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The Effects of Worksite Health Promotion Programs on Employee Biometric Data

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on Employee Biometric Data

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ABSTRACT

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INTRODUCTION: Worksite health promotion programs (WHPP) promote maintenance and changes of health-related behaviors of employees. Some companies opt to contract with a third party provider to implement a WHPP. PURPOSE: This study evaluated the participation rates, availability and use of health coaching, and changes in biometric data over a 2-year time period of employees in 13 companies for whom the WHPP was implemented by Wellness Corporate Solutions (WCS). METHODS: We had 2 years of biometric, health risk appraisal (HRA), or health coaching data on 4,473 employees. The statistical analysis included biometric screening data (percent body fat, body mass index (BMI), total cholesterol (TC), high- and low-density lipoproteins (HDL-C, LDL-C), TC/HDL ratio, triglycerides, glucose, systolic and diastolic blood pressures (SBP and DBP)) from all 13 companies and health coaching data from five companies. RESULTS: Employee participation rates of the 13 companies ranged from 35% to 75%. Five of the 13 companies provided voluntary telephonic health coaching to employees participating in their WHPPs. Of those employees for which we had 2-year data, 125 (12.9%) actually participated in health coaching. Only one of the 13 companies demonstrated improvement in all 10 biometric measurements and 1 company demonstrated improvement in only one biometric measurement. The biometric measurements that showed the greatest improvements over time were triglycerides, blood pressure, BMI, and TC. There was no association found between the number of variables that improved and employee participation rate ($p = 0.8814$) or the type of incentives offered to employees ($p = 0.1389$). Availability and use of health coaching did not appear to affect the number of variables that improved. Compared to employees who did not use health coaching, there were significantly greater changes in DBP, HDL-C, and BMI ($p < 0.05$) in employees who used health coaching. The magnitude of change in variables of interest was dependent, in part, on the baseline value. CONCLUSIONS: Voluntary participation in WHPPs results in positive changes in health-related biometric variables. Health coaching can positively affect the magnitude of change in some biometric variables and the magnitude of change is likely related to the baseline value and the frequency of coaching interactions. Further research should evaluate the benefits of various forms and frequencies of health coaching. Worksite health promotion programs and health coaching may also have a positive impact on other variables (e.g., employee attitudes and morale) not addressed in this study.

Keywords: health promotion, behavior change, wellness program, corporate wellness

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Introduction

Although heart disease mortality has exhibited a steady decline since 1980, diseases of the heart remain the leading cause of death in the United States.[1] Preliminary reports for 2011 indicate that nearly 600,000 people died from diseases of the heart, and together with cancer represent 47% of all deaths.[1] The population-attributable percent risk of death from coronary heart disease is 42% from high cholesterol,[2] 35% from physical inactivity,[3] 32% from obesity,[4] 29% from hypertension,[5] and 25% from smoking.[2] The five main risk factors related to heart disease (i.e., high cholesterol, physical inactivity, obesity, hypertension, and smoking) are, for the most part, modifiable. Health risks and modifiable risk factors increase health care costs to the individual but also to companies for which they work. In the United States, employers provide about 157 million nonelderly individuals with annual health insurance. Illnesses or injuries associated with an unhealthy lifestyle or modifiable risk factors account for at least 25% of employee health care expenses.[6] Annual medical costs for obese individuals are 41.5% higher than for those of normal weight.[7] The workplace can be an effective place to teach, support, and encourage people to make appropriate health behavior changes. Worksite health promotion programs (WHPP) can increase awareness, motivation and skills necessary to make behavioral changes.[8] The incentive for corporations to provide a WHPP for its employees is a return on their investment (ROI) through increased productivity, decreased absenteeism, increased employee morale, and decreased health care costs.

