypothesis is rejected.

Table 30

Organizational Effects on Participation

	Generalized Linear Modeling (GLM), Poisson
Hypothesis 1	Reject
Medium Size	Negative
Large Size	Positive*
Extra-large Size	Positive
Hypothesis 2	Reject
Low Engagement	Negative
Medium Engagement	Positive
High Engagement	Positive*
Very High Engagement	Negative
Hypothesis 3	Reject
Medium Work Income	Positive
High Work Income	Positive*
Residential Income	Positive
Interaction Between Work and Residential Income	Negative

Note. Organizational effects, either positive or negative, on participation, all being statistically significant. The starred items (*) had the largest effect.

When considering health outcomes over time, repeated measures ANOVA was conducted, with no statistical significance (see Table 31). Further exploration was conducted using generalized linear modeling with size as the independent variables and overall change between the earliest and latest health outcome measurements. There was no statistical significance; failed to reject the null hypothesis.

Table 31

Size Organizational Effects on Measureable Health Outcomes

	Body Mass Index	Systolic Blood Pressure	Diastolic Blood Pressure
Hypothesis 1	Accept	Accept	Accept
Repeated Measures ANOVA	NSS	NSS	NSS
GLM, Change Between First and Last Measurement	NSS	NSS	NSS

Note. Size organizational effects on measureable health outcomes for hypothesis 1, with no statistical significance (NSS).

Perceived health over time was analyzed with repeated measures ANOVA, with no statistical significance. Large sized organizations had significant effect on perceived health (see table 32), with negative effects on stress, energy, and confidence but positive effects on self-esteem. The null hypothesis was rejected.

Table 32

Size Organizational Effects on Perceived Health Outcomes

	Health	Stress	Energy	Self-esteem	Confidence	Body Image
Hypothesis 1	Accept	Accept	Accept	Accept	Accept	Accept
Repeated Measures ANOVA	NSS	NSS	NSS	NSS	NSS	NSS
GLM, Change, Medium Size	NSS	NSS	NSS	NSS	NSS	NSS
GLM, Change, Large Size	NSS	Positive*	Negative*	Positive*	Negative*	NSS
GLM, Change, Extra-large Size	NSS	NSS	NSS	NSS	NSS	NSS

Note. Size organizational effects, either positive or negative were statically significant, on perceived health outcomes for hypothesis 1. NSS indicates no statistical significance. The starred items (*) had the largest effect.

Hypothesis 2.

With a generalized linear regression analysis, specifically Poisson, between engagement and participation rates, null hypothesis was rejected. All levels of engagement were statistically significant, however, high engagement had the greatest effect (see Table 30).

There was no statistical significance in the repeated ANOVAs on the engagement effect on body mass index, systolic blood pressure and diastolic blood pressure. With

generalized linear modeling, there was no significance with low, medium, or high engagement on body mass index or systolic blood pressure (see Table 33). There was a statistically significant effect of engagement on diastolic blood pressure, for both low (negative effect) and high engagement (positive effect), with a greater effect with low engagement. The negative effect was the desired outcome, and low engagement producing the desired effect was not expected.

Table 33

Engagement Organizational Effects on Measureable Health Outcomes

	Body Mass Index	Systolic Blood Pressure	Diastolic Blood Pressure
Hypothesis 2	Accept	Accept	Reject
Repeated Measures ANOVA	NSS	NSS	NSS
GLM, Change, Low Engagement	NSS	NSS	Negative*
GLM, Change, Medium Engagement	NSS	NSS	NSS
GLM, Change, High Engagement	NSS	NSS	Positive
GLM, Change, Very High Engagement	NSS	NSS	NSS

Note. Engagement organizational effects on health outcomes, either positive or negative were statistically significant, with NSS indicating no statistical significance for hypothesis 2. The starred items (*) had the largest effect.

There was no statistical significance in the repeated ANOVAs on the engagement effect on health, stress, energy, self-esteem, confidence, and body image. For generalized linear modeling, there were a variety of effects from engagement on perceived health, with no statistical significant results on the effects of engagement on health, self-esteem and body image (see Table 34). There was a positive effect on stress from high engagement, but no statistical significance for low, medium or very high engagement on perceived stress. Perceived energy and confidence was a significant negative effect, with no statistical significance for low, medium or very high engagement on perceived energy.

