Workplace-Based Participatory Approach to Weight Loss for Correctional Employees

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Objective: To evaluate the effectiveness of a participatory approach using an employee design team for a 12-week weight-loss program with an 8-week follow-up. **Methods:** Twenty-four employees with mean [standard error (SE)] for weight 233.24 lb [8.16], body mass index 33.29 kg/cm^2 [0.82], and age 42.7 years [1.5] participated in the study, among whom 75% were men and 25% women. **Results:** Significant reductions in weight, body mass index, and waist circumference (among men) were observed before and after intervention ($P < 0.05$). About 73% and 68% of the variation in weight change ($P < 0.01$) and waist circumference ($P < 0.01$), respectively, were explained by Nutrition Knowledge and Exercise Confidence scores after controlling for gender and age. **Conclusions:** A participatory program with employee involvement resulted in positive outcomes. Increasing participants' knowledge and providing skills to manage their weight seem to change their attitudes, resulting in better outcomes.

The prevalence of obesity in the United States remains high. Data from the 2007 to 2008 National Health and Nutrition Examination Survey revealed that more than two-thirds of adults are either overweight or obese and more than one-third are obese.[1] Evidence suggests that overweight and obesity risk may be related to high-stress work environments and extended work hours.[2,3] Corrections work, the classic hazardous duty job, exemplifies a high-stress occupation. Environmental and organizational factors (eg, lack of job control, inflexible work hours, hazardous conditions/emergency situations, and shift work) contribute to the abnormally high stress and development of unhealthy behaviors, such as lack of physical activity, poor eating habits, smoking, and alcohol consumption, all of which contribute to weight gain and the risk for obesity and chronic diseases.[4–6]

Worksite health promotion programs have been identified as an effective approach to reducing the risk factors for obesity and chronic diseases, which, in turn, helps control the escalating health care costs. The majority (greater than 62%) of the US adult population is employed and spends about one-third of their waking hours at the workplace,[7] making it an ideal environment for implementing health promotion interventions. Despite the recognition of the benefits of worksite health promotion programs, researchers continue to examine approaches that will be most effective in improving the workplace environment to enhance employees' health behaviors. Conventional worksite health promotion programs rely on a "one size fits all" approach, neglecting unique conditions specific to the workplace, such as barriers/opportunities, organizational structure, and unique characteristics of the employees. A participatory approach based on employee involvement in the design of interventions is thought to offer a viable means to overcome organizational and employee barriers that would typically hinder program success and sustainability and help identify opportunities for successful program implementation.

A participatory approach empowers employees in two ways: by promoting positive attitudes toward health (eg, self-efficacy and motivation) and by enhancing knowledge and skills to take control over their work environment. In high-stress workplaces where employees generally have little influence regarding their work environment, a participatory approach is expected to result in a better design and implementation of worksite interventions with subsequent actions to improve the general healthfulness of the work environment. A well-designed participatory approach also educates managers and supervisors to gain support for implementing organizational and policy changes conducive to improvement of employee health.[8] It is hypothesized that a participatory approach to the development of a weight-loss program at a correctional facility would facilitate greater employee participation, significant weight loss, and greater program sustainability.[8,9]

METHODS AND DATA

Design

This was a pre-/posttest quasi-experimental design with a comparison group.

Setting

The program was implemented at a high-security correctional institution using a participatory approach for weight-loss intervention.

Procedures

As part of our center of excellence in worksite health promotion and heath protection program (Center for the Promotion of Health in the New England Workplace; http://oehc.uchc.edu/healthywork/index.asp), we developed an integrative approach to health promotion and health protection, using a participatory approach.[10] We refer to this combination of participatory ergonomics (PE) and health promotion (HP) as "PExHP" integration. An ideal PExHP will have a design team (DT), a dedicated steering committee (SC), and a program facilitator (PF). The DT is a group of 5 to 10 employees with significant interest in health and safety at the workplace, who might have played a significant role in planning such activities at the workplace in the past. The SC typically acts as an oversight committee and consists of top and middle managers who pledge to support and provide resources for the program. The PF usually is a health/safety professional who acts as a facilitator during DT and SC meetings and assists in the intervention and planning of the program. On the basis of the participatory approach of this project, a DT, a committed SC, and a PF were identified.

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The Design Team

The DT was the essential part of this participatory weight-loss program. The DT consisted of a voluntary group of seven correctional officers and staff members, all full-time employees of the correctional facility (four men and three women). One DT member was African American, five were white, and one Latino. The average tenure at the facility was 15 years. Four members were high school graduates, one had completed a general educational development test, one had earned a college degree, and one had earned a graduate degree.

The Steering Committee

A facility-wide SC was appointed. The SC comprised the warden, deputy warden, supervisors, and union leaders within the organization. The support of middle and top management was necessary for successful program implementation. The SC helped create an environment that was supportive of the program (eg, time flexibility for participants and coordinator, location for weigh-ins, funds for supplies, equipment, and incentives).

The Program Facilitator

The PF, a registered dietitian, facilitated and educated the DT members, using a design process wheel that was modified from a problem-solving approach developed by the Xerox Corporation[11] to meet the health promotion program needs.[8,12]

Figure 1 depicts the design process wheel[8] called PExHP wheel, which helped guide the planning, testing, and adjustment of workplace interventions as part of the continuous design process.[8]

The Weight-Loss Program

The DT members were required to participate in biweekly DT meetings and be active in designing the participatory weight-loss program, reviewing and selecting the educational material, promoting the program, and recruiting participants.

