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THE EFFECTS OF A MULTI-COMPONENT WELLNESS PROGRAM ON EMPLOYEE BIOMETRICS

A Thesis
presented in partial fulfillment of requirements
for the degree of Master of Science
in the Department of Nutrition and Hospitality Management
The University of Mississippi

by

JENNIFER E. PATRICK

May 2012

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ABSTRACT

Corporate wellness initiatives are gaining momentum as a critical indicator of business performance. Metabolic Syndrome is commonly used within corporations to assess the health of their employees and estimate potential healthcare costs. Using five risk factors (blood pressure, high density lipoprotein (HDL-C), triglycerides (TG), fasting blood glucose, and waist circumference) individuals with three or more risk factors are classified as having Metabolic Syndrome. Voluntary pre and post health screenings were conducted at a rural manufacturing plant. A multi-component wellness program was conducted over six months to determine if the program would have significant beneficial effects on employee biometrics and Metabolic Syndrome. Body mass index (BMI), waist circumference, blood pressure, blood lipids (HDL-C, LDL, TG) and fasting blood glucose were evaluated. Pre-intervention results versus post-intervention results for blood pressure (systolic $p<0.001$, diastolic $p<0.05$), HDL-C ($p<0.05$), blood glucose ($p<0.001$), and waist circumference ($p<0.001$) were significant within the non-participant group (n=53). However, blood pressure and blood glucose increased and HDL-C decreased. In the participant group (n=22), HDL-C ($p<0.05$), blood glucose ($p<0.001$), waist circumference ($p<0.001$), weight ($p<0.05$) and TG ($p<0.05$) significantly improved, except HDL-C, after comparing pre and post intervention results in the participant group. Metabolic Syndrome prevalence decreased in the participant group (36%, n=8 to 23%, n=5) and increased in the control group (26%, n=14 to 32%, n=17) although no significance was determined. The results support the importance and need for effective employee wellness programs that include on site health screenings.

DEDICATION

This thesis is dedicated to all of those who provided support and guidance during stressful and uncertain times both professionally and personally. In particular, I'd like to thank my fiancé, Andrew Hoffman, and his mother, Janet Hoffman, my family, Mark Patrick, Rose Patrick, and Anthony Patrick, and my dear friend Bethany Garner. If it were not for these individuals, I can without doubt say this thesis would not exist. I cannot express enough my gratitude to each of you!

LIST OF ABBREVIATIONS

BMI Body mass index

CVD Cardiovascular disease

HRA Health risk assessment

HDL High density lipoprotein cholesterol

kg/m2 Kilograms per meters squared

LDL Low density lipoprotein cholesterol

MEPS Medical Expenditure Panel Survey

mg/dL Milligrams per deciliter

mmHg Millimeters of mercury

NCEP-ATPIII National Cholesterol Education's Adult Treatment Panel III

NHANES National Health and Nutrition Examination Survey

NHIS National Health Interview Survey

ROI Return on investment

TG Triglycerides

WAI Work ability index

WPAIQ:GH Work Production and Activity Impairment Questionnaire: General Health

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Introduction

It is not a surprise why worksite wellness programs are being implemented in numerous companies. Healthcare costs are increasing along with obesity rates and other health complications. Over 65% of American adults have been classified as overweight or obese in the United States (Flegal, Carroll, Ogden, & Johnson, 2000; Ogden, Carroll, & Curtin, 2006). With healthcare costs on the rise, employers are implementing employee wellness programs as a strategy to reduce health insurance costs by focusing on prevention (Benedict & Afterburn, 2008). Having a well-implemented multi-component employee health program can produce measurable improvements in health risk status, absenteeism, and productivity if the participating employee is engaged (Mhurchu, Aston, & Jebb, 2010).

Successful wellness programs can produce benefits for the company and employees by not only reducing healthcare costs, but also improving productivity and absenteeism secondary to obesity. Research has demonstrated that obese or overweight individuals may contribute to work limitations, absenteeism, and reduced workforce participation (Benedict & Afterburn, 2008; Ferdowsian et al., 2009; Finkelstein, Fiebelkorn, & Wang, 2005; Goetzel et al. 2010; Lynch, Golaszewski, Clearie, Snow & Vickery, 1990; Mills, Kessler, Cooper, & Sullivan, 2007; Musich, Hook, Baaner, & Edington, 2006; Rodbard, Fox, & Grandy, 2009; Tunceli, Li, & Williams, 2006; Wattles & Harris, 2003). Rodbard, Fox, and Grandy (2009) evaluated employee absenteeism, productivity, and distribution of work, social, and family life among individuals of varying body mass index (BMI) with or at risk for diabetes mellitus. Using the Work Production and Activity Impairment Questionnaire: General Health version 2.0 (WPAI-GH) and the

Sheehan Disability Scale, 15,132 adults (7338 working adults) were assessed. Participants were separated into groups: low risk of diabetes, high risk of diabetes, Type 1 diabetes, or Type 2 diabetes based on the number of risk factors. Results indicated that individuals in the low risk, high risk, and Type 2 diabetes groups classified as obese (BMI ≥30 kg/m2), had the greatest impairment at work (11%-15% of work time), the greatest impairment of daily activities (20%-34% of time), and the greatest overall fraction of time (11%-15%) with work productivity impairment or missed days from work (Rodbard, Fox, & Grandy, 2009).

Overweight and obese individuals are at an increased risk for cardiovascular risk factors and disease (Wilson, D'Agostino, Sullivan, Parise, & Kannel, 2002). Employees that are obese or overweight have increased benefit costs, which in turn, affects employers. Finkelstein, Fiebelkorn, and Wang (2005) accessed survey data from the National Health Interview (NHIS) and the Medical Expenditure Panel Survey (MEPS) to assess if overweight and obese employees correlated with additional costs to employers due to healthcare and absenteeism. The final datasets included 20,329 and 25,427 adults respectively. Approximately 70% of the full-time employed male population were classified as either overweight (~46%) or obese (~23%) and 53% of the full-time employed female population were classified as overweight (~28%) or obese (23%). Absenteeism was assessed and defined as a missed day due to illness or injury. Grade-II and III obese men missed approximately two more work days per year than normal-weight men. Grade-II obese women missed 1.8 days more than normal-weight women, while grade-III women missed almost a week more than normal-weight women ($p<0.05$).

Metabolic syndrome is a growing trend that has been used to evaluate an individual's health. According to National Cholesterol Education's Adult Treatment Panel III (NCEP-ATPIII), metabolic syndrome is defined as having three or more of the following risk factors:

elevated fasting blood glucose (≥110 mg/dL), elevated blood pressure (≥130 systolic or ≥85 diastolic), elevated triglyceride levels (≥150 mg/dL), elevated waist circumference (>40 inches males, >35 inches female), or reduced high density lipoprotein (HDL) cholesterol (<40 mg/dL male, <50 mg/dL female). A constellation of these risk factors increases a person's risk for developing cardiovascular disease (CVD) (Grundy, Cleeman, Smith, & Lenfant 2004). The importance of reducing these risk factors is significant and necessary for the health of employees.