Health coaching is an integral part of WHPPs that increases employee interest and facilitates self-management of disease and disease risk factors in an efficient and cost-effective manner.[9] Health coaching facilitates changing lifestyle-related behaviors to improve health and quality of life as well as establishing and attaining personal health goals.[9] Coaching tends to

increase participation rates and participant satisfaction and achievement of goals.[10] There is a lack of strong evidence for the effectiveness of health coaching but some studies have found positive results.[11] Few studies have evaluated how phone or Internet-based health coaching can be used as an effective weight-loss strategy or to achieve other health outcomes.[12,13] Although it remains unclear what combination of coaching strategies and modes of coaching (e.g., face-to-face, Internet based, or telephonic) are most effective in creating changes in behavior,[11] health coaching has become popular due to the convenience of phone and email counseling.[14]

In this study, we evaluated the effects of WHPPs, health coaching, incentives, competitions, challenges, and biometric screenings on changes in employee biometric screening data (e.g., blood pressure, blood lipids, blood glucose, and anthropometric measurements). Employee participation in a WHPP and changes in measureable biometric outcomes were compared between WHPPs serviced by Wellness Corporate Solutions (WCS, Bethesda, MD). Participation rates were compared based on companies and characteristics of the WHPP, such as type of incentives offered, availability of health coaching, type of health coaching, and how participation was measured. It was hypothesized that there would be improvements in biometric data related to different aspects of the health promotion programs (e.g., availability and use of health coaching and/or type of incentives). Improvement in biometric data was determined by changes in biometric data between the consecutive biometric screenings.

Methods

Wellness Corporate Solutions is a company that offers wellness programs to companies nationwide. The company aims to foster a culture of wellness within companies that energize and empower employees to change behaviors that result in company financial savings by providing wellness programs that emphasize health education and improvements in health

behaviors. Each program is customized by WCS for the particular client (i.e., corporation) to meet the client's needs and maximize results. Wellness Corporate Solutions provides detailed reports and comprehensive data analysis to each company that describes the health status of their organization and highlights areas to improve.

Wellness Program

Management of each company decides which aspects of a WHPP will be provided by WCS. Worksite health promotion programs provided by WCS include one or more of the following: health risk assessments (HRA), biometric screenings, flu shots and immunizations, health fairs, comprehensive wellness programs, health coaching, on-site seminars, eight-week wellness campaigns, and/or wellness challenges. The HRA includes questions regarding biometric information, general health, medications, physical exams, nutrition, physical activity, emotional wellbeing, stress reduction, and health behaviors. Biometric screenings include measurements of blood pressure, total cholesterol (TC), high-density lipoproteins (HDL-C), low-density lipoproteins (LDL-C), blood glucose, waist circumference, body mass index (BMI), height, body mass, and body fat percentage. A year-long wellness initiative typically includes the HRA, custom-designed health fairs with topics selected by the client and program manager, biometric screenings, a wellness employee web portal with access to health education, nutrition and activity tracking tools and health coaches, an 8-week holiday weight maintenance program, a 12-week fitness/weight-loss program with a custom theme, periodic lunch-and-learn seminars on topics of interest to employees, health coaching for high risk employees, and a healthy living newsletter for employees.

Participants

Potential participants in this study included 12,955 employees of 13 companies representing a diversity of job types (Table 1). The WHPP for all 13 companies was provided by WCS. All 13 companies provided annual biometric screenings to employees, six provided HRAs, and five also provided health coaching (Tables 1 and 2). Health coaching included access to a wellness portal and monthly on-site, email or telephonic coaching (unlimited inbound calling and email), and/or quarterly outbound calls to high risk employees. The incentive program (i.e., outcome based, participatory), the type of incentives and the rewards varied between companies (Tables 2 and 3). Employee participation in the WHPP was voluntary. Participation in the WHPP was recorded as participation in any activity of the WHPP and participation rates for each company were provided by WCS. Baseline HRA or biometric data were available for 7,812 (60%) employees. For this study, we only included data on 4,473 (34%) employees for whom WCS had biometric screening or HRA data from two consecutive annual screenings (Table 1). Five of the 13 companies provided health coaching to their 1,537 employees (Tables 1 and 2), for which we had two-year data on 968 employees and health coaching data on 125 (12.9%) employees. Three of the companies provided health coaching that included unlimited inbound phone calls and emails but did not include outbound calls from the coaches. The other two companies had unlimited inbound phone calls and emails and quarterly outbound calls to high-risk individuals.

