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

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ABSTRACT

Purpose: The purpose was to determine the effectiveness of a ten-month multicomponent employee corporate wellness program on two health-related outcomes: weight loss and step count.
Design: Retrospective medical chart review.
Setting: Wenatchee Valley Hospital/Clinics.
Sample: Healthcare employees (n=1210) were evaluated; 74.2% of the initial population.
Intervention: Employees were assigned to either the Healthy Track (HT) or Body Mass Index (BMI) track based on a Health Risk Visit.
Measures: Employees in the HT had to achieve a certain step count, while those in the BMI track had to lose a certain number of pounds.
Analysis: A variety of statistical analyses were performed including: crosstabulation, Chi-Square test, independent samples tests, Levene's test, and linear regression.
Results: Data showed that employees in the HT who participated in at least one campaign showed a decrease in BMI percentage (p=.000), with greater losses noted in those participating in the nutrition series (p= 0.03). Analysis showed that there was no relationship between the number of steps taken and decrease in BMI percentage for employees in either track (R2 =.000).
Conclusion: Corporate wellness programs that offer web-based and in-person support can lead to modest reductions in BMI. This research offers recommendations on how to create a successful corporate wellness program. One noted limitation is that weight was only measured pre- and post-study.

Introduction

Obesity in the United States continues to be on the rise. According to the Centers for Disease Control (CDC) and Prevention, roughly 70% of adults over the age of 20 are overweight or obese. (Hales et al., 2017) Recent annual medical costs attributed to obesity ranged between $147 to $210 billion (Cawley & Price, 2013); with obese employees increasing the cost to employers an extra $4.3 billion per year due to missed work days. (Gates et al., 2008) Currently, 36% of men and 60% of women are trying to lose weight. However, research has shown that most people will be unsuccessful and return to their starting weight within three to five years (Cawley & Price, 2013). This has led to an increased demand for programs focused on both weight loss and weight gain prevention.

Corporate wellness programs (CWP) is 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. (Batorsky et al., 2016) CWP vary widely, but components may include: health risk management; behavioral health management; and/or primary care promotion and lifestyle management. The primary goal for most CWP is to improve the quality of life and overall productivity of their employees; other program goals aim to decrease total healthcare costs and rates

of absenteeism. (Kaspin et al., 2013) While there has been an increase in the literature related to the effectiveness of CWP, due to varying methods and inconsistent results, more research is warranted.

The majority of the current literature on CWP has focused on the effectiveness of incentive-based programs, strategies to increase participation rates, and variation in CWP components. (Almeida et al., 2015; Cook et al., 2007; Jamal et al., 2016; LaCaille et al., 2016; Lemon et al., 2010; Salinardi et al., 2013; Strickland et al., 2015; Wolever et al., 2013; van Berkel et al., 2014) To date, little research exists showing the effectiveness of these programs and their components on employee health outcomes. Common limitations noted include the use of a third-party market vendor without simultaneous in-person accountability and a lack of information provided regarding the credentials of those involved in providing key program components. (Almeida et al., 2015; Cook et al., 2007; Jamal et al., 2016; LaCaille et al., 2016; Lemon et al., 2010; Salinardi et al., 2013; Strickland et al., 2015; Wolever et al., 2013; van Berkel et al., 2014)

The purpose of this study was to determine the effectiveness of a ten-month multicomponent employee CWP led by a Registered Dietitian Nutritionist (RDN) on two 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 healthcare employees who were actively utilizing all components of the CWP would achieve their wellness track goal (weight loss or step count) when compared to participants who were not actively utilizing all components. Additionally, it was hypothesized that participants with a higher step count would have a lower overall BMI at study completion. This research will provide evidence on how to develop and implement a successful CWP, address barriers and limitations related to participation, and help address the current gaps and limitations in the literature.

Subjects and Methods

Study Design

This retrospective study entailed a blinded medical chart review upon completion of a ten-month worksite CWP. 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 program to track their progress. The data was accessed and assigned a de-identified study identification number by the Wellness Program Coordinator to maintain 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 multi-disciplinary wellness committee who developed the CWP included: two physicians; two RDNs; two Wellness Program Coordinators; and three human resource staff members. All members of the committee provided guidance in their area of expertise and approved all activities and initiatives/campaigns implemented. A wellness advisory committee comprised of hospital department representatives was also established.