The DT typically met with the PF on a biweekly basis. The first step in the participatory approach was for the DT to identify and select issues/concerns, which they perceived to be the most meaningful to their organization and feasible to change. During the initial discussions with the DT, lack of physical activity, poor eating habits, and overweight/obesity were identified as major concerns for the workplace. The DT attributed the lack of physical activity, unhealthy dietary habits, and overweight/obesity to their work environment, lack of job control, and sedentary lifestyles. For example, correctional officers have irregular work schedules, which pose challenges for planning and packing healthy meals. As a result, employees bring too much food to compensate for mandatory overtime shifts, order energy-dense take-out food (eg, pizza or Chinese food), or rely on vending machines for snacks (eg, chips, candy bars, and ice cream). Even though many officers report getting out of the academy physically fit, their job duties are mostly sedentary. Furthermore, they attribute overeating to job stress and emergency/hazardous work conditions. On the basis of these discussions, a workplace weight-loss program was proposed.

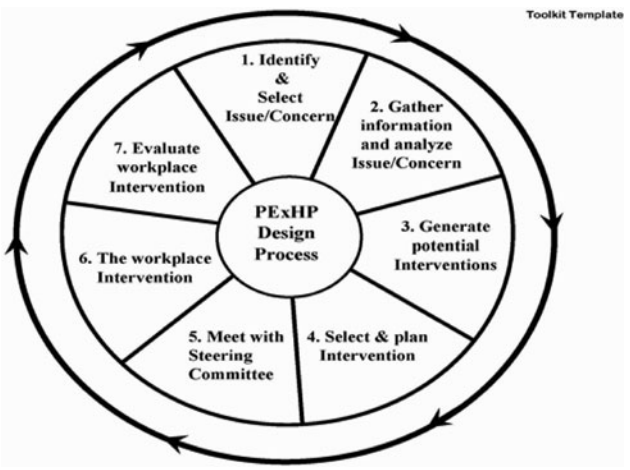

FIGURE 1. Participatory ergonomic and health promotion (PExHP) design process wheel.

After the DT decided on the weight-loss program intervention, they drafted a proposal outlining how the weight-loss program would be implemented and evaluated and the key roles top management and supervisors would take to promote participation. A member of the DT met the SC and presented the proposal. The SC approved the plan for the weight-loss program and offered the committee's full support, including advocating for the program and providing relief coverage to allow employees to participate in the program while on their shift.

Intervention. The details of the weight-loss program intervention were planned in the next six DT meetings. During these meetings, involvement from the DT was important in outlining and planning the weight-loss challenge. The following outline guided the development of the weight-loss program:

1. Deciding on a unique name for the program fitting to the workplace
2. Defining an appropriate time frame for the program
3. Choosing how employees would compete (individually vs teams) and determining how to track weight changes
4. Determining how often employees would weigh in
5. Creating a raffle prize

The DT formulated a 12-week weight-loss program with an 8-week weight-maintenance period (20-week program) called "Lose the Weight; Win Your Health" weight-loss challenge. They proposed that the program be offered to the entire facility and that all employees would have access to the educational material including those with a healthy body mass index (BMI). They also proposed an incentive system, using a raffle in which participant eligibility was based on achieving and maintaining an individual weight-loss goal.

Recruitment Process. A month before the kickoff of "Lose the Weight; Win Your Health" weight-loss challenge, the DT displayed recruitment posters in common areas (eg, officers' mess and port entrance). A DT member was present at every roll call so that potential participants could sign up for the weight-loss program after the announcement or by contacting a DT member at a later time. During the kickoff week, the DT acted as the main voice for the program. They were responsible for announcing the weight-loss challenge at all the roll calls and actively spreading the word throughout the organization and making sure that everything was running smoothly.

Kickoff and Weigh-ins. Program kickoff took place over 1 week. The DT helped with scheduling the weigh-ins so all shifts and slot rotations would be covered. They also identified a private room in the shift commander's office located within the secure area of the facility to conduct weigh-ins and identified a digital weight scale for all weigh-ins. The scale was calibrated by the PF during each weigh-in.

All participants were required to sign the approved project consent form. The PF reviewed the consent form with each participant, allowing additional time for review and questions before signing. Participants were asked to complete a Physical Activity Readiness Questionnaire (PARQ)[13] to determine whether they had health risks for partaking in physical activity or a weight-loss program. Participants answering "yes" to any questions in PARQ were

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asked to consult their physicians before starting the program. Once participants signed the consent form and met the requirements of the PARQ, they received a random ID number, the Nutrition and Physical Activity Questionnaire (NPAQ; 2.3.6.a), a nutrition information packet, and a pedometer with instructions. The nutrition information packet was a guide to help participants start eating healthier and becoming more physically active. Materials were adopted and tailored for correctional facility from the Centers for Disease Control and Prevention (CDC) Weight Management Research to Practice Series (http://www.cdc.gov/nutrition/professionals/researchtopractice/index.html).

Participants' body weight and waist and hip measurements were taken in a private room in the shift commander's office by the PF. Participant's BMI was used to determine a healthy weight-loss goal. For those with BMI more than 29.9, the goal was losing 1.5 lb per week, and for those with BMI between 25 and 29.9 kg/m^2 it was losing 1 lb per week. Participants had the option of contributing $8 toward the weight-loss raffle. All collected money was secured in the warden's safe.

Participants could complete the baseline NPAQ during the weigh-in if they had time; otherwise, they could drop it in a designated locked box located in the lieutenants' office. The locked box was accessible only to the PF.