Statistical Analysis

Data analysis was performed using data from 4,473 employees for whom we had two years of biometric, HRA, or health coaching data. The statistical analysis included biometric screening data from all 13 companies, HRA data available from six companies, and available coaching data from five companies. We evaluated the effects of health coaching on the change in

biometric data between two annual biometric screenings. We hypothesized that, compared to not using health coaching, use of health coaching would result in a greater change in biometric data.

The 10 variables of interest included percent body fat, BMI, TC, HDL-C, LDL-C, TC/HDL ratio, triglycerides, glucose, SBP and DBP. Frequency distributions, means, and mean changes were used to describe the data. Bivariate analyses were used to measure associations between selected variables with statistical significance based on the chi-square test for independence. Mean change scores were evaluated using the *t* statistic and the *F* statistic. The Mantel-Haenszel chi-square was used for comparing trends. The McNemar's test was used to compare paired dichotomous responses over time and the symmetry test was used to compare paired multichotomous responses over time. Multivariate analysis of variance was performed and evaluated using Wilks' Lambda. Two-sided tests of significance were based on the 0.05 level. All analyses were performed using SAS version 9.3 (SAS Institute Inc., Cary, NC, USA, 2013).

Results

Companies were ranked according to how many of the 10 biometric variables improved between the first and second biometric screenings. Of the 13 companies, one company demonstrated improvement in all 10 biometric measurements; two companies demonstrated improvement in nine measurements; and seven companies demonstrated improvement in 5–8 of the measurements. High-density lipoprotein and diastolic blood pressure (DBP) were improved in 10 of the 13 companies; systolic blood pressure (SBP), glucose, TC/HDL ratio improved in 9 companies; triglycerides improved in 8 companies; TC, LDL-C, BMI, and percent body fat improved in 5 to 7 companies. The biometric measurements that showed the greatest improvements over time were triglycerides, blood pressure, BMI, and TC. There was no association found between employee participation rate ($p = 0.8814$) or the type of incentives

offered to employees ($p = 0.1389$) and the rank of the company based on the number of variables that improved. With respect to participation rates or the number of biometric variables that changed over time, companies that offered coaching did not appear to perform any better than companies that did not offer coaching.

Five of the 13 companies provided voluntary telephonic health coaching to 1,537 employees participating in their WHPPs. Of 968 employees for which we had two-year data, only 125 (12.9%) actually participated in health coaching. Those who participated in coaching were on the average two years older than those that did not participate in coaching. Coaching was not significantly associated with sex. Baseline biometric scores were not significantly associated with coaching. The effects of health coaching on each of the 10 variables of interest were evaluated based on the change in the variables that occurred over time between the two biometric screenings.

Of the 10 biometric variables evaluated in this study, there were significant changes in SBP, DBP, TC, HDL-C, LDL-C, the TC/HDL-C ratio, and percent body fat when data from all employees were combined (Table 4). Overall improvements were observed in SBP, DBP, HDL-C, and the TC/HDL ratio whereas TC, LDL-C, triglycerides, blood glucose, percent body fat, and BMI tended to increase (Table 4). Compared to those who did not participate in health coaching—after accounting for age, gender, and the initial values at the first health screening—coaching resulted in significantly greater changes in DBP, HDL-C, and BMI ($p < 0.05$; Table 4). The average reduction in DBP of 4.70 mmHg in those who used coaching was significantly greater ($p = 0.0171$) than the 1.4 mmHg reduction in DBP that occurred in those who did not use coaching (Table 4). For those who used health coaching, there was a reduction in HDL-C of 1.10 mg/dL compared to an average increase in HDL-C of 0.90 mg/dL in those who did not use health

coaching ($p = 0.0477$; Table 4). There was an overall increase in BMI in those who used coaching as well as those who did not use coaching. Overall, there was a significantly ($p = 0.046$) greater increase in BMI in those who used coaching (0.45 kg/m^2) compared to those who did not use coaching (0.08 kg/m^2; Table 4). When the changes in biometric data in the categories of each of the 10 variables were analyzed, trends indicate that greater changes were observed in the higher risk categories of TC, LDL-C, triglycerides, blood glucose, SBP, and DBP (Table 5). Further analysis indicated a significant interaction ($p < 0.05$) between coaching and the TC and triglyceride categories indicating that the influence of coaching was different between the categories of TC and the categories of triglyceride (Table 5). When significant interactions are found, it is appropriate to compare categorized change scores between coached and not coached groups. The change in TC was significantly more pronounced in the coached group in the 200–239 mg/dL and > 240 mg/dL categories (Table 6). The change in triglycerides was much greater in the coached group in the > 240 mg/dL category.