Study Cohort and Recruitment

Every employee at a large multi-site corporate health care facility in Central Washington was mailed an invitational letter to participate in a Health Risk Visit (HRV) at their primary care provider's (PCP) office. The HRV is a wellness exam to assess the overall health of the participants. If an employee's body mass index (BMI) was > 30kg/m^2, they were placed into the BMI (weight loss) track, and if the BMI was < 30kg/m^2, 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 CWP during the insurance open enrollment period. Each employee who opted in to the CWP received information about which track they were placed in and were provided information

to reach their goals. Participants registered for the third-party website to access their wellness information and to track their progress.

Intervention

Company-Wide Program Components

A variety of company-wide initiatives were offered. A logo was used to designate information, initiatives, food, and other materials that were associated with the CWP. A monthly newsletter was distributed to all employees containing a weekly menu with a shopping list and recipe with nutrition facts created by the RDN. A weekly cafeteria wellness meal with the wellness logo was attached to the meal and to healthy items in vending machines. Four campaigns were developed and implemented throughout the program: New Year New You; Spring into Action; Get Outdoors Photo Contest; and Maintain Don't Gain.

Physical Activity Program Components

Each campaign had a physical activity component. Physical activities offered by the Wellness Program Coordinators/Certified Personal Trainers included yoga, stretching, and steps as the primary components emphasized. Additionally, a program called Walk and Talk was available to every employee. Characterized by a walk and discussion with a member of the leadership team, this event occurred monthly during the lunch hour at the main hospital campus. Participants were given an $80 credit and a discount toward the purchase of a FitBit activity tracker, along with a $25 - $40 local gym discount depending on their position in the company. Finally, two community 5k runs were offered and open to all employees.

Nutrition Program Components

The nutrition components were all taught by a RDN. The primary nutrition component of 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. Topics included a basic introduction to nutrition, healthy weight loss, meal prepping, menu planning, calorie needs, rethinking your drink, mindful eating, hunger and satiety cues, and the effects of sleep on food choices. An interactive grocery store tour with label reading and product placement education was also provided. An additional component was the Food for Thought series that was offered during lunch hours. 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.

Incentives

Three levels of monetary rewards were available for both tracks: gold ($300), silver ($200), and bronze ($100). In order to reach each level, the achievement of specific goals was required in terms of weight loss (BMI track) or number of steps (HT track).

Four campaigns were offered to all employees during the 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.

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 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.

Employees were encouraged to wear fitness trackers daily (e.g. Fitbit, Apple watch, Garmin, etc.) throughout the 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 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 CWP 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 signed a waiver prior to having their weight measured allowing another trained employee to enter their weight into their medical record. 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 (Hales et al., 2017).

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 HT.

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 HT. Levene's test assuming equal variances was also reported.

A final t-test was performed between the BMI track and the HT 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

There were 1,631 employees eligible for enrollment in a wellness track with the majority (70.3%) of participants being female with an average age of 43 years (Data not shown.). No ethnicity/race data was available for this study. Of those enrolled, 1,210 participants completed the study.

Effect of Intervention Participation on Reaching Goals and Incentives

Active participation in both the HT and BMI Track was comparable at 43.6% and 41.4%, respectively. Crosstabulation 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). While crosstabulation within the HT demonstrated statistically significant results (p=.000) (Data not shown). Analysis of the results among participants in the HT 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%) (Data not shown).

Statistically significant differences (p= 0.037) between those who were active in the nutrition series (n =59) and those who were not (n=1180) were demonstrated. 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 (**Table 1**).

Table 1. % Weight Change vs. Nutrition Series Participation

% Weight Change	Mean % Change Mean ± SD	95% CI
Active (n= 59)	-1.42% ± 6.8	-3.41, 0.156
Not Active (n = 1184)	0.208 % ± 7.2	-3.45, 0.197

Effect of Active Participation and Fitness Tracking

When comparing the percent weight change of participants in both tracks, statistically significant differences were exhibited (p=.000). The percent weight change for the participants in the HT increased while the percent weight change for participants in the BMI Track decreased (**Table 2**).

Table 2. Healthy Track vs BMI Track and Weight Change Percentage			
	Mean % Change Mean ± SD	95% CI	p-value
Healthy Track[1] (n= 705)	1.19% ± 6.9	-3.36, -1.81	.000
BMI Track[2] (n = 505)	- 1.38 % ± 7.5	-3.37,-1.80	.000

[1] Primary goal to count steps.
[2] Primary goal to lose weight.