Nutritional Bulletins and Handouts. A series of nutrition bulletins and handouts was developed by the PF in consultation with the DT after reviewing the responses to the baseline NPAQ survey and identifying areas in which participants needed information and education for a successful weight-loss program. For example, in response to questions regarding nutrition knowledge in the NPAQ, most participants incorrectly associated carbohydrates (potatoes, bread, and rice) with weight gain. Thus, the DT suggested developing nutrition information to increase participants' knowledge about energy balance and portion control, good fats versus bad fats, "fad diets," food-label reading, and caloric intake. Educational materials were mostly adopted from the CDC "Weight Management Research to Practice Series". Nevertheless, the DT worked with the PF to prioritize dissemination of the information, making sure that the materials were relevant, were literacy appropriate, and had aesthetic appeal for the officers. The correctional facility also had a gymnasium with aerobic and muscle-strengthening equipment. The DT invited a physical trainer to review physical activity guidelines at the facility, including how to efficiently incorporate physical activity during working hours with intermittent exercise regimens using available resources. The DT worked with the trainer and the PF to post the information on the bulletin board to help the participants incorporate physical activity into their daily life as part of a healthy weight-loss program. All educational materials for healthy weight-loss were posted biweekly on the bulletin board in the officers' mess (dedicated by the DT to the participants of the weight-loss program) throughout the 12-week weight-loss period. All the participants had access and were encouraged to review the bulletin boards. Table 1 depicts the nutrition-related materials that were posted biweekly throughout the 12-week weight-loss period.

Voluntary Incentive Raffle. As part of a voluntary raffle program proposed by the DT, each participant could deposit $8 for drawing at the end of the program. The rules for the raffle were as follow: (1) participants had to deposit $8; (2) meet their weight-loss goal at week 12; and (3) maintain or continue to lose weight at week 20. If the participant met all three conditions, his or her name was entered into the raffle. At the end of the program, the ID numbers of participants who met their weight-loss goals were placed into a paper bag and a designated member at the workplace was asked by the DT to draw three ID numbers. The money was evenly distributed among these final three. Participants could also sign up for the weight-loss challenge without depositing money; however, they would not qualify for the raffle at the end of the program.

TABLE 1. Weight-Loss Program Bulletin Topics

Bulletin 1	How to lose 1 lb of body fat?
	Portion distortion—what's a portion size?
Bulletin 2	How to read a nutrition label?
	Label reading—reduced/fat free and sugar free DOES NOT mean calorie free
Bulletin 3	Revealing the truth about common fad diets
	Following MyPyramid
Bulletin 4	Eating/ordering out: how to make the healthiest choices
	Planning ahead for healthy lunches/dinners
	Fighting food cravings
Bulletin 5	Busting common nutrition myths
Bulletin 6	Eating and exercise
	Beating the plateau

Participants

Convenience sampling was used to recruit volunteer participants who met the inclusion and exclusion criteria for the weight-loss program. Inclusion criteria were being an employee of the correctional facility, having no restriction in physical activity as indicated by the PARQ, and being willing to make a commitment to the 20-week intervention and evaluation. Because of the participatory approach and stipulations of the Department of Corrections, which required the program be offered to all the employees, 104 employees signed up; however, only 24 overweight and obese individuals completed the 20-week weight-loss challenge and were included in the evaluation and analysis. It should be noted that the DT members were also eligible to participate in the weight-loss program. Four DT members signed up to participate in the weight-loss program, and two of these members were among the six participants who met and maintained their weight-loss goals. All the program evaluations, including the final weigh-ins, were done at week 20.

Comparison Group

Having a true comparison group was not possible because of the participatory approach and stipulations of the Department of Corrections, which required the program be offered to all employees. Conversely, a group of 24 employees who were nonparticipants were randomly selected as a comparison group to evaluate changes in body weight, BMI, and waist circumference at 2 periods of time and to evaluate the effectiveness of this participatory weight-loss approach. There was no compensation or raffle for the comparison group. All the participants signed an informed consent approved by the university institutional review board before participating in the program.

Measurements

Nutrition and Physical Activity Questionnaire. The NPAQ developed by Faghri et al[14] consisted of two sections. Section I was adopted from the Hawkes and Nowak Nutrition Knowledge Questionnaire[15] and consisted of multiple-choice, classification, and true/false questions that helped gauge participants' understanding of sources of fat, cholesterol, and fiber in the diet. Respondents were awarded one point for each correct answer and zero for incorrect answers. The total possible score was 38 points. Section II included 26 multiple-choice and open-ended questions intended to evaluate eating habits in the workplace, 4 "check all that apply" questions addressing desire to exercise, and a physical activity self-efficacy question with multiple options. The exercise self-efficacy questions were developed by Sallis et al[16] and consisted of 8 questions

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regarding confidence about exercising for at least 6 months on the basis of different situations (eg, wake up early, even on weekends, to exercise and stick to your exercise program after a long, tiring day at work) on a -point Likert scale (not confident, somewhat confident, moderately confident, and very confident or I already do this). The highest possible score was 32.

The NPAQ was administered at baseline and week 20 to evaluate participants' change in nutrition knowledge, eating habits, and confidence about being physically active. Results from the completed baseline NPAQ were analyzed for discussion at the DT meeting held 1 week after the program kickoff for developing tailored material for the weight-loss bulletin as well as developing an agenda for institutional changes to be presented to the SC meeting. Weight, BMI, and waist circumferences were calculated at baseline using measured body weight and self-reported height.

Data Analysis

Between-group differences (participants in the weight-loss and the comparison group) in baseline BMI, weight, and waist circumferences were analyzed using a one-way analysis of covariance with age and gender as the covariates. One-sample *t* tests were used to analyze whether percentage changes in BMI, waist circumference, and body weight differed from 0 after 20 weeks in each group. In addition, analyses of covariance were used to analyze between-group differences in the percentage changes in the variables after the 20-week program.

Frequency distribution analysis was done to determine changes in dietary patterns and physical activity habits after the weight-loss program. Linear regression models were used to predict changes in weight loss and waist circumference and changes in Nutrition Knowledge and Exercise Self-efficacy at week 20. All the analyses were done by SPSS version 18.0 software (SPSS, Inc, Chicago, IL). For all analysis, significance was set at $P < 0.05$.