Table 34

Engagement Organizational Effects on Perceived Health

	Health	Stress	Energy	Self-esteem	Confidence	Body Image
Hypothesis 2	Accept	Reject	Reject	Accept	Reject	Accept
Repeated Measures ANOVA	NSS	NSS	NSS	NSS	NSS	NSS
GLM, Change, Low Engagement	NSS	NSS	NSS	NSS	NSS	NSS
GLM, Change, Medium Engagement	NSS	NSS	NSS	NSS	NSS	NSS
GLM, Change, High Engagement	NSS	Positive*	Negative	NSS	Negative	NSS
GLM, Change, Very High Engagement	NSS	NSS	NSS	NSS	NSS	NSS

Note. Engagement organizational effects, either positive or negative were significant, on perceived health outcomes for hypothesis 2. NSS indicated no statistical significance. The starred items (*) had the largest effect.

Hypothesis 3.

For H3, organizational effects may have varied effects on employee health outcomes, perceived health and participation rates depending on the employee residence and work median income zip code census data. This was an interaction model effect of

residence and work median income zip code census data. Work and residential median income had a statistically significant effect on participation, as well as the interaction between them (see Table 30). There was no statistical significance in the repeated ANOVAs on the income effect on measureable health outcomes. With generalized linear modeling, income effects on health outcomes were not statistically significant (see Table 35).

Table 35

Income Organizational Effects on Measurable Health Outcomes

	Body Mass Index	Systolic Blood Pressure	Diastolic Blood Pressure
Hypothesis 3	Accept	Accept	Accept
Repeated Measures ANOVA	NSS	NSS	NSS
GLM, Change, Medium Income	NSS	NSS	NSS
GLM, Change, High Income	NSS	NSS	NSS

Note. Income organizational effects on measureable health outcomes for hypothesis 3 produced no significant results (NSS).

There was no statistical significance in the repeated ANOVAs on the income effect on health, stress, energy, self-esteem, confidence, and body image (see Table 36). For generalized linear modeling, work median income was statistically significant for stress, energy and confidence. Perceived health outcomes results were poorer for the

significant categories. There was a positive effect on stress for both medium and high income. High-level median income level had a negative effect on energy and confidence.

Table 36

Income Organizational Effects on Perceived Health Outcomes

	Health	Stress	Energy	Self-esteem	Confidence	Body Image
Hypothesis 3	Accept	Reject	Reject	Accept	Reject	Accept
Repeated Measures ANOVA	NSS	NSS	NSS	NSS	NSS	NSS
GLM, Change, Medium Income	NSS	Positive*	NSS	NSS	NSS	NSS
GLM, Change, High Income	NSS	Positive	Negative	NSS	Negative	NSS

Note. Income organizational effects, either positive or negative results were significant, on perceived health outcomes for hypothesis 3. NSS indicated no statistical significance. The starred items (*) had the largest effect.

Chapter 4

DISCUSSION

Summary of Integration of Results

This longitudinal study was a correlational design using several layers of organizational effects on employee wellness in Southern California School Districts. The within-participants study considered the relationship of organizational variables on employee health over time and across situations and whether those variables could predict health outcomes. The archival data was collected from 2005 to 2012, and included: (a) participation; (b) objective health measurements, such as body mass index and systolic/diastolic blood pressure; and (b) self-reported perceived health measurements, such as health, stress, energy, confidence, self-esteem, and body image.

By understanding the organizational effects on employees' participation, measureable health outcomes and perceived health outcomes, wellness strategies can be better matched by the organizational characteristics. Strategies that match organizational variables can help to create best practices for organizational health and wellness. These findings may encourage strategies that satisfy all the levels within the ecological health model.

