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Health and behavioral findings with a Worksite Wellness Program

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Health and behavioral findings with a Worksite Wellness Program

by

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A thesis submitted to the graduate faculty in
partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Major: Nutritional Sciences

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NOMENCLATURE

WWP	Worksite Wellness Program
HRA	Health Risk Appraisal
ROI	Return on Investment
BMI	Body Mass Index
BIA	Bioelectrical Independence Analysis
W-H Ratio	Waist to Hip Ratio
PA	Physical Activity
FV	Fruit and vegetable
CVD	Cardiovascular Disease
CDC	Centers for Disease Control and Prevention

CHAPTER 1

INTRODUCTION

Background

The United States has a continually worsening problem with obesity and chronic disease. Employees spend a good portion of their time at worksites, which yields the opportunity to provide health education programming. Further, worksites are not typically conducive to positive health behaviors. Employer interest in offering worksite wellness programming has been on the rise and fueled by the Affordable Care Act legislation, which motivates employers to offer such programs. Current research is promising; however, more worksite wellness programming research needs to be conducted to document best practices and return on investment.

Project goal: Demonstrate employees taking part in a Health Promotion Program offered through a partnership with the Center for Industrial Research and Service and Iowa State University Extension and Outreach will have more improved outcomes than their colleagues that do not take part in the program.

Project objectives

Objective 1: Determine if employees receiving the intervention have better work attendance than those who do not.

Objective 2: Establish if employees receiving the intervention have lower cost/fewer health care claims than those in the control group.

Objective 3: Assess if intervention employees exhibit greater improvement in biochemical parameters post-intervention than those in the control group.

Objective 4: Assess if employees receiving the intervention have greater improvement in anthropometric parameters post-intervention than the control group.

Objective 5: Determine if employees receiving the intervention have greater improvement on self-reported health and financial behavior than those in the control group.

Thesis objectives: This thesis will not address all of the above objectives but instead will focus on the following six objectives.

Thesis Objective 1: Examine if individuals are categorized similarly by different body fat measures.

Thesis Objective 2: Examine which body fat measure categorization best correspond with health status indicators.

Thesis Objective 3: Examine the relationship of body fat measure categorization by gender.

Thesis Objective 4: Examine if the intervention participants have more improved self-efficacy than the control participants.

Thesis Objective 5: Examine self-efficacy by demographic factors (age, gender, education).

Thesis Objective 6: Examine whether self-efficacy correlates with a change in health behaviors.

Thesis organization

The following thesis begins with a review of the literature related to poor employee health, overweight/obesity, employer cost of poor health, worksite wellness programming,

current and best practice programming, benefits from programming, Healthy People 2020, and the Affordable Care Act. Next, the methods are outlined and two manuscripts on this project follow. Overall conclusions are made, potential limitations, and future directions of research are suggested. Concluding this thesis are the acknowledgements, appendices, and references.

CHAPTER 2

REVIEW OF LITERATURE

Factors Affecting Employee Health

Employees in the United States (U.S.) spend a good portion of their time at work. The normal workplace environment and culture aren't typically conducive to desirable health choices and behaviors with sedentary lifestyles while at work, fast food lunches, and energy dense, nutrient poor (EDNP) options in vending machines. Other factors influencing employee health include alcohol abuse, smoking, and stress. Addressing both the work environment and employee health behaviors are vital to health improvements.

Many modern businesses promote sedentary behavior due to the nature of work duties. Unfortunately, sedentary behavior at work often carries over into leisure time for employees. One-third of American adults report not meeting the 2008 Physical Activity (PA) Guidelines for aerobic PA ¹ while the Behavioral Risk Factor Surveillance System and National Health Interview Survey report less than 50% of adults meet these recommendations ². Current guidelines recommend adults engage in at least 150 minutes a week of moderate intensity aerobic activity or 75 minutes a week of vigorous intensity aerobic PA or some combination of the two. It has been reported that from 1988 to 2006, PA decreased more for men than women (-10% and -6%, respectively), which may be influenced by the nature of their work ³. Those age 75 and over, women, Hispanics, non-Hispanic blacks, and those with less education are groups least likely to meet the 2008 PA Guidelines (1,2). Low levels of PA and poor diet contribute to

overweight and obesity. A sedentary lifestyle is associated with four of the 10 leading causes of death (cardiovascular disease [CVD], cancer, stroke, and diabetes) ⁵.

Worksite vending machines often provide EDNP options making it difficult to choose healthy options leading to an overweight, undernourished population. Linnan and colleagues (2008) report 79.6% of worksites have food and beverage vending machines onsite. Only 37.4% of worksites report labeling healthy food choices and just 5.6% promote healthy food options ⁶. Poor food offerings likely contribute to worsening dietary intakes and disease from employees eating one to two meals at work each day ⁷. Americans with limited incomes are at a higher risk for these diet related health risks than are higher income Americans ⁸.

Poor Health Behaviors

Poor employee health behaviors that impact the bottom line for businesses include smoking, alcohol abuse, and poor mental health found with depression and stress. These behaviors impact the physical, financial, mental and emotional health of employees, ultimately at a cost to the organization. Peak organizational productivity and economic performance stem from healthy and productive employees ⁹.

Smoking is the leading cause of preventable death in the U.S. contributing to increased absenteeism and decreased productivity ^{10,11}. This is of particular concern as one in five American adults currently smoke ¹⁰. Between 2000 and 2004, healthcare costs related to tobacco use were estimated at \$96 billion annually in direct medical costs and \$96.8 billion annually in lost productivity, totaling \$192.8 billion per year ¹².

Excessive alcohol consumption is the third leading preventable cause of death in the U.S. and is a contributing factor to over 54 different diseases and injuries ¹⁰. The Centers for Disease Control and Prevention (CDC) defines excessive alcohol consumption as binge drinking, more than two drinks per day or more than 14 drinks per week, any consumption of alcohol by someone under the legal drinking age of 21, or any consumption by a woman who is pregnant ¹³. According to McFarlin and Fals-Stewart (2002), workers consuming alcohol the night before work were twice as likely to be absent from work the following day ¹⁴.

The mental health of employees also impacts the bottom line for American businesses ¹⁵. Harte et al. (2011) suggests that economic and environmental instability, workloads, work related issues, and juggling life's many commitments contributes to 68% of workers feeling high stress with fatigue and/or feeling loss of control. Depression and stress in the workplace have been directly related to less productive employees ¹⁵. A poll conducted by the National Institute for Occupational Safety and Health (NIOSH) reported 40% of employees perceive work as either "very or extremely stressful" and 26% feel "burned out" by their job ^{15,16}. Employees experiencing high stress have healthcare claims 46% higher than their less-stressed counterparts, costing an estimated \$300 billion annually ¹⁷. Stress is associated with poor diet, poor nutrition knowledge, low levels of PA, and high cortisol levels, all risk factors contributing to obesity and overweight ^{18,19}.

The CDC has identified lack of PA, poor diet, tobacco use, and excessive alcohol consumption as modifiable health behaviors responsible for much of the illness, suffering, and early mortality linked with chronic disease ¹⁰. These four modifiable behaviors contribute to

multiple chronic diseases, accounting for 70% of all deaths in the U.S.⁹. The incidence of chronic disease is more common with increasing age, which is of particular concern because the average age of the American labor force is increasing more rapidly than in other countries²⁰. With age, it is harder to re-establish health and reverse the damage from earlier years²¹. These poor health behaviors and aforementioned factors contribute to the increasing rates of overweight and obesity. Research also suggests the health of rural individuals is less optimal than their urban counterparts²².

The Obesity Epidemic

Obesity has reached epidemic proportions, with 35.7% of the adult population being obese. The combination of overweight and obesity afflicts 68% of the adult population²³. The American Heart Association reports overweight and obesity increases risk for the leading cause of death in the U.S., CVD as well as other chronic conditions including diabetes, hypertension, high cholesterol, and certain cancers^{24,25}. Cardiovascular disease, cancer, and stroke lead to more than half of all American deaths each year¹⁰.

Patterson et al. (2013) suggests 14% and 20% of cancer deaths in men and women can be attributed to overweight or obesity²⁶. A two-fold increase in breast cancer deaths with a body mass index (BMI) of 40 or above has been reported²⁵. Some diseases, including colon cancer can be prevented with a healthy lifestyle (i.e. healthy diet, proper weight, adequate PA, abstaining from smoking and heavy alcohol use)²⁷. Kaiser Permanente reports 70% of all stroke cases and 82% of all CVD cases are preventable.

With excess weight also comes inflammation and insulin resistance, key characteristics of diabetes ^{28,29}. Pre-diabetes afflicts 35% of the population ³⁰ and 70% of those with pre-diabetes progress to type 2 diabetes, which currently affects more than 8% of Americans ^{31,32}. It has been suggested that 91% of diabetes cases are preventable ³³. Weight loss and PA are two key health behaviors to reduce the incidence of type 2 diabetes and improve insulin sensitivity ³².

Methods of assessing obesity/weight status

Various methods exist to analyze body adiposity including: BMI, Bioelectrical Impedance Analysis (BIA), waist circumference, waist to hip ratio (W-H Ratio), skin fold measurements, underwater weighing, air displacement, and dual-energy X-ray absorptiometry ³⁴. Three commonly used measures are BMI, BIA, and W-H Ratio all of which have various benefits and drawbacks. BIA is considered to be more accurate, portable, and rapid; however, it is dependent on fluid/hydration status and is more costly. The RJL Systems-Quantum II model ³⁵ assesses BIA by introducing a small amount of electrical current into the body and utilizes regression equations to predict percent body fat using resistance and reactance output along with the individual's height, weight, age, and gender. This method categorizes individuals as underweight, healthy/normal, overweight, or obese.

A more commonly utilized body fat measure is BMI. It is a cost effective method, is convenient, and requires minimal training for administration. Body mass index is not considered to be as accurate as BIA and has a low correlation with body stature. Height and

weight measurements are used to calculate BMI (kg/m²) with the results categorized as underweight, normal weight, overweight, or obese ³⁶.

Another cost effective and convenient alternative is W-H ratio requiring minimal training to administer; however, it is considered to be less accurate ³⁴. Waist to hip ratio is an indicator of weight distribution and is calculated by dividing the waist circumference (smallest circumference below the ribs) by hip circumference (widest circumference of the buttocks) to obtain a ratio ^{37,38}. A lower W-H ratio indicates lower risk for developing chronic disease (e.g. CVD) whereas a higher ratio indicates a higher risk. Based on participant gender and age, ratios are compared against standards and categorized as low, moderate, high, or very high risk ³⁷.

Employer Cost of Poor Health

Poor health and obesity have considerable effects on both the employee as well as the employer due to increased health care costs and reduced productivity (29). Linnan and colleagues (2008) report that in recent years, 39% of worksites experienced increases in annual health care costs ranging from 10-15% ⁶. The overall inflation rate in 2011 was two percent while health insurance premiums for individuals and families rose eight and nine percent, respectively ⁴⁰. This sharp increase in health care costs has been attributed to higher cost of goods and services for care, growth in Medicare and Medicaid admissions, increased cost of physician visits, more costly medical technology, and increased laboratory testing ⁴⁰. The escalating rate of health care claims is further fueled by the increased incidence of disease and injury ⁴¹. Risk factors associated with increased costs include depression, high stress, hyperglycemia, overweight, tobacco use, hypertension, and lack of exercise ⁴².

Health care costs impact business and industry since the bulk of Americans (60%) carry their health insurance through their employer's private health insurance plan ⁴³. The majority of employers cover 20-50% of the cost of employee insurance policies ⁴⁴. Over half (60%) of post-tax company profits are used to pay for health benefits ⁴⁵ while only 10% of the labor force expends nearly 80% of these funds ⁴⁵. Modifiable health risks (dietary intake, smoking status, PA level and alcohol intake) account for approximately 20-30% of employer health care costs ⁴⁶.

Annual medical costs due to obesity and overweight have been estimated between \$51.5 billion and \$78.5 billion with that number increasing to about \$147 billion in 2008 ^{47,48}. Employers spend \$13 billion annually on the total cost of obesity or \$13,000 per employee in total direct and indirect health care costs ⁴⁸. Overweight and obesity constitute approximately 21% of health care costs among adults ⁴⁹ and increases the risk for these chronic diseases which account for three-quarters of all healthcare costs ⁵⁰. Health care costs are 37.4% higher for obese persons in comparison to their normal weight counterparts ⁴⁷.

It is reported that hypertension is the most costly chronic disease at \$392 per employee annually ⁵¹ while another reports depression has the highest economic impact at \$348 annually ⁵². Depression is the number one cause of disability worldwide and is associated with poor nutrition ⁵³; however, it is unclear if diet is a cause or a side-effect from the disease ⁵⁴. In addition to depression, chronic disease, overweight, obesity, anxiety/depression, and tobacco use are other risk factors for disability ⁵⁵.

Along with healthcare costs, there is a growing body of literature demonstrating a strong association between poor employee health and lost productivity⁵⁶. Employee absenteeism and presenteeism both impact overall productivity. It has been suggested lost productivity costs two to three times more than actual health care costs^{51,57,58}. Productivity losses related to both personal and family illnesses cost U.S. employers \$1,685 per employee annually or about \$225.8 billion per year nationally⁵⁹. Shi and colleagues (2013) identified high blood pressure, recurring pain, poor diet, low PA, and poor emotional well-being as health related risk factors linked to reduced productivity⁶⁰. Poor supervisor relations, not using individual job strengths and poor organizational support for health are other risk factors for reduced productivity.

Absenteeism is defined as time away from work due to illness or disability. Two components contribute to the total cost of absenteeism: salary with benefits and reduced work hours. First, daily salary and benefit costs (e.g. sick leave, paid holidays, vacation, disability, and salary continuation) remain even if the employee is absent⁵⁵. Second, when an employee is absent, there is a decrease in total working hours leading to a lower output of products and services. The U.S. Department of Labor estimates 4-10% of employees are not at work for various reasons on a given day. These unscheduled absences incur expensive worker replacement costs and are disruptive to the ability to deliver services and products⁵⁵. Obesity is a risk factor for higher absenteeism⁶¹ and annual obesity-related absenteeism in the U.S. has been estimated to cost anywhere from \$3.38 to \$6.38 billion⁶². Obese males and females miss two and three more work days annually than their normal-weight counterparts, respectively⁶³.

Health related absences account for 29% to 47% of all health care costs in business and industry ⁶⁴. Poor health (e.g. overweight, obese, hypercholesterolemia, stress, etc.) can increase absenteeism by 10 days per year ^{65,66}. A study by Collins and colleagues (2005) suggest the cost of medical care, absenteeism, and work impairment associated with common chronic diseases cost \$2,278, \$661, and \$6,721 per employee, respectively. Chronic disease plays a major role in absenteeism rates and work impairment ⁵².

Absenteeism and presenteeism are seen in a continuum, and employees often transition between the two over time ⁶⁷. Presenteeism is a term used to describe employees present at work with lingering health problems that interfere with job performance and productivity ⁶⁷. Presenteeism leads to significant economic costs and constitutes 71% of lost productivity, depending on the condition ^{51,57,59,68}.

Risk factors for presenteeism include health or medical conditions (chronic pain, hypertension, respiratory problems, mental health disorders) and unhealthy behaviors including overweight, smoking, and poor nutrition. Obesity has a particularly negative relationship with productivity relative to presenteeism ^{67,69}. Obese workers require more time to complete tasks and are less able to perform physically demanding jobs ⁶⁹.

Worksite Wellness Programming

The implementation of worksite wellness programs (WWP's) can serve as an effective way for employers to reduce obesity and associated chronic diseases to manage productivity losses and health care costs ⁷⁰. A WWP (as defined by Public Health Service Act) is a program

offered by an employer designed to promote health or prevent disease. Onsite WWP's are a convenient means to target and modify poor employee health behaviors as 65% of adults can be accessed at worksites⁸. Worksite wellness programs can assist employees and their families to overcome barriers to change/modify behaviors in support of healthful living by improving motivation, health related knowledge, and accessibility to programming and resources⁷¹.

According to the 2004 National Worksite Health Promotion Survey, larger employers (500 plus) are more apt to offer programming, policies, screening, and other services than smaller employers⁶. Approximately half of U.S. employers with 50 or more employees report offering wellness promotion programs⁷². These programs are offered by nearly 500 vendors creating a \$6 billion industry⁷².

Types of worksite wellness programs

There is great variation in wellness programming by content, theoretical methodology, timeline, program set-up, program delivery method, assessment methods, and accompanying activities (e.g., gym memberships, incentives, challenges, etc). Worksite wellness program interventions have been described much like those used in community nutrition programming⁷³. Level I builds awareness and consists of interventions such as newsletters, health fairs, health screenings, posters, flyers and classes. Level II influences lifestyle choices, health behaviors, and change which can include PA programming, onsite fitness centers, health related classes, guidance on proper performance of physically demanding work, or individual and small group counseling. Level III interventions create a supportive environment promoting healthy lifestyle and behavior, which can encompass providing equipment and space for an

onsite fitness center, health coaching, support groups, modifying worksite cafeteria and vending options, or policies that reinforce positive health behaviors (e.g. no-smoking facilities, benefit plan options, etc.).

Level I: Awareness interventions

Health risk appraisal's (HRA) vary but the basic elements include: the assessment of personal health habits and risk factors; quantitative estimation or qualitative assessment of future risk of death and other adverse outcomes; and feedback in the form of education messages and/or counseling to alert risk for disease or death ⁷⁴⁻⁷⁶. Biometric screenings are an optional component of HRAs and may be used to collect current biochemical and anthropometric measures. These screenings include blood pressure, pulse, cholesterol, blood glucose, high density lipoprotein (HDL), low density lipoprotein (LDL), triglycerides, body composition, physical fitness assessment, etc... ⁷⁷. The combination of behavioral, physiologic and other outcomes provide a more holistic evaluation of employee health and offer a method for evaluating program effect.

Health risk appraisals are quickly and easily administered, convey a lot of information, can be used in large populations, provide group estimates for WWP tailoring, engage employees and employers, and allow for follow-up ^{21,43,77}. Nearly 20% of companies utilize HRA's to increase awareness among employees ⁶. Of the companies offering WWP's, 46% of employees participate in clinical screenings sponsored by the company (53). It has been suggested that making HRA's an annual event will increase program success ⁷⁸. Previous reviews suggest the use of HRAs alone has value for increasing awareness of potential health

risks. The most current review of the literature conducted by the CDC Community Guide Task Force reports HRAs alone can increase awareness and produce modest improvements in many health behaviors, important physiologic outcomes, overall health risk, healthcare utilization and absenteeism ⁷⁷. This effect was more prominent when follow-up occurred with educational or behavior modification programs. However, these reviews found it difficult to ascertain the impact of HRA's on health behaviors and associated risk factors ^{75,79}.

Level II: Education interventions

“Health education is any combination of learning experiences intended to bring about behavior changes in individuals, groups, or larger populations to facilitate voluntary action conducive to health. Health education sessions may provide information about one or more health factors,” ⁷⁷. Education interventions vary greatly on the topics covered: nutrition, diet related to health, stress management, financial security, goal setting, PA, cooking lessons, etc... Health education and behavior modification programs typically include both an exercise and education component encompassing topics such as nutrition, PA, and stress management. *Small Steps to Health and Wealth* is a program designed by Rutgers University to encourage employees to follow behavior change strategies that lead to improved health and personal finance security ⁸⁰. The program includes an online challenge based on the performance of five health and nutrition practices and five financial management practices. Grounding education interventions in behavior change models leads to a more effective program with improved employee health ⁸¹. Two popular models include the trans-theoretical model and the health belief model ^{82,83}.

Level III: Environment interventions

Environmental interventions can be in the form of change in the physical environment or workplace culture. Companies have the opportunity to provide a supportive environment for employees including manipulating the physical layout and culture, as well as exposing employees to stimuli that improve health⁹. Modifications to the physical environment are intended to improve employee access to health promoting choices and behaviors. This may include an on-site fitness center, healthy foods in the cafeteria or vending machines, walking trails and programs, workshops or classes offered at the worksite. Other examples include free yoga, paid time to volunteer, healthy meals, meditation rooms, adjustable-height desks, cooking lesson, zumba classes, nutrition counseling, and blood pressure screenings¹⁷.

The environment and worksite culture can also be impacted through policy change. Policies affect all employees, not only those who elect to participate in WWP, as they are company-wide guidelines such as smoking bans or nutrition standards for worksite cafeterias and vending. Some businesses may even have policy to prevent burnout by flagging employees that log too many hours¹⁷.

Numerous studies have reported positive changes in dietary choices and purchases with environmental interventions^{8,84-87}. These interventions include worksite place-of-purchase strategies, making healthy options available and convenient, removing deterrents/competing foods, fruit and vegetable (FV) promotions, and cooking demonstrations. The introduction of healthy meals and canteen/vending options at the workplace has increased nutrition awareness, personal health empowerment, support for creating a health-promoting work

environment, and perceived social support from colleagues to reduce fat intake^{88,89}. Improved access to FV, as well as cooking skills and perception of family/friends eating healthfully, were positively correlated with FV purchasing, preparation, and consumption⁹⁰. In fact, significant weight loss has been documented among participants taking part in group discussions on weight loss with no further guidance⁹¹. This suggests having supportive peers play a significant role in weight loss.

Environmental interventions utilize the socio-ecological theory as it explains human behavior as an interaction of personal, social, physical and policy environment factors. This theory and key constructs are utilized in many WWP's to empower employee behavior change. There has been a recent emphasis on environment as a key element of health behaviors. The CDC, in particular is focusing on the personal-environmental interaction for many of its health promotion efforts.

Characteristics of a successful WWP

Researchers suggest various characteristics crucial to the success of WWP's. Intervention strategies rely on management commitment and supervisor support^{9,21,67,92} and a supportive workplace culture^{67,92}. Some found individually tailored programming^{20,67}, employee inclusion in the planning and implementation of programming⁹²⁻⁹⁴, and grounding interventions in behavior change models^{20,95} to be most effective. Other effective characteristics include annual, comprehensive, evidence-based HRA's correlated with cost benefits^{9,20,67} incentives that induce high levels of participation in programming^{9,20}, and environmental interventions (i.e. onsite fitness center, health promoting food options, no-

smoking policies)^{93,94,96-100}. Latest research can guide companies towards a more successful program and avoid costly trial and error⁷⁸.

Other reported components of successful WWP's with less agreement between researchers include physical exercise during work hours⁹⁶, increasing the frequency and duration of rest breaks for workers performing repetitive tasks⁹⁹, making health information available online¹⁰¹, an effective communication and promotion campaign⁹, and effective, evidence-based follow-up programming that improves participant health⁹. Thygeson (2010) suggests participation rates of at least 90% can be achieved in WWPs if these elements are included⁹. This review determined 70% of successful interventions included a HRA^{93-95,97,102,103} and interventions tailored to participant needs^{93-97,102,103}.

While comprehensive WWP's generate greater benefits, only 6.9% of companies actually offer these types of programs⁶. Worksites with an employee whose primary responsibility is health promotion were 30 times more likely to offer a comprehensive WWP than worksites without this employee⁶. Worksites in agricultural, mining, and financial industries were less likely to offer a comprehensive program⁶. Despite the number of studies suggesting evidence-based, strategized programs lead to more pronounced behavior change, only 49.5% of sites developed their programs based on data and just 30.2% of all programs had a three to five year strategic plan⁶. Continued WWP research is vital to offering successful programs that improve health and reduce costs.

Increasing buy-In

Buy-in and acceptance by employees and management is crucial for program success. Hunnicutt (2008) claims chief-executive-officer (CEO) buy-in to be the “single most important element in building and sustaining a wellness program”. Strategies to increase CEO buy-in include: 1) present a business case for wellness programming, 2) make CEO’s aware of their own health status, 3) document employee comments about their desire for better health, 4) connect the CEO with other CEO’s who support WWP’s, and 5) provide strategies or suggestions from other companies ²¹. Harte and colleagues (2011) cite the importance of presenting data in a visually appealing and eye-catching way “...data by itself isn’t extremely powerful. Rather, what yields results is the manner in which the key metrics are presented. Once convinced, CEO’s can lead by example through what they say and what they do.”

Once management is convinced, it is the leader’s responsibility to increase employee buy-in. Employee buy-in can be garnered by explaining the rationale for the change, increasing excitement by emphasizing the potential benefits, repeatedly sharing the vision, making progress visual, aligning company goals with the vision, and celebrating progress along the way ¹⁰⁴.

WWP incentives

Operant learning and behavioral economic theories suggest the use of incentives to be useful towards eliciting behavior change ⁹¹. The operant learning theory suggests behaviors that produce rewards are repeated; whereas, behaviors that result in punishment are avoided.

Behavioral economic theory states introducing monetary rewards for a certain behavior will

heighten this behavior and the resulting consequences. Ultimately, people behave in ways to maximize their economic gain.

WWP incentives to increase employee participation are important for program success. Twenty-six percent of all companies that offer WWP's report offering employees incentives with the goal of increasing participation ⁶. Another study suggests WWP's offering rewards for participation increased from 54% in 2011 to 62% in 2013 ¹⁰⁵. The prevalence of outcome-based incentives increased from 11% in 2011 to 48% in 2013 ⁵⁰.

Research suggests incentive value is directly related to completion of HRA's ¹⁰⁶. The average incentive is \$556.88 per employee annually in the form of gifts (most common), discounts and cash ⁴³. Bonuses, reimbursements, additional paid vacation, flex time, and merchandise are common incentives ^{43,105}.

Harris and colleagues (1971) explored the effects of incentives on weight loss and found employees tied to an incentive contract (invested money and earned it back by losing weight) lost significantly more weight than employees receiving behavior modification instructions. Jeffery and colleagues (1984) demonstrated greater incentive contracts increased weight loss; however, a higher cost contract also deterred enrollment. Research suggests as employees become acclimatized to incentives, weight loss slows ⁹¹. This effect may be overcome by increasing the incentive amount over time; however, once incentives were removed, behaviors motivated by this incentive deteriorate. Jeffery (2012) found that weight loss in programs was greatest at the beginning, slowed, eventually stopped, then slow weight regain occurred ¹⁰⁷.

In contrast, Paul-Ebhohimhen and colleagues (2008) found no significant difference in weight loss 12 and 18 months after intervention, regardless of whether an incentive was rewarded or not. A similar effect was observed in a smoking cessation program; however, participation in programming was significantly higher among the intervention group ¹⁰⁸. Studies have also shown financial incentives have minimal impact on health behaviors (e.g. weight loss or smoking cessation) ^{108,109}.

Delivery methods

Delivery method varies greatly between WWP's. Traditional delivery methods such as printed material are used by 46% of worksites and in-person strategies are used by 24.4% of worksites ⁶. A number of technology-enhanced WWPs have been reported including internet based programming by 28.1% of sites ¹¹⁰⁻¹¹⁴, email ^{95,115}, telephone ¹¹⁶, video games ¹¹⁷, webinar, and text. Web-based WWP's are quickly becoming a convenient way of providing companies with an easily administered wellness program ¹¹⁸.