RESULTS AND DISCUSSION

Results

Originally, 104 employees (men, $n = 71$; women, $n = 33$) signed up for the weight-loss program. Nevertheless, because of major organizational changes, retirements, and employee transfers, many were not able to continue with the program. Ultimately, 24 overweight and obese employees completed the entire program. There were no differences between those who completed the program and the general worksite employees on the basis of age, body weight, BMI, and waist circumference. Table 2 depicts the anthropometrics and demographics of the employees who participated in the study and those of the workplace. The majority of employees of the workplace were either overweight or obese on the basis of body weight [standard error (SE)] 207.09 lb [3.86] or BMI [SE] 31.57 kg/m^2 [0.48] yet they had significantly lower body weight 233.24 lb[8.16] or BMI 33.29 kg/m^2 [0.82] than the study participants. Furthermore, employees who participated in the program seemed to be more educated than the general workforce (82.3% vs 59.7% who had some college or college degree). The gender distribution of the study participants was representative of this workplace. There was no difference between the participants and comparison groups at baseline for body weight, BMI, and waist circumferences.

TABLE 2. Anthropometrics and Demographics of the Workplace Population Compared to That of the Study Participants

		Workplace Population	Study Participants
Gender	Men	70.4%	75%
	Women	29.6%	25%
Age	Year ± SE (ranges: program completers: 29–58 yrs; dropouts: 29–54 yrs)	41.76 ± 0.66	42.78 ± 1.53
Tenure	Years ± SE	12.46 ± 0.44	14.94 ± 0.89
Anthropometrics	Weight: pounds ± SE	207.087 ± 3.86	233.24 ± 8.16
	BMI: kg/m^2 ± SE	31.57 ± 0.48	33.29 ± 0.82
	Waist (men): inch ± SE	41.05 ± 0.69	43.79 ± 1.07
	Waist (women): inch ± SE	36.01 ± 0.91	36.79 ± 1.23
Race	White, European Decent	71.0%	64.7%
	African American/black	17.3%	11.8%
	American Indian, Alaska Native	3.1%	0%
	Asian, Asian American: includes Filipino, Korean, Chinese, Pacific Islander, etc	0.6%	0%
	Others	8.0%	23.5%
	Latino or of Hispanic origin or descent (answered yes: includes Puerto Rican, Cuban American, Mexican American, etc)	7.4%	23.5%
Education	Less than high school	0.6%	0%
	High school or GED	32.1%	17.6%
	Some college or college degree (2- or 4-yr college)	59.7%	82.3%
	Graduate degree	6.3%	0%
Job class	CO, CTO, Counselor (frontline staff)	69.8%	76.5%
	Lieutenant, captain, deputy warden, supervisors	14.5%	11.8%
	Support staff, medical staff	13.8%	11.8%

CO, corrections officer; CTO, corrections training officer; GED, General Educational Development.

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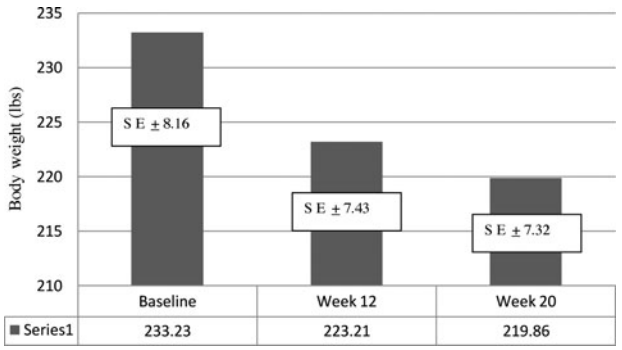

FIGURE 2. Weight in pounds at baseline, 12 weeks and 20 weeks (mean ± SE).

On average, participants lost a mean [standard error (SE)]of 10.01 lb [2.16] ($P < 0.05$) and 1.35 kg/m^2 [0.31] ($P < 0.05$) (body weight and BMI, respectively) at week 12 (Fig. 2). For the entire program (baseline to week 20), participants lost, on average, 13.36 lb [3.04] ($P < 0.05$) and 1.80 kg/m^2 [0.40] ($P < 0.05$). In contrast, the comparison group gained, on average, 4.72 lb [11.16] and 0.43 kg/m^2 [1.3140], but this change was not significant.

Figure 3 depicts the average change in body weight and BMI among study participants before and after intervention (20 weeks) and average change in body weight and BMI among the comparison group from time 1 to time 2.

According to the American Diabetes Association, people who lose as little as 5% to 10% of their body weight (~10 to 15 lb) and exercise just 30 minutes five times per week reduce their risk of developing diabetes by almost 60% (and significantly lower their risk for weight-related disease). Further evaluation indicated that participants, on average, lost about 5.4% of their body weight, thereby meeting the current American Diabetes Association recommendations to lose 5% initial body weight to prevent the development of type II diabetes. At week 20, 50% of the participants ($n = 12$) lost at least 5% of their initial body weight and 17% ($n = 4$) lost greater than 10% of their initial body weight.