The linear regression analysis (**Figure 1**) showed no relationship between the number of steps and the weight change percentage (R^2 = .000); both groups exhibited an increase of their starting weight (**Table 3**).

Table 3. Existence of a Fitness Tracker[1] vs Weight Change Percentage		
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

Discussion

In this study evaluating the effectiveness of nutrition education and fitness tracking within a large healthcare CWP demonstrated modest positive outcomes. The primary study hypothesis was partially confirmed; while active participants in the HT 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.

A 2010 study evaluated the effectiveness of a worksite intervention on weight gain prevention among healthcare employees. (Lemon et al., 2010) A variety of campaigns were offered using multiple platforms, including a social marketing and web-based campaign, environmental changes promoting physical activity and healthy eating, and activities promoting interpersonal support. (Lemon et al., 2010) Results showed a dose-response relationship with BMI, indicating that any measured reductions in BMI were directly proportional to the extent of participation. (Lemon et al., 2010) This is finding confirmed that a multicomponent intervention in a healthcare setting and participation rates played a role in BMI reduction. (Lemon et al., 2010) In the current study, active participation was similar in both tracks. The rates of active participation were near average when compared to previous studies, which varied from 10-56% participation. (Cawley & Price, 2013; Almeida et al., 2015; Cook et al., 2007; Jamal et al., 2016; La Caille et al., 2016; Lemon et al., 2010; Strickland et al., 2015) Highest rates of participation were observed in studies where CWP penalized participants through their health savings account for an increased BMI or weight gain. (Cawley & Price, 2013) Although active participation rates were average compared to previous studies, participants within the HT that were active in at least one campaign were more likely to reach any of the incentive levels, while no similar relationship

was observed in the BMI Track. Differences between the two tracks may be attributable to the different goals: steps versus pounds lost to reach various incentives. These finding suggest that step goals may be easier to achieve than weight loss goals.

Participants who were active in the nutrition component of the intervention experienced a significant decrease in BMI percentage change, while those not participating experienced the opposite. 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 (Cook et al., 2007; Jamal et al., 2016; Lemon et al., 2010). Although the number of participants enrolled in the nutrition component was small (n=59), the BMI decreases suggest that the nutrition component could aid participants in statistically significant weight loss in future studies.

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 in one's daily routine and the minimal equipment required. (Jamal et al., 2016; LaCaille et al., 2016; Salinardi et al., 2013; Strickland et al., 2015) Although step tracking was the primary outcome evaluated for participants in the HT, step tracking was also assessed in the BMI track. Some possible explanations for this result are that participants in either track may have done other types of physical activity that have low step counts, and since this study only evaluated the effect of step count on BMI percentage change, changes would not be observed. Participants in the HT started with a BMI < 30kg/m^2 and weight loss was not an identified goal, 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 1 suggests that individuals who were tracking steps may have stopped tracking once they reached the highest incentive level (gold). Thus, 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 those who did not was not statistically significant; similar to other findings. (Kaspin et al., 2013; Almeida et al., 2015; Jamal et al., 2016) Tracking steps alone did not have significant effects on BMI percentage change, suggesting 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 CWP have been historically low, however, these studies did suggest possible options for increasing rates. (Almeida et al., 2015; Jamal et al., 2016; LaCaille et al., 2016; Lemon et al., 2010; Strickland et al., 2015) One suggestion to improve participation rates was to offer higher end, immediate incentives to encourage participation. (Strickland et al., 2015) While the incentives offered in the current study were higher than those in the literature, it was still not successful at increasing participation beyond the rates previously recorded, suggesting that increased monetary incentives may not increase participation. (Almeida et al., 2015; Cook et al., 2007; Jamal et al., 2016; LaCaille et al., 2016; Lemon et al., 2010) Further studies identified other factors affecting program implementation, such as lack of management/organizational commitment, budget constraints, communication and advertising limitations for large corporations or those with multiple worksites, and the presence of shift workers or those who work long/infrequent hours. (Lemon et al., 2010; Strickland et al., 2015) In an attempt to address these issues, nutrition classes were offered at varied times. In addition, all campaigns, Web access to the third-market vendor, and all wellness information were available online. Regardless, the study results suggest that the majority of participants did not take advantage of these opportunities.