Online WWP typically include information on general health practices, activities the employee can perform to improve wellness, and health screening assessments to monitor progress ¹¹⁸. Companies have utilized online programming covering health promotion related to work and non-work issues such as how to avoid influenza and improve lifestyle ¹¹⁴. Online programs allow employees to log on to an educational module aimed to improve lifestyle behaviors and decrease CVD risks ¹¹⁴. Computer game based WWP's may be particularly useful for populations who frequently use social media and computers ¹¹⁷.

Recent studies have examined the impact of web-based education vs. in-person education in low-income audiences targeting adult health outcomes. In fact, targeted behaviors have been shown to improve significantly in both the web-based and in-person groups ¹¹⁰. Women, Infants, and Children (WIC) clinics found web-based education improved FV consumption in WIC participants more so than with in-person individual counseling with a Registered Dietitian ¹¹¹.

Barriers

Regardless of careful WWP design and development, there are challenges and barriers to success. Lack of interest (63.5%) is the most frequently reported barrier by companies. Lack of staff resources was reported by 50.1%, poor funding by 48.2%, low participation on the part of high-risk employees by 48.0%, and poor management support by 37.0% of companies have also been noted⁶. Other researchers have suggested poor acceptance by less healthy employees (those that are more likely to benefit) as well as cost and time for employers and employees as other barriers ^{91,95}. Employers need to bear in mind that WWP's will be most costly at the start-up of programming and return on investment (ROI) may take three to five years to culminate ^{43,107}.

Despite the surplus of data suggesting a positive ROI from offering a WWP, only 44.1% of companies expect to see a positive ROI, suggesting a lack of management buy-in ⁶. Chapman (2003) suggests lack of standardization in measuring methods, varying economic measures, differing research designs, and use of multiple statistical tests in the examination of WWP's to be potential barriers of documenting ROI among WWP's. Some researcher believe WWP's "only

have a modest effect” and credit success to the employees’ motivation. It is possible motivated employees are more apt to sign-up for voluntary programs which may contribute to program success ⁷².

Benefits of Worksite Wellness Programs

Employee benefits of worksite wellness programming

There are numerous potential employee benefits that come from offering a WWP including greater self-efficacy, improved anthropometric parameters, reduced stress levels, improved dietary intake, more knowledgeable and food secure employees, and increased PA. It has been suggested that increasing discipline in one behavior spills over into other areas ¹¹⁹. Thygeson (2010) notes WWP’s are non-standardized and many variables exist, suggesting the “average impact” observed is not a true representation of what a well-designed and well-implemented program could achieve.

Self-efficacy and health behaviors

Self-efficacy is the belief of having control, knowledge, skills, capability, and surroundings conducive to achieving one’s goal ¹²⁰. Higher self-efficacy levels are a predictor for intent to change and subsequent behavior change success ¹²¹. It is behavior specific in that the same individual may have high self-efficacy for one behavior and low self-efficacy for another behavior ¹²¹. It influences the amount of effort that will be expended, how long effort will be sustained, and how high of goals are set ¹²². Self-efficacy is associated with improved self-regulation skills of goal-setting and monitoring to change behavior ¹²³. Self-efficacy has been

shown to increase with higher education, reduce with age, and be lower in women than men¹²⁴⁻¹²⁷. Others have found no significant difference in self-efficacy by age, race, or gender¹²⁴.

Self-efficacy is pertinent to sustained behavior change as it is part of most behavior change theories: The Social Cognitive Theory¹²⁰, The Theory of Planned Behavior¹²⁸, The Transtheoretical Model^{82,83}, and The Health Action Process Approach^{129,130} all utilize the construct self-efficacy. The Social Cognitive Theory¹²⁰ requires a sense of control to facilitate behavior change. The Theory of Planned Behavior¹²⁸ deems intention as the central predictor of behavior. Self-efficacy is one of the main social-cognitive variables that increases from earlier to later stages in the Transtheoretical Model^{82,83}. The Health Action Process Approach^{129,130} requires the personal sense of competence to change behavior.

Higher self-efficacy has been linked to positive health behaviors: increased fruit, vegetable, fiber, and dairy intake along with increased activity, performance, weight loss, and smoking cessation^{8,123,126,131,132}. Improved self-efficacy to consume FV's is tied to on-going exposure to these foods⁸. Of all psychosocial constructs, self-efficacy is most closely tied to PA¹³³. Self-efficacy has been tied to lowered BMI, and reduced dietary fat and saturated fat intake¹³¹. The self-efficacy/health behavior relationship is especially strong with health related self-efficacy¹³⁰. Recent evidence suggests that self-efficacy may be more crucial to initial behavior change than to long-term behavior change¹³⁴.

The term self-efficacy is often interchanged with other terms such as activation, self-confidence, competence, self-belief, or certainty in outcomes. Activation measures the

knowledge, skills, and confidence to take care of one's own health ¹³⁵. Educational seminars have been shown to have improved levels of "activation" ⁷ which in turn may lead to reduced fat intake, dietary cholesterol intake, and BMI. Higher employee confidence has been linked to change in diets ⁹⁵. Those with higher self-confidence are less likely to relapse into previous poor health behaviors ¹³⁶. Positive self-belief and certainty in outcomes are tied to improvements in health ¹³⁷.

Body composition

Significant improvements in body composition parameters have been reported with WWP educational interventions. These parameters include weight reduction ¹³⁸⁻¹⁴³ reduced body fat ^{138,140,142} and decreased waist circumference ¹⁴³. Higher waist circumference and W-H Ratio can be used to predict risk of CVD as they have been positively correlated with increased serum lipid values, and hypertension ¹⁴⁴. A review by Soler et al. (2010) found body composition was not significantly impacted by WWP's.

Other clinical parameters

Significant improvements in biochemical parameters have also been reported with WWP educational interventions including decreased plasma total cholesterol, LDL-cholesterol and triglycerides ^{141,145}. Findings from a review by Soler et al. (2010) suggest reductions in blood pressure with WWP interventions and are effective in increasing PA. The effect of WWP interventions on fitness tends to be small.

Stress reduction

Stress reduction programming is offered by approximately 25% of U.S. based organizations ¹⁷. Improved stress levels with programming may reduce distracted eating, lower eating awareness, improve diet (more FV consumed), increase PA, raise self-efficacy, and reduce cortisol levels ¹⁷. A web-based program to reduce burnout demonstrated a 20% reduction in absenteeism in participants. Weight loss, increased PA, and improved mental health were also seen with this program which may also attribute to the reduction in absenteeism seen.

Dietary intake

The 2010 Dietary Guidelines identify potassium, dietary fiber, calcium and vitamin D as four nutrients of concern for Americans ¹⁴⁶. Fruits and vegetables are good sources of potassium, fiber, and calcium among many other nutrients; however, consumption is inadequate for most Americans ¹⁴⁶. Low FV intake is associated with increased risk for obesity ¹⁴⁷, CVD ¹⁴⁸, stroke ¹⁴⁹, certain cancers ¹⁵⁰, Alzheimer's disease ¹⁵¹, and depression ¹²³. Adequate low-fat dairy and whole grains are associated with a reduction in the risk for CVD, osteoporosis, and excess weight ¹⁵⁰. Worksite wellness programs provide an opportunity to educate employees on these topics to improve their dietary intake and overall health status

Nutrient and FV intake varies by age, gender, and income. Intake of FV's increases with age while dietary fiber intake declines with age ¹⁵². Consumption of FV's is negatively correlated with income level likely due to accessibility of healthy food options, lack of knowledge, and higher cost of healthy foods ¹⁵³ Intake of potassium, magnesium, and dietary fiber is higher

among men while saturated fat, dietary cholesterol, and total fat intake is lower among women¹⁵².

Research concludes nutrition interventions are effective in changing dietary patterns (increasing FV intakes and dietary fiber; decreasing fat intake)¹⁵⁴. Specifically, WWP's have been shown to improve FV intake¹¹¹, whole-grain intake, nutrition facts label use, breakfast, and meal-planning frequency¹¹⁰. Chipman and Litchfield (2010) reported improvements in FV's intake, vitamin C, potassium, magnesium and dietary fiber intakes; decreased intakes of total fat, saturated fat, percent calories from fat, energy intake, and dietary cholesterol¹⁵². More conservative findings were reported by Soler and colleagues (2010), where HRA's with follow-up education reduced fat intake but not FV intake. These positive changes in dietary intake are the result of education interventions influencing nutrition knowledge and behaviors^{112,155-157}.

Benefits for the company

Although WWP's tend to focus on improving employee health, there are considerable benefits for the employer as well. A trade-off does not need to be made between employee well-being and company benefits. Healthier employees are less frequently sick, more productive, and positively impact the bottom line.

One of the main reasons employers offer WWP's is the strong ROI, a form of investment analysis in which program input costs are compared against resulting financial benefits³⁹. A positive ROI is commonly seen related to improved productivity and reduced medical costs. Recent reviews suggest positive financial returns in terms of reduced absenteeism and/or

medical benefits ^{39,158}. Health care claims data are a popular measure of program success used by more than half of all studies evaluating ROI ^{6,101}. One literature review concluded worksite programs can save approximately \$3.00 in medical costs and \$2.70 in reduced absenteeism for every dollar invested, within a 3-year time period (see Figure 1) ⁴³.

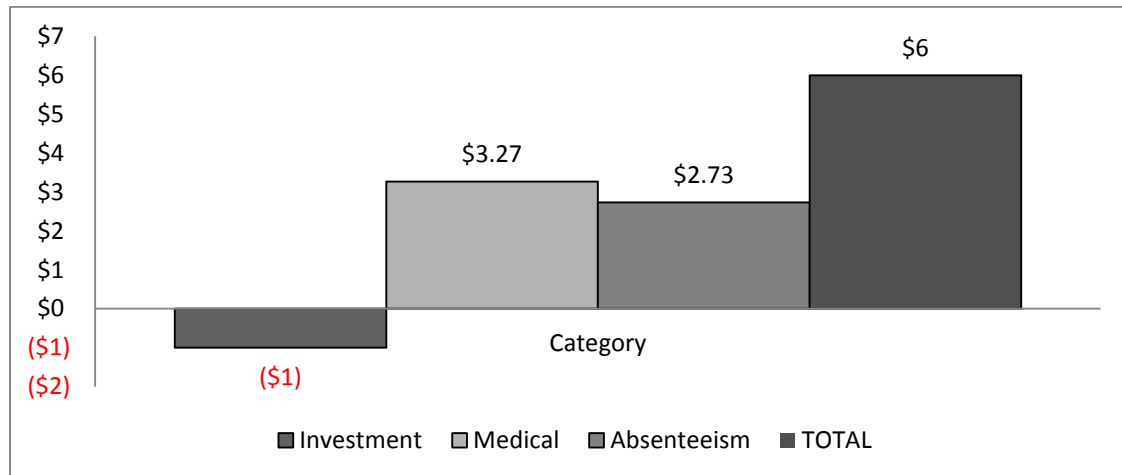


Figure 1. Return on Investment. Adapted from Baicker et al. (2010)

Soler and colleagues (2010) suggest a ROI range of \$1.40 to \$4.60 for every dollar invested (median \$3.20 per \$1.00 invested). Prior economic reviews ^{101,159} drew similar conclusions suggesting a ROI of 2.5 to 5 times the amount invested. A review by van Dongen and colleagues (2011) demonstrated a ROI ranging from -176% to 1,784% (indicating the percentage of profit per dollar invested). The net benefit (or the amount of money gained after cost recovery) of WWP's ranged from -\$451 to \$2757 (median of \$91 per employee). The benefit cost ratio (amount of money returned per dollar invested) ranged from -0.76 to 18.84. The financial return reported by the van Dongen and colleagues (2011) review was positive in 14 of 21 interventions and the benefit-standardized ROIs and benefit cost ratio were positive, suggesting WWP's generate financial savings during the first year post implementation. It should

be noted, other studies suggest it takes two to five years before a ROI from WWP is observed¹⁵⁹.

An extensive systematic series of literature reviews conducted by the CDC Community Guide Task Force report a number of improved individual behaviors that positively influence health care costs, absenteeism, presenteeism, as well as improved productivity and economic performance⁷⁷. The review also found improvements in health care use, especially in terms of reduced hospital admissions and days of care.

Cost-effectiveness reviews over the past 15 years by Pelletier (2011) found that between 2004 and 2008, seven of 16 new studies evaluated reported positive ROI. In the most recent review of 27 new studies between 2008 and 2010, eight reported positive cost benefits¹⁶⁰.

Set-up and topics of WWP's vary greatly, but tend to focus on improving the overall health and well-being of employees with the goal of increasing ROI through improved productivity and decreased health care expenses¹⁶¹. In addition to improved productivity and reduced health care claims, employers also benefit from improved employee morale, better company image, and reduced employee turnover also benefit the employer.

Influence of WWP's on productivity

Productivity is the primary incentive for most employers to invest in a WWP⁶⁷. WWP's, specifically nutrition education interventions, have been shown to decrease absenteeism and presenteeism resulting in improved employee productivity by one to two percent¹⁵⁴.

Sufficient or strong evidence suggests comprehensive, evidence-based programs can reduce the number of days absent from work due to illness or disability. Absenteeism has been reduced by 20-55% (approximately 3 working days) with WWP's ^{20,162,163}. Another review suggested a savings of 1.7-1.9 days (a value of \$309) per employee per year with WWP ⁴³. Inclusion of nutrition and PA in WWP interventions results in absenteeism benefits ranging from -\$113 to \$1,384 annually with a median of \$324 or \$2.70 dollars saved per dollar spent ^{39,102,164,165}. A review by van Dongen and colleagues (2011) reported absenteeism ROI from WWP ranging from 387% to -92% depending on program design.

Worksite wellness programs have been shown to decrease presenteeism by as much as 30% ¹⁶³. Additional evidence of reduced presenteeism has been reported with interventions including exercise programming ⁹⁶, mental health promotion ⁹⁸, health promotion via email ⁹⁵, additional rest breaks for highly repetitive work ⁹⁹, multi-disciplinary occupational health program ⁹⁷, multi-component health promotion program ¹⁰², change in lighting ¹⁰⁰ and health promotion via telephone communication ¹¹⁶. Ultimately, WWPs can yield healthy employees, functioning optimally at work, which leads to more productive, creative, resilient, intellectual employees yielding higher quality goods ⁵⁵.

Productivity measures

Absenteeism can be measured by the number of sick hours or days in a given year ¹⁵⁹. Measuring absenteeism provides quantitative data to document lost production while absent and/or the associated financial cost (salary and benefits). Tracking methods for absenteeism

vary from company to company and may be reported in hours or days missed. Previous research suggests approximately half of studies collected absenteeism sick leave data ^{6,20}.

Employers may also choose to include disability, family medical leave and workers compensation to better represent all lost-time related to absenteeism. Using worker's compensation (wage replacement and medical benefits to employees injured on the job) and disability measures in absenteeism varies widely ^{6,20}.

Presenteeism is a more challenging variable to measure, but is just as significant if not more so than absenteeism in its impact on productivity ¹⁵. There is no widespread agreement regarding how to measure presenteeism, yet it is usually measured as "costs associated with reduced work output, errors on the job, or failure to meet company production standards" ⁶⁷.

Numerous self-report methods have been developed to measure presenteeism ⁶⁷. Some consist of an assessment of perceived impairment approach, where employees are asked how much their illness hinders them from performing common mental, physical and interpersonal tasks required of their job.

Aside from the previously mentioned methods of evaluating WWP success ⁶, employee feedback and participation are collected by 73.2% and 57.4% of companies, respectively (11). Company and insurance provider satisfaction are other potential parameters to measure program success ⁵⁵. Calculators to estimate the cost of obesity, tobacco, alcohol, depression, physical inactivity, health care, absenteeism, and presenteeism are potential tools for WWP's

evaluation ⁷. Ultimately, evaluation methods are pertinent for tracking the health of employees and their organization in relation to WWP's.

Morale

The Merriam-Webster Encyclopedia defines morale as the feelings of enthusiasm and loyalty a person or group has about a task or job. Measuring morale or the impact of morale on productivity as a component of ROI is challenging. One common method of examining WWPs impact on morale is through questionnaires designed to evaluate employee attitudes and perspectives towards work. For example, National Aeronautics and Space Administration (NASA) reported a WWP correlated with an improved self-esteem, perception of higher productivity and more positive attitude among employees through a self-report survey ¹⁶².

Affective commitment is another way to examine WWPs' influence on morale and productivity ¹⁶⁶. It measures the employee's personal meaning to the company, and whether or not employees perceive themselves as responsible for problems in the organization on a scale of 1 (strongly agree) to 5 (strongly disagree) ¹⁶⁶.

Ultimately, the impact of WWP on productivity remains challenging to measure. An approach that utilizes a combination of these measures (absenteeism, presenteeism, and morale) can provide a more comprehensive view of how WWPs impact productivity.

Company image

WWPs can improve a business image, and serve as a tool for recruiting and retaining workers. Employees who perceive WWP's as a benefit are likely more interested in staying

healthy and have lower health care costs. Employee retention also lowers the costs associated with employee turnover. High employee turnover in a company reduces the potential impact of a program ⁹; a company that invests in a WWP won't collect dividends from healthier employees after they leave. The national average turnover rate is between 15% and 24% while the average among *The Principal 10 Best Companies'* (all have WWP's) is 9.8% demonstrating the impact successful wellness programming can have on the bottom-line ^{50,167}.

Affordable Care Act

Wellness programming efforts have been further fueled by federal legislation, Affordable Care Act (ACA), aimed to motivate employers to offer WWP and encourage employees to attend. The effective date for the ACA was August 2nd, 2013 and applies to group health plans and group health issuers for plan years beginning on or after January 1st, 2014 ¹⁶⁸. The ACA provides legislation specific to participatory WWP's as well as both activity-only and outcome-based health contingent WWP's.

Participatory WWP's don't require an employee to satisfy a health related standard in order to obtain an incentive. Examples of this type of program include reimbursing employees for all or part of the cost of membership for a fitness center, rewarding employees for attending a no-cost health education seminar, or participating in a diagnostic testing program. There is no set ceiling on the financial value of rewards for participatory WWP's.

Health contingent WWP's reward employees once they have satisfied a health related standard. The reward for these types of programs must not exceed 30% of employee health

benefit cost for general WWP's or 50% of employee health benefits for tobacco reduction/prevention programs. A penalization of the same amounts may be charged to employees for not participating in programs offered. Identical guidelines apply for spouses and dependents if they may participate in the program.

Health contingent WWP's are further separated into activity-only and outcome-based subgroups. With activity-only programs, employees must perform or complete a health related activity (e.g. walking, diet, exercise program) to obtain a reward. With outcome-based programs, employees must attain or maintain a certain health outcome (e.g., smoking cessation, healthy weight, lower cholesterol) to obtain a reward. Verification from a physician may be requested if it is unreasonable for an employee to take part in activity-only programs but not for outcome-based programs. All programs must be reasonably designed, available to all similarly situated individuals, and a reasonable alternative standard must be available.

Thygeson (2010) expresses concern companies will lose interest in WWP's when the Affordable Care Act (ACA) takes effect due to the reduced purchasing role the company will have with public insurance markets. However, companies with fewer than 500 employees may receive tax credit covering 25% of WWP costs (up to \$10,000/year) as well as discounts of their insurance premiums ¹⁶⁹.

Healthy People 2020

Efforts for WWP's are promoted through the Healthy People's science-based, 10 year goals and benchmarks for improving health. Five of the objectives set forth in *Healthy People*

2020¹⁷⁰ relate to worksite wellness. These include 1) to increase the proportion of worksites of all sizes that offer an employee health promotion program to their employees; 2) to increase the proportion of employees who participate in employer-sponsored health promotion activities; 3) to increase the proportion of worksites that offer nutrition or weight management classes or counseling; 4) to increase the proportion of employed adults who have access to and participate in employer-based exercise facilities and exercise programs; and 5) increasing the proportion of persons covered by indoor worksite policies that prohibit smoking. Healthy People 2020 define standards for a “comprehensive” WWP as those that include health education, a supportive social and physical work environment, integration (into the organization’s structure), linkage (to related programs), and worksite screening and education.

Summary

A sedentary lifestyle, poor dietary choices, smoking, alcohol abuse, and poor mental health all contribute to poor employee health. Poor employee health status costs employers through decreased productivity (absenteeism, presenteeism), increased medical costs, poor worker morale, and work impairment. It is estimated that lost productivity costs two to three times more than health care costs⁵⁸ and poor health may increase absenteeism by 10 days per year^{65,66}. It has been suggested obesity has a particularly negative relationship with productivity relative to presenteeism⁶⁹. Collins and colleagues (2005) reported the presence of a chronic disease played a major role in absenteeism rates and work impairment among employees.

Research suggests numerous benefits from offering a WWP including a better company image, improved dietary intake, increased PA, higher personal financial health, decreased stress levels, improved anthropometric parameters, improved clinical markers, and decreased health care claims. WWPs are considered an effective and convenient method for reducing employee-related expenses ^{39,77,101,159} and producing positive financial returns in terms of absenteeism, presenteeism, productivity, and medical benefits ^{39,43}. Collectively, the data presented from original research and reviews presented in this overview suggest positive clinical and financial outcomes of WWPs for both the employee and employer. It is not surprising WWPs have become a common method used to improve employee health and increase productivity in the workplace ⁶⁷. All of these aspects contribute to a positive return on investment impacting the bottom line for companies.

One critical factor in designing a WWP is tracking progress for employers and employees to document tangible improvements in health. A number of tools to assess the various benefits of WWPs have been discussed previously. Companies may examine health care claims pre- and post-WWP to evaluate the impact. Pre- and post-WWP comparisons of surveys and/or health screenings are other ways to track and document the progress of a WWP.

Legislation from ACA relative to WWP's presents a unique opportunity for companies interested in implementing a WWP. Legislation specific to participatory, activity-only, and outcome-based WWP's can be found in the ACA. The incentive employees can receive or be penalized has increased to 30% for general WWP's and 50% for tobacco reduction programs.

Worksite wellness programs vary greatly in the level of WWP intervention by program content, theoretical models, timeline, program set-up, program delivery method, assessment methods, and accompanying activities (gym memberships, incentives, challenges, etc). Some interventions focus on building awareness while others focus on changing lifestyle. Some programs work to create a supportive environment promoting healthy lifestyle and behavior. Despite the variation among WWP's, the primary goal of these programs is to improve employee health, reduce absenteeism and presenteeism, improve productivity, and reduce healthcare claims.

CHAPTER 3

METHODS

All protocols were reviewed and approved by the Human Subject Institutional Review Board at Iowa State University. Protocols and forms followed HIPPA guidelines. All measures were taken to ensure participant privacy and confidentiality throughout data collection and analysis.

Methods & Procedures**Subject recruitment**

The Center for Industrial Research and Service within Iowa State University Extension and Outreach recruited three Iowa based companies to participate in a worksite wellness program, which were primarily manufacturing and production operations. The companies were recruited through previously established business relations with CIRAS. The three companies included screen printing (240 employees, 2 shifts), electrical contract manufacturing (200 employees, 2 shifts), and hydraulic cylinder design and production (300 employees, 2 shifts).

Needs assessment: online survey and focus groups

Initial needs assessment included an online survey made available to all employees at each worksite. The survey included questions regarding demographics, dietary intake, PA, medical history, financial knowledge, interest in various health and wellness topics, and logistical preferences for a WWP (time of day, frequency, mode of delivery) (Appendix A).

Employees were provided (via email or paycheck stub) with a link to the online survey. To encourage employee participation a \$50 gift card was randomly awarded to one of the employees completing the survey at each worksite. While employee on-line survey responses were anonymous, names were saved in a temporary separate file to award the gift card.

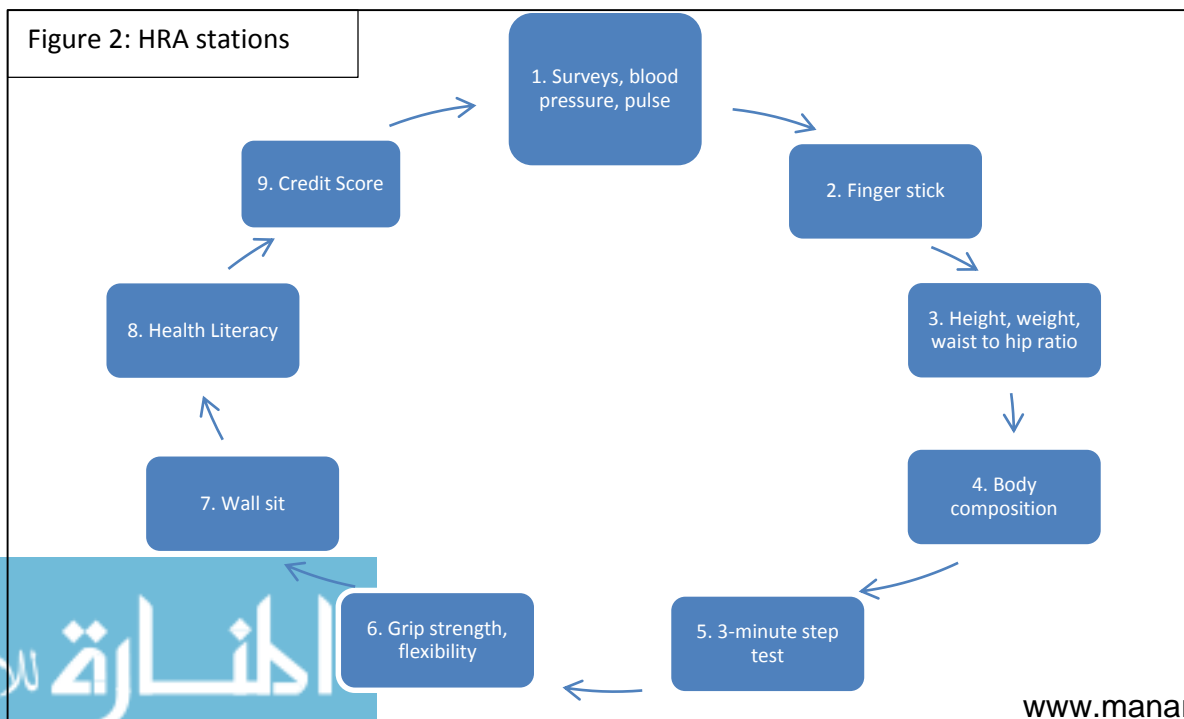
An on-site focus group was conducted by the Iowa State University research team at each worksite with employees, management team, and (if applicable) wellness committee. Each focus group consisted of 5-8 individuals and lasted around an hour. Focus groups conducted with employees were used to clarify findings and expand upon responses to the online surveys. Management and wellness committee focus groups were conducted to gather information on company culture and vision, program expectations, and history with health promotion. Each employee participating in the focus group was compensated \$25. Management and wellness committee focus groups were conducted without compensation. Informed consents were completed and collected by all participants in the focus groups (Appendix B and C). Focus group recordings were transcribed by a member of the research team.