Discussion

The primary reasons companies implement WHPPs are to reduce health care costs and absenteeism,[15] however, a company's ROI goes beyond savings in health care costs to nonhealth-related ROI.[16] A ROI is achieved through improved employee health, reduced costs of employee benefits (e.g., health insurance), increased productivity, intellectual capacity of employees, reductions in disability, reduced absenteeism, improved employee morale and employee perceptions of the company.[15,16] In this study, our primary goal was to evaluate the effects of WHPPs, specifically health coaching, on changes in biometric screening data over a two-year time period in employees participating in a third party WHPP. Data was not available

to evaluate other variables that may contribute to the ROI in the13 companies. The results of this study indicated that WHPPs and health coaching can positively affect biometric results.

The effectiveness in changing behaviors and cost-effectiveness of WHPPs largely depends on employee participation levels, especially those employees who are at increased risk of illness due to lifestyle.[17] Although WHPPs are available to all employees in a company, not all employees participate in their WHPP. The employee participation rate in 10 of the 13 companies for whom we had participation rates in our study ranged from 35% to 75% (Table 1). In this study, participation in the WHPP was recorded as participation in any activity of the WHPP. Participation rates for each company were provided by WCS. The number of employees with baseline and two-year biometric or HRA data is lower that the reported participation rates (Table 1) because participation was not based on completion of the biometric screenings or HRA. Participation rates in WHPPs vary with the programs available and incentives offered. A previous report indicates that participation ranged from 32% in health education programs to 5% for smoking cessation programs.[16,17] Previous reports suggest that most companies do not provide incentives for participation,[16,18] some companies offer disincentives and lotteries,[15] and that incentive-based WHPPs do not appear to increase participation more than those that do not offer incentives.[16,18] All 13 companies in this study offered cash, paid time off, gift cards, premium reduction, and raffles as incentives and rewards to participate in the WHPP (Tables 2 and 3). Although participation was encouraged with incentives and rewards, our data shows that there was no association between employee participation rates and the type of incentive offered. This only suggests that in these 13 companies one type of incentive was not more influential in determining participation rate than another type of incentive. Nevertheless, incentives and rewards for participation may have contributed to the high participation rates in this study. There

was also no association with the type of incentive offered and the number of biometric variables that improved in the two-year time period during which data was collected. Although incentive programs may increase participation rates, previous research suggests that incentive and disincentive programs have minimal impact on health status and medical claims.[16]

In this study, improvement in all 10 biometric variables was observed in only one of the 13 companies. This was a law firm with an overall 50% participation rate, 286 employees participating in the WHPP at baseline, and 279 (97.5%) of those had annual screenings over the two years with a premium reduction incentive and no coaching. To the contrary, only one variable improved in a casino chain that had an overall 35% participation rate, 333 employees participating in the WHPP at baselines, and 173 (52%) who had annual screenings over the two years with a cash/raffle incentive and telephonic coaching. The results of our study indicate that the magnitude of improvement is dependent on the initial value at baseline (Tables 5 and 6). This might suggest that the company that had the greatest number of variables improve had the poorest health at baseline. We suspect that this is not the case in this study since results of some studies[19-21] tend to suggest that the employees who have the most to gain from participation in a WHPP are the least likely to participate and that the concept of wellness may alienate those with unhealthy lifestyles.[19-21] Socioeconomic group and level of education are strong indicators of likelihood of participation in a WHPP.[23] A higher socioeconomic status (SES) in the United States has been related to healthier lifestyle habits and is a powerful determinant of health status.[24] Individuals of lower SES are exposed to fewer messages about smoking, poor diet, and lack of exercise; have negative health outcomes (e.g., sedentary, high BMI, chronic stressful experiences, and higher rates of cardiovascular disease) throughout the life span; are less likely to spend time exercising; have less access to health care support; and have higher morbidity and

mortality rates than those in a higher SES.[24,25] We speculate that one possible explanation for the differences in the number of biometric variables that showed improvement in each of the three companies is the differences in the SES of the employees.