Conferring to the CDC classifications for BMI (kg/m^2), obesity is broken down into three classes: class I obesity (30 to 34.9 kg/m^2), class II obesity (35 to 39.9 kg/m^2), and class III or extreme obesity (40 kg/m^2 or more).[12] At baseline, 20.8% ($n = 5$) participants were overweight (25 to 29.9 kg/m^2), 58% ($n = 14$) had class I obesity (30 to 34.9 kg/m^2), 12.5% ($n = 3$) had class II obesity (35 to 39.9 kg/m^2), and 8.3% ($n = 2$) had class III or extreme obesity (40 kg/m^2 or more). At the completion of the program, 37.5% ($n = 9$) participants were overweight (25 to 29.9 kg/m^2), 45.8% ($n = 11$) had class I obesity (30 to 34.9 kg/m^2), and 16.7% ($n = 4$) had class II obesity (35 to 39.9 kg/m^2). There was no class III obesity. In contrast, the comparison group seemed to move from lower-risk categories to higher-risk categories. At time 1, 29.1% ($n = 7$) of the comparison group was overweight (25 to 29.9 kg/m^2), 50% ($n = 12$) had class I obesity (30 to 34.9 kg/m^2), 16.7% ($n = 4$) had class II obesity (35 to 39.9 kg/m^2), and 4.2% ($n = 1$) had class III or extreme obesity (40 kg/m^2 or more). At time 2, 4.2% ($n = 1$) were normal weight (20 to 24.9 kg/m^2), 25% ($n = 6$) participants were overweight, 37.5% ($n = 9$) had class I obesity, 25% ($n = 6$) had class II obesity (35 to 39.9 kg/m^2), and 8.3% ($n = 2$) had class III obesity (Table 3).

Referring to the CDC waist circumference classification, a waist circumference of 35 inches or more for women and 40 inches or more for men increases an individual's risk for chronic conditions.[12] For men, the average waist circumference declined from 43.79 ± 1.07 inches (mean ± SE) at baseline to 41.14 ± 1.04 inches (mean ± SE) at week 20 ($P < 0.05$). For women, the average waist circumference decreased from a mean [SE] of 36.79 inches [1.23] at baseline to 35.17 inches [1.66] inches at week 20. The number of participants with normal waist circumference increased from 5 (men, $n = 4$; women, $n = 1$) at baseline to 10 (men, $n = 6$; women, $n = 4$) at week 12. There was no significant difference in loss of waist circumference between genders. Participants' change in waist circumference ranged from +1 to −6.5 inches for women and from +0 to −6.75 inches for men.

In comparison, there was a significant increase in the men in the comparison group from a mean [SE] of 41.48 nches [0.91] at time 1 to 44.28 inches [0.94] at time 2 ($P < 0.05$). For women, the average waist circumference increased from 37.56 inches [2.99] inches at baseline to 37.78 inches [2.34] at time 2.

Figure 4 depicts average change in waist circumference for men and women among study participants before and after intervention and average change in waist circumference among the comparison group from time 1 to time 2.

Results from the Nutrition Knowledge and Exercise Self-Efficacy sections of the NPAQ did not show significant differences in the related scores before and after intervention. Nutrition Knowledge scores changed from mean [SE] 19.86 [0.89] to 20.95 [1.00] and exercise self-efficacy scores changed from 19.34 [1.44] to 22.71 [2.18]. At week 20, there were no significant differences between men and women for average Nutrition Knowledge and Exercise Self-Efficacy. Further analyses were performed using regression models to

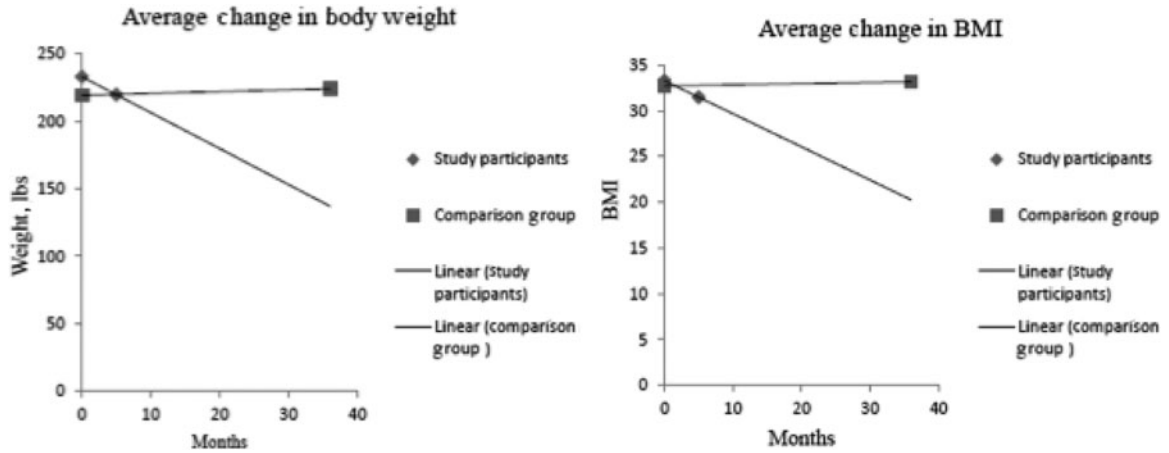

FIGURE 3. Changes in body weight and body mass index (BMI) at two time periods within 1 year for participants (before and after intervention) and comparison group (no intervention).

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TABLE 3. Comparison of BMI Classifications for Study Participants and Comparison Group

	Study Participants (Baseline)	Study Participants (Week 20)	Comparison Group (Time 1)	Comparison Group (Time 2)
Normal (18.5–24.9 kg/m^2)	0	0	0	1
Overweight (25–29.9 kg/m^2)	5	9	7	6
Class I obesity (30–34.9 kg/m^2)	14	11	12	9
Class II obesity (35–39.9 kg/m^2)	3	4	4	6
Class III obesity or extremely obese (40 kg/m^2 or more)	2	0	1	2