Hypothesis 1: For H1, mid-sized districts will have the most favorable effect on health outcomes, perceived health and participation rates. The effect of size on participation rates was accomplished by looking at generalized linear models, specifically Poisson, which demonstrated a negative effect in participation with medium sized

organizations and a positive effect with large and extra-large sized organizations, with the greatest effect with large organizations. All size categories were statistically significant, and therefore, the null hypothesis was rejected.

When considering size effects on both measured and perceived health outcomes over time, repeated measures ANOVA was conducted, with no statistical significance. Further exploration was conducted using generalized linear modeling with size effect on the overall change between the earliest and latest measureable health outcome measurements with no statistical significance, thereby failing to reject the null hypothesis. For perceived health outcomes, large sized organizations had poorer perceived health outcomes in stress, energy, and confidence but higher self-esteem. The null hypothesis was rejected.

Hypothesis 2: H2, if districts have wellness policies and best practices designed to encourage participation in wellness programs (engagement), the higher the engagement, the more positive effect on employee health outcomes, perceived health and participation rates. This was analyzed similarly to H1, using generalized linear models, specifically Poisson, between engagement and participation rates, null hypothesis was rejected. All levels of engagement were significant, however, high engagement had the greatest effect.

The engagement effect on employee measureable and perceived health outcomes was analyzed using repeated measures ANOVA, with no statistical significance. Engagement effect on health outcome change was analyzed by using generalized linear models, with a statistically significant effect of engagement on diastolic blood pressure, for both low (negative effect) and high engagement (positive effect). The negative effect was the desired outcome, and low engagement producing the desired effect was not

expected. High engagement was a positive effect on stress negative effect on energy and confidence, with no statistical significance for low, medium or very high. This outcome contradicted the findings that a supportive environment would produce healthier outcomes.

Hypothesis 3: For H3, organizational effects may have varied effects on employee health outcomes, perceived health and participation rates depending on the employee residence and work median income zip code census data. This was an interaction model effect of residence and work median income zip code census data, as well as interactions with other organizational variables. Generalized linear models, specifically Poisson, were conducted to consider the effect of income on participation rates, in order to determine if organizational variables were predictive for employee health outcomes based the assumption that staff living and work in lower median income areas had the lowest participation rates. Work and residential median income had a statistically significant effect on participation, as well as the interaction between them.

Using repeated measure ANOVAs, considering whether there were poorer measureable and perceived health outcomes for those working and residing in lower income areas, produced no results. Income effect on measurable health outcome change was analyzed by using generalized linear models, with no statistical significance. All perceived health results were undesired effect, with a positive effect on stress for both medium and high income and a negative effect on energy and confidence for higher incomes.

Additional Findings

Combined variable effects.

Many models that considered a variety of organizational variables, their combined effects and interactions on participation were analyzed using generalized linear modeling. The interactions between size and work median income zip code data effects on participation were statistically significant within each category of size and income levels. This was also true between work and residential median income zip code data effects on participation, which were statistically significant for all interactions between categories.

The interactions between engagement and residential median income zip code data effects on participation were statistically significant between very high engagement and residential median income effects on participation. The interactive effects of size, work and residential income zip code census data on participation data was statistically significant between variables. Using the Akaike information criterion was used to consider the relative quality of statistical models, the model that best explained the results was an interactive model using size, residential census zip code data and work census zip code data. This model was determined each time, even after the participation data set was manipulated with all participants, those with 2 or more wellness activities, 3 or more, 7 or more, and 10 or more. However, there was a moderating effect from coaching with 2 or more, but it was particularly strong with 7 or more.

Coaching effects.

Generalized linear modeling was used to analyze the relationships between participation and coaching and health outcomes. Coaching activities did have a moderately significance negative effect on diastolic pressure, which was the desired

effect. When the participation data set was manipulated to include participants with 2 or more wellness activities, there was a moderating effect from the coaching, which was visibly stronger by 7 or more.

Contributions of findings to literature

How findings resolve current issues.

With obesity rates on the rise, prevention and intervention of excess weight and obesity must be on-going, expand across one's lifetime, include all family members, and have adequate levels of support to increase the likelihood of success (CDC, 2002; Payne, Hahn & Lucas, 2007; Trotto, 1999; USDHHS, 2001). Because people spend a lot of their time at work and often have very important social networks within the workplace, this makes employment an ideal setting to combat weight issues amongst their employees.

