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Effectiveness of Nutrition Education and Fitness Tracking in a Large Corporate Healthcare Wellness Program

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EFFECTIVENESS OF NUTRITION EDUCATION AND FITNESS TRACKING IN A
LARGE CORPORATE HEALTHCARE WELLNESS PROGRAM

A Thesis

Presented to

The Graduate Faculty

Central Washington University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

Nutrition

by

Jess Tyrrell

May 2019

CENTRAL WASHINGTON UNIVERSITY

Graduate Studies

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ABSTRACT

EFFECTIVENESS OF NUTRITION EDUCATION AND FITNESS TRACKING IN A LARGE CORPORATE HEALTHCARE WELLNESS PROGRAM

by

Jess Tyrrell

May 2019

In the United States, greater than two-thirds of adults are considered overweight or obese – making the treatment and prevention of overweight/obesity a public health priority. In response, employers are recognizing that promoting and maintaining employee health is beneficial, so the implementation of corporate wellness programs is on the rise. The purpose of this study was to determine the effectiveness of a ten-month multicomponent employee corporate wellness program on two health-related outcomes: weight loss and step count. The study was used to determine how active utilization of program components would affect the achievement of health-related outcomes among participants. This retrospective chart review compared data within two wellness tracks (BMI and healthy) that were assigned to participants based on BMI findings from their Health Risk Visit assessment with their primary care provider. Participants in both tracks were offered four campaigns and a nutrition-focused series delivered by a registered dietitian. A positive relationship was observed among Healthy Track participants, as those who were active participants in at least one campaign (76.4%) reached an incentive level versus those who were not active participants (37.9%). Participants in the nutrition series had a mean loss of 1.46% BMI percentage change versus a mean gain of 0.10% BMI percentage change among those who did not participate ($p = .0475$). Additionally, no

relationship was found between the use of a fitness tracker and changes in BMI percentage for participants in either track ($p = .962$).

TABLE OF CONTENTS

Chapter	Page
I INTRODUCTION	1
II LITERATURE REVIEW	3
Detrimental Effects of Obesity.....	4
Rise and Importance of Corporate Wellness Programs.....	6
The Benefits of Corporate Wellness Programs.....	9
Participation in Wellness Programs.....	14
Incentive-Based Wellness Programs.....	18
Conclusion and Study Objective.....	20
III JOURNAL ARTICLE	22
Abstract.....	25
Introduction.....	27
Methodology.....	29
Statistical Analysis.....	36
Results	37
Discussion	40
JOURNAL REFERENCES	48
IV TABLES.....	50
Table 1- Wellness Tracks: Participants Incentive Levels	50
Table 2- Healthy Track and BMI Track Crosstabulation.....	51
Table 3- Incentive Results.....	52
Table 4-Weight Change Percentage vs. Nutrition Series Participation.....	53
Table 5- Healthy Track vs BMI track and Weight Change Percentage.....	54
Table 6- Existence of Fitness Tracker vs Weight Change Percentage.....	55
COMPREHENSIVE THESIS REFERENCES	56

CHAPTER I

INTRODUCTION

Over the last three decades, marked increases in body mass index (BMI) have been observed across all racial, ethnic, gender and age groups worldwide.¹ In the United States (U.S.), greater than two-thirds of adults are considered overweight or obese – making the treatment and prevention of overweight/obesity a public health priority.^{2,3} As a result of the obesity epidemic, national health care costs are roughly \$190 billion per year for the treatment of obesity-related diseases with annual medical costs for obese adults being roughly \$1429 higher than adults of normal weight.^{4,5} It has been determined that several demographic and socioeconomic factors are associated with obesity and that environments in which people live and work are strong influences on and predictors of obesity.² For example, it has been noted that higher levels of education are associated with decreased rates of obesity.⁵ Prevalence of obesity is also variable among age groups; 35.7% of adults aged 20-39 are obese, while 42.8% of adults aged 40-59 and 41.0% of adults aged 60 and over are obese, respectively.⁵ Obesity is associated with overall increased mortality and morbidity, resulting in a measurable reduction in an individual's overall quality of life.⁶

CHAPTER II

LITERATURE REVIEW

Detrimental Effects of Obesity

Obesity is a major risk factor for numerous diseases, such as type II diabetes, heart disease, hypertension, sleep apnea, stroke, asthma and select cancers; all of which are leading causes of preventable, premature death.^{5,7,8,9,10} Obesity is associated with a state of chronic low-level inflammation that can be systemic; it is often present in the liver, brain, pancreas and adipose tissue.⁹ This inflammatory response induced by obesity causes changes in the number and activity of immune cells.⁹ This dysregulated immune system response is considered to be the central mechanism connecting obesity to the increased risk of chronic diseases and their complications as outlined briefly below.⁹

The National Health and Nutrition Examination Study (NHANES) from 1999-2006 (N = 21,205) found that the risk of developing type II diabetes went from eight percent in individuals of normal weight to 43% in individuals with morbid obesity.⁹ A separate study found that for every four kg/m² increase in BMI, there was a 26% increase in the odds of developing coronary heart disease (CHD).⁹ Additionally, the Framingham Heart Study, a long-term, ongoing study of adults without a history of heart failure (N =

6,000) determined that heart failure risk was doubled in those individuals considered obese; heart failure risk increased five percent in men and seven percent in women for each additional one kg/m² increase in BMI.⁹ Obesity also plays a role in the development and severity of other health issues.

Obesity is a major pathogenic factor in obstructive sleep apnea (OSA) in adults.⁹ OSA is associated with hypertension, insulin resistance, liver dysfunction, general systemic inflammation and dyslipidemia.⁹ Obese individuals are also twice as likely to have a stroke (either ischemic or hemorrhagic) when compared with individuals whose BMI is less than 23 kg/m².⁹ Additionally, there is a strong association with obesity and an increased risk of gastric, pancreatic and gallbladder cancers; and the overall prognosis of obese individuals who develop certain types of cancer is poorer than people of normal weight.⁹ Finally, it is estimated that obesity is responsible for roughly 20% of all other types of cancer.⁹ The detrimental effects of obesity-related disease can be profound and widespread, greatly reducing the overall quality of one's life.

The previously discussed obesity-related complications can affect all aspects of an adult's life, including the workplace. In the workplace, obesity is related to higher medical and health insurance costs, increased rates of absenteeism, decreased productivity and an increased prevalence of obesity-related disabilities and healthcare claims.^{2,3} Workplace factors such as poor coworker and managerial support and unhealthy physical work environments (i.e. lack of access to healthy food options and limited opportunities for physical activity) further contribute to many negative health effects, including obesity.² Easy access to energy-dense food and beverages available in vending machines and cafeterias combined with largely sedentary work settings also

contribute to obesity in the workplace.⁸ Since most U.S. adults spend a significant amount of time at work, the negative effects of overweight and obesity in the workplace can be far reaching with dramatic effects on many **employees, and** thus the need for positive changes in the workplace environment are increasingly evident.

As the detrimental effects of obesity become more apparent and the prevalence of overweight and obesity continues to increase, it is becoming essential to identify effective strategies to combat it. Such strategies include the implementation of initiatives in schools and communities along with changes being made to public policy.³ Increased emphasis in the medical community on the importance of preventive care and positive lifestyle changes are other strategies being used to help combat the obesity epidemic.³ Education and commitment from employers to encourage lifestyle changes among employees can help reinforce other obesity-related prevention efforts, such as policy changes and other community interventions.³ **Even modest weight loss of five to ten percent of total body weight has been shown to lower the risk of developing type II diabetes and can improve other co-morbidities and obesity-related risk factors.¹** **Workplace wellness programs focusing on obesity intervention efforts are of considerable importance, indicating an urgent need for effective and sustainable workplace wellness interventions.**

Rise and Importance of Corporate Wellness Programs

Promoting and maintaining employee health is becoming increasingly recognized as beneficial as demonstrated through the rise of corporate wellness programs.¹¹ In 2004, the National Heart Lung and Blood Institute (NHLBI) launched a special initiative,

Overweight and Obesity Control at Worksites, in recognition of the potential reach and impact of corporate wellness programs.³ Seven worksite projects (N = 23,250) were funded nationwide from 2004-2012 to test the effectiveness of multi-component, ecologically based interventions at preventing and reducing overweight and obesity in the workplace.³ Prior to this initiative, no previous worksite study examined the impact of ecological interventions targeting weight gain prevention.³