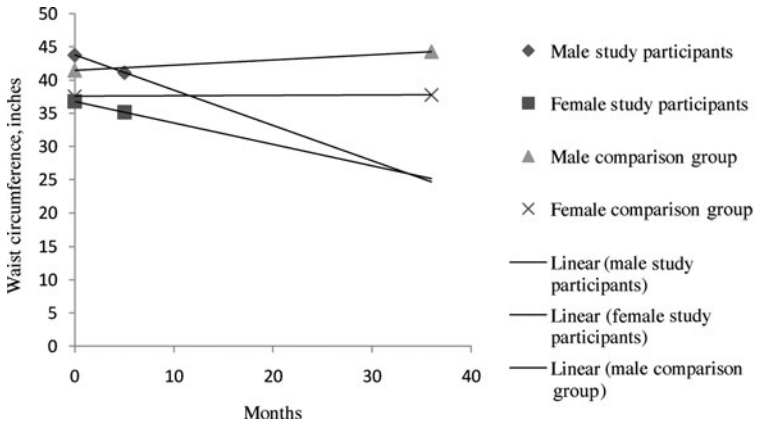

FIGURE 4. Changes in waist circumferences at two time periods within 1 year for participants (before and after intervention) and comparison group (no intervention).

determine whether Nutrition Knowledge and Exercise Self-Efficacy at week 20 were predictors of changes in weight loss and waist circumference after controlling for age and gender. In general, about 73% and 68% of the variation in weight change ($F = 6.477$, $P < 0.01$) and waist circumference at week 20 (F statistic $= 7.055$, $P < 0.01$), respectively, could be explained by Nutrition Knowledge and Exercise Confidence scores after controlling for gender and age.

As previously indicated, correctional officers have reported frequently snacking on high-energy dense foods; therefore, participants' snacking habits were addressed as part of the NPAQ. For eating habits, at baseline, 40% of the participants reported snacking at least three times on a typical workday; this percentage dropped to 21% at week 20. The percentage of individuals who snacked only once on a typical workday increased from 31% to 47%. In addition, at baseline, enjoyment is one of the major reasons participants gave for snacking; however, by week 20, participants reported that the major reason they snacked was to gain needed energy or to take a leisure break. This shift in the reported reasons for snacking by participants may possibly suggest an improvement in healthier snacking patterns among these participants. Participants were also asked about barriers to regular physical activity. At baseline, 53% and 31% reported not having enough time and energy, respectively, as barriers to exercise, whereas at week 20, 42% and 16% reported the same barriers. The percentage of individuals who reported having an adequate amount of exercise increased from 8% to 33% at week 20 (Fig. 5).

Discussion

On the basis of recent studies on PExHP,[8,10] a participatory approach is more effective in high-stress low-control jobs for implementation of workplace health promotion activities. The fundamental concept builds on the fact that the employees are typically more familiar with their organizational structure and day-to-day job requirements. They are also more familiar with the relationship, policy, and expectation of the top managements for performing their jobs and could propose interventions that are more appropriate for the type of job they do than a "one size fits all approach" is for worksite health-promoting activities. Furthermore, when employees play an active role in designing workplace interventions, they are able to assume ownership and are more likely to sustain these programs over a long term. It may also significantly increase the adoption and participation rate.

This program was entirely employee-based. Through the participatory design process, employees were able to assume ownership of the weight-loss challenge after customizing the intervention to meet the needs of the organization and the employees. A key aspect of this participatory approach was the PExHP process wheel that guided the planning, testing, and evaluation of the weight-loss challenge. Having this structured guide was important for the DT to effectively plan and implement the weight-loss program. The DT strategized the weigh-in schedule to ensure that the different shifts and slot rotations would be covered and designated a private room in the shift commander's office where weigh-ins could be conducted within the secure area of the facility, thereby preventing difficulties with inconvenient locations and scheduling. There was also a role for upper level or managerial involvement in this participatory approach[17] that supported the study and maintained communication with the DT and allowed time flexibility. This study suggested that the concept of managerial support is subtler than simple approval or acceptance. For example, correctional officers (COs) needed to get coverage to leave their post in order to weigh in; therefore, senior administration must be an active party to assist with time flexibility.

In general, the majority of employees at this correctional facility were either overweight or obese (86.8%). The prevalence of

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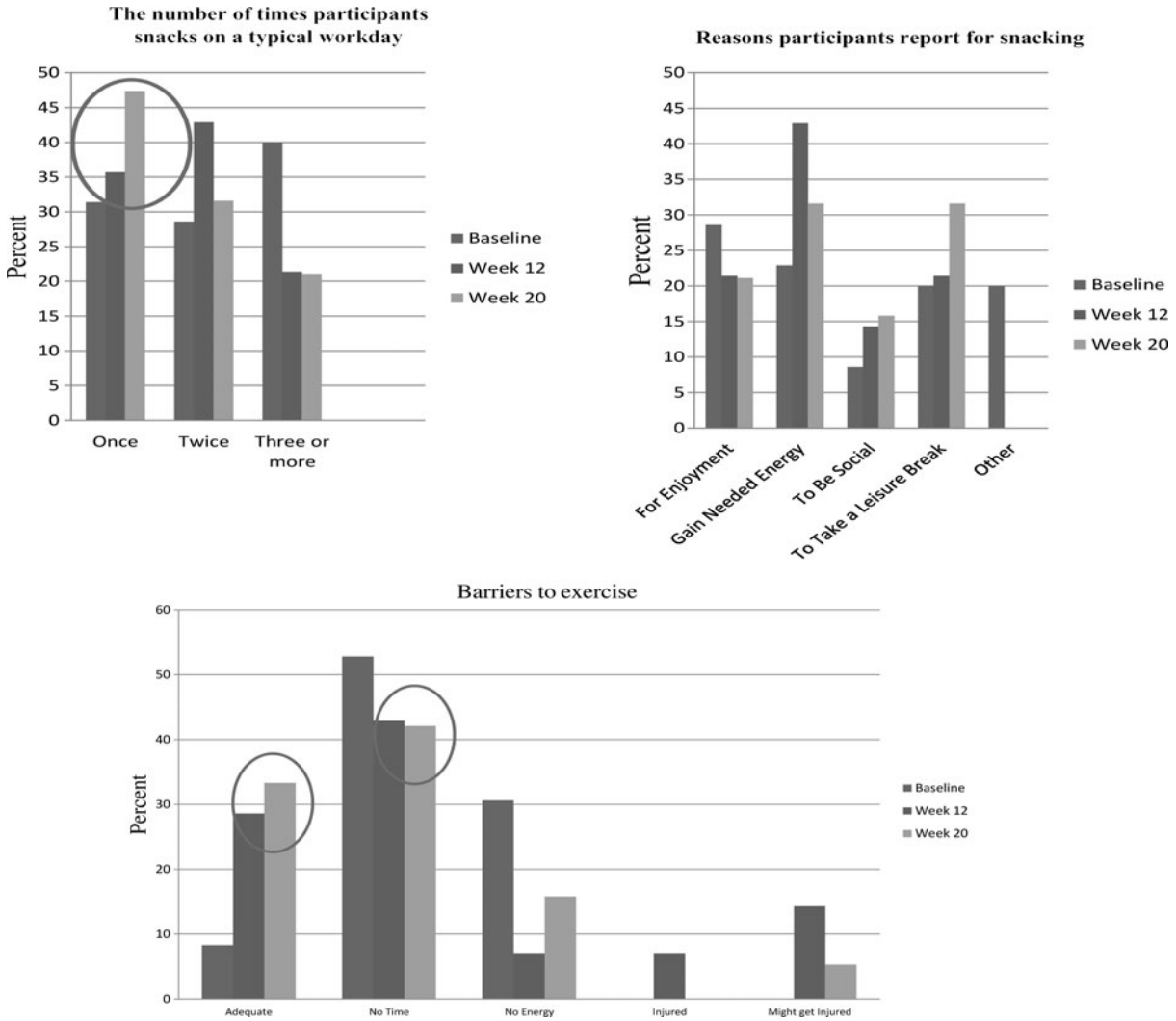