A study compared the cost of employees with metabolic syndrome to those without metabolic syndrome. It was found that metabolic syndrome costs employers $626 per person a month compared to $367 per month for individuals without metabolic syndrome. Of the $259 excess medical cost for individuals with metabolic syndrome, $46 was due to additional cardiovascular events and $213 was at the expense of higher prevalence of co-morbidities, particularly cardiovascular disease and diabetes (Fitch, Pyenson, & Iwasaki, 2007).

Statement of the Problem

As seen previously, studies have shown that obese and overweight employees have an impact on work productivity and additional healthcare costs. It is evident that wellness programs are needed in the workplace however; research is limited as most programs are relatively new. In fact, most wellness programs are less than four years old ("Trends in Wellness Plans," 2009). A better understanding of what produces a successful wellness program and measurement of program effectiveness is necessary.

Statement of the Purpose of Study

The purpose of this study is to compare the relationship of biometrical outcomes, particularly using metabolic syndrome, of participants in an employee driven multi-component wellness program to non-program participants.

Objectives

The present study will utilize the following data collected: 1) pre and post biometrical tests and 2) wellness activity participation of employees in a rural manufacturing plant. The data will be used to:

1. Analyze biometrical data of consenting participants and non-participants in a work-site wellness program.
2. Analyze the prevalence of metabolic syndrome in adult employees.

Research Question

1. Does participation in an employee driven multi-component worksite wellness program with an emphasis in coaching and fitness have an effect on employee biometrics?
2. Does participation in an employee driven multi-component worksite wellness program with an emphasis in coaching and fitness significantly decrease the prevalence of metabolic syndrome?

Hypothesis

H1: Participation in an employee driven multi-component worksite wellness program with an emphasis on health coaching and fitness will have a beneficial effect on employee biometrics including a significant reduction of the number of metabolic syndrome risk factors in employees.

H2: Participation rates greater than 25% in an employee driven multi-component worksite wellness program will provide significant improvement in biometrical outcomes compared to non-participants.

Justification

Based on the extensive review of the literature, many studies have looked at the biometrical outcomes of a wellness program, but more evaluation of a multi-component programs' effectiveness is necessary. Most studies have intervention groups with very high participation due to a controlled trial which is unrealistic in the actual work-setting. This study is a voluntary program which is a practical representation in an actual work environment. The results of this study could give employers an idea of employee behaviors in wellness programs with voluntary participation.

In addition, few programs have used metabolic syndrome exclusively as a way to measure employee health, however multiple studies have measured certain risk factors of metabolic syndrome such as HDL cholesterol, triglycerides, blood pressure, etc. Metabolic syndrome is a growing trend to indicate the severity of one's health. Further exploration of wellness program components as well as their effects on biometrical results, particularly the five risk factors of metabolic syndrome, will be discussed thoroughly in the literature review. In addition to the need of measuring program effectiveness, available research on measuring multiple aspects of a wellness program such as return on investment (ROI), the employers', and employees' attitude/ feedback are lacking.

Review of Literature

Worksite wellness programs can be beneficial for employees as well as employers. There are many variations of programs that can be provided for employees if adequate resources are available. The literature review is categorized into the following sections: background information on wellness programs, worksite health assessments, and impacts of a multi-component wellness program; particularly fitness programs and coaching.

Background Information on Wellness Programs

Larry Chapman (2004) reported that there are major advantages and disadvantages of wellness programs. The advantages include: working adults spend a significant amount of time at work and can usually be reached efficiently in these types of settings, work organizations have a clear economic and enhanced performance rationale for conducting health promotion programs, the compensation and benefit aspect of employment provides a strong potential platform for formal incentives for health promotion, medium and larger worksite settings have the economic capabilities of supporting a wellness program or in serving large numbers of small worksites, social support such as peers, co-workers, and supervisors are available in a worksite setting, and finally, work cultures influence and support health promotion.

Major disadvantages that are associated with worksite settings are: continuity, follow-up, and consistency of effort can be a challenge in the work place, funding of programs can be a financial pressure associated with the business cycle, health promotion programming can be difficult to rigorously evaluate (particularly the determination of the return on investment), the demands of modern work limit the amount of work-invasive programming that is feasible in worksite

settings, and potential distrust between employees and employers can limit participation and effectiveness of programming (Chapman, 2004). Limited research is available on advantages and disadvantages of wellness programs which are critical for employers when deciding if a wellness program is beneficial.

Other helpful information when beginning a program is using trends from current wellness programs. In 2009, Canadian Benefits & Compensation Digest completed results from a survey titled *Wellness Programs, Second Edition* conducted by the International Foundation of Employee Benefit Plans in October and November of 2008. Of the 586 U.S. and Canadian sponsors that responded, 55% represented corporations, 23% represented professional service providers, 16% were public sector and 7% represented multi-employer benefit plans. When asked about specific initiatives of their wellness programs, participants reported frequently utilized flu shot clinics (82%), health risks (73%), and health assessments (69%). Other common initiatives included weight loss and weight management strategies (49%), fitness challenges/programs (48%), and the availability of healthy food choices in a cafeteria or snack area (42%) ("Trends in Wellness Plans", 2009).

Support from senior management and mid-level managers is the key to program success (Chapman, 2006). However, the actual planning process can be different depending on the company's needs. Traditionally, management driven programs are most commonly seen in the workforce, but the use of employee driven ideas are becoming popular and yielding success (Groszkiewicz & Warren, 2006; Woodell, 2009). The impact of bottom-up programs are limited in the literature however, using other examples from programs that are non-health related, there is a positive trend of success and a sense of empowerment that employees experience when

involved in the change process (Wooddell, 2009). Although the need for research is evident, an employee driven health and wellness program could be beneficial in a work-setting.

Research demonstrates that there are numerous designs for corporate wellness programs (Bowles, Picano, Epperly, & Myer, 2008; Brown, 2011; Godefroi, et al., 2005; Muto, Hashimoto, Haruyama, & Fukuda, 2006; Short et al., 2010). The literature provides examples of various activities offered by a wellness program (Bowles, Picano, Epperly, & Myer, 2008; Ferdowsian et al., 2009; Henke, Goetzel, McHugh, & Isaac, 2011; Mhurchu, Aston, & Jebb, 2010). For example, does the company want to provide on-site fitness programs or solely provide participants with educational guidance on physical activity and encourage independent exercise? These are decisions companies encounter as they develop a wellness program.

Participation and engagement of employees can also be a challenge for companies that are initiating a wellness program. Poor participation in worksite programs is a major contributor to less than optimal outcomes in worksite based programs (Emmons, Linnan, Abrams, & Lovell, 1996). One study conducted in ten manufacturing sites tracked the participation of 162 women employees in multiple intervention activities. They were categorized as low, moderate, or high risk based on smoking, diet, and daily exercise parameters. The low-risk group, who did not participate in the program, demonstrated independence regarding health practices. They felt they did not need a workplace wellness program to be healthy and were self-motivated. In contrast, those women in the low-risk group who participated in the worksite program did so mainly for extra support (Emmons, Linnan, Abrams, & Lovell, 1996).