The schools in San Diego County had a higher prevalence of female employees, so it made school settings a particularly interesting area to target weight issues. It was more common for women to be less physically active than men, contributing to a higher risk of being overweight (CDC, 2002, 2007; Flegal, Carroll, Kuczmarski, & Johnson, 1998; USDHHS, Public Health Service, CDC, National Center for Chronic Disease Prevention and Health Promotion, & Division of Nutrition and Physical Activity, 1999), and physical activity to further decline with age (CD, 2005, October 7). Combating these trends may assist in lowering obesity trends with women.

What findings suggest about new distinctions and controls.

The uniqueness of this study was the population being explored, employees of school districts in which the majority were female. All employees that qualified had access to health care benefits, usually at no or little cost to the employee, which should

have decreased the likelihood of health disparities between different socioeconomic levels. One study linked sociocultural workplace attributes, incentives, and communication and organizational commitment level with participation in employer sponsored health assessments (McLellan, MacKenzie, Tilton, Dietrich, Comi, & Feng, 2009; Taitel, Haufle, Heck, Loeppke, & Fetterolf, 2008). Organizational variables influenced the effects of employee participation in wellness activities and the employee's health and perceived health outcomes. This study was conducted to help better explain some of the organizational variable influences.

Discussion

Size Effects: Findings in context of hypotheses and literature review

The generalized linear model results demonstrated a decrease in participation with medium organizations and an increase with large and extra-large organizations, with the greatest effect with large organization. Large organizations also had lower perceived health effects except for self-esteem. This study's results corroborated the literature findings that larger organizations were more likely to offer wellness programs but still had lower perceived employee health and a higher risk for being overweight (Alliance for a Healthier Minnesota, 2012). Overall, the group in this study had a higher incidence of obesity rates, depression, and diabetes and other preventable disease than the general populations within San Diego County (Rott, 2011), which also could have explained the overall lower perceived health results. This can be linked with an increased risk of psychological and neurological disorders, such as anxiety, depression, distorted body image, eating disorders, mood disorders, poor body image, and decreased self-esteem due to social stigmatization (Beydoun, Beydoun, & Wang, 2008; NIH & NHLBI, 1998;

USDHHS, 2001). This study's results could be used to incentivize larger organizations to seek more wellness strategies specifically targeting employees' perceived health.

Engagement effects: findings in context of hypotheses and literature review.

Taking into consideration the multiple layers of variables of the environment that may impact health behaviors and overall health in not a new concept, as seen with the ecological model of health (McLeroy, Bibeau, & Steckler, 1988; Sallis & Owen, 2002). Supportive environments encouraged and supported healthy lifestyle at every level and had the greatest impact in producing lasting changes in health affirming behaviors (O'Donnel, 1989, p.5; World Health Organization, 1995), which has been used in groups and communities and seen as the foundation required to tackle weight issue (Harachi, Ayers, Hawkins, Catalano, & Cushing, 1996; Shea & Basch, 1990; USDHHS, 2001).

Engagement scores were created based on best practices and specific actions that demonstrated implementation of the best practices in support of wellness workplace. Engagement effected participation rates, with high engagement districts having a more positive effect for their efforts. This may be attributed to more communication, marketing and overall publicity of the wellness programs to their employees.

Despite the positive effect on participation, these results did not carry through to demonstrate effect on health outcomes. This could be attributed to the low number of participants that participated in the health screenings and reported on their perceived health compared to the overall number of participants in wellness activities. This could help to justify the need to require health outcome reporting as an integral part of program evaluation.

Military studies considered organizational characteristics as predictor variables for wellness and health behaviors (Chaffin, Rothfuss, Johnson, Larsen, & Finstuen, 2004; Wynd, & Ryan-Wenger, 2004). In this study, engagement had no effect on body mass index or systolic blood pressure, however, there was statistical significance effect of low and high engagement on diastolic blood pressure. High engagement had a positive effect on diastolic blood pressure and low engagement had the desired negative effect on diastolic blood pressure. It is possible that with a high engagement district more employees with high blood pressure are being identified than with a low engagement district. Employees may be more willing and more trusting of the process at a worksite that is more actively involved in wellness activities.