Health risk appraisal

Employees were recruited on a first come, first serve basis to take part in an on-site Health Risk Appraisal (HRA) at all three worksites. All employees were eligible and informed of the opportunity via emails from the companies and/or promotional meetings and/or payroll staffers. The recruitment goal was 60 participants at each site (~180 total). Due to the large number of variables with differing statistical powers, power analysis was not calculated.

Instead, a study population of 25-30% of the company workforce was deemed appropriate for analysis by the primary investigator. No monetary compensation was provided for employees; however, they were informed the HRA was valued at \$100.

The on-site HRA consisted of nine different stations with a completion time of approximately one hour per employee. Measurements were taken in the morning with participants instructed to fast for 9-12 hours prior to HRA and to wear comfortable clothing. An informed consent and insurance release request form were completed by all participants prior to completing the stations (Appendix C and D). Members of the research team were available to answer questions or clarify confusion with these documents or the research project. The HRA stations consisted of various surveys, heart rate, blood pressure, blood work, height, weight, waist to hip measurements, and physical fitness parameters (see Figure 2). Multiple physical fitness parameters were measured and included: body composition, cardiorespiratory health, muscular strength, muscular endurance, and flexibility. All data was collected on the same form (Appendix F). Forms were de-identified and participants were assigned an identification number.



HRA's were conducted by a research team from Iowa State University: Extension and Outreach Program Specialists, graduate students, and undergraduate students thoroughly trained on the assessment protocols with hands on training and step-by-step instructions for stations. The primary investigator ensured each member of the data collection team was properly collecting data each HRA day. The research team initialed each participant's data collection form to track data collection. Participants were scheduled in five minute increments, rotating sequentially through each of the stations.

Station 1: Surveys, blood pressure, and pulse

The paper-based survey form was adapted from Healthways¹⁷¹. Additional questions were added from previously validated tools including questions on PA¹⁷², food frequency¹⁵⁷, personal financial well-being¹⁷³, presenteeism¹⁷⁴, satisfaction with life¹⁷⁵, perceived stress^{18,176}, food security¹⁷⁷, self-control¹⁷⁸, as well as healthy food, exercise, and general self-efficacy¹⁷⁹⁻¹⁸¹, (Appendix G). Demographic questions on age, gender, ethnicity, medical history, and education were also included in the surveys completed at station 1 requiring 10-15 minutes for completion.

Blood pressure and pulse were taken following the American Heart Association and Omron Instruction Manual protocols^{182,183}. Measurements were taken using the Omron Elite 7300W advanced upper arm blood pressure monitor in duplicates after the participant had sat completing the surveys for a minimum of 10 minutes. Blood pressure results were averaged

and analyzed based on blood pressure classifications for adults from the American College of Sports Medicine ^{184,185}.

Station 2: Biochemical blood analysis

Biochemical parameters were obtained using Cholestech LDX[®] according to manufacturer's instructions and protocols (Alere San Diego, Inc., 2011/03) ^{186,187}. Values for total cholesterol, triglycerides, high density lipoprotein (HDL), non-HDL, and blood glucose were obtained in mg/dL. LDL/HDL ratio and a calculated low density lipoprotein (LDL) were also provided.

Station 3: Height, weight, waist-to-hip measurements

Height was measured in inches with a portable stadiometer (SECA 213: Chino, California) in duplicate which was averaged to two decimal places. For height, participants stand with feet approximately 2.5 cm apart, hands on their hips, head in the Frankfurt Horizontal Plane, heels and back both against the stadiometer post. Weight was measured in pounds with a portable digital scale (SECA ROBUSTA 813: Chino California) in duplicate which was averaged to two decimal places. Height and weight measurements were used to calculate Body Mass Index (BMI = kg/m^2) ³⁶. The resulting values were categorized as underweight (<18.50), normal weight (18.50-24.99), overweight (25-29.99), or obese (>30).

Waist to Hip Ratio was determined by measuring waist and hip circumferences in centimeters to two decimal points. Duplicate measures were taken and averaged for both waist (smallest circumference below the ribs) and hip circumference (widest circumference of the

buttocks). If there is a question about the smallest circumference, the waist is measured at the horizontal plane with the umbilicus. The average waist circumference was divided by the average hip circumference to obtain a ratio. Based on gender and age, ratio was used to categorize participants low, moderate, high, or very high risk for chronic disease ³⁷.

Station 4: Body composition

Body composition was measured following manufacturer's instruction for a portable Bioelectrical Impedance Analysis (BIA) Quantum II Model (RJL Systems, Clinton Township, Michigan). BIA introduces a small amount of electrical current into the body and utilizes regression equations to predict body fat. These equations utilize resistance and reactance output along with the individual's height, weight, age, and gender. BIA categorizes individuals as underweight, healthy, overweight, or obese ³⁵.

Station 5: Cardiorespiratory health

Cardiorespiratory health was assessed using the three minute YMCA step test with a 12 inch step and a cadence of 96 beats per minute. Participants were seated immediately after step test completion and heart rate was measured at the carotid artery for one minute following completion. YMCA step test standards were used to categorize values as excellent, good, above average, average, below average, poor, or very poor based on age and gender ¹⁸⁸.

Station 6: Muscular strength and flexibility

Muscular strength was assessed using a Jamar Hydraulic Hand Dynamometer with four measures (in pounds) recorded on each hand according to manufacturer's instructions ¹⁸⁹. Measures were averaged for each hand, added together, and categorized as excellent, very good, good, fair, or needs improvement using Jamar standards ¹⁹⁰.

Flexibility was evaluated using the open hand shoulder mobility test. The palm of the upper hand was against the participant's back while the palm of the lower hand faced away from the back. The distance between the tips of each middle finger was measured in centimeters (positive if overlapping, negative if fingers fail to overlap). If the participant's fingers did not line up well, a straight surface (i.e. paper) was used to extend the horizontal line from the tip of the finger on the lower hand to a point under the fingers from the top hand and measure up. Triplicate measures were taken for each shoulder, averaged and compared against standards for corresponding age and gender to categorize participants as excellent, good, fair or low ¹⁹¹.

Station 7: Muscular endurance

Muscular endurance was assessed with four wall-sits each held for as long as the participant was able. If males exceeded 100 seconds or women exceeded 60 seconds, participants could stop that particular wall sit as they had achieved the highest value for their gender. Participants began with their back against a wall (no obstructions), feet shoulder width apart, approximately two feet from the wall. Participants slowly slid their back down the wall

until their thighs were parallel to the ground. They could adjust their feet so that their knees were directly above their ankles (rather than over their toes). Thirty seconds of rest was allowed between each wall-sit. Participant times were averaged and categorized as excellent, good, average, below average, or very poor ¹⁹².

Station 8: Health literacy

Health literacy was assessed using the Newest Vital Sign (NVS) consisting of six questions regarding a nutrition label. More than four correct answers is indicative of higher health literacy while less than four correct answers indicates the possibility for lower health literacy ¹⁹³.

Station 9: Credit score

Employees were given the opportunity to complete a credit history request form and have their credit report sent to the mailing address provided by the participant (Appendix E). Credit scores were not collected by researchers.

Health risk appraisal results

Each employee (both control and intervention) that took part in the HRA received individualized feedback and explanation of their HRA results (Appendix H and I).

Health Care Claims and Absenteeism Records

Insurance health care claims

Healthcare claims were obtained from the organization's insurance provider with the insurance release form that was signed by the employees at the baseline HRA (Appendix D). Insurance healthcare claims were reported by total claims (dollars) as well as by line item. Medical claims were obtained for the year prior to programming and for the year during programming. Total claims were categorized for analysis into subgroups based on The International Classification of Diseases, 9th edition, Clinical Modification (ICD-9-CM). (Appendix L and M). This classification system is used to code and classify mortality and morbidity data ¹⁹⁴.

Absenteeism

Companies released employee attendance records for the year prior to programming as well as for the year coinciding with programming. Employers tracked sick time, made-up time, unpaid time off, vacation, dental visits, doctor visits, disability, family medical leave, and workers compensation. Tracking methods for absenteeism varied from company to company and were reported in either hours or days missed. Absenteeism was measured by the time missed for personal health reasons for each employee and was converted to hours missed per year. Days were converted to hours based on the number of hours that employee worked in a typical day (days missed x hours per day = hours missed per year). If an employee was with a company for less than a year (i.e. hired in March or retired in October) their average hours

missed per month while employed was extrapolated to reflect 12 months ([total hours missed/months employed] x 12 months= hours missed per year) (Appendix K).

Intervention

After completing the HRA, a random number generator was used to assign participants to either the intervention (N = 30 x 3 sites) or control group (N = 30 x 3 sites). Participants were made aware of their group assignment after completion of their baseline HRA. The control group received no additional contact with the researchers until month six (mid-way) and month twelve.

The theoretical basis for the program was the health belief model. The intervention group participated in 12 to 14 bi-weekly lunch-and-learn educational modules over a 24-28 week period. The research-based modules were developed and facilitated onsite by Iowa State University (ISU) Human Sciences Extension and Outreach specialists.

Module topics were determined using employee and company feedback with topics ranging from general well-being to nutrition or financial health. There was little variation between module content at each of the three sites. General well-being topics discussed included goal setting, accepting change, benefits of tracking, and stress management. Nutrition topics covered included meal planning, disease prevention, label reading, proper portion sizes, deciphering marketing ploys, healthy meals in a hurry, exercise, and stretching the food dollar. Financial health topics included debt reduction, money personality, cash management, investing in the future, credit history, and 401K.

Modules typically began with a review of the previous module's main topics, then progressed through an outline for the day, highlighted the topic to increase interest and importance, main points were covered, experiential learning activities were completed, group discussion/reflection, main points were summarized, and challenges were assigned if applicable. Group and individual challenges took part during the intervention to allow application of the constructs the employees were focusing on in the modules. Challenges included decreasing leisure screen time, saving a set dollar amount, tracking steps walked with a pedometer, increasing fruit and vegetable intake, increasing water intake, and logging daily intake, activity, and spending.

Employees in the intervention group were incentivized with healthy free lunches and small prizes (i.e. gift cards, water bottles, pool passes) for attendance and participation. There was no direct cost to the companies for any part of the program (HRA or intervention); however, there were encouraged to provide incentives for employees to attend and participate in the program.

Module Descriptions

- Introduction to Program. The link between health and wealth was explained and goal setting strategies were explained. Participants developed their own SMART (specific, measurable, attainable, realistic, and timely) goals.

- Change and tracking. Participants learned about the five stages of change, what does and doesn't work to initiate change, willpower, and habits. Participants were encouraged to begin tracking their food intake, exercise and spending.
- Handling stress. Stress relative to enhancing or reducing performance was introduced with strategies to control stress level.
- Accepting change. Participants were reminded that change is constant and ways to best handle and react to these changes.
- Midway check point. This module was used to evaluate participant progress towards personal goals established in the first module. Methods to overcome obstacles and setbacks were discussed. Participants were encouraged to reward successes they have made towards their goals.
- Diet linked to health status. The link between diet and individual health status (chronic diseases including cancer, CVD, etc.) was discussed. Participants reviewed the results from their blood draw (glucose, blood triglycerides, cholesterol). Dietary trackers were introduced and participants were encouraged to use SuperTracker ¹⁹⁵.
- Spend smart, eat smart. Participants were educated on budget friendly nutrition tips. Methods for planning healthy meals in a hurry were covered. A cost and nutrition comparison was done on various foods to demonstrate how fast and pre-packaged foods compare with fresh and homemade.

- Label reading. Participants were educated on label reading, the "health-halo", and how to obtain recommended amounts of certain nutrients of concern (potassium, dietary fiber, calcium, and vitamin D).
- Exercise. Participants were educated on the five components of fitness and went over their individual fitness scores from the initial assessment. PA recommendations, how to incorporate daily activity, and different heart rate zones were covered.
- Budgeting. The importance of budgeting spending and caloric intake was emphasized. Participants delved into why their budgets (financial and dietary) may have failed in the past. The topics of overeating and portion control were discussed with a final case study on budgeting strategies.
- Debt reduction. This module covered reasons for reducing debt, strategies to stop borrowing money, and how to pay off existing debts.
- Getting the most from your money. Participants reviewed reasons for sticking to a written budget and covered strategies for minimizing the dollar amount spent for common purchases.
- Investing in the future. This module covered reasons to invest one's money and common investment strategies, such as mutual funds and 401k accounts.
- Money personality. This module covered common perspectives that people often have about money and the consequences each perspective can have on one's personal finances. Participants assessed their personal habits and attitudes (money personality) related to money.

Modules typically began with a review of the previous module's main topics and progressed through an outline of the day's topic. Key points were highlighted, experiential learning activities were completed, group discussion/reflection occurred, and challenges were assigned if applicable. Group and individual challenges took part during the intervention to allow application of the constructs the employees were focusing on in the modules. Challenges included decreasing leisure screen time, saving a set dollar amount, tracking steps walked with a pedometer, increasing fruit and vegetable intake, increasing water intake, and logging daily intake, activity, and spending.

There was no direct cost to the companies for any part of the program (HRA or intervention); however, there were encouraged to provide incentives for employees to attend and participate in the program. Employees in the intervention group were incentivized at select sites with healthy free lunches and small prizes (i.e. gift cards, water bottles, pool passes) for attendance and participation.

Newsletters

A series of eight Iowa State University Extension and Outreach Newsletters [Eating Well, Moving more] were individually distributed to each intervention employee after completion of the intervention¹⁹⁶. Newsletter distribution occurred in two-week increments beginning two weeks after the completion of intervention educational programming. Nutrition information included in the newsletters was based upon the DASH (Dietary Approaches to Stop

Hypertension) dietary recommendations¹⁹⁷. Newsletters include self-assessment tools and encouraged individual goal setting.

Six and Twelve Month Health Risk Appraisals

Six month health risk appraisal

- Employees (both control and intervention) completed the paper-based portion (demographic data, medical history, surveys) of the HRA six months after the baseline assessment at the conclusion of the educational modules.

Twelve month health risk appraisal

- One full calendar year after the baseline assessment, employees (both control and intervention) completed the HRA (demographic data, medical history, surveys, heart rate, blood pressure, height, weight, waist-to-hip measurement, and physical fitness parameters) conducted at baseline with the exception of the credit score.

Statistical Methods

Data was analyzed using SPSS version 21 (SPSS IBM, New York, U.S.A.) and JMP[®], Version 11 (SAS Institute Inc., Cary, NC, 1989-2007)^{198,199}. JMP[®] was utilized to for Mosaic plots and SPSS was utilized for all other analysis. Significance was set at $p < 0.05$ and .05-.10 was considered a trend. Trends were not noted in manuscript 1. Descriptive statistics, independent samples t-tests, and Pearson's chi-square explored basic demographic variables. Education status, age, BMI, W-H Ratio, and BIA were examined by analysis of variance (ANOVA). Paired t-tests examined change in a number of variables (i.e. self-efficacy scores, dietary intakes,

physical activity, etc..) from baseline to 12 month follow-up. Chi-square analysis and mosaic plots were used to compare body weight status categorization methods (i.e., BIA, BMI, W-H Ratio). ANOVA was used to examine self-efficacy scores and health behaviors by educational status and age groups. Bivariate correlations were run to examine relationships between variable change scores. No imputation was made for skipped for incomplete questions. Presenteeism scales were omitted from analysis due to improper understanding and completion by participants.

CHAPTER 4

MANUSCRIPT 1: COMPARISON OF BODY FAT MEASURES AND RELATIONSHIP WITH HEALTH STATUS INDICATORS

Abstract prepared for submission to International Journal of Obesity

Abstract

Participants (n=176) from three Midwest companies completed a worksite health risk appraisal (HRA). Mean age was 40 years (range 20-76) with fairly equal distribution by gender. Weight status was assessed by Bioelectrical Impedance Analysis (BIA), Body Mass Index (BMI), and waist-to-hip ratio (W-H Ratio) and categorized participants as underweight/low risk (N = 2 vs. 3 vs. 39, respectively); healthy/normal/moderate risk (28 vs. 35 vs. 61); overweight/high risk (45 vs. 57 vs. 44); and obese/very high risk (100 vs. 78 vs. 31), respectively. Categorization methods were significantly different ($p<0.05$). BIA placed more participants in the obese category, whereas W-H Ratio placed more participants in the low/moderate risk categories.

Each method detected differences in four health status indicators (non-HDL, left and right flexibility, and MET scores) by weight category. Detection of differences in the remaining eight health status indicators (cholesterol, HDL, LDL, HDL/LDL ratio, triglycerides, glucose, diastolic blood pressure, and endurance) varied by weight categorization method. These differences also varied by gender.

Results confirm previous findings that increasing adiposity negatively impacts health status indicators. Findings suggest the use of multiple body adiposity measures may be

warranted to screen for various chronic diseases. Use of weight status measures should be tailored to gender, age, and disease risk; however, this topic should be further explored.

Introduction

The incidence of obesity is widespread, with 36% of US adults categorized as obese and 68% of the population as either overweight or obese ¹. Overweight and obesity are associated with four of the 10 leading causes of death: cardiovascular disease (CVD), cancer, stroke, and diabetes ^{2,3}. These chronic diseases account for 75% of all health care costs ⁴; overweight and obesity alone constitute 21% of all adult health care costs in the US ⁵. Of particular concern, health care costs are 37% higher in obese individuals compared to their lean counterparts ⁵.

Various methods exist to assess adiposity include: body mass index (BMI), bioelectrical impedance analysis (BIA), waist circumference, waist to hip ratio (W-H Ratio), skin fold measurements, underwater weighing, air displacement, and dual-energy X-ray absorptiometry (DXA) ⁶. Of these methods, three commonly used measures are BMI, BIA, and W-H Ratio. Despite their common use, each of these methods has benefits and limitations. The gold standard in body composition analysis is DXA, which scans the body at two different energy levels and calculates mineral mass, mineral-free mass, and fat mass based on the absorption rate⁷. Bioelectrical impedance analysis is considered more accurate than BMI and W-H Ratio when compared to DXA. It is a portable and rapid assessment tool; however, is dependent on the individual's fluid/hydration status and more costly than the other two methods ^{6,7}. A more commonly utilized body fat measure is BMI which is cost-effective, convenient, and requires minimal training for administration. It is not considered as accurate and has a low correlation

with body stature ⁷. Another cost-effective, convenient method requiring minimal training is W-H Ratio; however, it is considered to be the least accurate method of the three ⁶. Some support the use of “simpler measures” rather than DXA or BIA ⁹⁻¹². While BMI has been shown to be a good predictor of percent body fat, W-H Ratio is a good predictor of health indicators ^{8,13}. Little is known about comparability of these weight status measures and their sensitivity to differences in health status indicators, gender, age, and chronic disease risk.

Methods

A worksite wellness program was conducted in three manufacturing companies in one Midwest state. The companies were recruited through previously established business relations with a university-based center providing services to enhance industry performance. The three were small scale manufacturing companies. Participants were recruited to take part in a baseline Health Risk Appraisal (HRA) on a first come, first serve basis via email and word of mouth with the recruitment goal of 60 participants from each worksite. All protocols were approved by a University Human Subject Institutional Review Board; informed consent was obtained for each participant.

The HRA collected a variety of health status indicators including: heart rate, blood pressure, biochemical parameters (i.e. cholesterol, blood glucose), height, weight, waist and hip measurements, as well as physical fitness assessments (i.e. body composition, cardiorespiratory health, muscular strength, muscular endurance, flexibility). A research team from Iowa State University conducted the HRA's: Extension and Outreach Program Specialists, graduate students, and undergraduate students. The team was thoroughly trained on the HRA protocols

with hands-on training and step-by-step instructions for each station. No monetary compensation was provided for the HRA; however, participants were made aware it was valued at \$100.

Procedures

Body composition was assessed by BIA with the RJL Systems-Quantum II model using manufacturer's protocol instructions¹⁴. This method utilizes resistance and reactance output along with the individual's height, weight, age, and gender to predict percent body fat. Participants were categorized as underweight, healthy/normal, overweight, or obese.

Height and weight measurements were used to calculate BMI (kg/m^2) with results categorized as underweight, normal weight, overweight, or obese¹⁵. Height (inches) was measured with a portable stadiometer (SECA 213) in duplicate and later averaged. Participants stood with feet approximately 2.5 cm apart, hands on hips, head in the Frankfurt Horizontal Plane, with heels and back against the stadiometer post. Weight (pounds) was measured with a portable digital scale (SECA ROBUSTA 813) in duplicate and later averaged. Socks or disposable booties were worn and sweatshirts/jackets were removed prior to measurement. Inches were converted to centimeters and pounds were converted to kilograms for BMI calculation.

Waist circumference (cm) and hip circumference (cm) were each taken in duplicate and later averaged. The tape measure was snug against the participant but did not cause indentation of the skin. If uncertainty regarding the smallest circumference existed, the waist was measured at the horizontal plane with the umbilicus. Waist to hip ratio was calculated by dividing the average waist circumference (smallest circumference below the ribs) for each

participant by the average hip circumference (widest circumference of the buttocks) ^{16,17}. A lower W-H Ratio indicates lower risk for developing chronic disease whereas a higher ratio indicates a higher risk. Based on participant gender and age, ratios were categorized as low, moderate, high, or very high risk ¹⁶.

Blood pressure and pulse were taken following the American Heart Association and Omron Instruction Manual protocols ^{18,19}. Measurements were taken using the Omron Elite 7300W advanced upper arm blood pressure monitor in duplicate after the participant had sat for 10 minutes.

Biochemical parameters were obtained using Cholestech LDX[®] according to manufacturer's instructions (Alere San Diego, Inc., 2011/03) ^{20,21}. Values for total cholesterol, triglycerides, high density lipoprotein (HDL), low density lipoprotein (LDL), non-HDL, and blood glucose were obtained in mg/dL; LDL/HDL ratio was also noted.

Flexibility was analyzed using the open hand shoulder mobility test ²². The palm of the upper hand was placed against the participant's back while the palm of the lower hand faced away from the back. The distance between the tip of each middle finger was measured in centimeters (positive if overlapping, negative if fingers failed to overlap). If the participant's fingers did not line up well, a straight surface (i.e. paper) was used to extend the horizontal line from the tip of the finger on the lower hand to a point under the fingers from the top hand. Triplicate measures were taken for each shoulder and averaged.

Muscular endurance was assessed with four wall-sit tests with thirty seconds of rest allowed between each ²³. Participants began with their back against a wall (no obstructions), feet shoulder width apart and approximately two feet from the wall. They slowly slid their back down the wall until their thighs were parallel to the ground. They could adjust their feet so that their knees were directly above their ankles (rather than over their toes). Participants were instructed to hold this position as long as possible. Once males exceeded 100 seconds or women exceeded 60 seconds (maximum scores), they were instructed to stop. Participant times were averaged and recorded.

Metabolic equivalent task (MET) scores, an indicator of physical activity level, were calculated based on age, gender, BMI, resting heart rate, and self-reported physical activity level ²⁴. Higher scores indicate greater physical activity.

Statistical Analysis

Data was analyzed using SPSS version 21 (SPSS IBM, New York, U.S.A.) and JMP[®], Version 11 (SAS Institute Inc., Cary, NC, 1989-2007) ^{25,26}. No imputation was made for skipped or incomplete data and significance was set at $p < 0.05$. Pearson chi-square and Mosaic Plots were used to examine the three measures of body composition; the adjusted α level for Pearson Chi Square was 0.02. Analysis of variance (ANOVA) with Tukey's post hoc examined health status indicators ($n = 12$) by weight status categorization with the three measures of body composition. Bonferonni adjustments were made for multiple comparisons ($.05/12$), yielding an overall experimental error rate of 0.0042. Mosaic plots were analyzed using JMP[®] while all other analysis was performed with SPSS.

Results

Participants in the HRA (n=176) ranged in age from 20 to 76 years. Mean age was 40 years with near equal distribution by gender (85 men and 91 women) (Table 1). The majority of the subjects were white (>95%) and two-thirds of the employees lived in rural areas (data not shown). Employees at each company ranged from primarily blue collar workers to administrative and professional staff.

Categorization of weight status by BIA, BMI, and W-H Ratio appear in Figure 1. Bioelectrical impedance analysis tended to categorize more participants as obese/very high risk, whereas W-to-H ratio distributed participants more evenly into the four categories with more participants in the underweight/low risk and normal/healthy/moderate risk categories. Body Mass Index categorized the majority as obese/very high risk and was the method with the highest frequency in the overweight/high risk category. Pearson chi-square between the weight status categorization methods revealed a significant difference ($p < \text{adjusted } \alpha \text{ level of } .02$) between all three methods (Table 2).

The relationship between body fat categorizations was examined using Mosaic plots (Supplemental Information- SI). Column width represents the frequency in each category of the x-axis while column height represents conditional probability of the y-axis (the probability of Y given X). Larger squares indicate more agreement between the categories. The BIA by BMI mosaic plot (SI 1) suggests fewer participants are categorized as under and normal weight by BIA and a high level of agreement exists between categorization with the two methods. Of

those categorized as obese with BIA, nearly 80% are obese using BMI. Of those categorized as normal using BIA, roughly 60% are also categorized as normal with BMI.

The mosaic plot for W-H Ratio by BIA in SI 2 suggests more equal distribution among the four W-H Ratio categories (slightly higher in moderate risk). The smaller squares suggest less agreement between W-H Ratio and BIA in normal/moderate risk and overweight/high risk. Of those categorized as low risk with W-H ratio, around 30% are normal weight and 50% are obese using BIA. Of those categorized as very high risk with W-H ratio, about 80% are obese with BIA.

The similar column widths in SI 3 (W-H Ratio by BMI) also suggests more equal distribution among the four W-H Ratio categories . The smaller squares suggest less agreement between W-H Ratio and BIA in normal/moderate risk and overweight/high risk. Fifty percent of those with low W-H ratio also have normal BMI. As W-H ratio increases, a larger percentage of the subjects have a higher BMI. Of those with a very high risk W-H ratio, approximately were 75% obese and 25% were overweight using BMI.