Similarly, the Affordable Care Act, in addition to the National Institutes of Health (NIH) and the Centers for Disease Control and Prevention (CDC) created new incentives to promote employer wellness programs and provide opportunities to support healthier workplaces as a priority location for implementing wellness programs and health interventions.² Additionally, Anderson et al identified that such programs may be useful in reaching objectives specified in *Healthy People 2010*, a comprehensive disease prevention and health promotion agenda for the U.S. that was first developed in 1990 by the Department of Health and Human Services (DHHS).^{8,12} The development of these objectives was based on the 1979 report *Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention* whose primary goals were to decrease premature deaths and preserve independence for older adults in the U.S.¹² When it was developed in 1990, the *Healthy People 2000* report outlined 376 objectives in 21 focus areas that it hoped to address by the year 2000.¹² Forty objectives on this report specifically targeted physical activity and nutrition; and it was noted that greater progress was made towards meeting physical activity goals compared to nutrition goals.¹² Worksites of three different sizes achieved the goal of increasing their offerings of physical activity programs to employees; 20% of companies with 50-99 employees, 35%

of companies with 100-249 employees and 50% of companies with 250-749 employees were the established targets.¹² While the 80% target for companies with 750 or more employees was not met, progress was made toward the goal with 68% of companies having increased their physical activity program offerings.¹² Based on these findings, the *Healthy People 2000* final review suggested that worksites that provide facilities and other measures that support physical activity could offer the best opportunities for adults to lead active lives.¹² In contrast to these findings, one of the most relevant objectives related to nutrition moved away from its target – the prevalence of overweight adults aged 20-74 years.¹² The prevalence of overweight adults was 26% at baseline and increased to 35% by the end of the report, moving further from the established 20% target.¹² In an effort to address and expand upon these results, changes were made to the *Healthy People 2000* physical activity and nutrition objectives and goals in preparation for the *Healthy People 2010* report.¹² Physical activity changes included an emphasis on changes in individual behaviors combined with community support to achieve consistent moderate physical activity.¹² The nutrition changes for the 2010 report were more drastic; the nutrition chapter was renamed *Nutrition and Overweight* in an effort to provide increased focus on the achievement and maintenance of healthy weight.¹² In addition, two objectives outlined for the 2010 report aimed to promote nutrition education and weight management initiatives at worksites.¹² For the *Healthy People 2010* report, both physical activity and overweight and obesity were identified as two of the ten Leading Health Indicators (LHIs) that were introduced for the first time.¹² Identification of the LHIs reflected major public health priorities that the *Healthy People 2010* report and future reports would focus on.¹² In the *Healthy People 2010* report, the proportion of

adults who did not participate in physical activity decreased from 40% to 36%, moving toward but not ultimately achieving the established 20% target.¹² In contrast, almost no progress was made toward the nutrition and overweight objectives and goals; the number of adults aged 20 years and older considered obese rose from 23% to 34%, considerably moving away from the established 15% target.¹² In an effort to continue addressing these alarming trends, the number and content of objectives increased when the *Healthy People 2020* report was being created; the number of physical activity objectives increased from 18 to 36 while the number of nutrition and overweight objectives increased from 22 to 38.¹² For the 2020 report, the physical activity objectives were developed to assess the environments and policies in place that support being active and five objectives were specifically designed to address worksite physical activity and active transportation programs.¹² The nutrition and overweight objectives and goals were changed more significantly for *Healthy People 2020*; the chapter was renamed *Nutrition and Weight Status* in an effort to better assess individual behaviors regarding consumption of a healthy diet and achievement/maintenance of a healthy weight and the policies and environments that support or hinder these behaviors.¹² The nutrition-related objectives were expanded to include a broader range of policies and environmental factors in specific settings like worksites that support diet and weight changes.¹² Based on the objectives outlined in the *Healthy People 2020* report, it is the ultimate goal that significant strides will be made in meeting targets for physical activity and nutrition and weight status. This continued identification of specific, measurable goals over the last several years has confirmed the importance of addressing overweight and obesity, and corporate wellness programs were identified as an important target for reaching large

segments of the adult population.⁸ Corporate wellness programs are also being recommended based on additional factors, including their efficient means of delivery and their social support impact.^{1,2,3} By taking advantage of these characteristics, several recent studies have identified an array of benefits to corporate wellness programs.^{3,4,8,10,11,13}

The Benefits of Corporate Wellness Programs

As corporate wellness programs have gained popularity and their importance is being increasingly acknowledged, the benefits of implementation are becoming more apparent. An early evaluation of multiple comprehensive corporate wellness programs concluded that available studies suggest positive clinical and cost outcomes, including the importance of interventions that focus on a dose-response relationship and the emergence of mental health as a critical program component.¹³ The workplace offers existing social networks, common systems of communication, readily available eating environments and access to employer support programs, all of which have the potential to help facilitate weight loss and other healthy behavioral changes.^{3,4,13} In fact, the results of two recent studies suggest that corporate wellness programs may have several benefits.^{1,10} In one such study, Almeida et al evaluated an individually-targeted, internet-based intervention with monetary incentives (INCENT) program which was compared to a more minimal intervention, the Livin' My Weigh (LMW) program.¹ The INCENT and LMW programs were informed by research findings and the strategies used were based on social cognitive theory.¹ The LMW program utilized condensed versions of the informational materials from the INCENT program, like the promotion of a healthful diet and regular

physical activity, but it did not include any incentives or strategies deemed to be key intervention components (e.g. personally tailored information, daily emails, and regular access to the program's website).¹ Four newsletters delivered at the beginning of each quarter provided information on different exercise programs and gave examples of eating plans and meal ideas.¹ Additionally, four group resource sessions, each lasting one hour in duration, were delivered quarterly.¹ It was determined that employees in both the INCENT and LMW groups were able to reduce their weight and BMI; however, these reductions were not statistically significantly different between groups.¹ Results do show that a significant percentage of participants in both the INCENT and LMW groups achieved five percent weight loss of total body weight (14.56% and 9.67%, respectively).¹ In a similar study, LaCaille et al also evaluated a low-intensity intervention known as the *Go!* study and it was characterized by multiple theoretically-driven and low-cost components targeting changes in eating and physical activity habits among participants.¹⁰ Primary components of this study included the use of an innovative labeling scheme for all foods in the cafeteria and vending machines, the distribution of pedometers and the identification and use of influential employees to target social norms.¹⁰ Influential employees were identified as well-respected, knowledgeable, socially well-connected and persuasive employees who were able to affect others' attitudes and behaviors.¹⁰ The labeling scheme at point-of-selection in the workplace helped identify and place foods in three categories based on "traffic light" color ratings; green **foods = go**: eat in large portions; yellow **foods = caution**: eat in moderation; and red **foods = stop**: eat in small portions.¹⁰ Use of this scheme could increase employee knowledge, awareness of food intake and provide visual cues as to

which foods are healthiest and intervention participants expressed positive attitudes toward this motivational strategy.¹⁰ Additional environmental modifications used that may have contributed to positive changes in dietary behaviors included: reduction of serving spoon size; offering half-portions of meals at half price; increasing the number and visibility of healthy food options; and moving dessert options to less visible areas.¹⁰ Intervention participants were given information about how the pedometer could help them monitor activity in relation to food intake (i.e. energy balance) and were provided with a personalized magnet with energy balance facts and daily calories needed to maintain their current weight.¹⁰ The distribution and use of pedometers showed modest increases in physical activity among intervention participants in the form of walking and stair use; the intervention group showed an increase of roughly 22 more minutes in daily walking time when compared to the control group.¹⁰ and were provided with a personalized magnet containing energy balance facts and daily calories needed to maintain their current weight.¹⁰ This suggests that the use of targeted messaging (e.g. small steps making a big difference) and strategies encouraging increases in physical activity in one's daily routine can be successful in creating sustainable changes.¹⁰ As a result of this year-long study, significant increases in knowledge, information, perceptions of employer commitment and health discussions with peers were exhibited among the intervention participants but there was no statistically significant differences in weight, BMI or waist circumference when compared to the control group.¹⁰ However, employees in both the intervention and control groups gained less weight (0.20 kg and 0.45 kg respectively) than the expected annual amount for the adult population of 0.82

kg.¹⁰ To identify additional benefits of corporate wellness programs, analyses of multiple randomized controlled trials was performed.⁸

In the meta-analysis conducted by Anderson et al, reviews and analyses of worksite nutrition and physical activity programs were completed for nine randomized controlled trials; this analysis illustrated some of the potential benefits of corporate wellness programs.⁸ This systematic review assessed the effectiveness of worksite nutrition and physical activity programs (N = 47) in promoting healthy weight among participants.⁸ The results of the meta-analysis demonstrated that program effects were consistent with an average loss of 2.8 lbs among participants at six and 12 month follow ups.⁸ In terms of BMI, an average loss of 0.47 BMI kg/m² at six and 12 month follow-ups was observed in six of the nine randomized controlled trials.⁸ Subgroup analyses assessing the impact of the sample population, intervention features, study design and the length of follow-up revealed that there was no association between program effectiveness and the focus of the program (e.g. weight loss, physical activity, or both).⁸ Based on the reviews, Anderson et al concluded that there was fair to good evidence that high-intensity counseling regarding dietary behaviors, physical activity, or both, combined with behavioral interventions aimed at skill development, motivation and support strategies, produced modest weight loss.⁸ Results of this review suggest that active participation in a corporate wellness program with any program focus (e.g. physical activity, dietary behavior, or both) can be effective in achieving a variety of goals such as weight loss, reduction in BMI, or changes in physical activity behavior.⁸ Another study that primarily focused on dietary behaviors also showed effectiveness in achieving specific goals as summarized below.⁴