Engagement effects on perceived health results were similar to size effects on perceived health outcomes. For large organizations, there was a positive effect on self-esteem and a negative effect on stress, energy, confidence and body image from high engagement. Self-esteem and stress had the desired effects.

Median income data in context of hypotheses and literature review.

This was an interaction model effect of residence and work median income zip code census data on participation. Work median income had a statistically significant positive effect on participation for both the medium and high income zip codes school districts, though high income districts had a much higher positive effect than medium income districts. This mirrors research that linked higher rates of weight issues with lower socioeconomic status, with women from all racial and ethnics group highest at risk (CDC, 2002; USDHHS, 2000, 2001). Women who work in lower income school districts may be less likely to participate in wellness activities offered at work.

Work median income had an increased effect on perceived health, which was an increased effect in the districts that were located in higher median income zip code areas. Environments influence health, lower income neighborhoods tended to have more health disparities than those in higher income areas (Diez Roux, 2001; Jones, & Duncan, 1995; Kaplan, 1996; Macintyre, Maciver, & Sooman, 1993). Higher income participants had positive effect on stress, and a negative impact on energy and confidence, which is the opposite of what we might expect to see based on previous literature. Because the results of perceived health could not be corroborated with actual health measurement, it remains difficult to determine if the perceived health is reflective of actual health. With the increased participation in high income districts, the lower perceived health may be linked to an increased awareness of health needs, of the need to do more for their health. These results were similar to those of large organizations and high engagement, which may be linked. It would be interesting research to explore in future studies.

Residential median income had a statistically significant effect on participation, as well. What makes this more interesting, when the interaction of both work and residential median incomes effect on participation; statistically significant at every level of income. Where people live, work and play influences individual behavioral decisions towards excessive intake and sedentary lifestyles (Booth, Pinkston, & Poston, 2005; Carlos-Poston & Foreyt, 1999; Drewnowski, 2004; Hill & Peters, 1998). Employees living and working in higher income zip codes were more likely to participation in wellness activities, which supports previous research on increased sedentary lifestyle and higher health disparities in low income areas.

Drawing Conclusions

Information from this study can be used to drive wellness efforts toward organizational policy level and less away from the individual level. Currently, the majority of employee wellness program target individual efforts, which is not the standard or best practice for public health models. The most effective public health models use the ecological model of health, which is a more sustainable and effective approach for change.

Organizational characteristics should be considered when developing wellness strategies. In this study, size, where the organization was located and where the employees lived seemed to have the greatest influence on whether the employee participated in wellness strategies. If the organization is smaller, it may be more difficult to generate the participation rates of a larger organization, therefore, it would be important to explore reasons for less participation in smaller school districts to see if strategies can be more district specific requests.

School wellness programs have a great potential for return for the payer/employer (Eaton, Marx, & Bowie, 2007). School employees tend to be long-term employees and therefore, the employer is more likely to see the benefits of wellness programs with the limited employee turnover. Despite the potential for employer gains, there remain substantial gaps in school employee wellness programs, such as a lower prevalence of wellness programs being offered to school employees and wellness policies that target students but omit staff.

Intervention should be shared responsibilities and focus on all levels in order to slow down the health crisis (Levi, Vinter, St. Laurent, & Segal, 2008; Nestle & Jacobson,

2000). Results will not be quick, so it is important to tackle the problem from all angles, with a variety of strategies (Institute of Medicine, 2007). Employee wellness programs are often rolled out in packages of services available that are not necessarily developed specifically to the target audience, tailored around organizational characteristics. For example in low income areas, there is an increased likelihood that those districts' employees are more ethnically diverse. Creating strategies that culturally match the employees, which tap into resources directly within the community. This may gain more buy-in from the participants. Tailored efforts were used successfully in the promotora model targeting Latino public health issues.