Weight status categorization by each of the three methods (BIA, BMI, and W-H Ratio) was examined by ANOVA (Table 3: panels A-C) relative to 12 health status indicators (cholesterol, HDL, LDL, non-HDL, HDL/LDL ratio, triglycerides, glucose, diastolic blood pressure, endurance, flexibility, and MET score). Weight status categorization indicative of greater adiposity tended to be associated with less desirable health status indicators and greater disease risk (i.e. high cholesterol, high LDL, high blood glucose). A significant difference ($p < \text{adjusted } \alpha \text{ level of } .0042$) in LDL, non-HDL, HDL/LDL ratio, flexibility and MET score was

observed between weight status categories by BIA (Table 3A). In contrast, HDL, LDL, non-HDL, HDL/LDL ratio, diastolic blood pressure, flexibility and MET score were significantly different ($p < \text{adjusted } \alpha \text{ level of } .0042$) between weight status categories by BMI (Table 3B). Finally, a significant difference ($p < \text{adjusted } \alpha \text{ level of } .0042$) in non-HDL, blood glucose, flexibility and MET score was observed between weight status categories by W-H Ratio (Table 3C). In each case, clinical indicators of health status worsened with increasing weight.

Table 4 summarizes the results of the panels from Table 3, where “Yes” indicates a significant difference in health status indicator by weight status categorization method. Significant differences in non-HDL, flexibility, and MET score ($p < \text{adjusted } \alpha \text{ level of } .0042$) were observed among each of the weight status categorization methods (BIA, BMI, W-H Ratio). Conversely, no difference in cholesterol, triglycerides, or muscular endurance was noted among the categorization methods. Differences among the remaining health status indicators (HDL, LDL, HDL/LDL ratio, blood glucose, and diastolic blood pressure) varied by weight status categorization method. Differences in health status indicators (HDL, LDL, non-HDL, HDL/LDL ratio, and diastolic blood pressure) were more consistently observed by BMI weight status categorization than BIA and W-H Ratio methods. Interestingly, a significant difference in blood glucose was only observed by W-H Ratio (significantly higher in the very high risk).

Further examination by gender (males = 85, females = 91) within each of the weight status categorization methods suggests the relationship between health status indicators and weight status categorization methods may be gender specific (Table 4). Significant differences in blood glucose were specific only to women using the W-H Ratio method. Significant

differences in cholesterol, LDL, HDL/LDL Ratio, and endurance were specific only to men using the BMI method. Two of the health status indicators, MET score and flexibility, were significantly different among all three weight status classifications methods.

Discussion

Results suggest the weight status categorization methods differ from one another. BIA categorizes more as obese and W-H Ratio categorizes more as low and moderate risk in this sample. Disease risk categories for W-H ratio fall on a continuum, which places low risk subjects in the same grouping as underweight individuals in this particular study; however, research suggests underweight status increases risk for morbidity and mortality²⁷. Regardless, the continuum of these categories was kept in the original order from the analysis tools. Both BMI and W-H Ratio have been shown to be correlated with percent body fat²⁸; however, research suggests BMI is better than other measures at predicting percent body fat and adiposity^{8,28}. Each of the methods has various benefits and limitations, which may influence ideal implementation and application of each measure. This is noteworthy since weight status measures are used clinically to predict risk for developing chronic disease. Use of just one weight status method may cause a practitioner to miss an early diagnosis and an opportunity to provide education/intervention for disease prevention. This particular study suggests the use of multiple body fat measures may more accurately predict true adiposity and identify risk for different diseases (e.g. W-H Ratio may better identify risk for diabetes among women while BMI may better identify risk for CVD among men). The concept of utilizing multiple methods has previously been supported by others^{12,29}.

These results suggest weight status categories indicative of greater weight and adiposity are associated with negative health status indicators and is consistent with previous findings that greater weight status negatively impacts risk for developing chronic disease ^{2,30}. Although these results suggest the weight status categorization methods did detect differences among a number of health status indicators, these differences may have implications for clinical application.

BMI, commonly used to assess body weight status, appears to discriminate differences in biochemical parameters and diastolic blood pressure better than BIA and W-H Ratio methods in this sample. Biochemical parameters and diastolic blood pressure are risk factors for CVD ³¹, which suggests BMI may be a more appropriate measure for evaluating cardiovascular health.

On the other hand, BMI did not distinguish differences in blood glucose for this particular sample. This may be due to the fact BMI does not assess actual adiposity or weight distribution. Inflammation and insulin resistance, etiological factors for diabetes, stem from increasing adiposity and abdominal obesity ³². The W-H Ratio method, which measures central obesity and accounts for adiposity/abdominal obesity, did exhibit significant differences in blood glucose between categories ^{33,34}. This suggests W-H Ratio may be a more appropriate measure to assess risk for type 2 diabetes (T2DM) with this sample. Recent research suggests W-H Ratio to be the best screening tool for health indicators, in particular diabetes, metabolic syndrome, hypertension, and dyslipidemia ^{35,36}. Previous studies show W-H Ratio to be more closely correlated with CVD risk than other disease states ^{34,37}.

Bioelectrical impedance analysis was least sensitive to differences in health status indicators by weight status categorization method, particularly among men. Previous research suggests it is one of the worst predictors for health indicators ¹³.

Further analysis by gender also suggests some important clinical applications. Among all three weight status categorization methods, BMI was most sensitive to differences in health status indicators. BMI was particularly more sensitive to risk factors for CVD suggesting use of BMI in screening for CVD, but this was true only in males. While results suggest the W-H Ratio may be sensitive to blood glucose, this was only true among females. Regardless of gender, increased adiposity and abdominal fat increase the risk for diabetes, CVD, and other health outcomes ^{2,38}.

Conclusion

Results confirm previous findings that increasing adiposity is negatively associated with health status indicators. While the three weight status categorization methods (BIA, BMI, and W-H Ratio) identified differences in health status indicators similarly, there were some unique differences. Weight status categorization methods uniquely detect differences in some health status indicators, thus tailoring body fat measure use based on gender, age, and disease risk/state may provide benefits. These findings suggest the use of multiple body adiposity measures may be warranted when screening for a variety of chronic diseases. This will more accurately reflect adiposity and lead to early diagnoses with preventative treatment.

Limitations

The study included participants who self-selected to take part in the program making them more apt to have an interest in health. Socioeconomic status data was not collected from participants. These findings cannot be extrapolated to all populations as the majority of the subjects are rural residing Caucasians, working primarily blue collar jobs.

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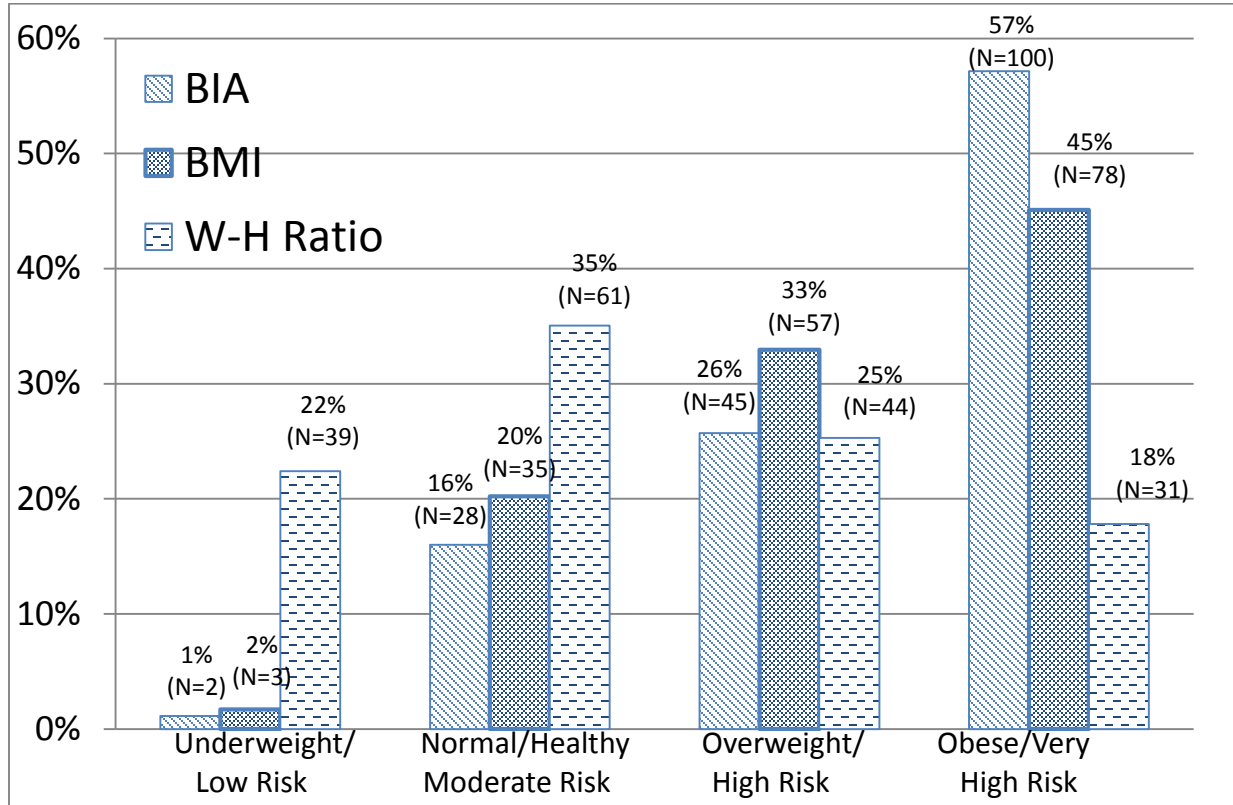


Figure 1. Distribution of weight status categorization by BIA, BMI, and W-H Ratio.

Age	Male % (N)	Female % (N)
<30	28.2% (50)	34.1% (60)
31-40	28.3% (50)	15.4% (27)
41-50	23.5% (41)	15.3% (27)
51+	20% (35)	35.2% (62)
TOTAL:	52%	48%
average: 40 years (range 20-76)	39.72 years	41.51 years
Educational Status		
Some high school or less	0% (0)	3.3% (6)
High school degree	22.4% (40)	30.8% (54)
Some college	34.1% (60)	35.2% (62)
College graduate	37.6% (66)	29.7% (52)
Post grad or prof degree	5.9% (10)	1.1% (2)

Method	Pearson Chi-Square Value	P value
BIA by BMI	216.40	<.0005
BMI by W-H	49.05	<.0005
W-H by BIA	45.01	<.0005

Table 3: ANOVA of Health Status Indicators by BIA, BMI, and W-H Ratio Weight Status Classification

MEASURE	Underweight	Healthy	Overweight	Obese	P-value*
Cholesterol (mg/dL)	183.50 (6.50)	169.46 (5.35)	184.39 (6.20)	194.38 (4.09)	.034
HDL (mg/dL)	83.00 (14.00)	57.92 (4.14)	59.32 (3.24)	52.67 (1.67)	.035
LDL (mg/dL)	84.50 (17.50)	92.09 (4.80)	104.17 (5.87)	117.90 (3.46)	.003
Non-HDL (mg/dL)	100.00 (21.00)	112.40 (5.36)	124.90 (6.05)	140.83 (4.17)	.003
HDL/LDL Ratio	1.10 (.40)	1.90 (.20)	1.98 (.15)	2.49 (.10)	.002
Triglycerides (mg/dL)	79.00 (15.00)	102.19 (11.95)	121.68 (12.38)	135.77 (7.86)	.178
Blood Glucose (mg/dL)	101.50 (4.5)	95.08 (2.25)	93.09 (2.31)	104.31 (2.87)	.047
Diastolic BP** (mm Hg)	71.25 (4.75)	79.96 (2.34)	83.16 (1.63)	86.64 (1.26)	.021
Endurance (seconds)	39.75 (20.25)	40.08 (3.97)	37.66 (3.28)	29.36 (2.07)	.038
Flexibility-left (cm)	-7.40 (7.10)	-3.98 (1.74) ^a	-9.58 (1.78)	-13.54 (.92) ^b	<.0005
Flexibility-right (cm)	-8.75 (2.05)	.60 (2.02) ^a	-4.86 (1.74)	-9.21 (1.02) ^b	<.0005
MET Score***	8.61 (.26)	10.57 (.44) ^a	9.68 (.41) ^a	7.93 (.28) ^b	<.0005

Superscript letters denote significant difference between columns within rows.

*adjusted α level = 0.0042

**BP = blood pressure

***MET score = metabolic equivalent

Panel B. ANOVA of Health Status Indicators by BMI. Mean (Standard error of the mean)					
MEASURE	Underweight	Normal	Overweight	Obese	P-value*
Cholesterol (mg/dL)	176.00 (8.39)	168.48 (5.47)	190.61 (5.43)	195.47 (4.62)	.010
HDL (mg/dL)	81.67 (8.19)	60.15 (3.34)	58.07 (2.74)	50.40 (1.85)	.002
LDL (mg/dL)	84.50 (17.50)	91.07 (4.79) ^a	114.02 (5.27)	117.54 (3.77) ^b	.001
Non-HDL (mg/dL)	94.00 (13.53)	108.88 (4.81) ^a	132.12 (5.85)	144.47 (4.40) ^b	<.0005
HDL/LDL Ratio	1.10 (.40)	1.70 (.13) ^a	2.27 (.15)	2.54 (.10) ^b	<.0005
Triglycerides (mg/dL)	67.67 (14.26)	98.67 (10.44)	126.14 (11.61)	141.67 (8.52)	.029
Blood Glucose (mg/dL)	102.00 (2.65)	93.09 (1.71)	98.13 (3.66)	104.59 (2.92)	.119
Diastolic BP** (mm Hg)	71.50 (2.75)	80.25 (2.13)	83.59 (1.48)	87.73 (1.41)	.004
Endurance (seconds)	37.67 (11.88)	38.82 (3.53)	34.40 (3.03)	30.06 (2.33)	.230
Flexibility-left (cm)	-1.03 (7.57)	-3.50 (1.39) ^a	-10.72 (1.46) ^b	-14.96 (1.00) ^b	<.0005
Flexibility-right (cm)	-.07 (8.76)	1.52 (1.49) ^a	-6.28 (1.44) ^b	-10.69 (1.16) ^b	<.0005
MET Score***	10.08 (1.47)	10.85 (.39) ^a	9.22 (.34) ^b	7.50 (.30) ^c	<.0005

Superscript letters denote significant difference between columns within rows.

*adjusted α level = 0.0042

**BP = blood pressure

***MET score = metabolic equivalent

Panel C. ANOVA of Health Status Indicators by W-H Ratio. Mean (Standard error of the mean)					
MEASURE	Low	Moderate	High	Very High	P-value*
Cholesterol (mg/dL)	174.29 (6.16)	182.62 (4.60)	202.77 (6.56)	193.87 (6.84)	.006
HDL (mg/dL)	61.05 (3.34)	54.56 (2.23)	55.60 (3.13)	51.35 (3.23)	.188
LDL (mg/dL)	96.40 (6.34)	108.54 (3.98)	118.15 (5.53)	116.77 (6.42)	.033
Non-HDL (mg/dL)	114.56 (6.06) ^a	128.68 (5.17)	149.95 (6.20) ^b	140.17 (6.87)	.003
HDL/LDL Ratio	1.87 (.17)	2.26 (.13)	2.43 (.14)	2.40 (.17)	.070
Triglycerides (mg/dL)	99.47 (10.00)	120.23 (9.93)	140.28 (10.90)	149.90 (16.71)	.025
Blood Glucose (mg/dL)	94.87 (1.94) ^a	95.02 (1.40) ^a	100.26 (2.99)	116.16 (8.05) ^b	<.0005
Diastolic BP** (mm Hg)	81.22 (2.03)	83.86 (1.32)	86.86 (1.90)	88.10 (2.94)	.085
Endurance (seconds)	38.81 (3.43)	25.77 (3.19)	29.90 (2.55)	24.72 (2.61)	.019
Flexibility-left (cm)	-5.31 (1.43) ^a	-9.33 (1.32) ^{ac}	-15.99 (1.43) ^b	-14.84 (1.81) ^{bc}	<.0005
Flexibility-right (cm)	1.04 (1.44) ^a	-6.15 (1.35) ^b	-10.87 (1.73) ^b	-11.37 (1.73) ^b	<.0005
MET Score***	10.67 (.40) ^a	9.04 (.35)	7.87 (.40) ^b	7.25 (.43) ^b	<.0005

Superscript letters denote significant difference between columns within rows.

*adjusted α level = 0.0042

**BP = blood pressure

***MET score = metabolic equivalent

	BIA			BMI			W-to-H		
	All	Men	Women	All	Men	Women	All	Men	Women
Cholesterol (mg/dL)	-	-	-	-	Yes	-	-	-	-
HDL (mg/dL)	-	-	-	Yes	-	-	-	-	-
LDL (mg/dL)	Yes	-	-	Yes	Yes	-	-	-	-
Non-HDL (mg/dL)	Yes	Yes	-	Yes	Yes	-	Yes	Yes	-
HDL/LDL Ratio	Yes	-	-	Yes	Yes	-	-	-	-
Triglycerides (mg/dL)	-	-	-	-	-	-	-	-	-
Blood Glucose (mg/dL)	-	-	-	-	-	-	Yes	-	Yes
Diastolic BP* (mm Hg)	-	-	-	Yes	-	-	-	-	-
Endurance (seconds)	-	-	Yes	-	-	-	-	-	-
Flexibility (cm)	Yes	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MET Score**	Yes	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*BP = blood pressure

**MET score = metabolic equivalent

CHAPTER 5

MANUSCRIPT 2: EMPLOYEE CHANGES IN SELF-EFFICACY RELATED TO HEALTH BEHAVIORS

Abstract prepared for The Journal of Health Promotion

Abstract

Health risk appraisals (HRA) were conducted at three Midwest companies as part of a worksite wellness program (WWP). The HRA was comprised of a series of validated surveys regarding basic demographics, self-efficacy, dietary intake, and physical activity, anthropometrics, and biochemical measures. Employees (n = 105) ranged in age from 20-76 years (mean age = 40) with fairly equal distribution by gender. Employees at each worksite were randomly assigned to either the control (N = 47) or intervention group (N = 45) after completing the HRA.

Increasing health care costs, concerns regarding employee productivity, and research suggesting a significant Return on Investment (ROI) drive the increasing employer interest in WWP's. Onsite WWP's can provide access to 65% of the adult population with targeted strategies to modify poor health behaviors.

WWP's have been shown to improve health status including increased self-efficacy. Self-efficacy is the belief of having control, knowledge, skills, capability, and surroundings conducive to achieving one's goal. Higher self-efficacy has been linked to positive health behaviors: increased fruit, vegetable, fiber, and dairy intake along with increased activity, performance, weight loss, smoking cessation, lowered body mass index (BMI), as well as reduced dietary and saturated fat intake ¹³¹.

Current findings suggest self-efficacy diminishes with age and increases with education level. Health status indicators were shown to vary by gender. Designing a program to control for outside factors and tailoring programming to gender, age, and education status may provide the foundation for significant improvements in self-efficacy and health behaviors. Findings suggest education has the strongest influence on self-efficacy which should be taken into account during program development.

Introduction

The Public Health Service Act defines a Worksite Wellness Program (WWP) as a program offered by an employer designed to promote health or prevent disease ²¹⁷. Employer interest in WWPs is on the rise driven by increasing health care costs, concerns regarding employee productivity, Affordable Care Act legislation aimed to motivate participation in WWP ¹⁶⁸, and research suggesting a significant Return on Investment (ROI) from programming ^{6,43,51,56,77}. Onsite WWP's provide access to 65% of the adult population and an opportunity to deliver targeted strategies to modify poor health behaviors. Ideally, strategies improve motivation, raise knowledge/importance, improve accessibility to programming and resources, and increase self-efficacy ⁷¹. As a result, employees and their families are enabled to overcome barriers to change/modify behaviors in support of healthful living ⁷⁰.

Self-efficacy is critical to sustained behavior change and is a construct of most behavior change theories including Social Cognitive Theory ¹²⁰, Theory of Planned Behavior ¹²⁸, Transtheoretical Model ^{82,83}, Health Belief Model ²¹⁸, and Health Action Process Approach ¹²⁹. Self-efficacy is the belief of having control, knowledge, skills, capability, and surroundings conducive to achieving one's goal ¹²¹. Higher self-efficacy levels are a predictor for intent to

change and behavior change success ¹²¹. Self-efficacy is behavior specific in that the same individual may have high self-efficacy for one behavior and low self-efficacy for another behavior ¹²¹. It determines the amount of effort that will be expended, how long effort will be sustained, and how high goals are set ¹²². Self-efficacy is associated with improved self-regulation skills of goal-setting and monitoring to change behavior ¹²³. It has been shown to increase with higher education ^{124,125}, decrease with age ¹²⁵, and be lower among women than men ^{125,127}; however, others suggest no difference in self-efficacy by age or gender ¹²⁴.

Higher self-efficacy has been linked to positive health behaviors: increased fruit, vegetable, fiber, and dairy intake along with increased physical activity, performance, weight loss, and smoking cessation ^{8,123,126,131,132}. Of all psychosocial constructs, self-efficacy is most closely correlated with physical activity ¹³³. Self-efficacy has been associated with lower body mass index (BMI), as well as reduced dietary and saturated fat intake ¹³¹.

Methods

A WWP implemented at three Midwest companies specializing in manufacturing and production included a health risk appraisal (HRA) and educational programming based on the Health Belief Model. The focus of the Health Belief Model is the perception of a health problem and the belief that behavior change can alleviate/diminish the health problem ⁷³. Programming included key theory constructs of perceived susceptibility, impact/advantages of change, assessment of benefits/barriers, cues to action, and self-efficacy.

Employees were recruited to take part in a baseline HRA via email and word of mouth with the recruitment goal of 60 employees at each site. All protocols were approved by a University

Human Subject Institutional Review Board; informed consents were obtained for each employee. At the baseline HRA, employees completed a series of validated surveys including basic demographics, self-efficacy ^{179,181}, dietary intake ¹⁵⁷, and physical activity ¹⁷². No monetary compensation was provided for the HRA; however, employees were made aware that the HRA was valued at \$100. One full calendar year after the baseline assessment, employees completed a follow-up HRA.

Employees at each worksite were randomly assigned to either the control (N = 30) or intervention group (N = 30) after completing the HRA. The control group received no further interaction until the 12 month HRA. The intervention group received 12 to 14 bi-weekly lunch-and-learn educational modules taking place over approximately six months. Modules were approximately 30 minutes in duration and topics were identified through focus groups with employees and management teams at each company. Module topics included: general well-being (stress management, goal setting, and exercise), nutrition (meal planning, disease prevention, label reading, and deciphering marketing ploys), and financial health (debt reduction, money personality, credit history, and investing in the future). Modules included experiential learning activities and were led by Extension and Outreach Program Specialists. The educational modules, activities, and discussion were designed to emphasize the constructs of perceived benefits and self-efficacy while reducing perceived barriers. There was no direct cost to the companies for any part of the program (HRA or intervention) but they were encouraged to provide incentives to enhance participation. Some incentivized with small prizes for attendance and participation. Free lunches were provided as an incentive and cue to action to reinforce some of the nutrition modules. Other cues to action included in programming

included encouraging use of Map My Run® (an electronic app used to track physical activity), Extension publications, tracking forms, and challenges. Challenges consisted of individual and/or team-based goals and activities (increase fruits and vegetables, track steps, limit dining out) with tracking forms and rewards given for success. After the six months of educational programming, the intervention group also received a series of eight bi-weekly newsletters for the next six months reinforcing module content.

Procedures

A combination of previously validated self-efficacy scales were included in the HRA for a total of 14 questions using a 4-point Likert scale where 1 = very uncertain in ability to make change and 4 = very certain in ability to make change^{180,181}. Five questions pertained to healthy foods, five to exercise, and the remaining four to health promoting behaviors. Responses for each of the three categories were scored individually for diet (0-20), exercise (0-20), and health promoting behavior (0-16). Scores for all items were totaled for a composite self-efficacy score ranging from 0 (low) to 56 (high).

Dietary intake was evaluated using the Block Food Frequency Screeners from NutritionQuest¹⁵⁷. The Dietary Fruit-Vegetable-Fiber Screener® included seven food items and consumption was assessed on a 6-point Likert scale ranging from less than once a week (0) to two or more times a day (5). Regression equations predicted dietary intakes for fruit and vegetable servings per day, dietary fiber (g), vitamin C (mg), magnesium (mg), and potassium (mg). The Dietary Fat Screener® included 15 food items with frequency assessed on a 5-point Likert scale ranging from once a month or less (0) to five or more times a week. Regression

equations predicted nutrient intakes for total fat (g), saturated fat (g), percent calories from fat and dietary cholesterol (mg) (4).

Physical activity level was assessed using a non-exercise assessment tool ²¹⁹. Employees indicated current activity level on a scale of 1 (low activity) to 5 (high activity). This value, along with age, gender, body mass index, and resting heart rate was used to calculate a metabolic equivalent task (MET) score ²⁰⁷. A MET score is an indicator of physical activity level where higher scores indicate a higher level of physical activity.

Finally, health literacy was assessed using Newest Vital Sign (NVS) ¹⁹³. This health literacy assessment tool consists of six questions regarding a nutrition label, and classifies individuals as high likelihood of limited literacy, possibility of limited literacy, or almost always adequate literacy ¹⁹³.

Statistical Methods

Change scores were computed for all variables: self-efficacy scores (healthy foods, exercise, health promoting behaviors, and composite), diet (fruit/vegetable servings, dietary fiber, potassium, magnesium, vitamin C, total fat, saturated fat, percent calories from fat, cholesterol), MET score, and health literacy score. Baseline values were subtracted from 12 month follow-up values for all variables where an increasing score indicated improvement in the variable (i.e. activity, fruit and vegetable servings). Twelve month values were subtracted from baseline values for all variables where a decreasing score indicated improvement in the variable (i.e. dietary fat, dietary cholesterol). Positive change scores indicated a desirable

change in health behavior whereas negative change scores indicated an undesirable change in health behavior.

Data was analyzed using SPSS version 21 (SPSS IBM, New York, U.S.A.) and significance was set at $p < 0.05$ while $p = .05 - .10$ was considered a trend.¹⁹⁹ Paired samples t-tests were used to examine health behavior change by subject. Independent samples t-tests were used to examine health behaviors by treatment and gender. Analysis of variance (ANOVA) was used to examine health behaviors by age and education status. Bivariate Spearman correlations were run to explore change scores and all health behavior variables. Multivariate regression models were run to examine whether treatment, gender, age, or education status had a predictive association with any of the four self-efficacy scores (healthy foods, exercise, health promoting behaviors and composite).

Results

Demographics

Employees participating in both the baseline and 12 month HRA ($n=92$) ranged in age from 20 to 76 years. Mean age was 40 years with fairly equal distribution by gender (43 men and 49 women) (Table 1). The majority of employees were white (>95%), two-thirds residing in rural areas. Employees ranged from primarily blue collar workers to administrative and professional staff. Independent samples t-test revealed the intervention group was significantly older than the control group ($t= -2.34, p = .02$). Gender distribution and education status was not significantly different between the treatment groups ($p = .53$ and $p = .61$, respectively; data not shown).