FIGURE 5. Changes in dietary habits before and after intervention and reported barriers to exercise.

obesity was higher than that in the general population (55.8% vs 32%). For that reason, corrections would seem to offer opportunities for health promotion.

A total of 104 employees signed up for the weight-loss program and 24 participants completed the program (baseline to week 20). Factors such as large organizational layoffs, restructuring, and contract negotiations occurred at the workplace while the program was implemented. Many employees either left or had significant increases in their duties, making it difficult for them to leave their assigned posts to attend weigh-ins. There were no differences between those who completed the program based on age, body weight, BMI, and waist circumference and general workplace. Nevertheless, study participants seemed to be more educated than the general workplace population and those who dropped out, which is typical for worksite health promotion programs.[18] Studies have also shown that individuals with lower level of education were less likely to understand the consequence of their body weight on health and were less willing to lose weight.[19] Hence, it could be postulated that higher dropout rates among those with lower education could be attributed to a lack of perceived susceptibility for the development of health-related conditions and perceived benefits for losing weight.[19]

Little research has been done to identify intervention strategies that support health enhancement among high-stress workplaces such as corrections. Health promotion programs in corrections need to account for social norms and unique barriers at the workplace such as shiftwork, relief from job tasks, unexpected emergencies, and leaves of absence, to ensure program success.[20] In addition, lack of employee interest, low participation on the part of high-risk employees, limited management support, inconvenient locations, and scheduling difficulties[21,22] have been reported as common barriers to traditional health promotion programs. The strength of a participatory approach is the involvement of the employees, who understand the workplace structure and cultural norm, in the decision-making and problem-solving processes.

At the outset of program planning, we found that DT meetings had high attendance rates and the DT work effectively as a team; they freely expressed ideas and concerns to effectively motivate changes at the workplace. The DT process, therefore, worked well; the team was able to develop effective recruitment and incentive strategies and prioritize program implementation (release time, location for weigh-in, and support from upper management). The DT efficiently used the organizational channels to communicate and market the program as well as generate excitement throughout the organization for the program.

A key indicator of the effectiveness of this participatory approach was high employee participation rates at the kickoff of the

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program. In high-stress workplaces (where employees typically experience high job demands and low job control), employees' participation in standard traditional top-down worksite health promotion programs is low. A review by Bull et al[23] reported that participation rates among eligible employees varied widely across studies, from 8% to 97% (median, 61%). Robroek et al[24] showed similar variation in participation rates; nevertheless, the median (33%) was much lower than previously reported. Although participation in workplace health promotions seems to vary greatly,[23,24] researchers have reported that blue-collar workers are less likely to partake in these programs.[25] In this study, we found that support and participation from the DT promoted positive attitudes toward health and weight loss throughout the organization and likely influenced baseline participation rates. Nevertheless, organizational restructuring and lack of job control might have contributed to the low level of completion rate. Unpredictability and layoffs are common issues with today's jobs and could contribute to low completion rates even when initial enthusiasm is high. Workplace health promotion planners should consider and be mindful of these unpredictable organizational changes and their effects on the programs' participation and adoption rates.

Another predicament for the study was that because of the previously discussed issues, the DT members, who were the primary liaisons between the research team and the employees, had to deal with the same reorganization and increased job demands, which made it difficult to schedule regular DT meetings during program implementation. During the 20-week period in which the weight-loss program was conducted, only three DT meetings were held, greatly limiting the communication between the DT, research team, and employees. Professionally directed programs seem to have higher completion rates with lower baseline recruitment; however, studies have shown that such programs mostly recruit those who are ready to change rather than those who are most vulnerable and at high risk.[26] Furthermore, studies suggest that completion and maintenance of weight-loss programs in the workplace are characteristically influenced by recruiting participants as a group.[27] In this study, low retention rates among participants could have potentially been increased by adding a dynamic team and simultaneously introducing organizational changes to further encourage healthier eating and fitness habits.