Salinardi et al aimed to test an ecologically based, multicomponent lifestyle intervention among overweight/obese employees (N = 133) on weight loss over six months and prevention of weight regain from six to 12 months beyond the initial intervention.⁴ Primary goals of the intervention included a reduction of energy intake to achieve weight loss of 0.5-1.0 kg/wk through dietary modification that was adapted to focus on fiber intake (≥ 40 g daily); protein (25%); fat (27%); and low-glycemic carbohydrates (48%).⁴ Information was delivered to intervention participants via 19 sessions led by nutritionists with experience in behavior modification who addressed a variety of topics specific to standard lifestyle interventions including dietary composition recommendations, portion control, self-monitoring, social support and weight maintenance.⁴ The intervention was compared to a control group that was given a low-intensity health and nutrition education program that consisted of six newsletters on healthy eating and monthly, open access seminars on general interest topics including cardiovascular health and physical activity.⁴ Intervention participants' (N = 84) mean weight change from baseline to six months was -8.0 ± 0.7 kg, while mean weight change among the control group (N = 34) from baseline to six months was $+0.9 \pm 0.5$ kg ($p < 0.001$).⁴ While this difference was significant, a mixed model that accounted for the nested worksite variable found the difference was not significant.⁴ Mean BMI change among intervention participants was -2.8 ± 0.2 kg/m², while the BMI change among the control group was $+0.3 \pm 0.2$ kg/m² ($p < 0.0001$ and $p = 0.07$, respectively, in the mixed model).⁴ Intervention participants also showed statistically significant improvements in multiple cardiometabolic risk factors when compared to the control group from baseline to six months based on the analysis of covariance (ANCOVA) analyses.⁴ Measured

factors included: non-HDL cholesterol (-14 mg/dL intervention versus -1 mg/dL control), glucose (-6 mg/dL intervention versus +6 mg/dL control) and diastolic (-8 mm Hg intervention versus -1 mm Hg control) and systolic blood pressure (-9 mm Hg intervention versus +6 mm Hg intervention).⁴ Data from these initial studies suggest a variety of benefits to corporate wellness programs and many also suggest that those benefits may be dependent on the extent of both employee and employer participation.^{2,3,6,13}

Participation in Wellness Programs

While the number and depth of studies about participation in corporate wellness programs is limited to date, the few studies available have shown potential. As noted by Strickland et al in 2015 a small study based on the Healthy Workplace Participatory Program (HWPP) found positive changes in weight, waist circumference, nutrition knowledge and exercise self-efficacy in a pre-post evaluation among participants who completed an employee worksite wellness program.² Participants lost an average of 13.36# (p < 0.05) over the course of the 20-week program, with 50% of participants losing at least five percent of their initial body weight.² This program emphasized a participatory approach based on the extent of employee involvement in the design of interventions in combination with the changes to the work environment itself, with both strategies being a viable means to overcome potential employee barriers and to identify opportunities for successful program implementation.² Results suggest that a participatory approach to wellness programs empowers employees by promoting positive attitudes toward health and enhances their knowledge and skills to take control of their

environment.² Other research has also demonstrated the importance of employee participation on positive outcomes.

Lemon et al developed a two year multi-faceted intervention guided by an ecological framework which emphasizes that behavior is influenced by psychological and cognitive factors in its environmental context; based on these ideas, social cognitive theory was used to form intervention messages targeting both dietary and physical activity habits.³ Environmental strategies used to encourage healthy eating included: 1) the use of cafeteria signs and information, including point-of-purchase information; 2) pricing strategies based on food type; and 3) an increase in the availability of healthy food.³ Recipe books and other print materials were also created and made available to intervention participants, providing healthy menu suggestions and other specific topics like quick and healthy dinners.³ To encourage physical activity, messages from the CDC's StairWell campaign were included on stairway signs in highly visible areas.³ This campaign provided cues designed to target key constructs of knowledge, self-efficacy, social norms and access and convenience related to increases in walking and daily step counts.³ Display workshops and educational series were also developed, targeting individual knowledge, skills and behaviors.³ A social marketing campaign integrating all strategies was disseminated via a weekly newsletter, website and centrally located information center with printed materials.³ While there was no intervention impact on BMI, the intervention was successful at improving employees' perceptions of organizational commitment to improve employee health at both 12- and 24-months.³ In this study, it was observed that positive effects on employee's BMI were proportional to the extent of their participation; the group of employees with the highest weight gain

prevention had the highest levels of participation in intervention workshops and displays.³ Groups with the highest weight gain prevention were determined using a classification and regression tree (CART) analysis across segments of the workforce that were unique, mutually exclusive and exhaustive with respect to employee participation; the CART groups identified were then compared to employee characteristics.³ Based on the CART analysis, Lemon et al were able to identify five patterns of intervention participation that were associated with the greatest likelihood of no weight gain at 24 months; frequent: 1) utilizers of displays and workshops, 2) readers/users of cafeteria nutritional signs and information, 3) readers of newsletters related to the study, 4) readers/users of posted stairway signs and, 5) conversely, infrequent users of all intervention strategies.³ Another study with similar findings related to the effects of participation also identified patterns that were correlated with intervention outcomes.¹³

Cook et al evaluated a web-based intervention, Health Connection, which offered substantial information and guidance on the topics of stress management, weight/nutrition management and physical activity that was conceptually based on accepted models of health behavior change, including social cognitive theory and the transtheoretical model.¹³ The ANCOVA analyses showed significantly greater improvement on measures of Attitudes Toward a Healthful Diet ($p = 0.008$) and Dietary Stage of Change ($p = 0.01$) when compared with the group who received printed materials only.¹³ Although there was no statistically significant change in weight between the two groups, both groups achieved reductions in weight; the web-based group lost an average of 0.57 kg ($p = 0.04$) while the print-based group lost an average of 0.96 kg ($p = 0.02$) from pretest to posttest.¹³ Dosage analyses were performed to evaluate the extent to

which the web-based program effects were correlated with the number of times participants accessed a particular program module, such as the weight/nutrition management module, on outcome measures.¹³ Similar to the previously discussed study by Lemon et al, Cook et al were able to place participants in the web-based intervention into three groups based on their patterns of participation: 1) those who never accessed the specific module, 2) those who accessed the module once, and 3) those who accessed the module multiple times.¹³ Based on these groups, linear trends were assessed and significant linear effects were observed among the web-based intervention participants in the weight/nutrition management module on three of seven dietary measures: 1) Self-Efficacy; 2) Attitudes Toward a Healthful Diet; and 3) Dietary Stage of Change.¹³ When comparing participation between the web-based group and the print based group for the same three dietary measures, the significant dosage effects that were observed were associated with web-based participants who accessed the weight/nutrition management module more than once indicating a correlation between participation and positive outcomes.¹³ Results of a study by Jamal et al identified similar findings.⁶

In that study, Jamal et al determined that participation in a Group Support Lifestyle Modification (GSLiM) program led to the achievement of weight loss goals and increases in self-efficacy and dietary control.⁶ This study compared the effectiveness of the GSLiM program with an existing dietary counseling program.⁶ Participants (N = 97) were randomly assigned to either the GSLiM intervention group or the dietary counseling comparison group.⁶ The GSLiM program was developed based on the social cognitive theory, which posits that personal behavior, thoughts and environment reciprocate to produce action; for weight loss, high self-efficacy and social support are primary factors

influencing the cognitive process.⁶ GSLiM content was delivered by experts and credentialed professionals via seminars and group sessions over the course of 24 weeks and included self-monitoring, cognitive-behavioral sessions, and exercise and dietary change advocacy activities.⁶ Participant measurements were taken at baseline, 12-, 24- and 36-week intervals and included anthropometric and biochemical data, dietary intake, as well as physical activity and psychological parameters.⁶ Employees who participated in the GSLiM intervention were more effective in achieving the targeted six percent loss (19.6%) versus the dietary counseling comparison group (4.1%) while also seeing statistically significant improvements in group support and quality of life based on the results of multiple self-administered questionnaires.⁶ As with the previously outlined studies, intervention participation was directly correlated with successful outcomes.^{2,3,6,13}