Self-Efficacy

Results reveal total self-efficacy was significantly higher ($p < .05$) in the control group at baseline. There was also a trend ($p = .05-.10$) for exercise and overall self-efficacy to be higher in the control group at baseline (Table 2). At 12 months, this trend continued as total self-efficacy was significantly higher and overall self-efficacy tended to be higher in the control group.

Results showed no significant differences in self-efficacy (baseline and 12 months) or change scores by gender and education status (Tables 2 and 3). At baseline, those with a college degree tended to have greater self-efficacy for exercise than those with only some college ($p = .08$).

Although not significant, the majority of self-efficacy scores increased with more education.

Self-efficacy was also examined by age (Table 3). At baseline and at twelve months follow-up, no significant differences were seen in self-efficacy scores by age. A trend was noted at 12 month follow-up suggesting those in the 41-50 year age group had less general self-efficacy than those <30 years. Overall, all self-efficacy scores decreased slightly from <30 years to 41-50 years, but then rebounded slightly in the 51+ years age group. No significant differences were noted among the age categories and the four self-efficacy change scores.

Multivariate regression models did not identify any predictive association of any individual covariates (treatment, gender, age, and education status) with any of the four self-efficacy scores (healthful foods F ratio = 0.12, p-value 0.99; exercise F ratio = 0.16, p-value 0.98; general F ratio = 0.93, p-value 0.46; total F ratio = 0.20, p-value 0.96).

Health Behaviors

Health behaviors were also examined to explore whether behavior change may have occurred without change in self-efficacy. Independent samples t-tests of health behavior change scores including dietary intakes (fruit/vegetable servings, dietary fiber, potassium, magnesium, vitamin C, total fat, saturated fat, percent calories from fat, cholesterol), MET score, and health literacy score revealed no significant difference in change by treatment group or gender (data not shown). There was a trend ($p=.10$) among the intervention group to increase fruit and vegetable intake (data not shown).

Health behavior change scores for fiber ($p = .05$), magnesium ($p = .05$), vitamin C ($p = .07$), and potassium ($p = .05$) tended to be higher for those between the ages of 41-50 compared to those less than 30 years of age. Those 41-50 years of age tended to have higher change scores for dietary fat intake ($p = .07$) and percent calories from fat ($p = .07$) in comparison to those above the age of 50 (data not shown).

Health behavior change scores by education status suggest significant differences ($p = .01-.02$) between the high school and college graduate groups for dietary fiber, vitamin C, magnesium, and potassium. Health behaviors among the high school group improved while college graduates worsened (data not shown).

Significant ($p < .05$) correlations were observed between healthful foods self-efficacy and total fat, saturated fat, percent calories from fat, and cholesterol change scores (Table 4). Correlational trends were found between exercise self-efficacy and activity level change scores, general health self-efficacy and fruit/vegetable servings change scores, as well as total self-

efficacy with fruit/vegetable change and activity level change scores (Table 4). All correlations were positive suggesting employees with higher self-efficacy scores were more likely to improve health behaviors.

Discussion

The lack of significant difference by treatment in self-efficacy and health behavior change scores may be attributed to many factors. The control group at baseline had a significantly higher total self-efficacy ($p = .04$) and the intervention group was slightly older ($p = .02$). Both of these differences between the treatment groups likely contributed to the observed findings. Potential self-efficacy improvements in the intervention group may not have been detected due to the control group having significantly higher self-efficacy scores at baseline. Younger employees in the control group likely have higher self-efficacy than older employees in the intervention group as research suggests self-efficacy decrease with age¹²⁵. Previous research suggests others demographics such as gender and education also influence self-efficacy^{124,125}, which in turn influences health behaviors^{8,123,126,131,132}.

Previous research suggests motivated employees are more apt to participate in voluntary programs⁷². Employees self-selected to participate in this program and this pre-existing motivation may be a contributing factor to the results observed⁷². It is also likely those same motivated employees that initially volunteered were also more likely to complete the program and 12 month HRA, while others dropped out. Therefore, the final sample including both baseline and 12 month follow up data may tend to represent the healthier employees with higher self-efficacy

Further, health disparities may be present in this study sample due to a primarily rural population. Research suggests the health of rural individuals is less optimal than their urban counterparts due to reduced access ²². Thus, the lack of difference observed between the treatment groups may be due to the self-select nature of the participants and/or greater risk of health disparities present in both treatment groups, which decreases the likelihood of observing behavior change between the two groups.

Finally, research suggests the use of HRA's alone can improve health outcomes and increase awareness, perceived susceptibility/severity, and ultimately improve health outcomes ⁷⁷. In the present study, both the control and intervention took part in the HRA, which may account for the lack of change observed between the treatment groups.

Contrary to previous research suggesting greater self-efficacy among males, these results suggest no significant difference in any of the self-efficacy scores by gender ¹²⁷. Similar to previous findings, older employees had lower self-efficacy scores than younger employees for all baseline self-efficacy scores ¹²⁶; however, these differences were not significant. These differences in baseline self-efficacy by age may have also led to differences in health behavior change scores by age. The older employees in this study had more room for improvement potentially contributing to more improved health behavior change scores. It should be noted that the majority of self-efficacy scores improved from baseline to 12 month follow up in all age and education groups.

Although not significant, results from the current study suggest self-efficacy increases with higher education, which is consistent with previous findings ^{124,125}. Interestingly, dietary fiber,

vitamin C, magnesium, and potassium intake declined in those with more education and improved in those with less education. This is likely due to the fact that the lower educated employees had more room for improvement in dietary behaviors than the more highly educated employees.

Consistent with previous research, change in self-efficacy was found to be correlated with change in health behaviors (activity level, total calories from fat, and saturated fat) ^{131,133}. Addressing self-efficacy is necessary to improve health behaviors; however, recent evidence suggests self-efficacy may be more crucial to initial behavior change than to long-term behavior change ¹³⁴.

Conclusion

Not surprisingly, changes in self efficacy were found to be associated with changes in health behaviors demonstrating the importance of improved self-efficacy from health education to solicit positive behavior change. Findings suggest self-efficacy is lower among older adults and increases with education level which should be considered during program development. Designing an effective program requires tailoring programming to gender, age, and education status to foster significant improvements in self-efficacy and subsequently health behaviors. Based on findings, employees with lower self-efficacy at baseline will likely demonstrate greater improvements from programming.

The majority of participants were rural residents and previous research has noted less optimal health for this population than urban residents due to limited access to resources. Health interventions for rural populations are pertinent to resolve health disparities present in

these locations. Health promotion programming for rural residents should be tailored specifically to this population to increase self-efficacy relative to existing resources to improve health behaviors.

Limitations

Employees self-selected to take part in the program (92 employees at follow-up) making them more apt to change behavior and continue with the program. High self-efficacy scores at baseline may have caused a ceiling effect and self-reported responses may have skewed results. At baseline, employees in the control group had higher self-efficacy scores than the intervention.

Employees in both the control and intervention received HRA results and worked in the same facilities. The HRA results may have elicited behavior change while working in the same facility may have led to cross over of behavior change/knowledge/motivation from the intervention to the control. These findings should not be extrapolated to all populations as over half of the subjects reside in rural areas and are primarily blue collar workers. Further, socioeconomic status data was not collected as part of this study.

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Age	TOTAL (N = 92)	Male (N = 43)	Female (N = 49)	Control (N = 47)	Intervention (N = 45)
Mean Age	40.57 years	41.02 years	40.16 years	38.60 years	42.62 years
<30	32.6% (N=30)	27.9% (N=12)	36.8% (N=18)	40.4% (N=19)	24.4% (N=11)
31-40	21.7% (N=20)	25.6% (N=11)	18.4% (N=9)	31.9% (N=15)	11.1% (N=5)
41-50	21.7% (N=20)	27.9% (N=12)	16.3% (N=8)	4.3% (N=2)	40.0% (N=18)
51+	23.9% (N=22)	18.6% (N=8)	28.6% (N=14)	23.4% (N=11)	24.4% (N=11)
TOTAL:		46.7%	53.3%	51.1%	48.9%
Educational Status	TOTAL	Male	Female	Control	Intervention
High school degree or less	21.7% (N=20)	16.3% (N=7)	26.5% (N=13)	21.3% (N=10)	22.2% (N=10)
Some college	32.6% (N=30)	30.2% (N=13)	34.7% (N=17)	31.9% (N=15)	33.3% (N=15)
College graduate or above	45.7% (N=42)	53.5% (N=23)	38.8% (N=19)	46.8% (N=22)	44.4% (N=20)

Self-efficacy Score	Control		Intervention		Change Score P-value
	Baseline	12 months	Baseline	12 months	
Healthful Foods (out of 20)	14.47 \pm 3.31	14.64 \pm 3.39	13.60 \pm 3.39	13.98 \pm 3.04	.86
Exercise (out of 20)	14.09 \pm 3.47*	14.15 \pm 3.38	12.89 \pm 3.31*	13.02 \pm 3.38	.81
General (out of 16)	11.89 \pm 2.56*	11.91 \pm 2.57**	10.76 \pm 3.11*	10.62 \pm 2.56**	.64
TOTAL (out of 56)	40.45 \pm 7.35**	40.70 \pm 8.07*	37.00 \pm 8.80**	37.33 \pm 8.53*	.98
	Male		Female		
	Baseline	12 months	Baseline	12 months	
Healthful Foods (out of 20)	13.49 \pm 3.49	13.88 \pm 3.72	14.53 \pm 3.19	14.69 \pm 2.70	.84
Exercise (out of 20)	13.98 \pm 3.56	13.79 \pm 3.60	13.08 \pm 3.29	13.43 \pm 3.26	.51
General (out of 16)	11.00 \pm 3.32	10.91 \pm 2.98	11.63 \pm 2.42	11.61 \pm 2.26	.75
TOTAL (out of 56)	38.21 \pm 9.31	38.28 \pm 9.86	39.24 \pm 7.23	39.73 \pm 6.96	.74

**p<.05 between control and intervention

*p=.05 - .10 between control and intervention

Table 3. ANOVA of self-efficacy scores by education and age. Mean \pm standard deviation.

Self-efficacy Score	Baseline				12 Months				Change Score P-value
	High School Degree or Less	Some College	College Graduate or Above		High School Degree or Less	Some College	College Graduate or Above		
Healthful Foods (out of 20)	13.80 \pm 3.25	13.73 \pm 3.83	14.38 \pm 3.08		14.05 \pm 2.95	14.17 \pm 3.61	14.55 \pm 3.12		.72
Exercise (out of 20)	12.85 \pm 2.66	12.80 \pm 3.13*	14.31 \pm 3.82*		13.20 \pm 2.75	12.97 \pm 2.70	14.24 \pm 4.05		.98
General (out of 16)	10.80 \pm 3.86	11.37 \pm 2.51	11.57 \pm 2.61		11.00 \pm 3.24	10.87 \pm 2.34	11.71 \pm 2.50		.55
TOTAL (out of 56)	36.90 \pm 9.49	37.90 \pm 7.09	40.26 \pm 8.28		37.60 \pm 9.72	38.00 \pm 6.87	40.50 \pm 8.73		.93
Years	<30 yrs	31-40 yrs	41-50 yrs	51+ yrs	<30 yrs	31-40 yrs	41-50 yrs	51+ yrs	
Healthful Foods (out of 20)	15.00 \pm 3.43	13.55 \pm 3.75	12.95 \pm 2.98	14.18 \pm 3.02	15.23 \pm 3.21	13.75 \pm 4.27	13.85 \pm 2.50	14.00 \pm 2.62	.75
Exercise (out of 20)	14.07 \pm 3.08	13.35 \pm 3.82	13.50 \pm 3.22	12.86 \pm 3.78	14.40 \pm 3.44	13.05 \pm 3.52	13.20 \pm 3.68	13.36 \pm 3.03	.82
General (out of 16)	12.07 \pm 2.08	10.45 \pm 3.87	10.60 \pm 2.96	11.82 \pm 2.48	12.13 \pm 2.22*	11.15 \pm 3.39	10.35 \pm 2.25*	11.09 \pm 2.51	.50
TOTAL (out of 56)	41.13 \pm 7.22	36.80 \pm 10.18	37.05 \pm 8.18	38.86 \pm 7.28	41.77 \pm 7.79	37.30 \pm 10.59	37.40 \pm 7.75	38.45 \pm 7.16	.96

* $p = .05-.10$ between education status or age group

Table 4. Bivariate Spearman correlations of self-efficacy and health behavior change scores.

Change Scores	Self-Efficacy Change Scores									
	Healthy foods		Exercise		General Health		TOTAL			
	CC ¹	P-value	CC	P-value	CC	P-value	CC	P-value	CC	P-value
Fruit & vegetable servings	.12	.28	.15	.16	.18	.10*	.20	.05*		
Dietary fiber (g)	.10	.34	.09	.40	.11	.29	.15	.15		
Vitamin C (mg)	.10	.34	.11	.32	.12	.27	.17	.11		
Magnesium (mg)	.10	.37	.10	.36	.12	.28	.16	.14		
Potassium (mg)	.11	.29	.10	.37	.13	.23	.17	.11		
Total fat (g)	.24	.02**	-.02	.86	.09	.42	.12	.25		
Saturated fat (g)	.25	.02**	.02	.89	.08	.47	.15	.15		
Percent calories from fat	.25	.02**	-.01	.95	.10	.36	.14	.19		
Cholesterol (mg)	.25	.02**	.02	.85	.08	.46	.15	.15		
Health Literacy	-.04	.72	-.13	.21	-.14	.20	-.13	.23		
Activity Level	.11	.29	.21	.05*	.17	.11	.18	.09*		
MET Score ¹	.03	.80	.11	.30	.13	.22	.10	.37		

¹CC Correlation Coefficient

²MET Score

** $p < .05$

* $p = .05-.10$

CHAPTER 6

CONCLUSION

Results confirm previous findings that increasing adiposity negatively impacts health outcomes. BIA, BMI, and W-H Ratio weight status categorization methods identified differences in health status indicators similarly; however, there were some unique differences. These findings suggest the use of multiple body adiposity measures may be warranted when screening for a variety of chronic diseases. Tailoring body fat measure use based on gender, age, and disease risk/state may provide benefits. This will more accurately reflect adiposity and lead to early diagnoses with preventative treatment. It appears that weight status categorization methods uniquely detect differences in some health status indicators.

Findings suggest self-efficacy is lower among older adults and increased with education level. Health status indicators were shown to vary by gender. Findings suggest education has the strongest influence on self-efficacy which should be taken into account during program development. Designing a program to control for outside factors and tailoring programming to gender, age, and education status may provide the foundation for significant improvements in self-efficacy and health behaviors. Health interventions for rural populations are pertinent to resolve health disparities present in these locations. Not surprisingly, changes in self efficacy were found to be associated with changes in health behaviors demonstrating the importance of improved self-efficacy from health education to solicit positive behavior change.

Limitations

The study included participants who self-selected to take part in the program making them more apt to have an interest in health. Many surveys were based on self-report /proxy responses. Socioeconomic status data was not collected from participants. Participants in both the control and intervention received their HRA results which may have elicited behavior change in both groups. Control and intervention employees worked at the same facilities and behavior changes/knowledge/motivation in the intervention may have crossed over into the control. This study had a small sample size of 92 employees at follow-up.

Future Directions

Recently, the National Institute for Health Care Management convened a panel of experts to develop focus points to guide future WWP research (Goetzel et al., 2011). Questions they have identified and some of my own based on my findings include:

- What aspects of the organizational environment or culture affect program success?
- What changes can employers make to create a more supportive culture within their company?
- What are the biggest drivers of medical spending, absenteeism, presenteeism, and disability?
- What health promotion programs are feasible and most effective for smaller employers? Are there effective models for coalitions of small employers?
- What is the role of financial incentives in encouraging engagement and participation and in motivating behavioral change? What non-financial motivators contribute to program success? What are the long-term implications of utilizing these incentives?
- How do worksite health promotion programs affect quality of life, psychosocial drivers of behavior (e.g. stress, social isolation, self-efficacy), health risk factors, behavior and clinical outcomes?

- How can health-related productivity losses (or gains) be measured and monetized in ways that are meaningful for business leaders and shareholders?
- What factors affect ROI and to what extent? Can this effect be standardized?
- What communication methods are best for certain groups?
- What is the optimal length of time (session and overall program) needed for a program to achieve results and sustain these changes?

ACKNOWLEDGEMENTS

This program was partially funded through the Department of Commerce, Economic Development Administration and the National Institute for Standards and Technology (NIST) Manufacturing Extension Partnership. Iowa State University Extension and Outreach field specialists for program development and delivery: Jody Gatewood, Tim Griesdorn, Jill Weber, Phyllis Zalenski, Holly VanHeel, Ruth Freeman, Renee Sweers and Jan Monahan. The organization's Human Resource representatives assisted with program coordination and collection of attendance records. This program would not be possible without commitment from the study participants.

APPENDIX

ON-LINE SURVEY AND FOCUS GROUP RECRUITMENT EMAIL TEXT
FOCUS GROUPS QUESTIONS
INFORMED CONSENTS
INSURANCE RELEASE FORMS
CREDIT REPORT FORM
DATA COLLECTION FORM
SURVEY EXPLANATIONS AND REFERENCES
EMPLOYEE RESULTS FORMS
RESULT TALKING POINTS
SPSS DATA ENTRY KEY
ATTENDANCE KEY
HEALTHCARE CLAIMS KEY
ICD9 CODES

ON-LINE SURVEY AND FOCUS GROUP RECRUITMENT EMAIL TEXT

Suggested Recruitment Script to be included in email or payroll stuffer.

Our company is considering establishing a worksite wellness program in collaboration with Iowa State University. The first step in this process is to conduct a survey of our employees and conduct a focus group with a few employees so the worksite wellness program can be designed to best meet your needs.

Worksite wellness programs have been shown to improve physical health, financial success, and overall sense of well-being. The survey will take about 10-15 minutes of your time, depending on your responses. After completing the survey, you will have an opportunity to win a check for \$50 in a random drawing, no matter whether you complete all parts of the survey. Company management personnel will not receive individual survey responses, only a descriptive overview of all survey responses collectively. If you are interested in participating in this survey, please click on the link provided below.

LINK REMOVED

In addition to the survey responses, the researchers would like to meet with a few volunteers to discuss the worksite wellness program design in more detail. ISU is requesting 7 - 10 employees to participate in this focus group. If you agree to participate, you will be asked to attend a focus group session, along with approximately 7 to 10 other employees. The focus group will be a discussion, which allows the researcher to learn about your thoughts and attitudes towards worksite wellness programming. You will be asked as a group to respond to a series of questions and share your perceptions. Your time commitment will be approximately forty-five (45) minutes to one (1) hour. The focus group sessions will be audio-recorded. The tapes will be transcribed by the researchers and will be erased following the transcription (within 6 months). Names will not be included as the recording is being transcribed. Company management personnel will not be present during the focus group, nor will they receive a copy of the transcript. You would be paid \$25 for your participation in this focus group. If you are interested in volunteering to be a part of this focus group please contact the human resources office.

FOCUS GROUP QUESTIONS

Employee Focus Group Questions

1. Describe your biggest frustrations or stressors in the areas of health, nutrition and money?
 - How do these frustrations or stressors affect you personally and in your relationships?
 - Why do think some are more successful in these areas than others?
 - How do you determine if you have been successful in these areas?
2. Results of the online survey suggest fairly frequent use of convenience foods and fast foods, do you have thoughts or opinions?
3. What are your expectations of a worksite wellness program? What would the ideal worksite wellness program look like?
4. Results of the online survey suggest the following...what would this look like?
 - i. Walking program
 - ii. Stretching program
5. Describe challenges or barriers that keep you from participating in programs offered by your worksite or in the community? (i.e. educational programs/classes, exercise programs/classes)
6. What would motivate you to participate in programs offered by your worksite? (educational programs/classes, exercise programs/classes)
 - a. Incentives?
 - b. Topic/type of class offered
7. Results of the online survey suggest the following...can you describe or explain?
 1. cancer prevention?
 2. CVD prevention?
 3. debt reduction?
8. Time/location class is offered
9. Financial incentive (vacation time)
10. How does your overall well-being impact you at work?
11. How does your employer/organization show their concern about your overall well-being?
12. Describe how you prioritize your resources (i.e. time and money).

Employer Structured Interview Questions

1. Describe the overall vision and functions of a health promotion program for your organization.
 2. What financial and human benefits do you expect from a health promotion program at your organization?
 3. What financial and logistical support will your organization provide to support a health promotion program?
 - a. Incentives?
 - b. Flexible work schedule?
 4. Has your organization previously implemented or attempted to implement a health promotion program?
 - a. If so, please describe the program and the outcomes.
 - b. If not, please explain what barriers have prevented implementation of a health promotion program. Do you believe these barriers are still present?
 5. Describe your perception of the organization's employee interest in a health promotion program.
 6. Does your organization intend to track individual and organization benefits of health promotion programs?
 - a. If so, how?
 7. Does your organization intend to celebrate individual and organization achievement of health goals?
 - a. If so, how?
 8. Describe your past and current personal efforts to adopt healthier lifestyle practices.
- Employees' financial health has also been shown to impact overall health...**
9. Does your organization have a defined contribution retirement benefit (401-k or something similar) for employees?
 - a. If so, are there any default selections (i.e. auto-enrollment, auto-escalation, investment selection, etc.) associated with this program?
 - b. Does this benefit have an employer match?
 - c. What is the current participation rate for this program?
 10. Does your organization offer a flexible spending account for medical or dependent care expenses?
 11. Does your organization consider offering early retirement incentives?
 - a. If so, what types?
 12. Which of the following statements best describes your organization's attitude toward health promotion:

- a. We are enthusiastic about health promotion and actively promote it at the workplace.
- b. We are enthusiastic about health promotion, but do not actively contribute to our workplace health promotion effort.
- c. We are neutral about whether or not we should have a health promotion program here.
- d. We are opposed to health promotion, but I am not actively working to stop health promotion programs.
- e. We are opposed to health promotion and I am doing what I can to stop health promotion programs at the workplace.

Wellness Committee Structured Interview Questions

1. Describe the overall vision and functions of a health promotion program for your organization.
2. What financial and human benefits do you expect from a health promotion program at your organization?
3. What financial and logistical support will your organization provide to support a health promotion program?
 - a. Incentives?
 - b. Flexible work schedule?
4. Has your organization previously implemented or attempted to implement a health promotion program?
 - a. If so, please describe the program and the outcomes.
 - b. If not, please explain what barriers have prevented implementation of a health promotion program. Do you believe these barriers are still present?
5. Describe your perception of the organization's employee interest in a health promotion program.
6. Does your organization intend to track individual and organization benefits of health promotion programs?
 - a. If so, how?
7. Does your organization intend to celebrate individual and organization achievement of health goals?
 - a. If so, how?
8. Describe your past and current personal efforts to adopt healthier lifestyle practices.
9. Which of the following statements best describes your organization's attitude toward health promotion:
 - a. We are enthusiastic about health promotion and actively promote it at the workplace.
 - b. We are enthusiastic about health promotion, but do not actively contribute to our workplace health promotion effort.
 - c. We are neutral about whether or not we should have a health promotion program here.
 - d. We are opposed to health promotion, but I am not actively working to stop health promotion programs.
 - e. We are opposed to health promotion and I am doing what I can to stop health promotion programs at the workplace.

INFORMED CONSENTS

INFORMED CONSENT DOCUMENT

Title of Study: Worksite Wellness Focus Group

Investigators: Ruth Litchfield, Ph.D., (Principal Investigator);
 Tim Griesdorn, Ph.D., (Co-PI);
 Mike O'Donnell, MBA, (Co-PI);
 Kayli Julander (Co-PI);
 Kevin Zimmerman (Co-PI).

This is focus group research study. Please take your time in deciding if you would like to participate. Please feel free to ask questions at any time.

INTRODUCTION

The purpose of this study is to conduct a focus group to identify employee needs and perceptions regarding worksite wellness programs. This information will be used to develop worksite programs that promote positive behaviors and skills in the area of health, nutrition and personal finance with a goal of improving employee wellness and financial literacy. Through the use of focus groups, we hope to understand the individual needs of your workplace; therefore, allowing us to create a customized worksite wellness program that better suits the needs of your worksite. You are being asked to participate in this study as a potential participant in a worksite wellness program. Participation in this focus group does not mean you agree to participate in the workplace wellness program when it is established, nor do you have to participate in a focus group to be eligible to participate in the workplace wellness program.

DESCRIPTION OF PROCEDURES

If you agree to participate, you will be asked to attend a focus group session, along with approximately 7 to 10 other employees. No management or supervisory employees will participate in the focus group. The focus group will be a discussion, which allows the researcher to learn about your thoughts and attitudes towards worksite wellness programming. You will be asked as a group to respond to a series of questions and share your perceptions. Your time commitment will be approximately forty-five (45) minutes to one (1) hour. The focus group sessions will be audio-recorded. The tapes will be transcribed by the researchers and will be erased following the transcription (within 6 months). Names will not be included as the recording is being transcribed.

RISKS

Potential risks of the study are minimal beyond those of participating in a group discussion. Some participants may be uncomfortable sharing their opinions in a group setting.

BENEFITS

If you decide to participate in this study there may be no direct benefit to you. You may gain an increased awareness of worksite wellness opportunities. The information gathered in this focus group will be used to design pilot interventions to increase employee awareness of these issues and provide strategies for behavioral change.

COSTS AND COMPENSATION

You will not have any costs from participating in this study. You will be compensated \$25 for participating in this study. You will need to complete a form to receive payment. Please know that payments may be subject to tax withholding requirements, which vary depending upon whether you are a legal resident of the U.S. or another country. If required, taxes will be withheld from the payment you receive.

PARTICIPANT RIGHTS

Your participation in this study is completely voluntary and you may refuse to participate or leave the study at any time. If you decide to not participate in the study or leave the study early, it will not result in any penalty or loss of benefits to which you are otherwise entitled. You can elect to not respond to any questions that you do not wish to answer.

CONFIDENTIALITY

Records identifying participants will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal government regulatory agencies, auditing departments of Iowa State University, Economic Development Administration and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis. These records may contain private information. Confidentiality of all records is strictly maintained by established procedures.. To ensure confidentiality to the extent permitted by law, the following measures will be taken: 1, the original study data will be kept in the principle investigator's office and will be entered into a computer by the principal investigator or a co-principal investigator; 2. the computer file will contain the research data that will be utilized for the statistical analysis; 3.the statistical data will not contain any personal information such as the name of the person who participated in the focus group, or email address; 4, the statistical data will be kept on Iowa State University computers during the time the research is being conducted; access to these computers requires a principle investigator

user name and password; 6. focus group participants will be instructed not to share anything during the focus group that do not want more widely shared; and 7. focus group participants will be instructed to keep what they hear confidential. Focus group transcripts will not be shared with management or supervisory employees. Focus groups results will be shared with management in report format, which describe general themes and ideas that emerged from the focus group.