The moderate and high risk group had quite a different attitude towards the wellness program. Trust issues with co-workers and the employers, particularly about efforts to change smoking habits, were evident in the high-risk group. Barriers for participation included fear of

failure, lack of long-term commitment, and busy schedules. Many indicated that they would rather use their break or go home after work to relax than participate in events. However, this study shows that convenience regarding scheduling around employee needs, support systems with friends and coworkers, and a favorable atmosphere is ideal when attracting employees to participate in a wellness program (Emmons et al., 1996).

As the Emmons et al. (1996) study suggests convenience is a major part of increasing participation in any type of program. Questionnaires and surveys could be a possible way to get feedback from employees on what they would like to have in a company wellness program. One study used data from a 2004 Health Styles survey in order to determine selected potential use of worksite health promotion programs among employed adults (n=2337) (Kruger et al., 2007). The results revealed that 80.6% of employees would utilize an on-site fitness center if available. The study suggested providing opportunities for active and sedentary employees by offering an on-site fitness facility to potentially reduce the time and inconvenience of exercising outside of work and may encourage greater physical activity among employees.

Another component of the survey revealed that 77.5% of employees reported they would purchase healthier foods in vending machines and cafeterias if offered. As a result, employees reported having these foods easily available would encourage them to eat a healthier diet (Kruger et al., 2007). An increase in nutritious foods could greatly help with weight loss and other health complications. More importantly, when designing a worksite wellness program, implementing intervention activities that employee's desire could increase participation and improved health outcomes.

Worksite Health Assessments

Health assessments can be used to obtain baseline and repeated biometrics to provide employees with information on their personal health and, more importantly, awareness of risk factors. Studies have indicated relatively low rates of awareness among individuals regarding lipid values and cardiovascular disease risk factors (Brown, 2011; Godefroi, et al., 2005; Nash, Mosca, Bluementhal, Davidson, Smith, & Pasternak, 2003; Short et al., 2010). According to health promotion professionals, Ron Goetzel and Nicolaas Pronk (2010), there is significant evidence that health assessments with follow-up counseling for feedback serves as a "cornerstone for health promotion from which other programs flow" (p. 224).

Measures such as weight, body mass index (BMI), waist circumference, blood pressure, total cholesterol (HDL-C and LDL-C), fasting glucose, and triglycerides are some examples of metrics that can be measured at a health assessment. As mentioned previously, a few worksites have used biometrics to determine the prevalence and predictors of metabolic syndrome (Godefroi et al., 2005).

A study conducted in 2005 described the prevalence of metabolic syndrome in a sample of employed adults attending a worksite cardiovascular screening program (Godefroi, et al., 2005). Approximately 27% of the study sample was classified as having metabolic syndrome which coincides with data from the NHANES 1999-2000 survey. This survey reported the increase from 23.1%, reported by the NHANES III survey in 1988-1994, to 26.7% U.S. adults that have been diagnosed with metabolic syndrome (Ford, Giles, & Mokdad, 2004).

Environmental work factors such as different shift times may also have an impact on employee health. In regards to the prevalence of metabolic syndrome, a study in 2009 assessed the difference between anthropometric measures (BMI, height, weight, waist and hip

circumference), dietary habits, job stress, and biological measurements between 198 male chemical plant workers in Southern France (Esquirol, et al., 2009). Results indicated that alterations in metabolic parameters were evident with a rise in triglycerides and lower HDL cholesterol levels in shift workers. The authors suggest that rotating shift work compared with a routine day shift is associated with an increased risk of metabolic syndrome.

Although further research is necessary on the metabolic syndrome, the prevalence is considerable and should be addressed since evidence has shown that those with metabolic syndrome are at increased risk for diabetes and cardiovascular disease (Laaksonen et al., 2002; Lakka et al., 2002). Regardless, if employees are diagnosed with metabolic syndrome, having any abnormal risk factors increases the risk for cardiovascular disease and other complications (Wilson et al., 2002). Worksite programs can help to improve biometrics such as cholesterol and other risk factors (Muto, Hashimoto, Haruyama, & Fukuda, 2006). Implementing health assessments as part of a worksite wellness program can encourage more employees to learn about their personal health and potentially motivate behavioral changes.

Impacts of Multi-Component Worksite Wellness Programs

Multi-component worksite wellness programs are being utilized more frequently in health promotion. A multi-component program can be tailored to the needs and desires of the company to maximize results. Educational methods with wellness programs have included: group and/or individual counseling, grocery store tours, individual diet planning, computer-tailored dietary feedback, weekly health promotion email messages, and worker participation in program planning. Environmental changes in nutritional policies and practices such as nutrition labeling, vending policies, canteen food/supply availability, and menu reformation have also been seen in combination with education in wellness programs (Mhurchu, Aston, & Jebb, 2010).

The Ferdowsian et al. study (2009) followed 68 individuals (18 male, 50 female) in the intervention group and 45 individuals (2 male, 43 female) in the control group for 22 weeks. Participants had a BMI ≥25 kg/m2 and/or previous diagnosis of Type 2 diabetes. These participants completed a baseline assessment and the intervention group was asked to follow a low-fat vegan diet. Other components such as instructor-led presentations, group discussions, cooking demos, and grocery store tours were offered to the intervention group. Results showed a decrease in body weight in the intervention group and an increase in the control group ($p<0.0001$). BMI decreased an average of 2.0kg/m2 in the intervention group with no change in the control. More importantly, total and LDL cholesterol decreased to a greater extent in the intervention group. Interestingly, HDL decreased in the intervention group compared to the control ($p=0.002$). Although systolic and diastolic blood pressure did not change in the intervention group, other results still showed positive effects. Additionally, over the 22 weeks, the intervention group reported a mean of 16.7 ± 2.5 hours of work loss because of health problems, compared with 22.8 ± 2.6 hours in the control group ($p=0.17$) (Ferdowsian et al., 2009).

Johnson and Johnson's Live for Life program was introduced in 1979 and has been recognized as a best practice among wellness programs. The program offers an on-site fitness center in combination with nutrition education, lifestyle management, and computerized counseling. This comprehensive wellness programs' average annual savings was $535 per employee in 2007 after total medical costs were contrasted to expected costs. This produced a return of investment of $3.92 for every dollar spent. Compared to other companies, Johnson and Johnson employees had a lower average predicted probability of being at high risk for six of nine health risks examined: high blood pressure, high cholesterol, poor nutrition, obesity, physical

inactivity, and tobacco use (Henke, Goetzel, McHugh, & Isaac, 2011). A combination of fitness programs with some type of counseling or coaching could maximize results.

On-Site Fitness Programs. Components such as on-site fitness programs can help improve the health of employees. This is ideal since a lack of vigorous physical activity, in addition to being classified as obese, can also affect employees' workability. A study completed in 2008 explored the relationship of psychosocial factors on work, life style, lack of physical activity, and stressful life events on health and work ability among white-collar workers. A short-form health survey (SF-12) and physical examination were used to assess their health. Workability was measured using the Work Ability Index (WAI) and was statistically significant when demonstrating the influence of psychosocial factors at work, stressful life events, lack of vigorous activity and obesity on employee workability (Van den Burg et al., 2008).