In the first 12 weeks of the intervention, 33 (17%) participants attended four or more sessions, while 34 (17.5%) participants attended three or four sessions and 30 (15.5%) attended two sessions or less.⁶ None of the participants who attended less than three sessions achieved the targeted six percent weight loss; in contrast, 8.9% of participants who attended between four and six sessions did achieve the targeted weight loss goal.⁶

Over the course of the 36 week intervention, almost half (44.8%) of the participants who attended seven or more sessions achieved the targeted six percent weight loss ($p < 0.001$), demonstrating a statistically significant change and a positive correlation between attendance and weight loss.⁶ Considered together, results of these studies suggest that increased intervention participation is associated with positive changes and the successful implementation of programs. Another key strategy employed by a number of these studies with positive outcomes was the use of various incentives.^{1,2,3,10,13}

Incentive-Based Wellness Programs

Recent studies have demonstrated that the use of incentives to encourage enrollment in corporate wellness programs may lead to increased rates of participation and positive health outcomes.^{1,2,3,10,13} During interviews and focus groups in a recent study conducted by Strickland et al, employees repeatedly indicated their desire for incentives, such as financial support for healthy food and health insurance premium adjustments, which may encourage them to change and sustain a healthy diet.² A hallmark of the INCENT program was the use of monetary incentives based on the participants' percent of weight loss (e.g. 1% weight loss = \$1.00).¹ Participants lost an average of 2.27 lbs ($p < 0.001$), resulting in a subsequent average BMI decrease of 0.36 kg/m² ($p < 0.001$).¹ Results were not statistically significant when compared with the LMW control group, who received condensed versions of the same material used in the INCENT intervention, but weight loss and BMI reduction among both groups suggests that any type of incentive may be successful.¹

In a 2007 study by Cook et al, the use of incentives was identified as a component that might improve intervention adherence and efficacy.¹³ Participants in the comprehensive, web-based Health Connection intervention were given \$50 for completing pre- and post-test surveys and each was entered into a \$500 raffle prize.¹³ When compared to the study control group who received print materials only, intervention participants performed significantly better on measures of Attitudes Toward a Healthful Diet and Dietary Stage of Change; dosage analysis also indicated significant effects of the weight/nutrition management module on Dietary Self-Efficacy.¹³ The

topics included in the intervention and that of the print material control group were the same, but not necessarily the same content, suggesting that perhaps both the intervention and delivery mode/content played a role in the outcome of the study.¹³

Similarly, participants (N = 806) in a two year, cluster-randomized study received a \$20 gift card for completing each assessment at baseline, 12- and 24-month intervals.³ Assessment data sources included anthropometric measurements, human resource records and a 30-minute self-administered survey.³ There was no intervention impact on BMI from baseline to 12 months or from baseline to 24 months; the estimated group decrease in BMI was 0.272 kg/m² from baseline to 12 months and 0.276 kg/m² from baseline to 24 months.³ However, while a dose-response relationship was observed; positive effects on dietary behavior and physical activity were directly proportional to the extent of participation, which the use of incentives attempted to increase.³ Using intervention exposure (scale = 0 to 100) as the independent variable, there was a decrease of 0.012 kg/m² for every unit increase in intervention participation at the 24-month follow-up.³ A second study drew similar conclusions, as summarized below.

In the year-long *Go!* study, each of the intervention participants (N = 407) received a pedometer and up to \$50 in cash (\$10 at baseline and \$20 at both the six and 12 month assessments).¹⁰ Use of these incentives led to increases in daily walking, perceived improvement in employer commitment and health discussions and the expression of positive attitudes toward the intervention and its environmental changes.¹⁰ While not all components of the aforementioned studies yielded statistically significant changes in dietary and physical activity behavior, the use of incentives could be directly

correlated with the extent of employee participation and ultimately the positive changes that were observed.^{1,2,3,10,13}

Conclusions and Study Objectives

The purpose of this study was to determine the effectiveness of a ten-month multicomponent employee corporate wellness program led by a Registered Dietitian Nutritionist on two specific health-related outcomes: weight loss and step count. The study was designed to determine how active utilization of program components would affect the achievement of health-related outcomes among participants. Specifically, it was hypothesized that the male and female healthcare employees who were actively utilizing all components of the corporate wellness program would achieve their wellness track goal (weight loss or step count) when compared to participants who were not actively utilizing all components. Additionally, we hypothesized that participants with a higher step count would have a lower overall BMI at the end of the ten-month study.

This retrospective chart review study compared data within two wellness program tracks (BMI and healthy) that were assigned based on the BMI findings from each participants' Health Risk Visit (HRV) with their primary care provider (PCP). Participants in both tracks were offered four campaigns in addition to a nutrition-focused series delivered by a registered dietitian.

CHAPTER III

JOURNAL ARTICLE

EFFECTIVENESS OF NUTRITION EDUCATION AND FITNESS TRACKING IN A LARGE CORPORATE HEALTHCARE WELLNESS PROGRAM

Effectiveness of nutrition education and fitness tracking in a large healthcare corporate wellness program

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Short Running Head:

Nutrition and Fitness Tracking in Wellness Program

Abbreviations:

CDC: Centers for Disease Control and Prevention

BMI: Body Mass Index

HRV: Health Risk Visit

RDN: Registered Dietitian Nutritionist

PCP: Primary Care Provider

MD: Medical Doctor

ABSTRACT**Background:**

Roughly 70% of adults are considered overweight or obese in the United States. The workplace has been identified as an important location to implement wellness programs that can assist employees in improving their health, while simultaneously saving employers money via reduced healthcare costs and increased productivity.

Objective:

The purpose of this study was to determine the effectiveness of a ten-month multicomponent employee corporate wellness program on two specific health-related outcomes: weight loss and step count.

Design:

This retrospective medical chart review evaluated healthcare employees (n = 1631) during the ten-month period. Employees were assigned to either the Healthy Track or BMI Track based on a Health Risk Visit with their primary care provider. To reach the incentive levels of bronze (\$100), silver (\$200) or gold (\$300), employees in the Healthy Track had to achieve a certain step count, while those in the BMI track had to lose a certain number of pounds. Intervention included four campaigns, a nutrition series and the use of a fitness tracker. Active participation was measured by enrollment in interventions.

Results:

Chi-Square analysis found that only employees in the Healthy Track who participated in at least one campaign showed a decrease in BMI percentage ($p = .000$). An independent samples *t* test showed that employees participating in the nutrition series had greater decreases in their starting weight ($p = 0.03$). Active participants had a mean loss of 1.42% of their starting weight compared to those who did not participate who had a mean gain of 0.21%. Linear regression analysis showed that there was no relationship between the number of steps taken and a decrease in BMI percentage for employees in either track ($R^2 = .000$).

Conclusions:

Corporate wellness programs that offer both web-based and in-person support and accountability can lead to modest reductions in BMI. An RDN led nutrition component appears to support greater weight loss.

Keywords: Corporate wellness programs, healthcare employees, employee wellness, obesity, nutrition education

INTRODUCTION

Obesity in the United States (U.S.) has been on the rise for the past several decades. According to the Centers for Disease Control and Prevention, roughly 70% of adults over the age of 20 are classified as overweight or obese.¹ According to the most recent available data, annual medical costs attributed to obesity ranged between \$147 to \$210 billion.² This has also had a direct effect on obese employees with the number of

sick days **increasing**, costing the employer an extra \$4.3 billion per year.³ Additionally, obese employees are costing the employee **an** estimated \$506 per year due to decreased productivity.³ The obesity epidemic has led to an **increased** number of people trying to lose weight. Currently, 36% of men and 60% of women are trying to lose weight by dieting, however, research has shown that most people attempting to lose weight or who have lost weight will be unsuccessful and will return to their starting weight within three to five years.² This has led to an increased demand for programs focused on both weight loss and weight gain prevention in a variety of settings.

Corporate wellness programs are an example of one setting that is gaining popularity. Twenty-seven percent of large companies (defined as having ≥ 200 employees) had adopted incentive based programs by 2006, with 75% having adopted them by 2013 in an attempt to improve their employees' health status and reduce health care costs.⁴ Wellness programs vary widely, but program components may include: health risk management (e.g. screening for: overweight/obesity; or cardiovascular risk factors such as dyslipidemia and hypertension); behavioral health management (e.g. smoking abstinence, substance abuse or psychological counseling); and/or primary care promotion and lifestyle management (e.g. weight loss, physical activity, or nutrition). The goal for most wellness programs is to improve the quality of life and overall productivity **of employees.**⁵ Other program goals may aim to decrease total healthcare costs (e.g. reduced emergency room visits, hospitalizations, surgeries, or visits to a specialist) and reduce rates of absenteeism.⁵ While there has been an increase in the literature related to the effectiveness of corporate wellness programs, due to varying methods and inconsistent results, more research is warranted.