In this study, participants had significant weight loss and reductions in BMI and waist circumference (among men) with 29% of participants moving from a higher BMI category to a lower category. Changes in the social norm by enhancing competition and setting weight-loss goal may have had an influence on weight loss. In contrast, the comparison group showed an increase in body weight and BMI and a significant increase in waist circumference (among men), and there was greater movement from lower to higher BMI categories. Although this was not a true comparison group, it is interesting to note that weight gain and increase in BMI and waist circumference occur among this group from time 1 to time 2. This significant increase in weight without any intervention suggests that correctional employees working overtime are susceptible to weight gain.

Corrections work is considered a classic hazardous duty job; therefore, environmental and organizational factors (eg, lack of job control, inflexible work hours, hazardous conditions/emergency situations, and shift work) contribute to the abnormally high stress and development of unhealthy behaviors, such as lack of physical activity, poor eating habits, smoking, and alcohol consumption, all contributing to weight gain and the risk for obesity and chronic diseases.[4–6] Moreover, correctional officers need to be alert and ready to respond to emergency situations, such as disgruntled inmates, inmate fights, assaults on an officer, and exposure to disease. To ease the persistent work-related stress, correctional employees consume energy-dense, nutrient-poor foods.[28] Furthermore, sick leaves and staff shortages force correctional officers to work long hours (eg, voluntary or involuntary overtime, 16-hour double shifts), which also challenges the ability to obtain healthy meals or to engage in adequate exercise.

Studies have shown that the rates of obesity among correctional officers are higher than those for the general population, which explains greater occurrence of myocardial infarction, high blood pressure, diabetes, asthma, and ulcers than seen in employees in other jobs.[29] The average life span of a correctional officer is 59 years, approximately 16 years lower than the national average.[29] Corrections would, therefore, seem to offer opportunities for disease prevention and health promotion.

With health care costs becoming increasingly expensive for employers, worksite wellness programs that cause weight loss, significant enough to move individuals from higher to lower classes of obesity, can result in increased cost savings for worksites. In this study, at week 20, no participants fell into the class III obesity category and those classified as class I obese decreased from 58% to 45.8%. Gates et al[30] suggest that workplace interventions that target the extremely obese could produce a large cost savings to employers by moving employees from the most extreme obese category to a lower category, producing notable improvements in productivity and financial savings. Studies have shown that presenteeism, absenteeism, and the associated health care costs are disproportionately related to higher BMI classifications. Gates et al[30] found the annual presenteeism cost of $1783.81 for the moderately or extremely obese worker was $506 more than the annual presenteeism cost of $1277.82 for all other workers. The annual absenteeism cost of $1575.41 for the moderately or extremely obese worker was $433 more than the absenteeism cost for all other workers. Trogdon et al[31] also reported noteworthy difference in the annual cost savings depending on BMI, ranging from $60 to $160 for overweight to class III obese. In this study, the improvements in the health status of those who were at most risk (class I and III obese) can translate into additional cost savings for this workplace.

Changes in attitudes (ie, self-efficacy and motivation), knowledge, and skills are the preconditions for behavior change.[32] Baseline responses from the NPAQ indicated that participants had inadequate nutrition knowledge necessary to make healthy food choices. Results from the Nutrition Knowledge and Exercise Self-Efficacy sections of the NPAQ did not show significant differences in the related scores before and after intervention; however, there was significant weight loss among participants. Further analyses using regression models indicated that approximately 73% of the variation in weight change at week 20 ($F = 6.477$, $P < 0.01$) and 68% of the variation in waist circumference at week 20 (F-statistic $= 7.055$, $P < 0.01$) could be explained by Nutrition Knowledge and Exercise Confidence scores after controlling for gender and age. On the basis of these findings, self-efficacy and nutrition knowledge account for a greater variation in weight change than that found in a previous study by Edell et al[33] Edell et al[33] concluded that self-efficacy and self-motivation accounted for about 32.2% ($P < 0.01$) of the variance in actual weight loss among 147 subjects who were at least 50 lb overweight. Increasing self-efficacy and nutrition knowledge could provide better response to weight-loss interventions at the workplace.

We found that a higher percentage of participants reported not having enough time to exercise at baseline than at week 20 (53% vs 42%). Furthermore, the percentage of individuals who reported having an adequate amount of exercise increased from 8% to 33% at week 20. The DT reported that participants were using the pedometers to create friendly walking competition and were more motivated to complete their tours around the facility and get up and move while on shift. Not only did this increase physical activity among study participants, but it also seemed to improve productivity at the workplace. We suggest that, in order to sustain behavior change, correctional employees could benefit from incorporating physical activity into their highly structured work environment.

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CONCLUSIONS

Very little research has been done to identify intervention strategies that support health enhancement among correctional officers. The correctional officers are a high-risk population and in need of interventions; nevertheless, the rigid structure and unique dynamics of this workplace make it challenging to promote positive change. Participation by correctional employees in the design process of a weight-loss program seemed to be crucial to the success of this intervention. Through the participatory design process, employees assumed ownership of the weight-loss challenge intervention after customizing the intervention to meet their needs. This participatory approach facilitated by outside health experts thus empowered correctional employees to set their own goals and provided a very effective mechanism to ensure high levels of employee involvement.

Future interventions should explore ways of incorporating regular physical activity into correctional officers' daily routine, such as adopting a form of job rotation that would eliminate long uninterrupted sedentary work. In addition, factors such as voluntary and involuntary overtime and double shifts, which offer little time to prepare healthy meals or engage in adequate exercise, may further contribute to adverse health outcomes in this population and could be addressed in a more targeted way. More research is needed regarding participatory interventions that both support the adoption of healthy lifestyle habits and include changes in work organization as an integrated approach to improving the health of correctional officers.

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