In this study, health coaching was associated with an unexpected overall decrease in HDL-C of 1.10 mg/dL and an increase in BMI of 0.45 kg/m^2 (Table 4). A HDL-C of less than 40 mg/dL increases the risk of cardiovascular disease and a HDL-C greater than 60 mg/dL is a negative risk factor. An overall decrease in HDL-C occurred in employees with the lowest HDL-C values and the greatest increase in HDL-C occurred in employees with the highest HDL-C values (Table 5). The observed increase in HDL-C in the > 60 mg/dL is clinically relevant. For every 1mg/dL increase in HDL-C, the risk of having a cardiovascular event is reduced by 2–3%.[26] Of those 968 employees who had access to health coaching and for whom we had two-year data, 65.6% were classified as overweight or obese (Table 5). There were overall increases in BMI in all BMI categories except the obese category (Table 5). There was an overall increase in BMI of 2.39 kg/m^2 in underweight individuals (Table 5) which can be interpreted as an improvement in BMI. There was also an average increase in BMI of 0.25 kg/m^2 and 0.46 kg/m^2 (Table 5) in those individuals classified as normal weight and overweight, respectively; a trend that is indicative of the rising obesity rates in America. Individuals in the overweight and obese BMI categories tend to have more cases of chronic disease.[27] Reducing BMI would reduce the prevalence of overweight and obesity. Recent estimates suggest that if the BMI in the population was reduced by one unit, the prevalence of overweight would decrease from 43% to 37.2% in men and from 29.2% to 23.9% in women, and the prevalence of obesity would decrease from 16.1% to 11.6% in men and from 13.4% to 10.2% in women.[27] A one-unit decrease in BMI would also result in an overall reduction in chronic disease by 4% in those who are overweight

and obese.[27] The results of this study suggest that greater emphasis should be placed on weight loss in WHPPs and health coaching.

In 2010, high blood pressure was the leading risk factor for the overall global burden of disease.[30] The burden of hypertension across the age-span is substantial.[30] In this study, there was an overall decrease in both SBP and DBP (Table 4). Health coaching was associated with a significantly ($p = 0.0171$) greater decrease in DBP compared to those who did not use health coaching (Table 4). Although the effect of health coaching was not significant in the reduction of SBP, there were substantial overall reductions in SBP (Table 5). It is estimated that a 5 mmHg reduction in SBP in the population would result in a 14% overall reduction in mortality due to stroke, 9% reduction in mortality due to coronary heart disease, and a 7% decrease in all-cause mortality.[28] Compared to the year 2000, Capewell et al. estimated that there would be 48,000 fewer deaths due to coronary heart disease if mean SBP were to decrease by 5 mmHg in all age groups.[29] A 10 mmHg decrease in SBP or 5 mmHg decrease in DBP is associated with an approximately 20–25% lower risk of coronary heart disease and an approximately 40% lower risk of stroke.[31,32] The results of our study indicated that the greatest reductions in SBP and DBP were in those individuals classified as prehypertensive or hypertensive (Table 5) and that the magnitude of the reductions would significantly reduce the risk of coronary heart disease and stroke.

The data from this study indicate that although the overall effect of health coaching was not significant in the changes in TC and triglycerides (Table 5), the influence of health coaching varied between the categories of TC and triglycerides (Table 6). The mean changes in TC and triglycerides associated with coaching were more pronounced in the higher risk groups.

Although we have no explanation for this finding, decreases in TC and triglycerides in the high risk groups are an indication of the positive influence of health coaching.