The majority of the current literature on corporate wellness programs has focused on the effectiveness of incentive-based programs, strategies to increase participation rates, and variations in corporate wellness program components.⁶⁻¹⁵ To date, there is little to no research that shows the effectiveness of these programs and their components on specific employee health outcomes, such as step count goals or reductions in body mass index (BMI). Common limitations noted in existing literature include the use of a third-party market vendor without simultaneous in-person accountability (i.e. a web-based intervention) and a lack of information given regarding the credentials of those involved in providing key program components (i.e. health/wellness coaches teaching classes or providing nutrition guidance, and individuals assisting with physical activity goals).⁶⁻¹⁵ Thus, the purpose of this study was to determine the effectiveness of a ten-month multicomponent employee corporate wellness program led by a Registered Dietitian Nutritionist (RDN) on two specific health-related outcomes: weight loss and step count. The study was designed to determine how active utilization of program components by participants would affect the achievement of health-related outcomes among participants. Specifically, it was hypothesized that the male and female healthcare employees who were actively utilizing all components of the corporate wellness program would achieve their wellness track goal (weight loss or step count) when compared to participants who were not actively utilizing all components. Additionally, we hypothesized that participants with a higher step count would have a lower overall BMI at the end of the ten-month study. This research will provide evidence on how to develop and implement a successful corporate wellness program and will address barriers and

limitations related to participation. Additionally, this research will serve as a tool to help address the current gaps and other limitations identified in the literature.

Methods

Study Design

This retrospective study entailed a blinded medical chart review upon completion of a ten-month worksite corporate wellness program. The program included health promotion campaigns, nutrition education and fitness classes, gym membership and fitness tracker discounts, and cash incentives. Data was pulled from a contracted external third-party website that employees could access throughout the ten-month program to track their progress. The data was accessed and assigned a de-identified study identification number by the Wellness Program Coordinator to maintain participant confidentiality. The researchers did not have access to any personal identifiers. This study was approved by Central Washington University's Human Subject Review Committee.

The wellness committee responsible for the development of the wellness program included several healthcare experts, including: two physicians; two registered dietitian nutritionists; two Wellness Program Coordinators; and three human resource staff members. All members of the committee provided guidance in their area of expertise and were required to approve any activity, initiative or campaign prior to its implementation. A wellness advisory committee was also established. This group was comprised of hospital department representatives who met on a quarterly basis to discuss current events and campaigns.

Study Cohort and Recruitment

Every employee at a large multi-site corporate health care facility in Central Washington was mailed an invitational letter from the Accountable Care Department encouraging them to participate in a Health Risk Visit (HRV) at their primary care provider's (PCP) office. The HRV is a guided wellness exam to help determine the overall health of the participants. If an employee's BMI was over 30kg/m², they were placed into the BMI (weight loss) track. If an employee's BMI was under 30, they were placed in the Healthy (step) track. Additional recruitment techniques included the placement of multiple banners on the employee intranet that was accessible to all employees.

Employees were asked to opt in to the wellness program during the insurance open enrollment period in November 2017. Each employee who opted in to the wellness program received detailed information about which track they were placed in (BMI or Healthy) as a result of their HRV. Additionally, they were provided with the necessary information to reach their goals in order to receive their incentive by the end of the ten-month program. Participants also received information for the third-party external website and were encouraged to register using their employee email address. The website allowed employees to access all of their wellness information and allowed them to track their progress at any given time.

For an individual to participate in the wellness program, they had to be an employee and had to be enrolled in one of the top two tiers of the employer-owned

insurance plans. In addition, employees were required to complete an HRV and simultaneous approval was required from their PCP. Individuals who were not employed by the organization, who were enrolled in the lowest tier insurance coverage and those who did not have an HRV were not eligible to enroll in any of the wellness program tracks. They could, however, still participate in the campaigns offered and register for the third-party website.

Intervention

Company-Wide Program Components

A variety of company-wide initiatives were offered, targeting all employees, and not just participants in the wellness program. A special logo was used to designate information, initiatives, food, and other materials that were approved for and distributed by the wellness committee. Additional strategies to identify items related to the wellness program included the use of a branded wellness name and the use of a specific wellness wheel comprised of six different pieces that represent a portion of the entire program: physical, nutritional, mental, financial, holistic, and social.

A monthly newsletter was distributed to all employees via three routes of distribution: the hospital website; email; and printed copies that were available at all company campuses. Newsletters from previous months were also available online for review. Each edition contained a weekly menu with a prep list, shopping list, and recipe with nutrition facts that was created by the registered dietitian. In addition, a weekly cafeteria wellness meal was advertised; the wellness program logo was used to identify

this meal. Similarly, the wellness logo was attached to healthy items in vending machines in multiple locations across multiple campuses. Signs posted near the vending machines were used to explain the healthy foods and all vending machines were changed so half of the contents were healthy choices and half were standard choices. In addition, free apples were given out to every employee in the cafeteria on a daily basis.

The first campaign, *New Year New You*, began in January and lasted for eight-weeks. This campaign emphasized one health-related topic per week that was delivered via email. Topics included nutrition, hydration, sleep, physical activity, mindfulness, spirituality, finances, and holistic well-being. The second campaign, *Spring into Action*, lasted six-weeks and emphasized physical activity. Once per week, physical activities, such as planned walks, yoga classes, runs, or hikes were provided at all major facilities. Members of the wellness program team also traveled to some of the smaller clinics for a wellness day. The third campaign, *Get Outdoors Photo Contest*, lasted four-weeks and promoted physical activity in the outside in the surrounding areas. Employees were encouraged to take photos participating in various types of physical activity and upload their photos to their online third-party vendor account. Once the contest ended, the wellness committee voted on a winner and that winner was awarded a prize. The winning photo, along with other photos submitted during the campaign, was used to promote the wellness program and demonstrate some of the benefits of physical activity participation. The final campaign, *Maintain Don't Gain*, was designed to set employees up for success for weight maintenance and lasted four-weeks. Weekly newsletters were sent to employees regarding water intake, sleep, and physical activity. Participants were considered active when they acknowledged that they had reviewed these newsletters.

This information was logged to the employees' Extracon account and if the employee logged the required data, read all materials, and completed both the pre- and post-campaign surveys, they received a prize at the end of four-weeks.

Physical Activity Program Components

Each of the four campaigns had a physical activity component, with two of the campaigns specifically targeting physical activity as its focus. Physical activities such as yoga, stretching, and steps were the primary components emphasized throughout the campaigns. To deliver these components, one of the Wellness Program Coordinators/Certified Personal Trainers traveled to different company locations to teach yoga and stretching. Additionally, a program called *Walk and Talk* was available to any employee who wished to participate. Characterized by a walk and discussion with a member of the leadership team, this event occurred during the lunch hour at the main hospital campus and occurred the same day and time on a monthly basis. Participants were also given an \$80 credit and a discount toward the purchase of a FitBit activity tracker through the wellness program website, along with a \$25 or \$40 local gym discount depending on their position in the company. Finally, two community 5k runs were offered and were open to anyone who wished to participate.

Nutrition Program Components

The nutrition components of the wellness program were all taught by a registered dietitian. The primary nutrition component of the wellness program was a five-month long series that was taught at different times each month so all employees had the chance

to participate. In total, 12 sessions were offered per month to accommodate varying work schedules. Specific topics addressed included a basic introduction to nutrition, healthy weight loss, meal prepping, menu planning, calories needs, rethinking your drink, mindful eating, hunger and satiety cues, and the effects of sleep on food choices. Additionally, an interactive grocery store tour with label reading and product placement education was provided. Another nutrition program component was the *Food for Thought* series that was offered during lunch hours at the two main facilities. This series discussed the following topics: fad diets versus healthy diets; plant-based diets; stress and how it affects your gut; and healthy eating out. A discussion given by a wellness physician also explained the effects of sugar on brain health.

Incentives

Three levels of monetary rewards were available for both tracks: gold, silver and bronze. In order to reach each level, the achievement of specific goals was required. For the BMI track, weight loss was the primary determinant of goal achievement, while step count was the emphasis for the Healthy track. Details are outlined in **Table 1**.

Table 1. Wellness Tracks: Participant Level Incentives		
Level	BMI	Healthy
Gold (\$300)	≥ 20lbs weight loss	≥ 2.4M steps 1/1/18 - 10/31/18
Silver (\$200)	≥ 15lbs < 20lbs weight loss	≥ 1.8 < 2.4M steps 1/1/18 - 10/31/18

Bronze (\$100)	$\geq 10\text{lbs} < 15\text{lbs}$ weight loss	$\geq 1.4\text{M}$ steps 1/1/18 - 10/31/18
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Four unique campaigns were offered to all employees during the ten-month study period. For each campaign, pre-and post-surveys were required in order to be eligible for prizes. In each campaign, weekly \$25 gift card drawings were done based on participation. Additionally, there was a \$450 grand prize winner drawn at the end of each campaign; the winner had their photo taken with three members of the wellness team and the photo was shared company-wide to encourage further participation.