In addition, it is important to spend more efforts targeting improved health behaviors and health status. Often, individuals and companies said outcome goals, such as weight, cholesterol levels and blood pressure. However, there is often a cluster of common behaviors that are linked with those outcomes. By focusing on behavior changes instead of outcomes, the results tend to be more sustainable, and eventually the outcomes will fall in line with positive results based on those changes.

Applied implications.

The expected contribution of the study is to demonstrate the influence of organizational factors on employee health, through health outcomes and participation rates in wellness activities. Organizations may use information from this study to increase awareness of what effect the organization could potentially have on its employee. Larger organizations are more likely to have the participants but less likely to have possible health outcomes. Organizations can development programs that specifically target perceived health. One way to do that is to link behaviors with

outcomes. If an employee exercises more, they will feel better. If they feel better, they are more likely to deal with stress better. If they have less stress, they may feel happier, and so on. The wellness strategies can be linked to organizational characteristics, as well as the more traditional linkages, such as health care utilization, worker compensation claims, etc. These strategies can be part of the organization's wellness strategic planning and organizational goals. The goals should be integrated into the organizational culture: mission and goals, staff cohesion, communication, and openness to change.

Being able to determine organizational influence on wellness program may assist in determining the best target strategies, which will help to allocate limited resources that assist employers in achieving the best return on their investment. In addition, this information may help to shift focus away from individual change to more policy and environmental change. This will provide a greater level of support to individuals in making health-affirming changes.

Limitations

Design and internal validity.

Despite this high volume of participants in the participation data set, consistent participation, pre-/post-data, and long-term health screening data was intermittent due to employees dropping in and out of the wellness programs throughout the years. Survey tools and health screening data was inconsistent. If was difficult to obtain pre- and post-data.

Biometric data collected may have had inter-rater reliability issues between health coaches conducting the measurements. In addition, survey and self-reported data results were over the last 30 days from when they took the survey. This overall scoring for the

last 30 days could include inflated or deflated results based on whether they had a health coach (not was disappoint the health coach) or recency effect (what happened to them most recently but not necessarily their overall rating for the full 30 days. Pre/post data would have most likely produced more accurate results that the pre-data that was used.

External validity and generalizability.

This data set only represented school district employees within Southern California and was mostly made up of women. Though this made the study very interesting, the results may not be the same in other industries or regions of the county. In addition, the data analysis results represented mostly women, so it we could not apply these results to groups that were made up of mostly men or equally made up of women and men.

In addition, the survey data was largely collected from pre-data over time, not from pre- and post-data. Even though there was a pre-/post- survey for each wellness challenge, most participants only completed the pre-data. The survey data was primarily made up of pre-survey data, and there may have been pre-test effects in the survey data that was collected. Health data also was not before/after change data, because there were different start and stop points within the 4-year period.

Analysis and statistical power.

The participation data set was very large, which helped to minimize errors. Preliminary data analysis was used to better select statistical tests that best fit the data. Generalized linear modeling, specifically Poisson, was used. A repeated measure ANOVA was used to consider data over time. The Akaike information criterion was

used to consider the relative quality of statistical models, to determine the model that best explained the results.

Measurement.

The limitations of the this study are the inconsistent tools used to collect data, the voluntary drop-in and drop-out in employee wellness participation, the inability to compare employee health outcomes and self-reported data against employee attendance records and personnel files to measure productivity, and population being only employees in the public systems, which may limit the application of this study's finding to the general population. However, this last limitation is also a plus, since this pool of employees tends to be long-term employees and lacks the transient nature of employment that the general population has, which makes this an ideal group to study in real-life scenarios.

Future Directions

It is important for future studies to continue to explore organizational influence on employee participation in wellness activities and their health outcomes. This study provided information on how organizational variables may predict employee behaviors to participate in wellness and health outcomes. However, there were many limitations in this study.

Future studies results can help to encourage more strategies at all the levels within the ecological health model. Strategies better matched with organizational variables can help to create best practices for organizations based on their individual characteristics. This will help to influence health and wellness results in employees.