Fitness levels, such as muscular strength, have been shown to play a role in employee's productivity at work. A study conducted by Wattles and Harris (2003), speculate this may be true because employees with more muscular strength would not be as physically taxed as employees with lower strength levels. Aerobic fitness has also shown to have positive impact on employees. The Jasonski, Holmes, Solomon, and Aguiar (1981) study found that after a 10-week aerobic exercise class, employees benefited from a sense of well-being and satisfaction. A survey completed in multiple worksite settings in a northwest community obtained 143 employees' feedback about their level of fitness and it's relation to perceived productivity. Ninety-two percent of all employees strongly agreed that regular exercise would help them to be more productive at work. Over 44% stated that exercise habits would increase as a result of having exercise equipment at their worksite (Wattles & Harris, 2003).

As the previous studies have demonstrated, work-site fitness programs are more convenient for employees and can help them acquire the recommended amount of daily physical activity. One study showed a decrease from 20% of employees reporting no daily physical activity at a baseline assessment to only 5% after 36 months of having an on-site fitness program (Vingard et al., 2009). A program as simple as a walking program can yield significant results. Murphy, Murtaugh, Boreham, Hare, and Nevill (2006) studied 37 civil servants in Europe (24 women) in the worksite setting. Subjects were not normally active and were assigned to either two 45 minute walks per week or no fitness training. Compared to baseline and post-intervention, there were significant differences in systolic blood pressure and body fat ($p<0.05$).

Coaching or Counseling Sessions. It is not uncommon to find wellness programs that offer counseling or coaching which can provide employees with the knowledge necessary to make lifestyle changes (Short et. al, 2010). Saleh, Alameddine, Hill, Darney-Beuhler, and Morgan (2010) completed a study with three groups out of six employers in a rural setting. The control group consisted of 19 participants who worked in a nursing home. They were offered an annual health risk assessment (HRA) with no intervention or organized health improvement activities. An intervention group had 90 participants from a county government office. They were offered an annual HRA screening coupled with year round awareness messages and no additional intervention. The last intervention group (intervention group 2) had 42 participants that worked in four different settings: home health agency, museum, bank, or a special education school. Participants were offered year round awareness messages and annual HRA screening with one-on-one lifestyle coaching and high-risk referral/case management. Results showed that the coaching and referral group achieved better improvements in a number of areas. As far as cost-effectiveness, an analysis revealed that the first intervention group, which was provided

with HRA screening and year-round awareness messages, achieved better cost results. The study speculates this may be due to the fact that fixed costs of the coaching and referral group were distributed across a smaller number of people. It also may be worthy to note that there was low acceptance of the coaching and referral program. Perhaps this was because of the programs' intensity compared to the other groups (Saleh, Alameddine, Hill, Darney-Beuhler, & Morgan, 2010).

Muto, Hashimoto, Haruyama, and Fukuda (2006) studied a manufacturing company's wellness program consisting of 32 employees (42 in control group). The program consisted of nutritional education, physical activity, and focusing on reducing CVD risk factors through individual counseling by employee health nurses. The follow-up program consisted of telephone counseling by nurses which were conducted three months after the follow-up. Prevalence of high cholesterol in the intervention and control group before the intervention did not significantly differ at 37.5% and 51.2% respectively. However, after the intervention, the difference was nearly significant ($p=0.06$) at 25.0% and 46.5% respectively. Although the program was characterized by its low intensity with counseling, positive results were still distinguished.

Counseling methods such as off-site counseling can be difficult for employees since they usually require participants to visit a treatment center during office hours on a regular basis. Distance counseling (through a phone or email) could be more reasonable (Wier et al., 2006). Successful work-site counseling has been seen in the literature (Muto & Yamauchi, 2001; Muto, Hashimoto, Haruyama, & Fukuda, 2006; Saleh, 2010; Short, 2010). Having on-site counseling is convenient for employees and still provides that personal connection between the counselor/coach and the employee. No matter what method of counseling is used, behavior

change strategies such as: stages of readiness to change, goal setting and follow-up, motivational interviewing, external incentives, and support system planning are just some beneficial approaches presented by Larry Chapman (2007).

Measuring Program Effectiveness with Participation

There is a critical need of measuring program effectiveness and evaluation in the literature. Most wellness programs in the literature measures program effectiveness using biometrical outcomes, but few have evaluated using other measures. It was more common to see evaluation with return on investment through healthcare costs (Henke, Goetzel, McHugh, & Isaac, 2011). Limited research has been published that show the relationship between participation rates and biometrical outcomes.

Conclusion

In conclusion, wellness programs that are comprehensive with multiple components have been demonstrated by several studies and typically produce successful results for employers and employees (Ferdowsian et al, 2009; Muto, Hashimoto, Haruyama, & Fukuda, 2006l; Muto & Yamauchi, 2001; Short et al., 2010). The literature also commonly discusses a strategy of health assessments followed by programs such as on-site fitness and lifestyle coaching to help employees with behavioral changes. Substantial evidence exists to confirm the fact that worksite wellness programs, if well implemented, can yield positive health and productivity outcomes (Benedict & Afterburn, 2008; Bowles, Picano, Epperly, & Myer, 2008; Brown, 2011; Ferdowsian et al., 2009, Henke, Goetzel, McHugh, & Isaac, 2011, Goetzel et al., 2010; Mhurchu, Aston, & Jebb, 2010; Milani & Lavie, 2009; Mills, Kessler, Cooper, & Sullivan, 2007; Murphy, Murtaugh, Boreham, Hare, & Nevill, 2006; Muto, Hashimoto, Haruyama, & Fukuda, 2006; Muto & Yamauchi, 2001; Ryan, Chapman, & Rink, 2008; Saleh, Alameddine, Hill, Darney-

Beuhler, & Morgan, 2010; Short et al., 2010; Vingard et al., 2009). Employers should assess available resources and healthcare expenditures, along with employee well-being to determine if a wellness program is right for their organization.

Support for Study

As mentioned earlier, limited research has been conducted on multi-component wellness programs since most are relatively new. Furthermore, very few studies have evaluated the program effectiveness using metabolic syndrome. Financially, it is necessary to understand this information in order to help employers cut costs of potentially unsuccessful expensive programs.

Measuring improvements in biometrics at a health screening assessment or screening is commonly seen in the literature. It is well documented that wellness programs can be effective if well implemented, but gaining more knowledge of what characteristics about wellness programs are successful and unsuccessful is necessary. Successful strategies and methods for measuring employee health as a result of this study can be applied to other worksite wellness programs.

Methodology

This study aims to research the biometrical outcomes of multi-component wellness program participants with greater than 25% participation and non-participants. A participation rate of 25% or greater was determined by adding the total number of fitness classes and coaching sessions offered. If the employee attended at least 25% in either activity or a combination of both, he/she was considered a program participant.

The location of this study was a rural aircraft engine manufacturing plant in Mississippi. The total number of employees at the plant was 253 at the beginning of the study. This plant had quick growth of employees throughout the study, hiring approximately 30 new employees every three to four months. Only employees that were able to attend the assessment in January and July were considered for this particular study.