Data Collection

Data for all campaigns was self-reported on the third-party website. Employees reported completion of the identified task each week during the four campaigns. The website tracked participation during this time and participants were considered active when they completed a pre- and post-survey for each campaign and logged in to report their weekly progress. Participants were considered not active when they didn't log into the website, sign up for campaigns, attend the nutrition series, or track their steps.

Employees were encouraged to wear fitness trackers daily (e.g. Fitbit, Apple watch, Garmin, etc.) throughout the ten-month program to track their steps. Fitbit was the most utilized tracker, as employees received an \$80 credit toward their purchase and an additional 15% off provided by the corporation. For Fitbit users, steps were logged directly to their fitness tracker account and were then automatically uploaded to the third-

party website. For alternative fitness trackers, participants had to use an additional application to sync their steps prior to uploading the step data to the third-party website.

Anthropometric data (height [m] and weight [lbs]) was collected at each employee's HRV. Data was collected by a trained employee from the wellness program or from another provider within the healthcare organization. Although data was collected at different locations throughout the organization, standardized procedures were used. Weight was measured on a standardized, portable scale with a digital display (Pelstar Health O Meter Professional scale, Model 499KL). The scale was zeroed between each weight and participants were allowed to remove any heavy clothing or footwear prior to weighing in. Participants were required to sign a waiver prior to having their weight measured that would allow another trained employee to enter their weight into their medical record using their established medical record number. Height [m] information was previously recorded from a trained employee of the healthcare organization at their last yearly physical. This data was made available from each participant's electronic medical record and was synced in conjunction with their weight. The BMI for each participant was calculated based on the CDC's adult BMI calculator.¹

Statistical Analysis

Participants were considered to be actively participating when they completed a pre- and post-survey for each campaign and logged in to report their weekly progress under their account on the third-party website. Participants were considered active in the nutrition series when they attended the healthy eating series.

Crosstabulation was used to examine the total number of campaigns that participants were enrolled in (0 to 4) and their incentive level achieved (gold, silver, bronze or none) for each track (BMI and Healthy). A Chi-Square test was used to determine the relationship between these categorical variables for both the BMI track and the Healthy track.

To examine the effect of nutrition series participation on percent weight change, an independent samples test was used. A *t*-test for equality of means was used to compare the percent BMI change among active versus non-active participants in both tracks. To confirm the homogeneity of variance, Levene's test was also utilized. An additional *t*-test was used to compare the difference in BMI percentage change among participants who tracked their steps (via a FitBit or other fitness tracker) versus participants who did not among both the BMI track and the Healthy track. Levene's test assuming equal variances was also reported.

A final *t*-test was performed between the BMI track and the Healthy track to determine which track had the greatest percent change in starting weight as a group at the end of the study period. Levene's test was also used to evaluate this data.

The final test used was a linear regression analysis with graph. This test was performed to evaluate the relationship between the total number of steps taken and the percentage change in BMI among participants in both tracks. Finally, a case proceeding summary compared the ending BMI of each participant to the number of campaigns in which they participated. This summary was reported based on all participants in both tracks (n=1243).

Results

Study Population

Enrollment rates are available below in **Figure 1**. There were 1,665 employees eligible for enrollment in a wellness track based on HRV findings with the majority (70.3%) of participants being female with an average age of 43 years (Data not shown.). No ethnicity or race data was available for this study. Employees were excluded from enrollment if their PCP advised that weight loss was not medically necessary or if they were unable to walk an average of 4,000 steps per day, which was the requirement for the lowest incentive level (bronze).

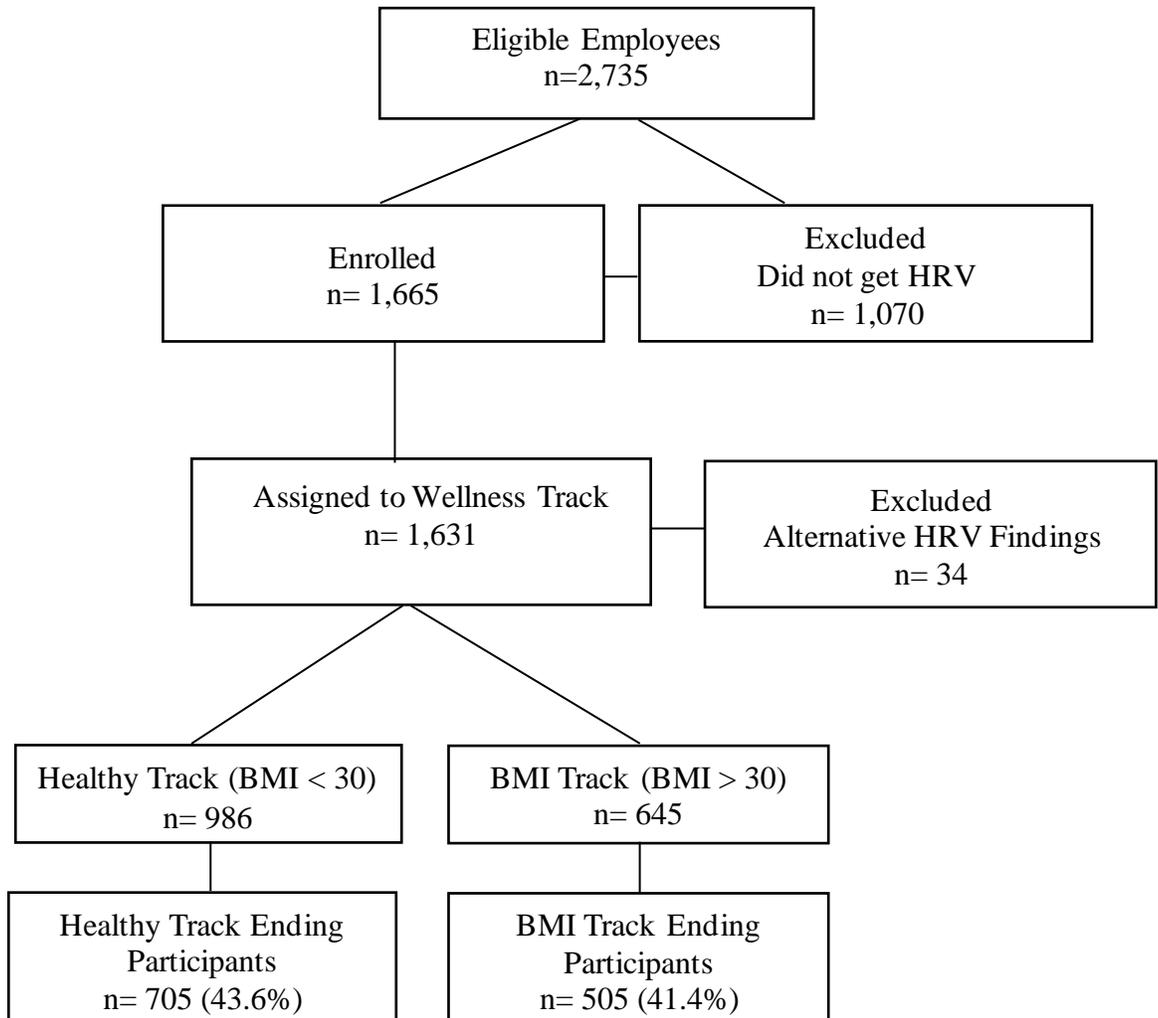


Figure 1.
Study Population Enrollment Data

Effect of Intervention Participation on Reaching Goals and Incentives

Active participation in both the Healthy Track and BMI Track was comparable at 43.6% and 41.4%, respectively. Crosstabulation was performed within each track. Based on this analysis, it was determined that within the BMI track there was not a relationship between the number of campaigns a participant was active in and the achievement of any incentive level ($p=0.065$). Crosstabulation analysis within the Healthy Track demonstrated statistically significant results ($p=.000$). Results are shown in **Table 2**.

Table 2. Healthy Track and BMI² Track Crosstabulation		
	Incentivized	Not Incentivized
Active Participation¹	76.4%	23.6%
No Participation	37.9%	62.1%

Table 2.
¹ Healthy track participants were active in at least one campaign.
² BMI chi-square test showed a p-value of 0.065. No further crosstabulation results done.