Further exploration on organizational effects on measureable and perceived health outcomes is also recommended. Considering income effects health outcomes has been explored extensively, but not from perspective of the work-site. It would be interesting research to explore in future studies. Linking income effects to culturally appropriate strategies that are designed based on the diversity of the group being served.

It is important to link participation with actual health measurements that are part of their medical records and utilization rates. This might improve the likelihood of determining which wellness strategies are working to provide measureable improvements in health. In addition, this could be expanded to match participation with moral, job satisfaction, attendance, presenteeism, and workers compensation claims. More consistent data to compare with participation may help to vet out best programs for each specific group.

Conclusion

The purpose of this study was to consider organizational variable effects on employee participation in wellness activities and health outcomes. The overall findings demonstrated the interaction model between size, work income, and residential income, as the model that best explained the affects in this study, using the Akaike Information Criterion. The organizational size effects were predicted, based on the existing literature, regarding size effects, on wellness activities, and health outcomes. The hypothesis was tested using archival data on wellness participation, health outcomes, as well as, employee data to determine the size category of each school district. It was hypothesized that medium sized organizations would have a higher level of participation and better health outcomes than large-sized organizations. The results of this study indicated that

large, extra-large, and then medium sized organizations affected participation, respectively in order from greatest to least effect. Size did not affect measured health outcomes, and only large sized organizations affected perceived stress, energy, self-esteem and confidence. It is of interest to note that the results regarding stress, energy and confidence were rated poorer with large organizations, while self-esteem was affected positively. The self-esteem results contradict the literature and the overall health effects results did not support the hypothesis of this study. In this study, it appears that for stress, energy and confidence, the results mirror previous research with large organizations. Perhaps, larger organizations seek more wellness strategies to combat the overall lower perceived health of an individual, or individuals who have lower perceived health seek out wellness activities and happen to work in larger organizations. A definitive answer could not be determined.

There is extensive research that where people live and work impacts their health. In this study, we were unable to determine socioeconomic status of participants, so median income census data was used by zip code of where they worked and lived. It was assumed that employees living and working in lower income areas would have lower participation rates and worse measurable and perceived health outcomes than employees in higher income zip codes. Indeed, residential income, work income, and a combined/interactive effect between both did affect participation rates negatively, but had no measureable effects on health. Again, perceived health was worse for those in the higher income areas, which was not the expected result. Health disparities only seemed evident for participation rates, with employees working and living in lower income areas which are less likely to participate. It is unclear whether it was an organizational affect

or if the results demonstrated more of a difficulty in overcoming where people were raised and how that impacts their participation in wellness, especially if they work in areas that are within close proximately to where they grew up. This latter point was not explored in this study. Regardless, greater efforts need to be implemented in lower income districts to off-set the trends of health disparities, as well as further studies to explore the reasons for these disparities and how they carry-over into the workforce. Further exploration in organizational variables and perhaps employee characteristics might help to explain the disparities, such as workplace culture, workplace communication, employee stages of readiness, educational levels, actual household income, cultural competency of the wellness strategies, and how these might impact participation in wellness activities. A better understanding of these variables may help with improved program development, implementation and evaluation for specific target populations.

This study also considered engagement of the organization to support employee wellness efforts. Districts with better developed wellness policies demonstrated a commitment to the overall health of their employees. This encourages and supports the employee in wellness efforts, which should have been demonstrated with higher participation rates that impacted measureable and perceived health. Even though, engagement was not part of the AIC model selection, engagement had interested affects.

The results for low and very high engagement had a negative effect on participation. It makes sense that low engagement would have a negative effect, but it does not make any sense for high engagement, unless at that level it no longer feels like support but instead is interpreted as intrusive or feels too much as an organizational

strategy that has lost sight of the importance of grass root efforts. High engagement seemed to be the ideal for both participation and had the desired effect on diastolic blood pressure. Perhaps at this level of organizational support, employees trust the wellness strategies and the organizational intent to participate. More employees are identified with risk factors, and there are enough people participating to generate friendly wellness competition among peers. Supportive work environments that encourage a healthy lifestyle, corroborates with the literature, that states, that supportive environments had the greatest and most lasting health changes.