Olsen et al.[13] reviewed the effectiveness of health coaching interventions on improving healthy lifestyle behaviors and the key factors of an effective health coaching program. They concluded that health coaching improves adherence to a nutritious diet in adults and children; reduced calorie, sugar, fat, and cholesterol intake; and increased fiber and complex carbohydrate intake. Olsen et al. also found that health coaching improves physical activity and fitness measures, weight management, and medication adherence. Olsen et al. suggested that the optimal length of a health-coaching program should be between 6 and 12 months for behavior change and that health coaching should occur multiple times per week, once every four to six weeks, or at least quarterly. Other research has shown that health coaching contributed to a significant reduction in the participant's weight and body fat percentage, with weight loss remaining consistent over the entire study.[12,14]

Health coaching that is more involved and regular has resulted in greater health improvements.[27,33] In a study by Merrill, et al. monthly telephonic health coaching was provided along with annual biometric screenings and HRAs.[34] Participants were required to set a minimum of two goals with their health coach, to track goals 75% of the time, and to meet these goals 50% of the time.[34] Participation increased over a 4 year period from 48% to 71%.[34] In some companies, over 50% of insured employees participated in health coaching until they no longer had health risks.[34] Merrill, et al. reported significant improvements due to coaching in BMI, SBP, DBP, TC/HDL ratio, glucose, and BF%,[34] compared to our study that saw significant changes in only 3 variables; BMI, HDL, and DBP. In our study, participants received a phone call from their coach or a registered dietitian and on average had only 2.5 coaching sessions over

a 2-year period, compared to Merrill, et al. where coaching contact occurred monthly.[34] The frequency of health coaching could explain why, in the present study, it did not have a significant impact on more variables. The infrequent health coaching interactions found in this study also suggest that the true effectiveness of health coaching on biometric variables may be underestimated from the results of this study. It is difficult to disentangle the true effect of health coaching or what its potential impact could be from the results of this study because employees were required to call in or email their health coach. The individuals that did participate in health coaching may have been highly self-motivated to participate. Baseline scores in the coaching and noncoaching groups were similar, therefore poor baseline scores were not likely to be the motivation to participate in coaching. Other studies have shown that participants who participate in more than four or eight coaching sessions have significant improvements in well-being, coping, work attitudes, goal-directed self-regulation,[33] and significant weight loss.[34,35] Those that participated and set goals of weight loss and physical activity saw significant weight loss compared to those who did not set goals.[35] For participants who are in the preparation stage of change, health coaching increases their motivation and confidence to take action.[33,35] In this study, we evaluated the influence of health coaching on measureable outcomes such as BMI, blood pressure, and blood lipid profiles. Data on well-being, attitudes, morale, goals, dietary choices and food intake, and use of medications were not available, thus the positive effects of health coaching may have been more far-reaching than indicated in the results of this study.

Limitations to our study included a lack of a comparison or control group of employees who did not participate in the WHPP. Data on each employee and each corporation was limited to what was provided by WCS. Screenings only occurred once a year, so changes observed over time are represented by data collected at a limited number of time intervals and may not reflect

trends that might otherwise be observed with more frequent data collection. In addition, due to the infrequent health coaching interactions found in the WHPP of these 13 companies, the true effect of health coaching may be underestimated from the results of this study.

Conclusion

Based on the results of our data, voluntary participation in WHPPs that include annual biometric screenings and health challenges promote positive changes in health-related biometric variables. Health coaching can positively affect the magnitude of change in some biometric variables. The magnitude of change in biometric variables is likely related to the baseline value at the first screening and the frequency of coaching interactions. Further research can evaluate the benefits of various forms and frequencies of health coaching. Worksite health promotion programs and health coaching may have a positive impact on other variables (e.g., employee attitudes and morale) not addressed in this study.

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Table 1 Industry type, number of employees and participation rates of 13 companies involved in this study.

Industry Type	No of Employees	Baseline Data	2-Year Data	Participation Rate†
*Credit Union	325	188	105	75%
*Casino Chain	900	333	173	35%
*Nonprofit	60	37	19	75%
*Production Plant	225	81	48	55%
*Law Firm	1600	286	279	50%
*Sand Mining	1200	652	639	68%
*Software	2000	531	386	60%
*Insurance	120	24	24	50%
*Financial Association	325	177	98	75%
*Tire Manufacturing	900	415	263	35%
*Management	2,500	2,034	143	—
*Machinery	3,600	2,259	1,866	—
*Produce Packaging	1,200	795	430	—
Total	12,955	7,812	4,473	

†Participation rate provided by WCS and was calculated as participation in any aspect of the WHPP. Number of employees with baseline data may be less than the participation rate because participation was not based on completing the biometric screenings.
*Company provided health coaching as part of their WHPP.