Analysis of the results among participants in the Healthy Track showed those who were active in at least one campaign were more likely to reach any one of the incentive levels (76.4%) versus those who were not active in any campaigns (37.9%). Results for the number of participants who reached an incentive level is shown in **Table 3**.

Table 3. Incentive Results

Track	Healthy (n = 705)	BMI (n = 505)
Gold (\$300)	35%	10%
Silver (\$200)	9%	5%
Bronze (\$100)	9%	5%

An independent samples *t*-test showed a statistically significant difference ($p=0.037$) between those who were active in the nutrition series ($n=59$) and those who were not ($n=1180$). The percent weight loss for participants in the nutrition series was a mean of 1.42% of their starting weight while those who did not participate exhibited a mean gain of 0.21% of their starting weight. Results are shown in **Table 4**.

Table 4. % Weight Change vs. Nutrition Series Participation		
% Weight Change	Mean % Change Mean \pm SD	95% CI
Active (n= 59)	-1.42% \pm 6.8	-3.41, 0.156
Not Active (n = 1184)	0.208 % \pm 7.2	-3.45, 0.197

Effect of Active Participation and Fitness Tracking

When comparing the percent weight change of participants in both tracks at the completion of the study, statistically significant differences were exhibited ($p=.000$). The percent weight change for the participants in the Healthy Track increased by a mean of 1.19% of their starting weight. In contrast, the percent weight change for participants in

the BMI Track decreased by a mean of 1.38% of their starting weight (**Table 5**). While the emphasis for each track was different (steps for the Healthy Track and weight loss for the BMI Track), the percent weight change for subjects in the Healthy Track increased and the percent weight change for subjects in the BMI Track decreased at the end of the ten-month study period.

Table 5. Healthy Track vs BMI Track and Weight Change Percentage			
	Mean % Change Mean \pm SD	95% CI	<i>p</i> -value
Healthy Track ¹ (n= 705)	1.19% \pm 6.9	-3.36, -1.81	.000
BMI Track ² (n = 505)	- 1.38 % \pm 7.5	-3.37,-1.80	.000

Table 5.
¹ Primary goal to count steps.
² Primary goal to lose weight.

The linear regression analysis illustrated in **Figure 2**. that there was no relationship between the number of steps and the weight change percentage ($R^2 = .000$). Additionally, *t*-test showed similar results; there was no statistically significant difference in weight change percentage between those who tracked steps (n=732) and those who did not (n=508). Those who tracked steps exhibited an increase of 0.026% of their starting weight while those who did not track steps exhibited an increase of 0.301% of their starting weight. (**Table 6**).

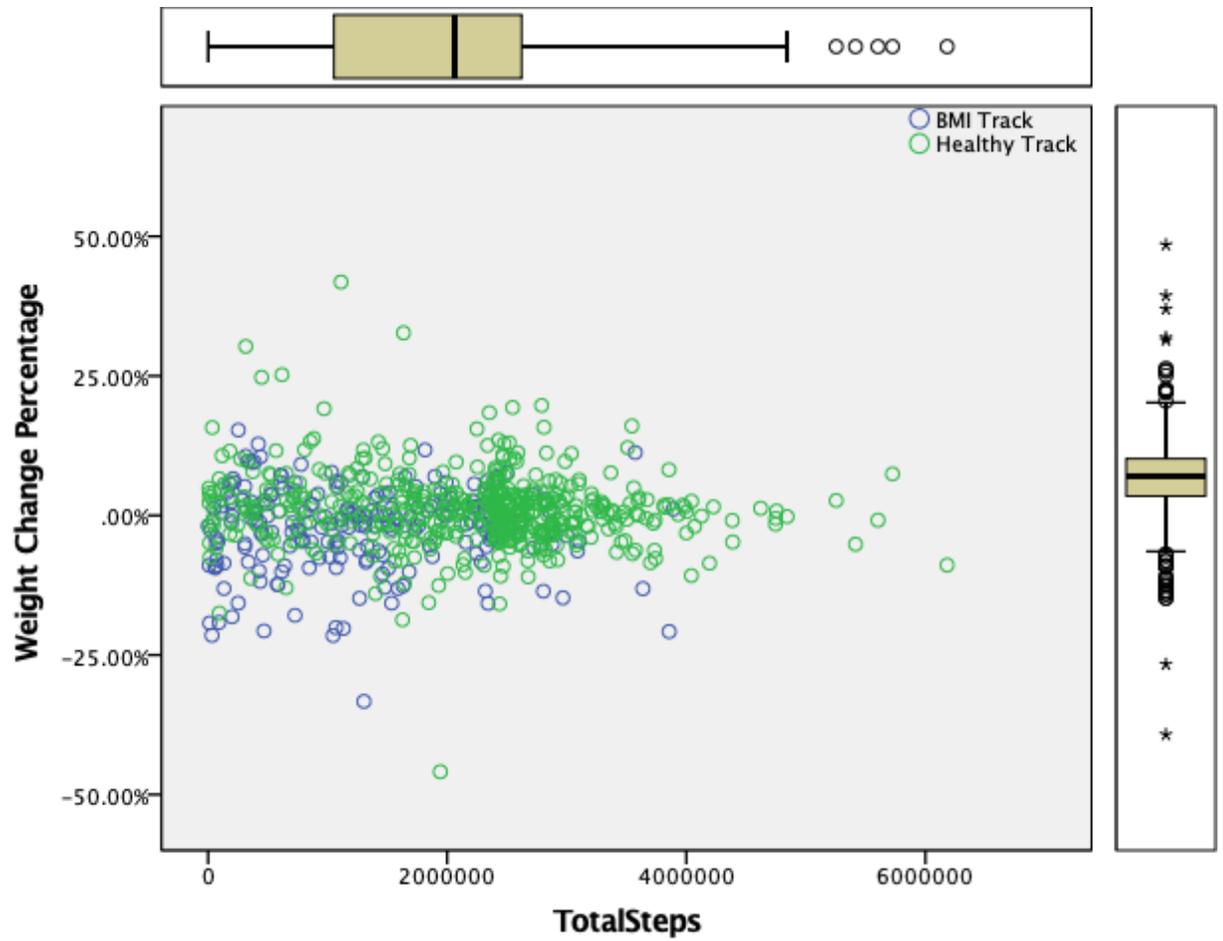


Figure 2. Linear Regression Chart

Table 6. Existence of a Fitness Tracker ¹ vs % Weight Change		
Group	Mean % Change Mean ± SD	95% CI
Steps Tracked (n= 732)	0.0257% ± 7.0	-1.047, 0.497

Steps Not Tracked (n = 508)	0.301 % ± 6.4	-1.034, 0.485
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Discussion

In this study evaluating the effectiveness of nutrition education and fitness tracking within a large healthcare corporate wellness program, only modest positive outcomes were achieved. The primary study hypothesis was partially confirmed; while active participants in the Healthy Track did experience greater rates of achievement of any incentive level, participants in the BMI Track did not. Interestingly, the additional hypothesis that a higher step count would correlate to a lower overall BMI was not confirmed for participants in either track. No relationship between step count and BMI percentage change was found. Findings in previous studies are similar, in that specific hypotheses were only partially confirmed or were not confirmed.^{6,9,10}

In a 2010 study, the hypothesis that the intervention would have effects on weight gain prevention was not confirmed.¹⁰ The study evaluated the effectiveness of a worksite intervention on weight gain prevention among a large number of healthcare employees. A variety of campaigns were offered using multiple platforms, including a social marketing and web-based campaign, environmental changes promoting physical activity and improvements in healthy eating, and activities promoting interpersonal support.¹⁰ Although the study hypothesis was not confirmed, results of this study did show a dose-response relationship with BMI, indicating that any measured reductions in BMI were directly proportional to the extent of participation.¹⁰ This is an important

finding, as that study also evaluated a multicomponent intervention in a healthcare setting and participation rates played a role in the study results.¹⁰

In this study, active participation was similar in both tracks (43.6% in Healthy Track and 41.4% in BMI Track). The rates of active participation were near average when compared to previous studies, with the lowest participation rate observed was ten percent and the highest participation rate observed was 56%.^{6-10,12,14} Highest rates of participation were observed in studies where wellness programs penalized participants through their health savings account for an increased BMI or weight gain.¹⁴ Although active participation rates were average compared to previous studies, the campaigns offered were useful in helping participants within the Healthy Track reach various incentive levels. Participants within the Healthy Track that were active in at least one campaign were more likely to reach any of the incentive levels, while it was determined that there was no relationship between the number of campaigns and reaching the incentive levels for participants in the BMI Track. Differences between the two tracks may be attributable to the difference in track goals: participants in the Healthy Track were required to achieve a certain number of steps over the course of the program, while participants in the BMI Track were required to achieve a certain number of pounds lost to reach various incentives. With each track emphasizing different outcomes, active participation rates could have been affected. To examine active participation, multiple components of the wellness program were taken into consideration.