Physical records are stored in a secured building in a locked cabinet. Field notes will be locked in a file cabinet and will be destroyed after three years. The primary investigator and co-investigators are the only people who will have access to the data. Violations of confidentiality will be immediately reported to the IRB. Study records will not identify subjects by name but using a numeric code. If the results are published, your identity will remain confidential.

QUESTIONS OR PROBLEMS

You are encouraged to ask questions at any time during this study.

- For further information about the study contact Ruth Litchfield by phone at 515-294-9484 or via email at litch@iastate.edu.
- If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

PARTICIPANT SIGNATURE

Your signature indicates that you voluntarily agree to participate in this study, that the study has been explained to you, that you have been given the time to read the document, and that your questions have been satisfactorily answered. You will receive a copy of the written informed consent prior to your participation in the study.

Participant’s Name (printed) _____

(Participant’s Signature)

(Date)



INFORMED CONSENT DOCUMENT

Title of Study: Worksite Wellness Program

Investigators: Ruth Litchfield, Ph.D., (Principal Investigator);
Tim Griesdorn, Ph.D., (Co-PI);
Mike O'Donnell, MBA, (Co-PI);
Kayli Julander (Co-PI);
Kevin Zimmerman (Co-PI)

This is a research study. Please take your time in deciding if you would like to participate. Please feel free to ask questions at any time.

INTRODUCTION

The purpose of this study is to create a worksite wellness program to promote positive behaviors and skills in the area of health, nutrition and personal finance to improve employee wellness and financial literacy. We are examining the impact of the worksite wellness program on healthcare usage as well as health status markers. This data will demonstrate how worksite wellness programs provide a return on investment to both the employer (healthcare usage and cost) and the employee (health status). The objectives are to increase understanding of nutrition and physical activity recommendations, modify the workplace food environment (vending machine and cafeteria), improve dietary intakes, increase physical activity levels, improve health status indicators, increase participation in Flexible Spending Accounts, improve financial management skills, increase awareness of community resources available to assist with financial decision making, establish personal financial goals and make progress towards those goals, and increase productivity. You are being invited to participate in this study as a participant in the worksite wellness program. Participation in the health risk appraisal means you agree to participate in the workplace wellness program when it is established. If you presently have one of the following unmanaged health conditions (asthma, coronary artery disease, depression, diabetes, hypertension, migraines, cancer or cancer related complications) you will be excluded from the wall sit and 3-minute step test portion of the health risk appraisal.

DESCRIPTION OF PROCEDURES

If you agree to participate, you will be asked to complete:

- A health/medical history [i.e. education, gender, age, nationality, marital status, family/friend ties, children, pregnancy status (women only), tobacco and alcohol use, sleep habits]
- Surveys about physical activity, stress level, financial well-being, satisfaction with life, food security, eating habits, work experiences, and intentions
- Fitness assessment (hand grip strength, wall sit test, shoulder mobility test, body composition test, and a 3-minute step test)
- Height will be measured using standard meter sticks attached to the wall and flat headpiece to form a right angle with the wall
- Weight will be measured with a portable digital scale
- Blood pressure and heart rate will be measured with an automated cuff following the National Heart Lung and Blood Institute guidelines
- Finger stick for blood sample (glucose, triglycerides, cholesterol) will be taken by a Blood Borne Pathogen trained team member. The finger stick will be done with a lancet on the finger tip to obtain a few drops of blood.
- Financial counseling (ISU faculty) to review financial well-being scale and may complete a Credit Report Request Form (this will require your social security number and your credit history report will be mailed to you)
- Health counseling (ISU faculty) to review health related surveys, risk appraisal results and complete a health literacy assessment.

Participants will be randomly assigned to either receive or not receive the worksite wellness programming. You will not be allowed to decide which group you wish to participate.

Your participation will last anywhere from 12 months to a maximum of 24 months. The initial assessment will last approximately an hour and will consist of the above mentioned surveys, fitness assessments, blood draw, and measurements. The worksite wellness programming portion of this study will consist of 13-26 educational sessions lasting an hour to an hour and a half in length over a six month period of time. The paper based portions of the health risk appraisal will be administered at the conclusion of programming (approximately 15 minutes in length). The follow-up health risk appraisal will occur six months after completion of the

wellness programming and will consist of the same data collection as the initial assessment (approximately one hour in length).

Participant absenteeism records will be tracked by your employer and will be provided to the research team over the course of the study. Healthcare use (office visits, procedures, hospitalization, prescription claims, and diagnoses) tracked by your insurance carrier and will be provided to the research team upon completion of a Health Information Portability and Privacy Act authorization form.

RISKS

Potential risks of the study are minimal beyond those of getting a physical exam and attending educational programs on nutrition and finance. Potential bruising or infection may result around the finger stick site. While participating in this study you may experience the following risks: boredom when completing the study surveys, learn your current lifestyle exposes you to higher risks of heart disease, cancer, and type 2 diabetes, or feel uncomfortable when asked to participate in adult learning strategies such as cooperative learning in the education programs. All precautions are being taken to maintain confidentiality of all personal information.

BENEFITS

If you decide to participate in this study there may be no direct benefit to you. You will receive individual feedback from filling out a risk assessment that highlights areas for improvement and how your values compare to recommended standards or guidelines. You will gain knowledge and understanding of your current health and financial status as well as receive educational programming on healthy living (food preparation skills, nutrition and physical fitness) and resource management principles. This may improve your overall health, improve productivity and profits, and decrease healthcare expenditures. It is hoped that the information gained in this study will benefit society by improving worksite wellness programming to facilitate the transfer of positive behaviors and skills in the area of health, nutrition and personal finance to employees.

COSTS AND COMPENSATION

You will not have any costs from participating in this study. The initial and follow-up health risk appraisals will be provided to participants free of charge representing an approximate \$100 value to participants. Participants will also receive all educational programming free of charge.

PARTICIPANT RIGHTS

Your participation in this study is completely voluntary and you may refuse to participate or leave the study at any time. If you decide to not participate in the study or leave the study early, it will not result in any penalty or loss of benefits to which you are otherwise entitled. You

can skip any questions that you do not wish to answer or any portion of the health risk appraisal.

CONFIDENTIALITY

Records identifying participants will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal government regulatory agencies, auditing departments of Iowa State University, Economic Development Administration and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis. These records may contain private information.

To ensure confidentiality to the extent permitted by law, the following measures will be taken: Confidentiality of all records is strictly maintained by established procedures, the original study data are kept in a locked file in the principal investigator's office with access limited to the principal investigator. All data will be stripped of personal identifiers prior to entering data into an electronic data file using SPSS (Statistical Package for the Social Sciences). Study records will not identify subjects by name but using a numeric code. The data will be entered into a computer by the principal investigator or a co-principal investigator. The computer file will contain the research data that will be utilized for the statistical analysis. The statistical data will not contain any personal information such as your name or email address. The statistical data will be kept on Iowa State University computers during the time the research is being conducted. Access to these computers requires a principal investigator user name and password and access is limited to those listed as investigators. Physical records are stored in a secured building in a locked cabinet and will be destroyed after three years. The primary investigator and co-investigators will review all data. Any violation of confidentiality will be immediately reported to the IRB. All measures will be taken for participant privacy and confidentiality throughout data collection (health risk assessment) and analysis. During the health risk appraisal, those items confidential/sensitive in nature will be performed in as much privacy (i.e. private room, curtains, screens) as possible. Electronic files will be retained for five years after data collection. If the results are published, your identity will remain confidential as only group data will be shared.

QUESTIONS OR PROBLEMS

You are encouraged to ask questions at any time during this study.

- For further information about the study contact Ruth Litchfield, (515) 294-9484 or via email at litch@iastate.edu.

- If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

.....

PARTICIPANT SIGNATURE

Your signature indicates that you voluntarily agree to participate in this study, that the study has been explained to you, that you have been given the time to read the document, and that your questions have been satisfactorily answered. You will receive a copy of the written informed consent prior to your participation in the study.

Participant's Name (printed) _____

(Participant's Signature)

(Date)

INSURANCE RELEASE FORMS



Authorization

This form is used to authorize First Administrators, Inc. to disclose protected health information at the request of the individual.

Individual Authorizing Disclosure

Name: _____

Address: _____

City, State, Zip Code: _____

Telephone: _____ E-mail: _____

Identification Number: _____ Social Security Number: _____

Use or Disclosure Being Authorized

Entity Authorized to Disclose: First Administrators, Inc.

Protected Health Information to be Disclosed: Specifically and meaningfully describe the protected health information you are authorizing to be disclosed:

Date of service, health care provider, type of service, amount paid by health plan, and diagnosis code.

Persons or Entities Authorized to Receive: Name or specifically identify the persons and/or organizations (or the classes of persons and/or organizations), to whom you are authorizing the disclosure and subsequent use of the protected health information described above:

Ruth Litchfield, Iowa State University

Kayli Julander, Iowa State University

Effect of Granting this Authorization: I understand that if the person or entity that receives the information requested is not covered by federal or state privacy laws, the information described above may be redisclosed and will no longer be protected by law.

Prohibition of Redisclosure: This form does not authorize the disclosure of medical information beyond the limits of the authorization. Where information has been disclosed from the records protected by Federal law for alcohol/drug abuse records or state law for mental health records, the Federal requirements (42 CFR Part 2) and state requirements (SDCL 27A-12) prohibit further disclosure without the specific written consent of the release of medical or other information is NOT sufficient for this purpose. The Federal rules restrict any use of the information to criminally investigate or prosecute any alcohol or drug abuse patient.

No Conditions: This authorization is voluntary. First Administrators, Inc. will not condition your enrollment in a health plan, eligibility for benefits or payment of claims on giving this authorization.



Expiration and Revocation

Expiration: This authorization will expire upon termination of my health plan coverage, or upon settlement of claims incurred while covered, unless revoked or an earlier date or event is entered below:

- On 02 / 15 / 2014 (Date)
- On occurrence of the following event(which must relate to the individual or to the purpose of the use and/or disclosure being authorized):

Right to Revoke: I understand that I may revoke this authorization at any time by giving written notice of my revocation of First Administrators, Inc. at the address stated below. I understand that revocation of this authorization will *not* affect any action you took in reliance on this authorization before you received my written notice of revocation.

Individual's Signature

Specific Authorization for Release of Mental Health, Substance Abuse Treatment of Aids-Related Information: I authorize the release and disclosure of any and all personal health information, including specifically mental health information, substance abuse (drug or alcohol), and AIDS-related information, if applicable, and all claims information to the individual named below as long as this appointment of Authorized Representative is in effect. I understand that I may inspect the mental health information disclosed.

I, _____, have had full opportunity to read and consider the contents of this personal representative appointment and authorization, and I understand that, by signing this form, I am confirming my authorization of the disclosure of my protected health information, as described in this form. If this authorization involves the disclosure of mental health information, I acknowledge receipt of a copy of the authorization.

Signature: _____ Date: _____

A spouse or parent of an individual 18 years or older may NOT sign on behalf of the individual without appointment through a legal process or by the individual submitting a personal representative appointment form.

If this authorization is signed by a personal representative on behalf of the individual, complete the following:

Personal Representative's Name:

Relationship to Individual:

Send completed and signed form to:

First Administrators, Inc.
Compliance Department
PO Box 9900
Sioux City, Iowa 51102

You may also send via fax to (712) 279-8579 or email to: FAIComplianceTeam1@wellmark.com.
If you have questions about how to complete this form, please call (712) 279-8400.



An Independent Licensee of the Blue Cross and
Blue Shield Association

AUTHORIZATION

This form is used to authorize Wellmark to disclose protected health information at the request of the individual.

INDIVIDUAL AUTHORIZING DISCLOSURE

Name: _____

Address: _____

City, State, Zip Code: _____

Telephone: _____ E-mail: _____

Identification Number: _____ Social Security Number: _____

USE OR DISCLOSURE BEING AUTHORIZED

Entity Authorized to Disclose: Wellmark Blue Cross and Blue Shield or Wellmark Health Plan of Iowa, Inc.

Protected Health Information to be Disclosed: Specifically and meaningfully describe the protected health information you are authorizing to be disclosed:

Date of service, health care provider, type of service, amount paid by health plan, and diagnosis code.

Persons or Entities Authorized to Receive: Name or specifically identify the persons and/or organizations (or the classes of persons and/or organizations), to whom you are authorizing the disclosure and subsequent use of the protected health information described above:

Ruth Litchfield, Iowa State University

Kayli Julander, Iowa State University

Effect of Granting this Authorization: I understand that if the person or entity that receives the information requested is not covered by federal or state privacy laws, the information described above may be redisclosed and will no longer be protected by law.

Prohibition on Redisclosure: This form does not authorize the disclosure of medical information beyond the limits of the authorization. Where information has been disclosed from the records protected by Federal law for alcohol/drug abuse records or state law for mental health records, the Federal requirements (42 CFR Part 2) and state requirements (Iowa Code Chapter 228) prohibit further disclosure without the specific written consent of the patient, or as otherwise permitted by such law and/or regulations. A general authorization for the release of medical or other information is NOT sufficient for this purpose. The Federal rules restrict any use of the information to criminally investigate or prosecute any alcohol or drug abuse patient.

No Conditions: This authorization is voluntary. Wellmark will not condition your enrollment in a health plan, eligibility for benefits or payment of claims on giving this authorization.

EXPIRATION AND REVOCATION

Expiration: This authorization will expire 30 days after termination of my health plan coverage, or upon settlement of claims incurred while covered, unless revoked or an earlier date or event is entered below.

- On 02 / 15 / 2014 (Date)
- On occurrence of the following event (which must relate to the individual or to the purpose of the use and/or disclosure being authorized):

Right to Revoke: I understand that I may revoke this authorization at any time by giving written notice of my revocation to Wellmark Blue Cross and Blue Shield at the address stated below. I understand that revocation of this authorization will *not* affect any action you took in reliance on this authorization before you received my written notice of revocation and, if this authorization is obtained as a condition of obtaining insurance coverage, other law provides the insurer with the right to contest a claim under the policy or the policy itself.

INDIVIDUAL'S SIGNATURE

Specific Authorization for Release of Mental Health, Substance Abuse Treatment or Aids-Related Information: I authorize the release and disclosure of any and all personal health information, including specifically mental health information, substance abuse (drug or alcohol), and AIDS-related information, if applicable, and all claims information to the individual or entity named above as long as this authorization is in effect. I understand that I may inspect the mental health information disclosed.

I, _____, have had full opportunity to read and consider the contents of this authorization, and I understand that, by signing this form, I am confirming my authorization of the use and/or disclosure of my protected health information, as described in this form. If this authorization involves the disclosure of mental health information, I acknowledge receipt of a copy of the authorization.

Signature: _____ Date: _____

*A spouse or parent of an individual 18 years or older may **NOT** sign on behalf of the individual without appointment through a legal process or by the individual submitting a personal representative appointment form.*

If this authorization is signed by a personal representative on behalf of the individual, complete the following:

Personal Representative's Name: _____

Relationship to Individual: _____

RETAIN A COPY FOR YOUR RECORDS – Send completed and signed form to:

Wellmark Blue Cross and Blue Shield
Privacy Office, Station 4W777
P O Box 9232
Des Moines Iowa 50306-9232

If you have questions about how to complete this form, please call (877) 610-6395.

AUTHORIZATION

DATA COLLECTION FORM

1. Last 4 digits of phone #		2. Gender (check appropriate box)		3. Date of Birth		
		<input type="checkbox"/> Male	<input type="checkbox"/> Female	Month	Day	Year
4. You are (check appropriate box):						
<input type="checkbox"/> White	<input type="checkbox"/> Black	<input type="checkbox"/> Hispanic	<input type="checkbox"/> Asian	<input type="checkbox"/> Pacific Islander	<input type="checkbox"/> American Indian	<input type="checkbox"/> Other (specify)
5. Highest level of education you have achieved (check highest level of education):						
<input type="checkbox"/> Some high school or less		<input type="checkbox"/> High school graduate		<input type="checkbox"/> Some college		
<input type="checkbox"/> College graduate		<input type="checkbox"/> Post graduate or professional degree				
6. Has a doctor told you that you have any of the following? (check all that apply)						
----if any of the shaded conditions are not well-controlled or are currently being treated, do not complete wall sit or 3-minute step test						
<input type="checkbox"/>	Allergies	<input type="checkbox"/>	Heartburn or acid reflux			
<input type="checkbox"/>	Angina (chest pain)	<input type="checkbox"/>	High cholesterol (fat in the blood)			
<input type="checkbox"/>	Arthritis	<input type="checkbox"/>	Hypertension (high blood pressure) (if checked, is your hypertension being treated successfully by your doctor? Yes/No)			
<input type="checkbox"/>	Asthma (if checked, is your asthma being treated successfully by your doctor? Yes/No)	<input type="checkbox"/>	Joint disorder/degeneration			
<input type="checkbox"/>	Back pain	<input type="checkbox"/>	Kidney disease			
<input type="checkbox"/>	Cancer (if checked, are you currently being treated for cancer or any cancer related complications? Yes/No)	<input type="checkbox"/>	Liver disease			
<input type="checkbox"/>	Chronic bronchitis, emphysema or COPD (lung problems)	<input type="checkbox"/>	Menopause (women only)			
<input type="checkbox"/>	Chronic pain	<input type="checkbox"/>	Migraines (if checked, are your migraines being treated successfully by your doctor? Yes/No)			
<input type="checkbox"/>	Congestive heart failure	<input type="checkbox"/>	Osteoporosis (weak bones)			
<input type="checkbox"/>	Heart disease (heart problems or hardening of arteries) (if checked, is your heart disease being treated successfully by your doctor? Yes/No)	<input type="checkbox"/>	Past stroke			
<input type="checkbox"/>	Depression (if checked, is your depression being treated successfully by your doctor? Yes/No)	<input type="checkbox"/>	Prostate problems			
<input type="checkbox"/>	Diabetes (if checked, is your diabetes being treated successfully by your doctor? Yes/No)	<input type="checkbox"/>	Sleep disorder			
<input type="checkbox"/>	End stage renal disease	<input type="checkbox"/>	Thyroid problems			
<input type="checkbox"/>	Frequent colds (3+/year)	<input type="checkbox"/>	Other condition: _____			

8. Family history (Check family members who have had any of the following conditions):						
Medical condition	Mom	Dad	Sibling	Child	Grand-parent	Other Relative
Alcoholism						
Anemia						
Angina (chest pain)						
Arthritis						
Bleeding problems						
Cancer (all types)						
Chronic bronchitis, emphysema or COPD						
Chronic pain						
Congestive heart failure						
Coronary artery disease (heart problems/hardening of arteries)						
Depression						
Diabetes						
End stage renal disease						
Epilepsy (seizures)						
Genetic diseases						
Heartburn or acid reflux						
High cholesterol (fat in the blood)						
Hypertension (high blood pressure)						
Kidney disease						
Liver disease						
Lupus						
Migraines						
Osteoporosis (weak bones)						
Stroke						
Prostate problems						
Sleep disorder						
Thyroid problems						
Tuberculosis						
Other conditions (specify): _____						

9. Current medications (prescription, non-prescription, vitamins, herbs, birth control):		
Medication	Dose (if known)	Times per day

10. Procedure history: (list all prior operations and dates)					
Procedure	Date		Procedure	Date	

11. Marital Status (check as appropriate)					
<input type="checkbox"/>	Single	<input type="checkbox"/>	Married	<input type="checkbox"/>	Widowed
<input type="checkbox"/>		<input type="checkbox"/>	Separated	<input type="checkbox"/>	Divorced

12. In general, how strong are your social ties with your family and/or friends? (check as appropriate)					
<input type="checkbox"/>	Very strong	<input type="checkbox"/>	About average	<input type="checkbox"/>	Weaker than average
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	Not sure

13. Do you have children?			
<input type="checkbox"/>	Yes	<input type="checkbox"/>	No

14. Women only: are you pregnant?			
<input type="checkbox"/>	Yes	<input type="checkbox"/>	No

15. How would you describe your cigarette smoking habits? (check as appropriate)					
<input type="checkbox"/>	Never smoked	<input type="checkbox"/>	Used to smoke	<input type="checkbox"/>	Still smoke
(if you still smoke) How many cigarettes a day? _____					
Other forms of tobacco					
<input type="checkbox"/>	Pipes	<input type="checkbox"/>	Cigars	<input type="checkbox"/>	Smokeless tobacco

16. How many alcoholic beverages do you drink in a typical week? (one drink= one beer, glass of wine, shot of liquor or a mixed drink)	

17. How many hours of sleep do you usually get at night? (check as appropriate)					
<input type="checkbox"/>	≤ 5 hours	<input type="checkbox"/>	6 hours	<input type="checkbox"/>	7 hours
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	8 hours
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	≥ 9 hours

Choose one activity category that best describes your usual pattern of daily physical activities, including activities related to house and family care, transportation, occupation, exercise and wellness, and leisure or recreational purposes.

_____ Level 1: Inactive or little activity other than usual daily activities.

_____ Level 2: Regularly participate in physical activities requiring low levels of exertion that result in slight increases in breathing and heart rate for at least 10 minutes at a time.

_____ Level 3: Participate in aerobic exercises such as brisk walking, jogging or running, cycling, swimming, or vigorous sports at a comfortable pace or other activities requiring similar levels of exertion for 20-60 minutes per week.

_____ Level 4: Participate in aerobic exercises such as brisk walking, jogging or running at a comfortable pace or other activities requiring similar levels of exertion for 1-3 hours per week.

_____ Level 5: Participate in aerobic exercises such as brisk walking, jogging or running at a comfortable pace or other activities requiring similar levels for over 3 hours per week.

Please indicate with a check how often you felt or thought a certain way during the last month.

Question: In the last month:	Never	Almost Never	Some times	Fairly Often	Very Often
1. How often have you been upset because of something that happened unexpectedly?					
2. How often have you felt that you were unable to control the important things in your life?					
3. How often have you felt nervous and "stressed"?					
4. How often have you felt confident about your ability to handle your personal problems?					
5. How often have you felt that things were going your way?					
6. How often have you found that you could not cope with all the things that you had to do?					
7. How often have you been able to control irritations in your life?					
8. How often have you felt that you were on top of things?					
9. How often have you been angered because of things that were outside of your control?					
10. How often have you felt difficulties were piling up so high you could not overcome them?					

Think about your eating habits over the past month. How often do you eat each of the following foods (breakfast, lunch, dinner, snacks, eating out)? Please check the one column that best describes the frequency of consumption for each food.

Fruits, Vegetables, and Grains	Less than 1/WEEK	Once a WEEK	2-3 times a WEEK	4-6 times a WEEK	Once a DAY	2+ a DAY
Fruit juice, like orange, apple, grape, fresh, frozen or canned (no sodas or other drinks)						
How often do you eat any fruit, fresh or canned? (not counting juice)						
Vegetable juice, like tomato juice, V-8, carrot						
Green salad						
Potatoes, any kind (baked/mashed/french fried)						
Vegetable soup, or stew with vegetables						
Any other vegetables, including string beans, peas, corn, broccoli or any other kind						
Fiber cereals (Raisin Bran, Shredded Wheat, Fruit-n-Fiber)						
Beans such as baked beans, pinto, kidney, or lentils (not green beans)						
Dark bread such as whole wheat or rye						

Meats and Snacks	1/MONTH or less	2-3 times a MONTH	1-2 times a WEEK	3-4 times a WK	5+ times a WK
Hamburgers, ground beef, meat burritos, tacos					
Beef or pork, such as steaks, roasts, ribs, or in sandwiches					
Fried chicken					
Hot dogs, or Polish or Italian sausage					
Cold cuts, lunch meats, ham (not low-fat)					
Bacon or breakfast sausage					
Salmon					
Other fish-mackerel, jack					
Salad dressing (not low-fat)					
Margarine, butter or mayo on bread or potatoes					
Margarine, butter or oil in cooking					
Eggs (not Egg Beaters or just egg whites)					
Pizza					
Cheese, cheese spread (not low-fat)					
Low-fat or reduced-fat cheese, cheese spread					
Whole milk					
1% or skim milk					
Yogurt (low-fat)					
French fries, fried potatoes					
Corn chips, potato chips, popcorn, crackers					
Doughnuts, pastries, cake, cookies (not low-fat)					
Ice cream (not sherbet or non-fat)					

Circle the number on the scale provided that most closely reflects your response to the question.

1. What do you feel is the **level** of your **financial stress today**?

1	2	3	4	5	6	7	8	9	10
Overwhelming Stress			High Stress		Low Stress			No Stress at All	

2. How **satisfied** are you with your **present financial situation**?

1	2	3	4	5	6	7	8	9	10
Dissatisfied			Somewhat Dissatisfied		Somewhat Satisfied			Satisfied	

3. How do you feel about your **current financial condition**?

1	2	3	4	5	6	7	8	9	10
Feel Overwhelmed			Sometimes Feel Worried		Not Worried			Feel Comfortable	

4. How often do you worry about being able to meet **normal monthly living expenses**?

1	2	3	4	5	6	7	8	9	10
All the Time			Sometimes		Rarely			Never	

5. How confident are you that you could find the money to pay for a **financial emergency** that cost about **\$1,000**?

1	2	3	4	5	6	7	8	9	10
No Confidence			Little Confidence		Some Confidence			High Confidence	

6. How often does this happen to you? You want to go out to eat, go to a movie or do something else and **don't go because you can't afford to**?

1	2	3	4	5	6	7	8	9	10
All the Time			Sometimes		Rarely			Never	

7. How frequently do you find yourself just getting by financially and living **paycheck to paycheck**?

1	2	3	4	5	6	7	8	9	10
All the Time			Sometimes		Rarely			Never	

8. How **stressed** do you feel about your personal finances **in general**?

1	2	3	4	5	6	7	8	9	10
Overwhelming Stress			High Stress		Low Stress			No Stress at All	

Below are five statements that you may agree or disagree with. Check the box that most closely reflects how much you agree or disagree with each statement

Statement	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
In most ways my life is close to my ideal.							
The conditions of my life are excellent.							
I am satisfied with my life.							
So far I have gotten the important things I want in life.							
If I could live my life over, I would change almost nothing.							

In the past 12 months:	Often	Some-times	Never true	Don't Know
The food that we bought just didn't last, and we didn't have money to get more.				
We couldn't afford to eat balanced meals.				

In the past 12 months:	Yes	No	Don't know	
Did you or any other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food.				
<i>If yes, circle how often that happened.</i>	Almost every month	Some months, not every	Only 1 or 2 months	Don't know

In the past 12 months:	Yes	No	Don't know
Did you ever eat less than you felt you should because there wasn't enough money for food?			
Were you ever hungry but didn't eat because there wasn't enough money for food?			

	Yes	No
Are you currently receiving assistance from any programs (federal, state or private)?		