For perceived health, the results were not the effects expected. It is possible that people have less perceived health because of the increased awareness in health or the fact that organizational engagement keeps wellness goals at the forefront, which is interpreted by employees that they are not as healthy as they should be.

Though this study did consider health outcomes overtime, the data was sparse, and consequently did not adequately address the long-term impact of organizational variables potential effects on wellness programs. This study had statistically significant results demonstrating organizational variable effects on participation in wellness activities, the study came up short demonstrating a meaningful effect on measured and perceived health outcomes. Many questions remain unanswered and the results were difficult to interpret. A much longer study and the ability to combine participation data with access to health care data, absenteeism, and worker's compensation claims may have proved to be a more fruitful endeavor.

School districts remain an interesting group to study, with many variables to consider. School district employees have an extremely important job, working with

youth who will become our next generation of either healthy or unhealthy adults. Healthier role models as a natural part of the learning experience could potentially impact youth on so many different levels, that more research should focus on this population.

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Appendix A

IRB Approval Notice

ALLIANT
INTERNATIONAL UNIVERSITY

Sent Via Email

San Diego IRB Committee
Approval Notice

Date: 12/19/12 Approval Number: #2111

Principal Investigator: Wendy Hileman
Faculty Supervisor: Dr. John Kantor

Project Title: *Organizational Influence on Health Outcome of School Employees*

The San Diego IRB Committee has reviewed the proposed use of human participants on the project identified above and has determined that the rights and welfare of human participants are adequately protected. The informed consent of participants will be obtained through a written or online consent form to be signed, either electronically or physically, by the subject (*unless otherwise noted below*).

____ Written Consent Waived ____Secondary Analysis of Pre-collected Data

Consent to be obtained by: ___ Introductory Letter ___Oral Statement

If modifications are made in the approved project, it is the investigator's responsibility to notify the IRB Committee.

IRB Approval Expires: 12/18/13. If this research study continues beyond the approval period, you must request re-approval of this study prior to the expiration date.

Sincerely,

Hoan Nguyen
San Diego Campus IRB Coordinator

Appendix B

Objectives within Best Practices

Best practices	District 1	District 2	District 3	District 4	District 5	District 6	District 7	District 8	District 9
Objectives to complete best practices									
Administrative support									
Develop a plan that helps the district achieve its mission				1					
Reviews health care claims data to justify need	1		1	1				1	1
Identify and achieve leadership support	1		1	1				1	
Identified resources									
What resources are needed	1								1
What resources and strengths are already available	1			1					
Identify a leader									
Determine what skills	1		1	1				1	
What is necessary in order to be a wellness advocate for wellness	1		1	1				1	
Organize a committee									
Decide on who should be represented on the wellness committee	1	1	1	1					
Define what active engagement means and when the committee will meet	1		1	1					
Gather and analyze data									
Identify what baseline data is needed for monitoring,									

evaluating and adapting the program, and how often should the data be evaluated									
Get staff input through a staff survey	1			1					
Set a schedule for evaluation									
Develop a plan									
Yearly calendar of health strategies	1			1					
Implement the plan									
Health fair or kick-off event	1		1	1		1	1	1	1
Health screenings with insurance plan open enrollments	1	1		1	1		1	1	1
Health screenings outside of open enrollments	1		1	1		1	1		1
Health risk assessment campaign	1								
District specific challenges	1		1	1					
Wellness workshops and/or exercise classes		1		1		1	1		
Marketing and communications plan									
Evaluate and adapt the plan									
Identify how well objectives were met, what the outcomes of the programs have been and identify ways to improve the program. Determine who will evaluate and what is being measured									
Sustain the program									

School board support									
Administrative support									
Sustainability plan									
Representation and collaboration									
Level of engagement	15	3	9	15	5	3	4	6	5

Note. Appendix B indicates the organizational level of participation in a variety of objectives intended to demonstrate that the district has implemented wellness policies and best practices surrounding wellness programs, such as administrative support, identified resources, identify a leader, organize a committee, gather and analyze data, develop a plan, implement the plan, evaluate and adapt the plan and sustain the program.