Table 2 Incentives provided by companies that provided coaching.

Industry Type	Incentive Program	Incentive Description	Incentive Reward	Coaching
Tire Manufacturing	Participatory Outcomes based	Points-based system on the portal for health insurance premium reduction	Up to $720 in premium reduction for earning the required amount of points	Telephonic
Casino Chain	Participatory	Completion of health screening and HRA	Cash, raffle for an expense-paid trip	Unlimited inbound calling and email and quarterly outbound calls to high risk employees
Production Plant	Participatory	Earn points by completing wellness activities	Up to $175 annually for earning enough points	Unlimited inbound calling and email and quarterly outbound calls to high risk employees
Software Infrastructure	Participatory	Points based	5% premium reduction	Telephonic
Financial Association	Participatory	Phase 1–complete HRA and screening Phase 2–points-based system on the portal for cash reward	$75 for HRA completion, $75 for screening completion, $50 for earning 100 wellness points	Telephonic

Table 3 Incentives provided by companies that did not provide coaching.

Industry Type	Incentive Program	Incentive Description	Incentive Reward
Nonprofit	Participatory	Earn points by completing wellness activities	$50/month if they earn enough points
Law Firm	Outcomes based	Based on initial health screenings, get premium reduction if don't have metabolic syndrome.	$50/month insurance premium reduction
Sand Mining	Participatory outcomes	Gift cards based on participation in HRA, screenings, etc. or maintaining or improving 2 out of 3 body comp measurements	$350 for body comp, $100 for HRA screening, $50 for challenges, seminars, and preventative care visits
Insurance	Participatory	Participation based	Gift cards for participation
Credit Union	Participatory	Earn points by completing wellness activities	Paid time off
Produce Packaging	N/A	N/A	N/A
Machinery	N/A	N/A	N/A
Management Consulting	N/A	N/A	N/A

N/A = information was not provided by WCS because these companies are not year long clients of WCS.

Table 4 Summary of changes in biometric data.

	Baseline	Change
Systolic Blood Pressure†	125.2 ± 14.2	-1.74 ± 13.4
Diastolic Blood Pressure†*	77.6 ± 10.7	-1.74 ± 10.3
Coached	79.5 ± 11.2	-4.70 ± 10.4
Not Coached	77.4 ± 10.6	-1.40 ± 10.3
Total Cholesterol†	183.6 ± 36.3	2.90 ± 27.6
High-Density Lipoprotein†*	49.2 ± 16.1	0.73 ± 10.6
Coached	49.9 ± 15.6	-1.10 ± 10.6
Not Coached	49.1 ± 16.2	0.90 ± 10.6
Low-density Lipoproteins†	112.8 ± 36.8	3.84 ± 34.9
Triglycerides	128.1 ± 72.6	0.94 ± 75.0
Blood Glucose	98.5 ± 26.6	0.08 ± 2.4
TC/HDL Ratio†	4.1 ± 1.7	-2.37 ± 25.1
Percent Body Fat†	28.6 ± 8.8	0.49 ± 3.1
Body Mass Index*	28.1 ± 6.1	0.12 ± 2.2
Coached	28.8 ± 6.9	0.45 ± 2.4
Not Coached	28.0 ± 6.0	0.08 ± 2.2

Change scores are shown for coaching and non-coaching groups if the change scores were significantly different. Baseline and changes score values represent mean and standard deviations.

† = significant change ($p < 0.05$) in biometric variable between screenings when data from all employees were combined.

* = significant ($p < 0.05$) difference between coaching and non-coaching groups.

Table 5 Changes in biometric data in categories of biometric variables.