Below-describe your work experiences in the past month. These experiences may be affected by many environmental as well as personal factors and may change from time to time. **For each of the following statements, please check one of the responses to show your agreement or disagreement with each statement.**

Statement	Strongly Disagree	Somewhat Disagree	Uncertain	Somewhat Agree	Strongly Agree
Because of my health problems, the stresses of my job were much harder to handle.					
Despite having my health problem, I was able to finish hard tasks in my work.					
My health problem distracted me from taking pleasure in my work.					
I felt hopeless about finishing certain work tasks, due to my health problems.					
At work, I was able to focus on achieving my goals despite my health problem.					
Despite having my health problem, I felt energetic enough to complete all my work.					
My health problem affected my productivity while I was working.					

In the past how much of the time did your *physical or emotional health problems* make it *difficult* for you to do the following? (Check the box that most closely reflects your response to each statement.)

Statement	All of the time	Most of the time	Some of the time	A slight bit of the time	None of the time	Doesn't apply
Handle the workload?						
Work fast enough?						
Finish work on time?						
Do your work without making mistakes?						
Feel you've done what you are capable of doing?						

Using the scale provided, please indicate how much each of the following statements reflects how you typically are.

Statement	Not at all					Very much				
	1	2	3	4	5	1	2	3	4	5
I am good at resisting temptation.	1	2	3	4	5	1	2	3	4	5
I have a hard time breaking bad habits.	1	2	3	4	5	1	2	3	4	5
I am lazy.	1	2	3	4	5	1	2	3	4	5
I say inappropriate things.	1	2	3	4	5	1	2	3	4	5
I do certain things that are bad for me, if they are fun.	1	2	3	4	5	1	2	3	4	5
I refuse things that are bad for me.	1	2	3	4	5	1	2	3	4	5
I wish I had more self-discipline.	1	2	3	4	5	1	2	3	4	5
People would say that I have iron self-discipline.	1	2	3	4	5	1	2	3	4	5
Pleasure and fun sometimes keep me from getting work done.	1	2	3	4	5	1	2	3	4	5
I have trouble concentrating.	1	2	3	4	5	1	2	3	4	5
I am able to work effectively toward long-term goals.	1	2	3	4	5	1	2	3	4	5
Sometimes I can't stop myself from doing something, even if I know it is wrong.	1	2	3	4	5	1	2	3	4	5
I often act without thinking through all the alternatives.	1	2	3	4	5	1	2	3	4	5

For each of the following items, mark the number that best describes your current beliefs.
How certain are you that you could overcome the following barriers?

1. I can manage to stick to healthful foods....	Very Certain	Rather Certain	Rather Uncertain	Very Uncertain
... even if I need a long time to develop the necessary routines.	4	3	2	1
... even if I have to try several times until it works.	4	3	2	1
... even if I have to rethink my entire way of eating.	4	3	2	1
... even if I do not receive a great deal of support from others when making my first attempt.	4	3	2	1
... even if I have to make a detailed plan.	4	3	2	1
2. I can manage to carry out my exercise intentions....	Very Certain	Rather Certain	Rather Uncertain	Very Uncertain
... even when I have worries and problems.	4	3	2	1
... even if I feel depressed.	4	3	2	1
... even when I feel tense.	4	3	2	1
... even when I am tired.	4	3	2	1
... even when I am busy.	4	3	2	1
3. How sure are you that you can do what you need...	Very Sure	Fairly Sure	Just a Little Sure	Not at all Sure
to make and stay with changes in your eating plan?	4	3	2	1
to make and stay with changes in your regular program of exercise?	4	3	2	1
to make healthful food choices regularly?	4	3	2	1
to get exercise regularly?	4	3	2	1

Do you have any food allergies and if so, what are they?	
Please list any dietary restrictions you may have.	

In general, would you say your health is (check one):

- Excellent
- Very Good
- Good
- Fair
- Poor
- Don't know

What do you feel is the best indicator of health status (check one)?

- Weight/ how your clothes fit
- Blood cholesterol
- Blood sugar
- Blood pressure
- Ability to participate in desired activities
- Feel as though energy is at adequate levels
- Dietary Habits
- Other: _____

This section is about some possible effects of regular physical activity. Please tell us a number to indicate your level of agreement:

If I participate in regular physical activity or sport, then:	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
1. I will meet new people	1	2	3	4	5
2. I will lose weight or improve my strength	1	2	3	4	5
3. I will feel less tension and stress	1	2	3	4	5
4. I will improve my health or reduce my risk of disease	1	2	3	4	5
5. I will do better at my job	1	2	3	4	5
6. I will improve my heart and lung fitness	1	2	3	4	5

Baseline Assessment Form

Participant ID # _____

Date _____ Start Time _____ Last 4 digits of phone number _____

*** Participant completed the informed consent and Health Risk Appraisal Survey

***An asterisk (*) denotes areas to leave blank and they will be figured later.

Blood Pressure	Systolic	Diastolic
Reading 1		
Reading 2		
Average		
Category*		

ADMIN _____

Pulse (beats per minute)	
Heart Rate 1	
Heart Rate 2	
Average	

ADMIN _____

Blood draw	(Yes/No)
Fasting	
ID # and initials written on label	

ADMIN _____ (place label print out to the right of this table)

Height (inches)	
(to 2 decimal places)	
Height 1 (in)	
Height 2 (in)	
Average	

ADMIN _____

Weight (pounds)	
(to 1 decimal place)	
Weight 1	
Weight 2	
Average	

ADMIN _____

Waist to hip ratio (within 0.5 cm)							
Waist 1		Hip 1		Ratio of Averages*		Disease Risk of Averages*	
Waist 2		Hip 2					
Average		Average					

ADMIN _____

Body composition			
Elbow Breadth (mm)		RJL BIA	
Measure 1		Resistance	
Measure 2		Reactance	
Average		BMI*	
ADMIN _____		Body fat %*	
		Classification*	
		Fat Free Mass*	

Cardiovascular (3-minute YMCA step test)	
BPM	
Classification*	

ADMIN _____

Strength			
Dynamometer (pounds)	Right hand	Left hand	
Measure 1			
Measure 2			
Measure 3			
Averages			Total* <input type="text"/>
Rating*			

ADMIN _____

Flexibility		
Shoulder Stretch Flexibility Rating (cm)	Left up	Right up
Measure 1		
Measure 2		
Measure 3		
Average		
Rating*		

ADMIN _____

Endurance					
Wall Sit (seconds)	1	2	3	4	Average
Times					
				Rating*	

ADMIN _____

Station 8 Task	Yes	No
Question 1.		
Question 2.		
Question 3.		
Question 4.		
Question 5.		
Question 6.		
Totals for Yes and No:		

Credit form completed and collected (check)	
---	--

ADMIN _____

SURVEY EXPLANATIONS AND REFERENCES

- Physical activity:
 - Participants reported their physical activity level using a non-exercise assessment tool where they indicated their current activity level on a scale of 1 (low activity level) to 5 (high activity level). This value was then utilized in figuring the participant's MET value (see below).

- MET Values
 - A metabolic equivalent task (MET) score is an indicator of physical activity level. This score is based on age, gender, BMI, resting heart rate, and self-reported physical activity level. Higher scores indicate a better physical activity level.

- Dietary Intake
 - Dietary intake was determined with the validated Food Screener from NutritionQuest¹⁵⁷. The Fruit-Vegetable Screener © includes seven food items. The frequency of consumption is assessed using a 6-point Likert scale ranging from less than once a week (0) to two plus times a day (5). These seven responses are entered into equations yielding dietary estimates for fruit and vegetable servings per day, dietary fiber (g), vitamin C (mg), Magnesium (mg), and Potassium (mg).

 - The Meat-Snack Screener © includes 15 food items with frequency assessed on 5-point Likert scale ranging from once a month or less (0) to five or more times a week (4). Responses are entered into equations to yield nutrient estimates for total fat (g), saturated fat (g), percent daily fat, and dietary cholesterol (mg).

- Personal Financial Well-being
 - The Personal Financial Wellness Scale™ (PFW Scale™) is an eight-item, self-report measure of perceived financial distress/financial well-being. The instrument measures the level of well-being and stress from one's financial condition from negative to positive feelings. The tool is a valid and reliable measure of personal financial wellness.

- Presenteeism
 - Presenteeism is measured as costs associated with reduced work output, errors on the job, or failure to meet company production standards due to sickness/injury while at work. These tools assess presenteeism using the

assessment of perceived impairment approach, where employees are asked how much their illness hinders them from performing common mental, physical and interpersonal tasks required of their job.

- *The Stanford Presenteeism Scale (SPS)*; ^{174,205} is a seven-item self-report tool answered on a 5-point Likert scale. The statements center around how health problems impact work stresses, finishing tasks, taking pleasure in work, focusing on goals, feeling energetic, and being productive.
- Satisfaction with life scale.
 - Satisfaction with life is assessed with employee responses to 5 statements: in most ways my life is close to ideal, the conditions of my life are excellent, I am satisfied with my life, so far I have gotten the important things I want in life, and if I could live my life over, I would change almost nothing. Responses are answered on a 7-point Likert scale ranging from one (strongly disagree) to seven (strongly agree).
 - Diener, E., Emmons, R. A., Larsen, R. J., Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment* 49(1), 71-75.
- Perceived Stress Scale
 - The level of perceived stress can be assessed by using the 10 question, Perceived Stress Scale. Questions on feelings and thoughts relative to stress over the past month are responded to using a 5-point Likert scale ranging from never (0) to very often (4). Values are totaled and compared based on a scale ranging from zero (low-stress) to 40 (high-stress)^{176,206}.
- U.S. Household Food Security Survey Module ¹⁷⁷ (HFSSM)
 - Food security was assessed with the nationally validated six-item (July 2008) version of the U.S. Household Food Security Survey Module. This tool assesses food insecurity status of respondents during the last year. The sum of affirmative responses to the 6 questions (score 0–6) is calculated and used to classify the individual as “food secure”, “food insecure without hunger”, and “food secure with hunger”.
- Self-Efficacy
 - *This combination of self-efficacy scales taken from previously validated tools combine 14 questions answered on a 4-point Likert scale. Five questions pertain to healthy foods, five pertain to exercise, and the remaining four pertain to health promoting behavior. Responses for the three categories can be totaled*

individually for diet (0-20), exercise (0-20), and health promoting behavior (0-16). Responses for all items are summed for a composite score ranging from 0 (low) to 56 (high).

- (DIET and EXERCISE) Schwarzer, R., & Renner, B. (2000). Social-cognitive predictors of health behavior: Action self-efficacy and coping self-efficacy. *Health Psychology, 19*, 487-495.
 - (COMBINED) Adapted from: Coyne, J.C. & Smith, A.F. (1994). Couples coping with myocardial infarction: A Contextual perspective on patient self-efficacy. *Journal of Family Psychology, 8*(1), 43 – 54.
- Self-Control
 - Self-control is assessed using a 13-item, self-report measure answered with a 5-point Likert scale ranging from 1 (not at all) to 5 (very much).
 - Tangney, J. P., Baumeister, R. F., Boone, A. L. (2004) Self-control scale. *Journal of Personality, 72*(2), 271-324

EMPLOYEE RESULTS FORMS

Participant ID # _____ Last 4 digits of phone
number _____

Height _____ Weight _____

Assessment	Your Results	Normal Ranges				
Blood Pressure	Systolic: Rating:	Category	Systolic	Diastolic		
		Normal	<120	<80		
	Diastolic: Rating:	Prehypertensive	120-139	80-89		
		Stage 1 Hypertension	140-159	90-99		
		Stage 2 Hypertension	≥160	≥100		
Pulse	Beats per minute:	60-100 beats per minute				
		Factors that could affect pulse Activity level, fitness level, air temperature, body position, emotions, body size, medications, caffeine				
Cholesterol	Level:	Level	Rating			
	Rating:	<200 ml/dL	Desirable			
		200-239 ml/dL	Borderline higher			
HDL (good)	Level:	Level	Rating			
	Rating:	<40 mg/dL	Low			
		≥60 mg/dL	High (good)			
LDL	Level:	Level	Rating			
	Rating:	<100 mg/dL	Optimal			
		100-129 mg/dL	Near optimal			
		130-159 mg/dL	Borderline high			
		160-189 mg/dL	High			
≥190 mg/dL	Very high					
Triglycerides	Level:	Level	Rating			
	Rating:	<150 mg/dL	Optimal			
		150-199 mg/dL	Near Optimal			
		200-499 mg/dL	High			
≥500 mg/dL	Very High					
Blood glucose	Level:	Fasting Glucose Level	Rating			
	Rating:	<100 mg/dL	Normal			
		100-125 mg/dL	Pre-diabetic			
≥126 mg/dL	Diabetes Mellitus					
Risk for disease (Waist to hip ratio)	Waist:	Men	Disease Risk Related to Obesity			
		Age (years)	Low	Moderate	High	Very High
	Hip:	20-29	<0.83	0.83-0.88	0.89-0.94	>0.94
		30-39	<0.84	0.84-0.91	0.92-0.96	>0.96
		40-49	<0.88	0.88-0.95	0.96-1.00	>1.00
	Ratio:	50-59	<0.90	0.90-0.96	0.97-1.02	>1.02
		60-69	<0.91	0.91-0.98	0.99-1.03	>1.03
	Disease Risk:	Women	Disease Risk Related to Obesity			
		Age (years)	Low	Moderate	High	Very High
		20-29	<0.71	0.71-0.77	0.78-0.82	>0.82
		30-39	<0.72	0.72-0.78	0.79-0.84	>0.84
		40-49	<0.73	0.73-0.79	0.80-0.87	>0.87
		50-59	<0.74	0.74-0.81	0.82-0.88	>0.88
		60-69	<0.76	0.76-0.83	0.84-0.90	>0.90

Body composition	Body fat %: Classification:	WOMEN (age)				
		Underweight	Healthy	Overweight	Obese	
		20-40 yrs	< 21%	21-33%	33-39%	>39%
		41-60 yrs	<23%	23-35%	35-40%	>40%
		61-79 yrs	<24%	24-36%	36-42%	>42%
		MEN (age)				
		Underweight	Healthy	Overweight	Obese	
20-40 yrs	< 8%	8-19%	19-25%	>25%		
41-60 yrs	<11%	11-22%	22-27%	>27%		
61-79 yrs	<13%	13-25%	25-30%	>30%		
Cardiovascular (3 minute step test)	Beats per minute: Classification:					
Strength (Grip strength)	Total of left average and right average: Rating:					
Flexibility (Shoulder stretch)	Average Left: Rating: Average Right: Rating:	Distance (cm)	Men		Women	
		Rating	R up	L up	R up	L up
		Excellent	>12	>9	>14	>12
		Good	1-11	1-8	4-13	4-11
		Fair	0	0	3	3
		Low	<0	<0	<3	<3
Muscular endurance (Wall sit)	Average time: Rating:	Time (seconds)				
		Rating	Males		Females	
		Excellent	>100		>60	
		Good	75-100		45-59	
		Average	50-74		35-44	
		Below Ave	25-49		20-34	
Very poor	<25		<20			
Personal Financial Wellbeing	Average score:	Average	Description			
		1.0	Overwhelming financial distress/lowest financial well-being			
		2.0	Extremely high financial distress/extremely low financial well-being			
		3.0	Very high financial distress/very poor financial well-being			
		4.0	High financial distress/poor financial well-being			
		5.0	Average financial distress/average financial well-being			
		6.0	Moderate financial distress/moderate financial well-being			
		7.0	Low financial distress/good financial well-being			
		8.0	Very low financial distress/very good financial well-being			
		9.0	Extremely low financial distress/extremely high financial well-being			
10.0	No financial distress/highest financial well-being					

RESULT TALKING POINTS

Blood Pressure

Blood pressure is the force of blood pushing against the walls of the arteries from the heart pumping. There are usually no signs or symptoms associated with HBP and you can have it for years without knowing it. If pressure rises and stays high over time, HBP can damage your heart, blood vessels, kidneys, and other parts of your body. About 1 in 3 adults in the United States has high blood pressure (HBP) so it is important to know your blood pressure, even if you are feeling fine.

Blood pressure is measured as systolic and diastolic pressures. "Systolic" refers to blood pressure when the heart beats while pumping blood. "Diastolic" refers to blood pressure when the heart is at rest between beats. Blood pressure numbers are usually written with the systolic number above/before the diastolic number, such as 120/80 mmHg. (The mmHg is millimeters of mercury—units used to measure blood pressure.) **If your results fall in the pre-hypertensive, Stage 1 or Stage 2 range it is recommended that you visit with your family physician.**

Blood Pressure Classification in Adults

Category	Systolic	Diastolic
Normal	<120	<80
Pre-Hypertensive	120-139	80-89
Stage 1 Hypertension	140-159	90-99
Stage 2 Hypertension	≥160	≥100

Heart Rate

Heart rate is determined by the number of heartbeats per unit of time, beats per minute (BPM). It can vary as the body's need for oxygen changes (eg: during exercise, sleep). Generally, a lower heart rate at rest means more efficient heart function and better cardiovascular fitness. For example, a well-trained athlete might have a normal resting heart rate closer to 40 beats a minute.

Heart Rate Norms for an Adult

Normal Resting Heart Rate	Factors that could affect the heart rate
60-100 beats per minute	<ul style="list-style-type: none"> • Activity level • Fitness level • Air temperature • Body position • Emotions • Body size • Medications • Caffeine

Cholesterol

Cholesterol is a soft, fat-like, waxy substance found in your blood and all your body's cells. It is important for a healthy body because it is used for producing cell membranes, hormones, and serves other bodily functions. An elevated level of cholesterol in the blood is a risk factor for coronary heart disease (which can lead to heart attack) and stroke. If your cholesterol is high, recommendations include reducing your fat intake, specifically saturated fat intake, increasing fruit, vegetable and whole grain intake as well as increasing your physical activity. For more information contact your family physician or visit the American Heart Association website.

Cholesterol Level	Rating
<200 ml/dL	Desirable
200-239 ml/dL	Borderline higher
≥240 ml/dL	Higher

High Density Lipoprotein (HDL)

Fats are transported by carriers called lipoproteins in your blood. There are two kinds that you need to know about: HDL and LDL.

- High-density lipoprotein, or HDL, is known as the "good" cholesterol and is made by your body for your protection. It carries cholesterol away from your arteries. Studies suggest that high levels of HDL cholesterol reduce your risk of heart attack. Being physically active can increase your HDL level.

HDL Level	Rating
<40 mg/dL	Low
≥60 mg/dL	High (good)

Low Density Lipoprotein (LDL)

Low-density lipoprotein, or LDL, is known as the "bad" cholesterol. High LDL cholesterol can build up in artery walls forming plaque (a thick, hard deposit) which can clog your arteries increasing your risk of heart attack and stroke. Limiting your saturated fat intake and replacing it with unsaturated (polyunsaturated and monounsaturated) fat can lower your LDL.

LDL Level	Rating
<100 mg/dL	Optimal
100-129 mg/dL	Near optimal
130-159 mg/dL	Borderline high
160-189 mg/dL	High
≥190 mg/dL	Very high

Triglycerides

Triglycerides are a type of fat found in your blood. Your body converts extra calories it doesn't need right away into triglycerides and stores them in fat cells. These triglycerides can be released later from fat cells for energy. Having high triglycerides can increase your risk for heart disease. Avoiding excessive intake of carbohydrate, specifically simple sugars, and physical activity can reduce triglycerides.

Triacylglyceride Level	Rating
<150 mg/dL	Optimal
150-199 mg/dL	Near Optimal
200-499 mg/dL	High
≥500 mg/dL	Very High

Fasting Blood Glucose

Blood glucose measures the amount of a type of sugar (glucose) in your blood. Glucose comes from carbohydrate food sources (eg- bread, pasta, rice) and is the main source of energy used by our bodies. Our blood glucose levels normally increase after we eat. Normally, insulin is released into the blood when the amount of glucose in the blood rises to help our body use the glucose. Blood glucose levels that stay high over time can damage your eyes, kidneys, nerves, and blood vessels.

Fasting blood glucose (which was done in the health risk appraisal) measures blood glucose after you have not eaten for at least 8 hours. It is often the first test done to check for prediabetes and diabetes. **If your results fall in the pre-diabetes or diabetes mellitus range it is recommended that you visit with your family physician.**

Fasting Blood Glucose Level	Rating
<100 mg/dL	Normal
100-125 mg/dL	Pre-diabetic
≥126 mg/dL	Diabetes Mellitus

Waist to Hip Ratio

The waist to hip ratio assesses distribution of body fat. Excess fat in the abdomen predicts risk for type 2 diabetes, hyperlipidemia, hypertension, and cardiovascular disease. A higher waist to hip ratio (higher waist measurement) is indicative of higher risk.

Waist to Hip Ratio Standards for Men

Age (years)	Disease Risk Related to Obesity			
	Low	Moderate	High	Very High
20-29	<0.83	0.83-0.88	0.89-0.94	>0.94
30-39	<0.84	0.84-0.91	0.92-0.96	>0.96
40-49	<0.88	0.88-0.95	0.96-1.00	>1.00
50-59	<0.90	0.90-0.96	0.97-1.02	>1.02
60-69	<0.91	0.91-0.98	0.99-1.03	>1.03

Waist to Hip Ratio Standards for Women

Age (years)	Disease Risk Related to Obesity			
	Low	Moderate	High	Very High
20-29	<0.71	0.71-0.77	0.78-0.82	>0.82
30-39	<0.72	0.72-0.78	0.79-0.84	>0.84
40-49	<0.73	0.73-0.79	0.80-0.87	>0.87
50-59	<0.74	0.74-0.81	0.82-0.88	>0.88
60-69	<0.76	0.76-0.83	0.84-.090	>0.90

Physical Fitness

Body composition, cardiorespiratory, muscular strength, muscular endurance, and flexibility are the 5 components of physical fitness. Being physically fit does not mean being able to run a marathon, be a body builder, or have the “perfect body”; it means having reduced risk of disease and disability while being able to perform physical activities you desire.

Body composition

Body composition is the amount of fat in the body compared to the amount of lean mass (muscle, bones etc.). Some fat is necessary for overall health as it protects internal organs, provides energy and regulates hormones. However, a high percentage of body fat can have a negative effect on your health. High body fat has been linked to an increased risk for diseases such as cancer, diabetes heart disease, and liver disease.

WOMEN (age)	Underweight	Healthy	Overweight	Obese
20-40 yrs	< 21%	21-33%	33-39%	>39%
41-60 yrs	<23%	23-35%	35-40%	>40%
61-79 yrs	<24%	24-36%	36-42%	>42%

MEN (age)	Underweight	Healthy	Overweight	Obese
20-40 yrs	< 8%	8-19%	19-25%	>25%
41-60 yrs	<11%	11-22%	22-27%	>27%
61-79 yrs	<13%	13-25%	25-30%%	>30%

Cardiorespiratory (3-minute step test) Beats per minute

Cardiorespiratory is the ability of your heart, lungs and vascular system to deliver blood to muscles (especially during exercise). A superior rating means your body is able to sustain exercise and able quickly recover afterwards. A lower rating means your body has a harder time sustaining activity and recovering.

MEN	18-25 years	26-35 years	36-45 years	46-55 years	56-65 years	Over 65
Excellent	≥78	≥79	≥81	≥84	≥82	≥86
Good	79-88	80-88	82-94	85-96	83-97	87-95
Above Ave	89-97	89-97	95-102	97-103	98-101	96-102
Average	98-104	98-106	103-111	104-115	102-111	103-113
Below Ave	105-114	107-116	112-118	118-121	112-118	114-119
Poor	115-126	117-126	119-128	122-130	119-128	120-128
Very Poor	127-164	127-164	129-168	135-158	129-150	129-152

WOMEN	18-25 years	26-35 years	36-45 years	46-55 years	56-65 years	Over 65
Excellent	≥83	≥86	≥87	≥93	≥92	≥86
Good	84-97	87-97	88-101	94-102	93-103	87-100
Above Ave	98-106	98-110	102-109	103-113	104-111	101-114
Average	107-116	111-118	110-117	114-120	112-117	115-121
Below Ave	117-124	119-127	118-127	121-126	118-127	122-127
Poor	125-137	128-135	128-138	127-133	128-136	128-134
Very Poor	137-155	136-154	139-152	134-152	137-151	135-151

Grip Strength

Muscular strength is the force your muscles can exert against a resistance. The grip strength test done in the health risk appraisal is used as a screening tool for measurement of upper body strength and overall strength. Research indicates that grip strength in midlife can predict physical disability in senior years. Improving your strength now may prevent injury and disability later. Be aware that some medical conditions, such as carpal tunnel syndrome and arthritis, affect grip strength. Grip strength and overall strength can be improved by weight training—and also by changing some daily activities.

Males	20-29 years	30-39 years	40-49 years	50-59 years	60-69 years
Excellent	≥115 kg	≥115 kg	≥108 kg	≥101 kg	≥100 kg
Very good	104-114	104-114	97-107	92-100	91-99
Good	95-103	95-103	88-96	84-91	84-90
Fair	84-94	84-94	80-87	76-83	73-83
Needs improvement	≤83	≤83	≤79	≤75	≤72

Females	20-29 years	30-39 years	40-49 years	50-59 years	60-69 years
Excellent	≥70 kg	≥71 kg	≥69 kg	≥61 kg	≥54 kg
Very good	63-69	63-70	61-68	54-60	48-53
Good	60-62	58-62	54-60	49-53	45-47
Fair	52-59	51-57	49-53	45-48	41-44
Needs improvement	≤51	≤50	≤48	≤44	≤40

Flexibility

Flexibility is how much your muscles will lengthen when stretched. Flexibility was measured in the health risk appraisal with the arm/shoulder reach flexibility test. A person may not function normally if a joint lacks normal movement and flexibility. Being able to move a joint through an adequate range of motion is important for daily activities as well as for sports.

Distance (cm)	Men		Women	
	R up	L up	R up	L up
Excellent	>12	>9	>14	>12
Good	1-11	1-8	4-13	4-11
Fair	0	0	3	3
Low	<0	<0	<3	<3

Wall Sit (Muscular Endurance)

Muscular endurance is the ability of your muscles to repeat a movement multiple times or hold a particular position for an extended period of time. The wall sit test assessed your muscular endurance.

Rating	Time (seconds)	
	Males	Females
Excellent	>100	>60
Good	75-100	45-59
Average	50-74	35-44
Below Average	25-49	20-34
Very poor	<25	<20

Personal Financial Well-Being

Overall average scale score:

In general, the higher the score the better. Scores range from 1-10 with 1 indicating the lowest level of financial wellbeing and 10 the highest. The national average is 5.7 as of 2006. A score of 8.1 or higher would indicate you are significantly less stressed than the majority of the population. A score of 3.3 or below indicates you are significantly more stressed about your financial situation than the majority of Americans and you may want to consider seeking additional help with your financial situation as soon as possible.