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, suggesting that the use of a credentialed nutritional professional influences participants to improve nutrition and weight loss. Previous studies that included specific nutrition components were delivered by unspecified health/wellness coach. (Almeida et al., 2015; Cook et al., 2007; LaCaille et al., 2016; Lemon et al.: Salinardi et al., 2014; van Berkel et al., 2014)

This study has some novel components that contributed to its strengths. First, the team that developed the CWP was multidisciplinary and were 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. (Almeida et al., 2015; Cook et al., 2007; Jamal et al., 2016; LaCaille et al., 2016; Salinardi et al., 2013; Strickland et al., 2015) Since the CWP was in its infancy stage, there were also notable limitations. No weight measurements were taken for participants midway through the ten-month program, which may have provided additional data and/or insight about program outcomes. In addition, increasing numbers of employees showed interest in joining a track mid-cycle, but they were unable to join midway through the ten-month program.

Results of this study suggest that a CWP 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 worksites who want to implement similar programs. Improvements to future CWP may allow for further increases in participation and successful employee health-related outcomes.

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References

Almeida, F., You, W., Harden, S., Blackman, K., Davy, B., Glasgow, R., et al. (2015). Effectiveness of a worksite-based weight loss randomized controlled trial: the worksite study. Obesity (Silver Spring, Md.), 23, 737–745.

Batorsky, B., Van Stolk, C., & Liu, H. (2016). Is More Always Better in Designing Workplace Wellness Programs?: A Comparison of Wellness Program Components Versus Outcomes. Journal of Occupational and Environmental Medicine, 58, 987-993.

Cawley, J., & Price, J. (2013). A case study of a workplace wellness program that offers financial incentives for weight loss. Journal Health Economics, 32, 794-803.

Cook, R., Billings, D., Hersch, R., Back, A., & Hendrickson, A. (2007). A field test of a web-based workplace health promotion program to improve dietary practices, reduce stress, and increase physical activity: randomized controlled trial. Journal of Medical Internet Research, 9, e17.

Gates, D., Succop, P., Brehm, B., Gillespie, G., & Sommers, B. (2008). Obesity and presenteeism: The impact of body mass index on workplace productivity. Journal of Occupational and Environmental Medicine, 50, 39-45.

Hales, C., Carroll, M., Fryar, C., & Ogden, C. (2017). Prevalence of obesity among adults and youth: United States, 2015–2016. National Center for Health Statistics. NCHS data brief, no 288.

Jamal, S., Moy, F., Azmi Mohamed, M., & Mukhtar, F. (2016). Effectiveness of a Group Support Lifestyle Modification (GSLiM) Programme among Obese Adults in Workplace: A Randomised Controlled Trial. PloS one, 11, e0160343.

Kaspin, L., Gorman, K., & Miller, R. (2013). Systematic Review of Employer-Sponsored Wellness Strategies and their Economic and Health-Related Outcomes. Population Health Management, 16, 14-21.

LaCaille, L., Schultz, J., Goei, R., LaCaille, R., Dauner, K., de Souza, R., et al. (2016). Go!: results from a quasi-experimental obesity prevention trial with hospital employees. BMC Public Health Journal, 16, 171.

Lemon, S., Zapka, J., Li, W., Estabrook, B., Rosal, M., Magner, R., et al. (2010). Step ahead a worksite obesity prevention trial among hospital employees. American Journal of Preventive Medicine, 38, 27–38.

Salinardi, T., Batra, P., Roberts, S., Urban, L., Robinson, L., Pittas, A., et al. (2013). Lifestyle intervention reduces body weight and improves cardiometabolic risk factors in worksites. American Journal of Clinical Nutrition, 97, 667–676.

Strickland, J., Eyler. A., Purnell, J., Kinghorn, A., Herrick, C., & Evanoff, B. (2015). Enhancing workplace wellness efforts to reduce obesity: a qualitative study of low-wage workers in St Louis, Missouri, 2013-2014. Prevention of Chronic Disease, 12, E67.

van Berkel, J., Boot, C., Proper, K., Bongers, P., & van der Beek, A. (2014). Effectiveness of a worksite mindfulness-based multi-component intervention on lifestyle behaviors. International Journal of Behavioral Nutrition and Physical Activity, 11, 9.

Wolever, R., Simmons, L., Sforzo, G., Dill, D., Kaye, M., & Bechard, E. (2013). A Systematic Review of the Literature on Health and Wellness Coaching: Defining a Key Behavioral intervention in Healthcare. Global Advances in Health and Medicine, 2, 38–57.