Having a greater knowledge of how this program affects a company will provide others with helpful guidance that is needed to implement a well-organized and successful program. The research design, methodology, and analysis approach will be discussed to provide a better understanding of this study.

Research Design and Methodology

Mainly quantitative data was collected in this study. Based on the parameters of the research, a quasi-experimental research strategy was used. The descriptive research method is correlational research in order to examine the correlation between the demographics of employees, participation in the program (≥25%), and biometrical outcomes.

Participants

All employees from a rural manufacturing plant were eligible for this study. A greater percentage of females than males were employed at this plant. The mean age of employees was mid-thirties and the majority of participants were hourly workers. The program had voluntary participation from all three shifts and salaried day workers. Times for each shift are as follows: first shift 7:00 a.m.-3:30 p.m., second shift 3:00 p.m.-11:30 p.m., third shift 11:00 p.m.-7:30 a.m., and salaried workers 7:00 a.m.-4:00 p.m.

An intervention group and a control group were voluntarily formed by those employees who chose to participate in the wellness program. Employees could enter and leave the program as desired. Prior to completion, participants signed a university approved informed consent document (Appendix A) and the study was approved by University of Mississippi Institutional Review Board.

Health advisors were three graduate students from the nutrition or health promotion programs at the University of Mississippi. Each health advisor worked a total of 20 hours per week. Shift times of these advisors included: Monday through Friday 5:00 a.m. to 9:00 a.m., 1:00 p.m. to 5:00 p.m., and Monday through Thursday 8:00 p.m. to 1:00 a.m. These shift times ensured that a health advisor was available an equal number of hours per week to the employees of the three shifts mentioned above. Responsibilities of the health advisor included: data collection, leading fitness classes, and nutrition/health coaching.

Variables

All participants in the program were assessed based on pre and post health screening results which consisted of the following variables: 1) weight, 2) body mass index (BMI), 3) blood pressure, 4) waist circumference, 5) fasting blood glucose, 6) total cholesterol, 7) high

density lipoprotein, 8) low density lipoprotein, and 9) triglyceride levels (Appendix B, Table 1). Metabolic syndrome was also measured which included employees with three or more risk factors (elevated blood glucose, blood pressure, triglycerides, waist circumference, and/or reduced HDL cholesterol). Actual parameters of these risk factors can be found in Appendix B Table 2.

Data Collection

Participants of the study were initially assessed at a health screening conducted at the work-site. The screening took place on January 26, 2011 from 6:00 a.m. until 6:00 p.m. to ensure all shifts would have the opportunity to attend. A second health screening was conducted six months after the pre-assessment with the same parameters. Participation rates were also collected at each wellness activity the employee attended. Employees signed-in at the beginning of every fitness class and documentation of all employees that attended a coaching session was kept by the health advisors on a data sheet for each participant.

Demographic Characteristics

Descriptive characteristics were determined for the sample. Gender and identification of participant or non-participant can be found in Table 1 in the results section.

Method of Data Analysis

To test for statistical significance of differences in biometrical outcomes, pair-t tests between pre and post assessments for both groups were utilized. Independent t-tests were estimated to compare the association between demographics, participation rates, and biometrics of those in the participant to the non-participant group for pre and post intervention. Descriptive statistics were used to describe the sample.

Results

The study consisted of a total of 75 employees (n=75). The wellness program participants (n=22) were employees with a participation rate of 25% or greater in the offered coaching sessions and/or fitness classes. Demographics reveal that 59% of the participants in the study were female (participant group: n=15 (68.81%), non-participant group: n=29 (54.71%). This was a representative sample since majority of employees at the plant were female.

Pre-Intervention Data

Pre-intervention data can be found in Table 1. An independent t-test was used to compare participant and non-participants for baseline data. No significance was noted among the groups as it was evident that percentages of means were comparable. Program participant and non-participant pre-intervention means are listed respectively: weight (216.52 lbs, 202.32 lbs.), systolic blood pressure (119.91 mmHg, 118.89 mmHg), diastolic blood pressure (80.73 mmHg and 79.47 mmHg), HDL cholesterol (49.86 mg/dL, 48.57 mg/dL), fasting blood glucose (97.32 ml/dl, 99.13 ml/dl), triglycerides (134.95 mg/dL, 126.55 mg/dL), and waist circumference (41.57 inches, 37.92 inches). It should be noted that 18.1% from the participating group and 37.7% of the non-participants did not properly fast before the initial health assessment which is considered a limitation.

In addition, metabolic syndrome risk factors were compared in Table 1. The number of program participants and non-participants whose values are within ranges of metabolic syndrome risk factors are listed respectively: systolic blood pressure $\geq$ 130 (n=5, 22.72% / n=12, 22.64%),

diastolic blood pressure ≥85 (n=5, 22.72% / n=12, 22.64%), HDL cholesterol <40 mg/dL for men and < 50 mg/dL for women (n=7, 31.81% / n=28, 52.83%), fasting blood glucose < 100 mg/dL (n=4, 18.1% / n=10, 18.9%), triglycerides < 150 mg/dL (n=6, 27.27% / n=13, 24.52%), and waist circumference ≤ 40 inches for men, ≤ 35 inches for women (n=20, 90.90% / n=31, 58.49%).

Table 1
Participants and Non Participants Pre-Intervention Data

Variables (Pre-Intervention)	**Participants (n=22)**	**Non-Participants (n=53)**	**T-Test (Part vs. Non-Part)**
% Female	15 (68.18%)	29 (54.72%)	
% Non-Fasted	4 (18.18%)	20 (37.74%)	
Mean (SD)			
Weight	216.52 (40.77)	202.32 (47.36)	1.026
Systolic	119.91 (11.36)	118.89 (14.57)	0.294
Diastolic	80.73 (7.03)	79.47 (8.78)	0.595
HDL	49.86 (13.36)	48.57 (20.11)	0.278
Blood Glucose	97.32 (12.12)	99.13 (22.96)	-0.350
Triglycerides	134.95 (87.90)	126.55 (89.32)	0.373
Waist Circumference	41.57 (4.48)	37.92 (6.46)	1.389
Metabolic Syndrome Risk Factors	**n (%)**	**n (%)**	
Systolic >130	5 (22.72%)	12 (22.64%)	0.008
Diastolic >85	5 (22.72%)	13 (24.52%)	-1.64
HDL Men: <40 mg/dL Women: <50 mg/dL	7 (31.81%)	28 (52.83%)	-0.278
Blood Glucose < 100 mg/dL	4 (18.18%)	10 (18.86%)	-0.350
Triglycerides < 150 mg/dL	6 (27.27%)	13 (24.52%)	0.373
Waist Men: > 40 in. Women: >35 in.	20 (90.90%)	31 (58.49%)	1.389

Note: Statistical significance is indicated as: * p<0.05, **p<0.01, ***P<0.001

Post-Intervention Data

Post intervention data for both groups are listed in Table 2. The mean and standard deviation for program participants and non-participants are listed respectively: systolic blood pressure 124.18 mmHg (13.66)/ 126.77 mmHg (16.30) ($p<0.001$), diastolic blood pressure 81.36 mmHg (9.12)/ 81.70 mmHg (9.71) ($p<0.01$), HDL cholesterol 46.14 mg/dL (10.97)/ 43.94 mg/dL (17.72) ($p<0.01$), fasting blood glucose 87.14 mg/dL (10.97)/ 89.25 mg/dL (25.10) ($p<0.001$), triglycerides 93.05 mg/dL (39.28)/ 110.45 mg/dL (69.00), waist circumference 38.41 inches (4.92)/ 37.92 inches (6.46) ($p<0.001$) and weight 208.95 lbs. (35.08)/ 202.32 lbs. (47.36).