Two individual questions that may be of particular importance: (have participants try to recall how they answered these questions)

How frequently do you find yourself just getting by financially and living **paycheck to paycheck**?

How often do you **worry** about being able to meet **normal monthly living expenses**?

If you scored a 1,2, or 3 on these questions, then I strongly encourage you to evaluate changes that could be made to improve your situation. A financial safety net can be created by selling items you no longer need, finding additional work, saving a portion of your paycheck automatically, and other ways. During the course of this program we will talk about how to implement several different strategies to help you find the money needed to build additional financial security into your life.

Score Descriptive terminology

Average Score	Description
1.0	Overwhelming financial distress/lowest financial well-being
2.0	Extremely high financial distress/extremely low financial well-being
3.0	Very high financial distress/very poor financial well-being
4.0	High financial distress/poor financial well-being
5.0	Average financial distress/average financial well-being
6.0	Moderate financial distress/moderate financial well-being
7.0	Low financial distress/good financial well-being
8.0	Very low financial distress/very good financial well-being
9.0	Extremely low financial distress/extremely high financial well-being
10.0	No financial distress/highest financial well-being

SPSS DATA ENTRY KEY

Worksite Wellness Data Entry Key

SubjectID:	Indicated on the top of each form.
Treatment:	Control = 0 Intervention = 1
Location:	Graphic Edge = 0 Timberline = 1 Rosenboom = 2
Gender:	Male = 0 Female = 1
Age:	Years of age
Ethnicity:	White = 0 Black = 1 Hispanic = 2 Asian = 3 Pacific Islander = 4 American Indian = 5 Other = 6 _____
Education:	Some high school or less = 0 High school graduate = 1 Some college = 2 College graduate = 3 Post graduate or professional degree = 4
Medical Conditions:	AllergiesPre: No = 0/ Yes = 1 AnginaPre: No = 0/ Yes = 1 ArthritisPre: No = 0/ Yes = 1 AsthmaPre: No = 0/ Yes (uncontrolled) = 1/ Yes (controlled) = 2 BackPainPre: No = 0/ Yes = 1 CancerPre: No = 0/ Yes (uncontrolled) = 1/ Yes (controlled) = 2 LungProblemsPre: (Chronic bronchitis, emphysema, COPD) No = 0/ Yes = 1 ChronicPainPre: No = 0/ Yes = 1 CongestiveHeartPre: No = 0/ Yes = 1 HeartDiseasePre: No = 0/ Yes (uncontrolled) = 1/ Yes (controlled) = 2 DepressionPre: No = 0/ Yes (uncontrolled) = 1/ Yes (controlled) = 2 DiabetesPre: No = 0/ Yes (uncontrolled) = 1/ Yes (controlled) = 2 EndStageRenalPre: No = 0/ Yes = 1 FrequentColdsPre: No = 0/ Yes = 1 HeartburnPre: (or acid reflux) No = 0/ Yes = 1 HighCholesterolPre: No = 0/ Yes = 1 HypertensionPre: No = 0/ Yes (uncontrolled) = 1/ Yes (controlled) = 2 JointDisorderPre:(degeneration): No = 0/ Yes = 1 KidneyDiseasePre: No = 0/ Yes = 1 LiverDiseasePre: No = 0/ Yes = 1 MenopausePre: No = 0/ Yes = 1 (blank for men) MigrainesPre: No = 0/ Yes (controlled) = 1/ Yes (uncontrolled) = 2 OsteoporosisPre: No = 0/ Yes = 1 PastStrokePre: No = 0/ Yes = 1

ProstrateProbPre: No = 0/ Yes = 1(blank for women)
 SleepDisorderPre: No = 0/ Yes = 1
 ThyroidProbPre: No = 0/ Yes = 1
 OtherPreNo = 0/Type in _____

Family History:

FHAlcoholismPre
 FHAnemiaPre
 FHAnginaPre
 FHArthritisPre
 FHAsthmaPre
 FHBleedingProbPre (bleeding problems)
 FHCancerPre
 FHLungProbPre (Chronic bronchitis, emphysema or COPD)
 FHChronicPainPre
 FHCongestiveHeartPre (congestive heart failure)
 FHHeartProbPre (Coronary artery disease- heart problems or hardening of arteries)
 FHDepressionPre
 FHDiabetesPre
 FHEndStageRenalPre (End stage renal disease)
 FHEpilepsyPre (seizures)
 FHGeneticDiseasePre
 FHHeartburnPre (heartburn or acid reflux)
 FHHighCholPre (High cholesterol- fat in the blood)
 FHHypertensionPre (Hypertension- high blood pressure)
 FHKidneyDiseasePre
 FHLiverDiseasePre
 FHLupusPre
 FHMigrainesPre
 FHOsteoporosisPre (Weak bones)
 FHStrokePre
 FHProstratePre
 FHSleepDisorderPre
 FHThyroidProbPre
 FHTuberculosisPre
 FHOtherPre_____

Total: 0- 5

If mom, dad, sibling or child is checked, add 1 point for each check.

If grand parent or other relative is checked, add .5 point for each check.

Example: Dad (+1), grandparent (+.5) = 1.5

Mom (+1), sibling (+1), other relative (+.5) = 2.5

Current Medications:

MultivitaminPre: No = 0/ Yes = 1
 SupplementsPre: No = 0/ Yes = 1
 HormoneTherapyPre: No = 0/ Yes = 1 (thyroid)
 MoodAlteringPre: No = 0/ Yes = 1
 InsulinPre: No = 0/ Yes = 1
 OralAgentPre: No = 0/ Yes = 1
 CholesterolLoweringPre: No = 0/ Yes = 1
 AntiHTNPre: No = 0/ Yes = 1
 MedOtherPre: No = 0/ Yes = 1

Procedure:

OpenHeartPre
 StintPlacementPre (angioplasty, pacemaker)
 CancerProcPre
 ArthroscopicPre (knee, shoulder)
 GallbladderPre
 GastroIntestinalPre (colonoscopy)
 HysterectomyVystectomyPre
 ProcOtherPre (tonsils, cosmetic, kidney stones, appendix, umbilical hernia, bone fusion, back fusion)

Marital StatusPre: Single = 0

Married = 1
Widowed = 2
Separated = 3
Divorced = 4

SocialTiesPre:

Very strong = 0
About average = 1
Weaker than average = 2
Not sure = 3

ChildrenPre:

Yes = 1
No = 0

PregnantPre:

Yes = 1

No = 0
Blank = men

CigaretteSmokingPre:

Never smoked = 0
Used to smoke = 1
Still smoke = 2

CigPerDayPre = _____ (if never, leave blank)

If range- go average.
1 pack = 20 cigs/day

TobaccoOtherPre (Other forms of tobacco): If none, leave blank

Pipes = 0
Cigars = 1
Smokeless tobacco = 2

AlcoholPre (How many drinks of alcohol): Number of drinks per week (value: drinks/week)

If range- go average.

SleepPre:

≤ 5 hours = 0
6 hours = 1
7 hours = 2
8 hours = 3
≥ 9 hours = 4

ActivityLevelPre: Level 1 = 1

Level 2 = 2
Level 3 = 3
Level 4 = 4
Level 5 = 5

METScorePre:

value = MET score

Fruit, Vegetable and Fiber

FrJuicePre (fruit juice)
FruitPre (fresh or canned)
VegJuicePre (vegetable juice, like tomato juice, V-8, carrot)
SaladPre (green salad)
PotatoesPre (potatoes, any kind)
VegSoupPre (vegetable soup, or stew with vegetables)
OtherVegPre (any other vegetables, including string beans, peas, corn, broccoli or artichoke)
FiberCerealsPre (Raisin Bran, Shredded Wheat, Fruit-n-Fiber)
BeansPre (beans such as baked beans, pinto, kidney, or lentils (not green beans))
DarkBreadPre (dark bread such as whole or rye)

less than 1/Week = 0
Once a week = 1
2-3 times a week = 2
4-6 times a week = 3
Once a day = 4
2+ times a day = 5

Meats and snacks

Don't include Salmon, other fish (mackerel, jack), Low-fat or reduced-fat cheese, cheese spread, 1% or skim milk, or yogurt (low-fat).

HamburgerPre (hamburgers, ground beef, meat burritos, tacos):
 BeefPorkPre (Beef or pork, such as steaks, roasts, ribs, or in sandwiches)
 FriedChxPre (Fried Chicken)
 HotDogsPre (Hot dogs, or Polish or Italian sausage)
 ColdCutsPre (Cold cuts, lunch meats, ham (not low-fat)
 BaconSausagePre (Bacon or breakfast sausage)
 SalmonPre
 OtherFishPre (mackerel, jack)
 SaladDressingPre (Salad dressing (not low-fat)
 MargarinePre (Margarine, butter or mayo on bread or potatoes)
 InCookingPre (Margarine, butter or oil in cooking)
 EggsPre (Eggs, not Egg Beaters or just egg whites)
 PizzaPre
 CheesePre (Cheese, cheese spread (not low-fat)
 LowFatCheesePre (or reduced-fat cheese, cheese spread)
 WholeMilkPre
 SkimMilkPre
 YogurtPre (low-fat)
 FrenchFriesPre (French fries, fried potatoes)
 CornChipsPre (Corn chips, potato chips, popcorn, crackers)
 DoughnutsPre (doughnuts, cake, cookies, cookies (not low-fat)
 IceCreamPre (Not sherbet or non-fat)

Once a month or less = 0
2-3 times a month = 1
1-2 times a week = 2
3-4 times a week = 3
5+ times a week = 4

FoodSecurityPre (scale responses)

0 affirmatives = NA
 1 affirmative = 2.86
 2 affirmatives = 4.19
 3 affirmatives = 5.27
 4 affirmatives = 6.30
 5 affirmatives = 7.54
 6 affirmatives = 8.48

FoodAssistancePre

Yes = 1
 No = 0

Presenteeism

Strongly disagree = 0
Somewhat disagree = 1
Uncertain = 2
Somewhat agree = 3
Strongly agree = 4

StressesPre (Because of my health problems, the stresses of my job were much harder to handle)
 FinishTasksPre (Despite having my health problem, I was able to finish hard tasks in my work)
 DistractedPre (My health problem distracted me from taking pleasure in my work)
 HopelessPre (I felt hopeless about finishing certain work tasks, due to my health problems)
 FocusPre (At work, I was able to focus on achieving my goals despite my health problems)
 EnergeticPre (Despite having my health problem, I felt energetic enough to complete all of my work)
 ProductivityPre (My health problem affected my productivity while I was working)

Self-Efficacy 0 = Very certain

- 1 = Rather certain
 2 = Rather uncertain
 3 = Very uncertain

I can manage to stick to healthful foods....

- A (even if I need a long time to develop the necessary routines)
 B (even if I have to try several times until it works)
 C (even if I have to rethink my entire way of eating)
 D (even if I do not receive a great deal of support from others when making my first attempt)
 E (even if I have to make a detailed plan)

I can manage to carry out my exercise intentions....

- F (even when I have worries and problems)
 G (even if I feel depressed)
 H (even if I feel tense)
 I (even when I am tired)
 J (even when I am busy)

How sure are you that you can do what you need...

- K (to make and stay with changes in your eating plan?)
 L (to make and stay with changes in your regular program of exercise?)
 M (to make healthful food choices regularly?)
 N (to get exercise regularly?)

Food Allergies or Dietary Restrictions:

FoodAllergyPre: No = 0

- Peanuts = 1
 Fish = 2
 Shell Fish = 3
 Eggs = 4
 Dairy = 5
 Wheat = 6
 Soy = 7
 Tree nuts = 8

SystolicPre: value = blood pressure

DiastolicPre: value = blood pressure

PulsePre: value = BPM

FastingPre: No = 0/ Yes = 1

CholesterolPre: value = mg/dL

HDLPre: value = mg/dL

TrigPre: value = mg/dL

LDLPre: value = mg/dL

Non-HDLPre: value = mg/dL

RatioPre: value = ratio

GlucosePre: value = mg/dL

HeightPre: value = Inches

WeightPre: value = Pounds

Leave blank if no reaction occurred

If TG < 45 = 45

If HDL > 100 = 100

WaistPre: value = cm

HipPre: value = cm

WaistHipPre: value = ratio

DiseaseRiskPre: Low = 0
Moderate = 1
High = 2
Very high = 3

ElbowBreadthPre: Small = 0
Medium = 1
Large = 2

BodyFat%Pre: value = percent

BodyFatClassPre: Underweight = 0
Healthy = 1
Overweight = 2
Obese = 3

FatFreeMassPre: value = kg

BMIPre: value = BMI

BPMPre: (beats per minute) value = BPM

BPMRatingPre: Excellent = 0 Round to lower rating/higher value if in between.
Good = 1 If omitted-leave blank
Above average = 2 If not full duration-leave blank
Average = 3
Below Average = 4
Poor = 5
Very Poor = 6

GripStrengthPre: value = kg

GripStrengthRatingPre: Excellent = 0
Very good = 1
Good = 2
Fair = 3
Needs Improvement = 4

FlexibilityLeftPre: value = cm If omitted-leave blank.

FlexibilityLratingPre: Excellent = 0
Good = 1
Fair = 2
Low = 3

FlexibilityRightPre: value = cm

FlexibilityRratingPre: Excellent = 0
Good = 1
Fair = 2
Low = 3

EndurancePre:	value = seconds	If not full duration-leave blank If omitted-leave blank.
EnduranceRatingPre:	Excellent = 0 Good = 1 Average = 2 Below Average = 3 Very Poor = 4	
FoodAwarenessPre:	value = # correct	
BMIClassPre:	Underweight = 0 Normal = 1 Overweight = 2 Obese = 3	
FrVegServingPre:	value = fruit, veg servings per day	
FiberPre:	value = grams of fiber	
VitCPre:	value = mg vit C	
MagnPre:	value = mg magnesium	
VitKPre:	value = mg vit K	
TotalFatPre:	value = grams total fat	
SaturatedFatPre:	value = grams saturated fat	
PercentFatPre:	value = % fat	
Dietary CholesterolPre:	value = grams cholesterol	
HoursMissed2012:	value = hours missed	
TotalMissedTimePre:	value = total hours missed (TIMBERLINE ONLY)	
SickandUPTORosen:	value = Sick & UPTO (ROSENBOOM ONLY)	
FinancialStressLevelPre:	0 = High stress = 0 – 3.3 1 = Average stress = 3.4 – 8.0 2 = Low stress = 8.1 – 10	

Value = Total dollar amount

TotalMedicalClaimePre
AcuteRespPre
AnxietySomatoformPre
BackSpineProbPre
BenignNeoplasmPre
BoneCartilagePre
CheckUpPre
CirculatoryDiseasesPre
COPDAlliedPre
DepressiveDisorderPre
DentalPre
DislocationPre

EyeAdnexaPre
FracturesPre
HypertensiveDisPre
InfectiousParaPre
JointProbPre
KidneyUrinaryPre
LowerDigestivePre
MalignantNeoplasmPre
MiddleDigestivePre
MuscleTendonProbPre
NonRhrumaticHeartPre
OpenWoundsPre
OtherMedClaimsPre
OtherBloodProbPre
OtherDigestivePre
OtherInjuryPre
OtherMentalPre
OtherMetabolicPre
PeripheralNSPre
PhysicalTherapyPre
PneumoniaInfluenzaPre
PregnancyPre
PrescriptionPre
ReproductivePre
SkinSubcutaneousPre
SurfacelInjuryPre
SymptomsSignsPre
ThyroidEndocrinePre
Type2DMPre
UpperDigestivePre
VaccinationsPre

ATTENDANCE KEY**Attendance Key****Rosenboom**

Sick days listed on attendance records

1 day = 9.5 hours

Absent value x (9.5) = hours missed

UPTO- similar to PTO, can be used for sick, vacation, children's events

Make-up:

must be made up in same week

Can be used to apt, leave early, children's event

Sick + UPTO used

Dental + Dr. also used

Graphic Edge

S- Sick

Behind- Hours Missed

D- Sick for Dependent (do not include)

A- Unpaid Absence

*- Unexcused Absence

Timberline

Combined personal and unpaid personal for "Personal" if both were present

Left blank if no value written in

ALSO HAVE A TOTAL MISSED TIME (ALL CATEGORIES)

****If employed for less than a year:**

(Total hours missed/ months employed) x 12= hours missed while employed

HEALTHCARE CLAIMS KEY

Healthcare Claims Key

- Only include employee health care costs
- Include total claims (\$)
 - If no claims for that year: \$0
 - If they don't have insurance: leave blank
- Include different categories
 - If employee has specific category but the cost is \$0: enter 0
 - If employee doesn't have specific category: leave blank

ICD9 CODES

1. Infectious and parasitic diseases (001-139)
 - a. Intestinal infectious diseases (001-009)
 - b. TB (010-018)
 - c. Zoonotic bacterial diseases (020-027)
 - d. Other bacterial diseases (030-041)
 - e. HIV (030-041)
 - f. Poliomyelitis & other non-arthropod-borne viral diseases & prion diseases of CNS (045-049)
 - g. Viral diseases accompanied by exanthema (050-059)
 - h. Arthropod-borne viral diseases (060-066)
 - i. Other diseases due to viruses and chlamydiae (070-079)
 - j. Rickettsioses & other arthropod-borne diseases (080-088)
 - k. Syphilis & other venereal diseases (090-099)
 - l. Other spirochetal diseases (100-104)
 - m. Mycoses (110-118)
 - n. Helminthiasis (120-129)
 - o. Other infectious & parasitic diseases (130-136)
 - p. Late effects of infectious & parasitic diseases (137-139)
2. Neoplasms (140-239)
 - a. Malignant (140-208)
 - b. Benign (210-229)
 - c. Other Neoplasms
 - i. Neuroendocrine tumors (209)
 - ii. Carcinoma in situ (230-234)
 - iii. Uncertain behavior/unspecified (235-239)
3. Endocrine, nutritional & metabolic diseases, & immunity disorders (240-279)
 - a. Thyroid gland, other endocrine glands (240-259)
 - b. Nutritional deficiencies (260-269)
 - c. Other metabolic & immunity disorders (270-279)
4. Diseases of the blood & blood-forming organs (280-289)
 - a. Anemia (280-285)
 - i. (iron def anemia, other def anemia, hereditary hemolytic anemia, acquired hemolytic anemia, aplastic anemia & other bone marrow failure syndromes, other & unspecified anemias)
 - b. Coagulation defects/clotting problems (286-287)
 - c. Other (288-289)
 - i. Diseases of white blood cells, other diseases of blood & blood forming organs
5. Mental disorders (290-319)
 - a. Psychoses, organic psychotic conditions, other psychoses (290-299)
 - b. Neurotic disorders, personality disorders, & other (300-316)
 - i. Anxiety, somatoform (300)
 - ii. Other mental disorders
 1. Personality disorder (301)
 2. gender & sexual identity (302)
 3. Physiological malfunction arising from mental factors (306)
 4. Special symptoms or syndromes, NOS (307)
 5. Acute rxn to stress (308)
 6. Adjustment reaction (309)

- 7. Specific nonpsychotic mental disorders due to brain damage (310)
- 8. Disturbances of conduct (312)
- 9. Disturbances of emotions (313) (kids)
- 10. Hyperkinetic syndrome of childhood (314)
- 11. Specific delays in development (315)
- 12. Psychic factors associated with diseases classified elsewhere (316)
- iii. Substance abuse (alcohol, drugs, nondependent) (303-305)
- iv. Depressive disorder, NOS (311)
- v. Mental retardation (317-319)
- 6. Diseases of the nervous system & sense organs (320-389)
 - a. Problems with CNS
 - i. Inflammatory diseases of the CNS (320-326)
 - ii. Hereditary & degenerative disease of the CNS (330-337)
 - iii. Other disorders of the CNS (340-349)
 - b. Organic sleep disorders (327)
 - c. Pain (338)
 - d. Other headache syndromes (339)
 - e. Disorders of the peripheral nervous system (350-359)
 - f. Disorders of the eye & adnexa (360-379)
 - g. Diseases of the ear & mastoid process (380-389)
- 7. Diseases of the circulatory system (390-459)
 - a. Heart disease
 - i. Rheumatic
 - 1. Acute rheumatic fever (390-392)
 - 2. Chronic rheumatic heart disease (393-398)
 - ii. Non-rheumatic
 - 1. Ischemic heart disease (410-414)
 - 2. Other forms of heart disease (420-429)
 - b. Hypertensive diseases (401-405)
 - c. Cerebrovascular disease (430-438)
 - d. Circulatory diseases
 - i. Diseases of arteries, arterioles & capillaries (440-449)
 - ii. Diseases of veins, lymphatics, other disease of circ. system (451-459)
- 8. Diseases of the respiratory system (460-519)
 - a. Acute respiratory infections (460-466)
 - b. Pneumonia, flu, pneumoconioses & other due to external agents
 - i. Pneumonia & influenza (480-488)
 - ii. Pneumoconioses & other lung disease due to external agents (500-508)
 - c. Chronic Obstructive pulmonary disease and allied conditions (490-496)
 - d. Other lung issues
 - i. Other diseases of the URT (470-478)
 - ii. Other diseases of the respiratory system (510-519)
- 9. Disease of the digestive system (520-579)
 - a. Diseases of oral cavity, salivary glands, and jaws (520-529)
 - b. Diseases of esophagus, stomach, & duodenum (530-538)
 - c. Intestines
 - i. Appendicitis (540-543)
 - ii. Noninfectious enteritis & colitis (555-558)

- iii. Other diseases of intestines & peritoneum (560-569)
 - d. Other digestive
 - i. Hernia of abdominal cavity (550-553)
 - ii. Other diseases of digestive system (570-579)
- 10. Diseases of the genitourinary system (580-629)
 - a. Kidney & urinary
 - i. Nephritis, nephrotic syndrome, & nephrosis (580-589)
 - ii. Other diseases of urinary system (590-599)
 - b. Reproductive organs
 - i. Diseases of male genital organs (600-608)
 - ii. Disorders of breast (610-612)
 - iii. Inflammatory disease of female pelvic organs (614-616)
 - iv. Other disorders of female genital tract (617-629)
- 11. Complications of pregnancy, childbirth, & the puerperium (630-679)
- 12. Diseases of the skin and subcutaneous tissue (680-709)
- 13. Diseases of the musculoskeletal system & connective tissue (710-739)
 - a. Arthropathies & related disorders (710-719)
 - b. Dorsopathies (720-724)
 - c. Rheumatism, excluding the back (725-729)
 - d. Osteopathies, periostitis, & other infections involving bone (730-739)
- 14. Congenital anomalies (740-759)
- 15. Certain conditions originating in the perinatal period (760-779)
- 16. Symptoms, signs, & ill-defined conditions (780-799)
 - a. Symptoms (Put in previous categories) (780-789)
 - b. Signs (encounter if any of these) (790-796)
 - c. Ill-defined & unknown causes of morbidity & mortality (797-799)
- 17. Injury & poisoning (800-999)
 - a. Fractures (800-829)
 - b. Dislocation, sprain, strain injury
 - i. Dislocation (830-839)
 - ii. Sprains & strains of joints & adjacent muscles (840-848)
 - c. Internal injury
 - i. Intracranial injury, excluding those with skull fracture (850-854)
 - ii. Internal injury of thorax, abdomen, & pelvis (860-869)
 - d. Open wounds (870-897)
 - e. Injury to blood vessels (900-904)
 - i. Put in circulatory problems category
 - f. Surface injury
 - i. Superficial Injury (905-919)
 - ii. Contusion with intact skin surface (920-924)
 - iii. Crushing injury (925-929)
 - iv. Effects of foreign body entering through orifice (930-939)
 - v. Burns (940-949)
 - g. Other injuries & poisoning
 - i. Injury to nerves & spinal cord (950-957)
 - ii. Certain traumatic complication & unspecified injuries (958-959)
 - iii. Poisoning by drugs, medical & biological substances (960-979)
 - iv. Toxic effects of substances chiefly nonmedicinal as to source (980-989)

- v. Other & unspecified effects of external causes (990-995)
- vi. Complications of surgical & medical care, NOS (996-999)

18. Procedures & Interventions, NOS

- a. Therapeutic ultrasound 00.0
- b. Pharmaceuticals 00.1
- c. Computer assisted surgery 00.3
- d. Other procedures & interventions 00.9
- e. Robotic assisted procedures 17.4
- f. Blood vessel procedures (include in circulatory)
 - i. Intravascular imaging of blood vessels 00.2
 - ii. Adjunct vascular system procedures 00.4
 - iii. Other cardiovascular procedures 00.5
 - iv. Procedures on blood vessels 00.6
- g. Joint procedures (include in joints)
 - i. Other hip procedures 00.7
 - ii. Other knee & hip procedures 00.8

19. Operations on the NS

- a. CNS
 - i. Incision & excision of skull, brain, & cerebral meninges 01
 - ii. Other ops on skull, brain & cerebral meninges 02 (same)
- b. PNS
 - i. Ops on spinal cord & spinal canal structures 03
 - ii. Ops on cranial & peripheral nerves 04
 - iii. Ops on sympathetic nerves or ganglia 05

20. Ops on the endocrine system 06-07

21. Ops on the eye 08-16

22. Intestinal Procedures

- a. Laparoscopic unilateral repair of inguinal hernia 17.1
- b. Laparoscopic bilateral repair of inguinal hernia 17.2
- c. Laparoscopic partial excision of large intestine 17.3

23. Ops on the ear 18-20

24. Ops on the nose, mouth , & pharynx 21-29

25. Ops on respiratory system 30-34

26. Ops on the cardiovascular system 35-39

27. Ops on hemic & lymphatic system 40-41

28. Ops on the digestive system 42-54

- a. Middle digestive
 - i. Ops on esophagus 42
 - ii. Incision & excision of stomach 43
 - iii. Other operations on stomach 44
- b. Lower digestive
 - i. Incision, excision & anastomosis of intestine 45
 - ii. Other ops on intestine 46
 - iii. Ops on appendix 47
 - iv. Ops on rectum, rectosigmoid & perirectal tissue 48
 - v. Ops on anus 49
 - vi. Repair of hernia 53
 - vii. Other ops on abdominal region 54

- Liver
 - Ops on liver 50
 - Ops on gallbladder & biliary tract 51
- Pancreas
 - Ops on pancreas 9-52
- Ops on urinary system 55-59
- Reproductive
 - Ops on the male genital organs 60-64
 - Ops on female genital organs 65-71
- Obstetrical procedures 72-75
- Ops on musculoskeletal system 76-84
 - Ops on facial bones & joints (split between bones, joints, dislocation, muscle/tendon & fracture)
- Ops on the integumentary system
 - Ops on the breast 85
 - Ops on skin & subcutaneous
- Miscellaneous diagnostic & therapeutic procedures 87-99
 - Split up

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