Analysis of the nutrition component of the intervention showed that enrolled participants experienced a decrease in BMI percentage change, while those who were not enrolled experienced an increase in BMI percentage change. These results were

statistically significant. Similar results were observed in three existing studies; increased rates of participation led to reductions in BMI, achievement of weight loss percentage goals and changes in attitudes toward BMI and weight management.^{7,8,10} Although the number of participants enrolled in the nutrition component was small (n=59), the BMI percentage decreases suggest that the nutrition component could aid participants in statistically significant weight loss in future studies. Attempts were made throughout the program to increase participation in the nutrition component by offering additional dates and times but the majority of participants in both tracks did not take advantage of these offerings. Possible reasons include personal or social conflicts with the times courses were offered, limited flexibility with their job and/or shift, and lack of awareness that this component was offered. Simultaneously, the nutrition component of this study was evaluated with the fitness tracking component to further examine active participation rates.

Based on previous research, tracking steps to aid in weight loss or weight gain prevention has been a primary focus for several reasons, including the ease of incorporating extra steps and including them in one's daily routine, and the minimal supplies and equipment required for implementation.^{8,9,11,12} Although step tracking was the primary outcome being evaluated for participants in the Healthy Track, step tracking was also taken into consideration for participants in the BMI track when reviewing study outcomes. Perhaps the most unexpected result of this study was the determination that there was no relationship between the number of steps taken and the BMI percentage change for all participants. The linear regression analysis yielded an R^2 value of .000, which is a rare occurrence. Some possible explanations for this result is that participants

in either track may have done other types of physical activity that have low step counts (e.g. yoga, weight training, CrossFit, etc.), and since this study only evaluated the effect of step count on BMI percentage change, changes would not be observed. Participants in the Healthy Track started with a BMI under 30 and weight loss was not an identified goal for this track, suggesting that participants already had a healthy BMI and weight loss was not necessary. In addition, the large cluster present on the linear regression model in Figure 3 also may suggest that individuals who were tracking steps may have stopped tracking once they reached 2.4 million steps to reach the highest incentive level (gold). If this was the case, it is possible that participants may have stopped tracking steps well before the end of the ten-month study period so accurate representations of their ending BMI percentage change may not have been included in the analyses. By simultaneously considering the linear regression analysis results and the *t*-test finding that the BMI percentage change between participants who did track steps and participants who did not was not statistically significant, these results are consistent with other study findings.^{5,6,8} Pedometers were a key component of a previous study, but the results were similar in that no statistically significant differences were observed between those who used the pedometers and those who did not.⁸ Two additional previous studies also found no relationship between step counts and changes in BMI percentage.^{5,6} Tracking steps alone did not have significant effects on BMI percentage change, suggesting that the inclusion of additional fitness components and tracking options could yield important and statistically meaningful results in future studies.

As noted in existing literature, participation rates in corporate wellness programs have been historically low, however, these studies did suggest possible options for

increasing rates.^{6,8,9,10,12} One suggestion to improve participation rates was to offer higher end, immediate incentives to encourage participation.¹² The largest dollar amount provided to incentivize participation in the current literature was \$100 for the entire wellness program, with the possibility of being entered into occasional drawings for larger amounts.^{6,9} Recognizing the potential that a greater amount of money may encourage participation, participants in this study were given \$250 for completing their HRV during the first year and \$100 for completing it thereafter. In addition, employees were given a credit for the purchase of a fitness tracker and were incentivized at three levels (\$100, \$200 or \$300) based on the achievement of specific track goals. However, these incentives were not successful at increasing participation beyond the rates previously recorded in the existing studies, suggesting that increased monetary incentives may not increase participation.⁶⁻¹⁰ In addition to participation challenges, further studies identified other factors affecting program implementation, like lack of management and/or organizational commitment, budget constraints, and communication and advertising limitations for large corporations or those with multiple worksites.¹²

Previous research regarding corporate wellness programs in healthcare settings note that program implementation is often difficult due to a variety of factors, such as the presence of shift workers, those who work long and/or infrequent hours, and those who have low flexibility in their positions.^{10,12} In an attempt to address these issues, nutrition classes were offered at the end of each shift and on weekend shifts. In addition, all campaigns were available online and could be accessed at any time indicating that participants could be actively participating at their convenience and without showing up to a class. Web access to the third-market vendor and all wellness information was also

available at any time. Even with these options, the study results suggest that the majority of participants did not take advantage of these opportunities.

This study has both strengths and limitations. While it was similar to one previous study in its evaluation of a multicomponent intervention using various methods, this study has some novel components that contributed to its strengths.¹⁰ First, the team that developed the corporate wellness program was multidisciplinary. Multiple perspectives are highly beneficial to a multifaceted corporate wellness program. In addition, multidisciplinary staff was on-site and available in person for assistance in combination with a web-based tool. Nearly all previous studies offered either in-person assistance or a web-based tool, but not both simultaneously.^{6-8,9,11-12} The final novel component evaluated in this study was the use of higher incentive amounts to encourage participation and achievement of goals. While these incentives did not have an effect on participation rates in this study, it would be something to consider implementing for future studies.

Since the wellness program evaluated in this study was created from the ground up and this was its first year of implementation, there were notable limitations. When measuring weight loss, the gold standard is to evaluate the percentage change in BMI. In this study, however, the weight for each participant in the BMI Track was measured in pounds. At the same time, no weight measurements were taken for those participants midway through the ten-month program, which may have provided additional data and/or insight about program outcomes. It should also be noted that increasing numbers of employees showed interest in joining a track since their coworkers were participating, but they were unable to join midway through the ten-month program since no HRV was

recorded at the program's outset. Although this means additional employees could participate in a track the following year, immediate enrollment was not an option.

Feedback from participants was completed via Survey Monkey at the end of the wellness track year that also illustrated potential limitations in this study. The primary criticism from participants in the BMI Track was that the HRV was performed early in the year and many gained weight after their initial measurements were taken, requiring individuals to lose more than the identified 20 pounds required to reach the top incentive level (gold). A secondary concern identified by participants was their lack of preparedness to make lifestyle changes at the time of track enrollment; interest was expressed however, in making changes in subsequent track years. The primary criticism from participants in the Healthy Track was that tracking steps was the only physical activity that was measured even though many participants were involved in other activities. While these activities may have contributed to other changes in participants health status (e.g. improvements in blood pressure or blood glucose), these changes were not measured in this study and were not considered when determining if participants reached any incentive levels. Additionally, there was feedback that not all employees were allowed to opt-in for enrollment into either track due to their insurance plan. While they were not allowed to be enrolled in either track, they could still participate in the campaigns offered.

In an effort to address the study limitations, multiple components of the existing wellness program should be modified for the next track year. Future wellness programs may benefit from the addition of further accountability in the form of additional support groups focusing on weight loss or other nutrition-related topics. Additionally, providing

more healthy food options and additional environmental improvements (e.g. posting of promotional signage) that are readily available may be beneficial. It is also suggested that participants be provided with additional fitness tracking options, such as active minutes or the use of MyZone MEPS.

The statistically significant results regarding participation in the nutrition series is an important finding in this study. Although the number of participants in the nutrition series was small (n=59), the statistically significant weight loss among participants shows promise for future studies. The nutrition component of this study was provided by an RDN throughout the entire series, possibly suggesting that the use of a credentialed professional influences participants to improve nutrition and lose weight. Previous studies that included specific nutrition components were delivered by a health or wellness coach without specific details on who developed the nutrition content.^{9,10} In the same two studies, no statistically significant weight loss was observed, possibly confirming the assertion that the use of an RDN can aid in weight loss.^{9,10} The nutrition series in this study was also delivered in person, whereas the nutrition components of previous studies were delivered primarily online with no in-person component.^{9,10} The use of an RDN is a unique and important aspect of this study, as the use of an RDN is likely correlated with the statistically significant weight loss results seen among participants in the nutrition series. In similar studies, the credentials of those who developed and delivered the nutrition content were unclear or not stated; studies mentioned the use of health and/or wellness coaches.^{6,7,9,10,11,15} Based on a 2013 systematic review, there is currently no agreed upon definition for what health or wellness coaching entails. The review was unable to identify three major components related to health and wellness coaching: 1) the

role of the coach (eg partner, facilitator, etc); 2) the delivery methods used (eg practices, strategies) and 3) the acceptable training and credentials for providing nutrition education.¹³

Results of this study suggest that a corporate wellness program that offers both web-based and in-person support and accountability can lead to modest reductions in BMI. The novel components of this study make it unique and can provide guidance to future worksites who want to implement similar programs. Improvements to future wellness programs may allow for further increases in participation and successful employee health-related outcomes.

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