Results show that there was a decrease in the average number of metabolic syndrome risk factors from 2.00 to 1.77 risk factors in the participant group and from 1.87 to 1.85 in the non-participant group. Although there was no statistical significance in these findings, the actual number of individuals with metabolic syndrome decreased from 36% to 23% in the participant group and increased in the non-participant group from 26% to 32%.

Table 2
Participant and Non Participants Post Intervention Data

Variables	**Participants (n=22)**			**Non-Participants (n=53)**		
	Pre	Post	T-test	Pre	Post	T-test
Mean (SD)						
Weight	216.52 (40.77)	208.95 (35.08)	-2.469*	204.27 (49.39)	202.32 (47.36)	-1.804
Systolic	119.91 (11.36)	124.18 (13.66)	1.402	118.89 (14.57)	126.77 (16.30)	5.056***
Diastolic	80.73 (7.03)	81.36 (9.12)	0.317	79.47 (8.78)	81.70 (9.71)	2.286*
HDL	49.86 (13.36)	46.14 (10.97)	-2.420*	48.57 (20.11)	43.94 (17.72)	-2.646*
Blood Glucose	97.32 (12.12)	87.14 (10.97)	-4.031***	99.13 (22.96)	89.25 (25.10)	-4.298***
% Non-Fasted	n=4 (18.18%)	n=0 (0.00%)		n=20 (37.73%)	n=2 (03.77%)	
Triglycerides	134.95 (87.90)	93.05 (39.28)	-2.322*	126.55 (89.32)	110.45 (69.00)	-1.602
Waist Circumference	41.57 (4.48)	38.41 (4.92)	-5.017***	39.51 (6.32)	37.92 (6.46)	-6.538***
MetS Risk Factors	2.00 (1.02)	1.77 (0.19)	-0.961	1.87 (1.14)	1.85 (1.31)	-0.155
MetS (≥3 RF)	0.36 (0.49)	0.23 (0.43)	-1.142	0.26 (0.45)	0.32 (0.47)	-1.000

Note: Statistical significance is indicated as: * p<0.05, **p<0.01, ***P<0.001

Comparison of Participants to Non-Participants

Program participants metabolic syndrome risk factors versus non-participants prior to and after participation include: zero risk factors 1 (pre) 1 (post); one risk factor 7 (pre) 8 (post); two risk factors 6 (pre) 8 (post); three risk factors 7 (pre) 5 (post); four risk factors 1 (pre) 0 (post); five risk factors 0 (pre) 0 (post). Program non-participants: zero risk factors 6 (pre) 9 (post); one risk factor 14 (pre) 14 (post); two risk factors 19 (pre) 11 (post); three risk factors 10 (pre) 11 (post); four risk factors 3 (pre) 5 (post); five risk factors 1 (pre) 1 (post).

The groups with three and four risk factors decreased in the participant group due to the elimination of one or two risk factors. This explains the slight increase of participants in the one and two risk factor categories. This was not seen in the non-participant group. The three and four risk factor category increased, indicating the prevalence of metabolic syndrome was higher among those in the non-participant group (Table 3).

Table 3
Metabolic Syndrome Risk Factors Pre and Post Intervention

Risk Factors	**Pre-Intervention**	**Post- Intervention**
Participants (n=22)		
0 risk factors	1	1
1 risk factor	7	8
2 risk factors	6	8
3 risk factors	7	5
4 risk factors	1	0
5 risk factors	0	0
Non-Participants (n=53)		
0 risk factors	6	9
1 risk factor	14	14
2 risk factors	19	11
3 risk factors	10	11
4 risk factors	3	5
5 risk factors	1	1

Average units of change and standard deviation of participants versus non-participants (Table 4) is listed respectively: systolic blood pressure 4.27 mmHg (14.29)/ 7.89 mmHg (11.36), diastolic blood pressure 0.63 mmHg (9.41), 2.22 mmHg (7.09), HDL cholesterol -3.72 mg/dL (7.23), -4.62 mg/dL (12.72), fasting blood glucose -10.18 mg/dL (11.85), -9.89 mg/dL (16.75), triglycerides -41.91 mg/dL (84.66), -16.10 mg/dL (73.13), waist circumference -3.16 inches (2.95), -1.59 inches(1.77; $p<0.001$), and weight -7.56 lbs. (14.37), -1.95 lbs. (7.88; $p<0.05$).

Table 4
Biometric Data of Participants vs. Non Participants

Variables	**Change in Participants**	**Change in Non-Participants**	**T-test (Part vs. NonP)**
Systolic	4.27 (14.29)	7.89 (11.36)	1.16
Diastolic	0.63 (9.41)	2.22 (7.09)	0.801
HDL	-3.72 (7.23)	-4.62 (12.72)	0.309
Blood Glucose	-10.18 (11.85)	-9.89 (16.75)	-0.075
Triglycerides	-41.91 (84.66)	-16.10 (73.13)	-1.328
Waist	-3.16 (2.95)	-1.59 (1.77)	-2.835**
Weight	-7.56 (14.37)	-1.95 (7.88)	-2.173*
Change in 3 or more risk factors	-0.63 (0.52)	-0.21 (0.43)	-2.015

Note: Statistical significance is indicated as: * $p<0.05$, **$p<0.01$, ***$P<0.001$

Discussion

The objective of this study was to observe the effect of a voluntary wellness program on employees' health results. Although blood triglyceride levels, blood glucose, and the number of employees with metabolic syndrome had improvement within the intervention group, these results were not significant when compared to the non-participant group. However, improvements in weight and waist circumference were significant when comparing participants to non-participants. Pre-intervention results versus post-intervention results for blood pressure, HDL cholesterol, blood glucose, and waist circumference proved to be significant within the non-participant group. Similar to the non-participant group, HDL cholesterol, blood glucose, and waist circumference in addition to weight and blood triglyceride levels were significant after comparing pre and post intervention results in the participant group. It is important to note that systolic and diastolic blood pressure increased in both groups and HDL cholesterol decreased in both groups. It is evident there is truth in the hypothesis that a multi-component worksite wellness program will have significant improvement in biometrical outcomes of participants compared to non-participants.

Overall, this study supports the conclusion suggested by the review of Heaney et al. that multi-component worksite wellness programs can reduce health risks if certain conditions are met. The review suggests that a critical component of an effective worksite wellness program is an individual risk reduction counseling program with an adequate length of time for high-risk employees (Heaney & Goetzel, 1997). This was a strong component of this wellness program which is believed to have contributed to some of the successful results in this study.