	N	Baseline	Change	Interaction p value
Total Cholesterol				0.0407
< 200 mg/dL	689	164.74 ± 22.15	8.47 ± 23.59	
200–239 mg/dL	235	217.00 ± 11.68	-5.43 ± 27.41	
> 240 mg/dL	68	259.85 ± 23.11	-24.63 ± 39.63	
High Density Lipoproteins				0.2619
< 40 mg/dL	242	71.04 ± 9.66	-2.75 ± 12.30	
40–60 mg/dL	429	48.87 ± 5.53	0.74 ± 9.50	
> 60 mg/dL	296	31.73 ± 5.76	3.55 ± 9.69	
Low Density Lipoproteins				0.0796
< 100 mg/dL	127	81.47 ± 13.73	14.73 ± 23.40	
100–129 mg/dL	117	115.81 ± 7.83	5.40 ± 21.60	
130–159 mg/dl	53	144.00 ± 8.43	-2.26 ± 22.37	
160–189 mg/dl	25	192.16 ± 51.77	-45.92 ± 82.52	
Triglycerides				0.0488
< 149 mg/dL	253	93.47 ± 27.86	13.93 ± 60.08	
150–199 mg/dL	43	167.95 ± 11.61	-14.19 ± 68.97	
> 200 mg/dL	49	272.10 ± 68.38	-52.82 ± 114.74	
Blood Glucose				0.3698
< 110 mg/dL	813	89.66 ± 9.32	2.07 ± 14.86	
110–125 mg/dL	84	115.75 ± 4.24	-9.60 ± 22.42	
> 125 mg/dL	92	160.34 ± 45.12	-35.02 ± 55.70	
TC / HDL Ratio				0.9377
≤ 3.5	715	3.35 ± 0.78	0.18 ± 0.83	
> 3.5	243	6.48 ± 1.58	-0.23 ± 4.64	

Values are mean ± standard deviations. *p* value represents the significance of the interaction between the biometric variable categories and health coaching.

Table 5. Changes in biometric data in in subcategories of biometric variables (continued).

	N	Baseline	Change	Interaction p value
Systolic Blood Pressure				0.4756
Normal (≤ 120 mmHg	344	110.75 ± 6.58	3.78 ± 11.76	
PreHxt (120–139 mmHg)	480	128.82 ± 5.78	-2.69 ± 11.74	
Stage 1 Hxt (≥ 140 mmHg)	136	148.62 ± 8.07	-12.37 ± 15.80	
Diastolic Blood Pressure				0.4568
Normal (≤ 80 mmHg)	547	70.56 ± 6.38	1.58 ± 9.11	
PreHxt (80–89 mmHg)	307	83.66 ± 2.81	-4.53 ± 8.00	
Stage 1Hxt (90–99 mmHg)	83	93.43 ± 2.93	-8.66 ± 11.06	
Stage 2 Hxt (≥ 100 mmHg)	22	107.64 ± 14.46	-19.14 ± 20.08	
Percent Body Fat				
Males < 25%	261	19.48 ± 4.35	1.01 ± 3.08	0.6936
Males > 25%	204	30.36 ± 4.20	-0.20 ± 3.32	
Females < 30%	114	25.12 ± 3.54	1.50 ± 3.52	0.5622
Females > 30%	246	38.32 ± 5.25	0.03 ± 2.58	
Body Mass Index				0.0959
Underweight (< 18.5 kg/m^2)	12	17.64 ± 0.94	2.39 ± 3.12	
Normal weight (18.5–24.9 kg/m^2)	317	22.61 ± 1.67	0.46 ± 1.62	
Overweight (25–29.9 kg/m^2)	343	27.24 ± 1.41	0.25 ± 1.68	
Obese (> 30 kg/m^2)	285	35.62 ± 5.00	-0.51 ± 3.04	

Values are mean ± standard deviations. *p* value represents the significance of the interaction between the biometric variable categories and health coaching.

Table 6 Interaction between health coaching and categories of biometric variables.

	Coached Mean Change	Not Coached Mean Change
Total Cholesterol		
< 200 mg/dL	10.94 ± 20.28	8.18 ± 23.93
200–239 mg/dL	-12.60 ± 29.10	-4.58 ± 27.15
> 240 mg/dL	-46.20 ± 45.49	-22.92 ± 39.02
Triglycerides		
< 200 mg/dL	15.88 ± 45.88	13.65 ± 61.95
200–239 mg/dL	4.50 ± 47.76	-18.46 ± 72.84
> 240 mg/dL	-132.25 ± 34.54	-45.76 ± 116.86

Values are mean ± standard deviations.