In addition to significant improvement of blood glucose and waist circumference in program participants, a greater amount of weight loss was found in employees that participated in the wellness program. The average amount of weight loss in the participant group was 7.56 pounds compared to an average loss of 1.95 pounds in the non-participant group ($p<0.05$). This provides support for other studies using multi-component wellness programs (Benedict & Afterburn, 2008). A literature review published by the American Journal of Health Promotion in 2008 reviewed 11 multi-component wellness programs. In general, weight loss and changes in body mass index (BMI) were significantly greater in the intervention group compared with the control group. In controlled trials, the intervention groups lost an average of 2.2 to 13.86 pounds versus the control groups that ranged in weight loss from 1.54 to a gain of 1.1 pounds (Benedict & Afterburn, 2008).

One of the main objectives of this study was to reduce metabolic syndrome risk factors in employees. Five out of the eight wellness program participants with metabolic syndrome at the initial assessment eliminated the syndrome within six months. However, two employees were diagnosed with metabolic syndrome in this group during the post-intervention assessment. In the non-participant group, three individuals eliminated metabolic syndrome and six were newly diagnosed with metabolic syndrome during the second health assessment. Three individuals maintained their metabolic syndrome risk factors in the participant group compared to eleven that maintained their risk factors in the non-participant group. The hypothesis that metabolic syndrome would be significantly reduced in the participant group was not proven true. Regardless of no significance for these results, it is evident that those in the participant group had greater success in improving employee health by eliminating or reducing the number of risk factors for metabolic syndrome.

A study discussed earlier analyzed metabolic syndrome in shift workers and showed metabolic syndrome was significantly and independently associated with shift work versus those that had normal day shift hours (Esquirol, et al., 2009). Two biometric measurements were associated with shift workers which were elevated triglycerides and reduced HDL cholesterol. This study showed that individual components of metabolic syndrome were analyzed and only a rise in triglycerides among shift workers versus day workers, were associated with shift work. This is a unique concept in the literature that is a limitation since it was not considered in this study. Due to the scheduling of the plant in where the current study was held, shift workers were often switching throughout the three shifts making it difficult for the researchers to categorize each participant into a shift.

The Godefroi et al. study reported the prevalence of metabolic syndrome in a work place of employed adults (Godefroi, et al., 2005). Their study found that half of the entire screened study population had either none or one of the metabolic syndrome risk factors. Only 37% of the employees in this study had one or no risk factors. Exactly one-third (33.3%) of employees in the current study had two metabolic syndrome risk factors which is similar to the Godefroi study where one quarter of the employees had two risk factors. Approximately 27% of the screened individuals in the Godefroi study compared to 37% of the employees in this study had metabolic syndrome (Godefroi, et al., 2005). In comparison, results of each study were similar. It is interesting to compare these results with Godefroi et al. although several factors such as location and other varying characteristics should be considered. Regardless, both studies provide a steady trend of consistent information on the prevalence of metabolic syndrome in employed adults.

Although not all hypotheses were proven true, several factors of this study contributed to the successful health improvements: 1) By providing individual employee attention, participants felt like a valued employee to the company, 2) The program was completely designed using employee feedback. This provided employees with a program they wanted and made them feel as if they contributed to the success, 3) The program included a goal-setting individual counseling program that provided an adequate amount of time to initiate, monitor, and evaluate behavioral changes, 4) The program addressed multiple cardiovascular and metabolic risk factors, 5) Multiple educational methods and techniques may be responsible for successful behavioral changes, 6) Group dynamics of fitness classes were shown to highly motivate fellow participants and increase participation.

Assumptions and Limitations of Study

The facility at which this study has taken place has given permission for this study to occur in result of a worksite wellness program. However, the formation of the control group and intervention group were voluntarily and based on employees' desires as this was considered their wellness program. Not only did this result in uneven group formation, it could attract those that are highly motivated to be a part of the intervention group which could be seen as an advantage. However, a voluntary program may create a more realistic idea of how a wellness program in other worksite settings may develop upon initiation.

Three nutrition and health promotion graduate students at a local university were implementing the study. Their role as "health advisors" was to conduct coaching sessions, lead fitness classes, and implement other programs for the employees. Coaching and fitness techniques could vary based on the advisor. This could be a potential limitation due to the fact variation exists among program techniques.

A percentage of employees did not properly fast more than eight hours for the blood test. This could have resulted in altered blood lipids such as fasting blood glucose. Table 1 in the results section provides the number of non-fasted employees.

The final limitation of this study is many other employees were participants in the wellness program; however, they were not included in this study because they were not employees at the time of the first health assessment in January. An extension of this study could be very beneficial and provide additional supportive data.

Conclusion

A preventative approach on healthcare is desperately needed in not only the workplace, but in society. It is evident from this study and others in the literature that a multi-component wellness program can prove to be successful if well implemented with the necessary components. Follow-up of such programs are just as important as implementation in order to ensure the program is providing desired health activities resulting in employee interest and participation. By instilling these valuable lessons of healthy living in individuals, employees are better prepared to make positive behavioral changes and ultimately bettering the value of their workplace.

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List of Appendices

Appendix: A

The University of Mississippi
Institutional Review Board
Protocol # 12-003
Approval date 7-12-11
Expiration date July 11, 2012
Signature Melinda Van Buren

CONSENT FORM

To Participate in GE Aviation HealthAhead Research Study

CURRENT OR PREVIOUS PROGRAM PARTICIPANTS

Who is doing the study? This study is conducted by two professors from The University of Mississippi (UM) Department of Nutrition and Hospitality Management:

Investigator:
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Purpose of the Research. As part of GE Aviation's HealthAhead Initiative, we and our graduate students are continuing to offer health, diet, and exercise activities to both groups and individuals at the plant. The purpose of this research is to find out how much this wellness program improves employees' health.

Description of the Research. We are asking your permission to use your information that we previously collected from you at the January 2011 GE Health Fair and – if you are still participating in the program – that we continue to collect:

1. surveys on health habits
2. weight
3. waist circumference
4. blood pressure
5. blood fats (HDL, LDL and triglycerides)
6. blood sugar
7. participation in health/wellness activities at the plant

We would also like your permission to:

1. collect additional diet, exercise, and health habit surveys from you
2. receive from you your results from the July 2011 and December 2011 (or January 2012) GE health fairs:
    a. blood draw results (blood fats - HDL, LDL & triglycerides; blood sugar)
    b. weight
    c. waist circumference
    d. blood pressure
    e. height

The surveys will take you about 20 minutes and the health fairs will take about 45 minutes.

Risks and Benefits. Feedback on changes in your measures – if you are participating in the program – might result in healthier lifestyle behaviors for you. If you are not in the program, you may be pleased to help us and GE understand how much the program helps program participants.

Cost and Payments. There is no cost for participating in this research or for the wellness program. It is free to you as part of GE's HealthAhead Initiative. You will not receive any payments for

participating, but at various times during the year, GE may offer incentives (prizes) for your participation in the wellness program.

Confidentiality. We will keep private all records that identify you, to the extent allowed by law. Information you provide during this study will be locked securely and/or entered into a database that is stored on a secured computer. No one will have access to it except the researchers.

You will not be identified in any reports to GE or in published articles on this research: your information will be combined with information from other people at the Batesville plant.

Right to Withdraw. You do not have to take part in this study. If you start the study and decide that you do not want to finish, all you have to do is to tell a graduate student or one of the investigators. You can contact us at the numbers or email addresses on the first page or write us at Department of Nutrition and Hospitality Management, 108 Lenoir Hall, Sorority Row, University, MS 38677. Whether or not you choose to participate or to withdraw will not affect your standing with GE Aviation or with the University of Mississippi, and it will not cause you to lose any benefits to which you are entitled. You may continue to use the fitness facility and consult with the researchers.

Protected Health Information. Protected health information is any personal health information that identifies you in some way. The data collected in this study includes information from your G.E. Health Fair Screenings or collected by the graduate students: weight, waist circumference, blood pressure, values from blood draws (HDL, LDL, triglycerides, blood sugar), participation in health/wellness activities at the plant, and surveys. Agreeing to take part in this research means that you agree to the use of your health information for the study described in this form. This information will not be released beyond the purposes of conducting this study. The data and information collected for this study will be kept for 5 years at University of Mississippi after the study ends. While this study is ongoing, you may not have access to the research information, but you may request it after the research is completed.

IRB Approval. This study has been reviewed by The University of Mississippi's Institutional Review Board (IRB). The IRB has determined that this study fulfills the human research subject protections obligations required by state and federal law and University policies. If you have any questions, concerns, or reports regarding your rights as a participant of research, please contact the IRB at (662) 915-7482.

Statement of Consent. I have read the above information. I have been given a copy of this form. I have had an opportunity to ask questions, and I have received answers. I consent to participate in the study.

Signature of Participant Date

Signature of Investigator Date

NOTE TO PARTICIPANTS: DO NOT SIGN THIS FORM

IF THE IRB APPROVAL STAMP ON THE FIRST PAGE HAS EXPIRED.

The University of Mississippi
Institutional Review Board
Protocol # 12-003
Approval date 7-12-11
Expiration date July 11, 2012
Signature Melinda Valliant

CONSENT FORM

To Participate in GE Aviation HealthAhead Research Study

PROGRAM NON-PARTICIPANTS

Who is doing the study? This study is conducted by two professors from The University of Mississippi (UM) Department of Nutrition and Hospitality Management:

Investigator
Melinda Valliant, PhD, RD
(662) 915-1437
valliant@olemiss.edu

Investigator
Mary Roseman, PhD, RD
(662) 915-1902
mroseman@olemiss.edu

Purpose of the Research. As part of GE Aviation's HealthAhead Initiative, we and our graduate students are continuing to offer health, diet, and exercise activities to both groups and individuals at the plant. The purpose of this research is to find out how much this wellness program improves employees' health.

Description of the Research. We certainly respect your decision to not participate in the wellness program at this time, but we hope you reconsider in the future. We would like your permission to:

1. collect diet, exercise, and health habit surveys from you
2. receive from you your results from the January 2011, July 2011, and December 2011 (or January 2012) GE health fairs:
    a. blood draw results (blood fats - HDL, LDL & triglycerides; blood sugar)
    b. weight
    c. waist circumference
    d. blood pressure
    e. height

The surveys will take you about 20 minutes and the health fairs will take about 45 minutes.

Risks and Benefits. Feedback on changes in your measures – if you decide to participate in the program – might result in healthier lifestyle behaviors for you. If you are not in the program, you may be pleased to help us and GE understand how much the program helps program participants.

Cost and Payments. There is no cost for participating in this research or for the wellness program. It is free to you as part of GE's HealthAhead Initiative. You will not receive any payments for participating, but at various times during the year, GE may offer incentives (prizes) for your participation in the wellness program.

Confidentiality. We will keep private all records that identify you, to the extent allowed by law. Information you provide during this study will be locked securely and/or entered into a database that is stored on a secured computer. No one will have access to it except the researchers.

You will not be identified in any reports to GE or in published articles on this research: your information will be combined with information from other people at the Batesville plant.

Right to Withdraw. You do not have to take part in this study. If you start the study and decide that you do not want to finish, all you have to do is to tell a graduate student or one of the investigators. You can contact us at the numbers or email addresses on the first page or write us at Department of Nutrition and Hospitality Management, 108 Lenoir Hall, Sorority Row, University, MS 38677. Whether or not you choose to participate or to withdraw will not affect your standing with GE Aviation or with the University of Mississippi, and it will not cause you to lose any benefits to which you are entitled. You may continue to use the fitness facility and consult with the researchers.

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Statement of Consent. I have read the above information. I have been given a copy of this form. I have had an opportunity to ask questions, and I have received answers. I consent to participate in the study.

Signature of Participant Date

Signature of Investigator Date

NOTE TO PARTICIPANTS: DO NOT SIGN THIS FORM

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Appendix: B

Table B1
Data Collection by Variables and Frequency

	FREQUENCY					
VARIABLES	Pre-Data	Daily	Weekly	Eight Weeks	Six Months	One Year
Biometrics						
a. Blood Pressure	X		X		X	X
b. BMI	X				X	X
c. Weight	X		X		X	X
d. Waist Measurement	X			X	X	X
e. Fasting Blood Glucose	X				X	X
f. Total Cholesterol	X				X	X
g. HDL	X				X	X
h. LDL	X				X	X
i. Triglycerides	X				X	X

Table B2
Clinical Identification of Metabolic Syndrome- Three or More of the Following

Risk Factor	**Defining Level**
Abdominal Obesity Men Women	Waist Circumference > 40 inches > 35 inches
Triglycerides	≥ 150 mg/dL
HDL Cholesterol Men Women	 < 40 mg/dL < 50 mg/dL
Blood Pressure	≥130/≥85 mmHg
Fasting Blood Glucose	≥110 mg/dL

VITA

EDUCATION AND TRAINING

Bachelor of Science in Dietetics, University of Kentucky, Lexington, KY. May 2008.

1LT United States Air Force, Combat Systems Officer, May 2008-June 2010.

PUBLICATIONS

Patrick, J.E., Valliant, M., & Roseman, M. (2011). Utilizing a health assessment survey in developing a worksite wellness program. *Journal of the American Dietetic Association, 111*(9), A87.

Roseman, M.G., Patrick, J., & Valliant, M. (2011). Utilizing employee feedback in the development of a corporate wellness initiative results in a customized program. *Journal of the American Dietetic Association, 111*(9), A86.

Valliant, M.W., Roseman, M., Patrick, J., & Wenzel, R.K. (2011). Worksite wellness screenings identify employees with metabolic syndrome. *Journal of the American Dietetic Association, 111*(9), A81.

PRESENTATIONS

Patrick, J.E. (September, 2011). Utilizing a health assessment survey in developing a worksite wellness program. Poster presentation at the Academy of Nutrition and Dietetics Food and Nutrition Conference and Expo, San Diego, CA.