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Act Healthy: promoting health behaviors and self-efficacy in the workplace

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Abstract

Chronic health conditions and multiple health risk factors afflict Americans and burden employers, but effective, affordable, workplace-based health promotion interventions have not been widely implemented. This is the first study to adapt the empirically validated Chronic Disease Self-Management Program for a general employee population in a workplace setting with an emphasis on disease prevention and health promotion. A quasi-experimental, wellness standard of care comparison, prospective cohort design was used among employee participants at a large University employer. Ninety-one individuals participated in the program. Participants reported significantly increased health behavior frequency and self-efficacy after the intervention, compared with their pre-intervention scores, and improvements were sustained at 3-month follow-up [self-rated abilities for health practices scale (SRA): $F = 30.89$, $P < 0.001$; health promoting lifestyle profile-II (HPLP-II): $F = 36.30$ $P < 0.001$]. Individuals in the intervention group reported improved self-efficacy and health behaviors compared with the wellness standard of care comparison group at post intervention (SRA: $F = 12.45$, $P < 0.001$; HPLP-II: $F = 25.28$, $P < 0.001$). Adapting lay-facilitated self-management for the workplace offers promise as a replicable, scalable, affordable model for culture change in organizations.

Introduction

Chronic diseases such as heart disease, stroke, cancer and diabetes are among the most common, costly and preventable of all health concerns [1]. As prevalent as chronic health conditions are among Americans, their precursors are far more widespread. Half of adult Americans have one or more cardiovascular risk factors such as high blood pressure, high low density lipoprotein cholesterol and smoking [1]. Approximately one-third of adults were obese in 2009–10 [2]. More than half of Americans in 2011 did not meet the recommendations for physical activity, and about three-quarters (76%) of adults reported eating fewer than five servings of fruits and vegetables each day [1].

These lifestyle risk factors heavily influence the costs of health care utilization, absenteeism, injuries and disability [3, 4]. Not only have health care costs escalated rapidly, but employee productivity losses are estimated to be four times the direct cost of health care [5]. Employers, therefore, raise benefit rates at the expense of compensation, creating

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recruiting disadvantages or pressure to cut back or eliminate insurance benefits. Health-related employer costs and productivity burdens have generated a pressing need for interventions to promote health and well-being [5–8].

Primary care providers are under time constraints and lack resources to support people in their natural environments [3]. Models are needed that support individuals in taking health information from providers about behavior change and making those changes a reality during their waking hours. Worksite venues provide an excellent opportunity for health promotion programs with easy access for reaching employees with the goal of decreasing chronic disease risk factors [9]. The federal government has emphasized the importance of worksite wellness programs through the development of The Guide to Community Preventive Services and the new incentives in the Affordable Care Act [10, 11]. Private sector collaborations, such as the National Business Group on Health are also working to develop recommendations for worksites [12].

Research has documented the ability of workplace programs to improve health outcomes [3, 8, 13–18], but many worksites still do not offer comprehensive health promotion programs [19, 20]. Some of the barriers to widespread implementation of health promotion programs are funding; staff resources; time limitations; inconvenient locations and insufficient employee interest, especially from high-risk employees [20, 21].

An ideal intervention would improve health behavior, be affordable and time-efficient, leverage volunteer coworkers as leaders, and catalyse a workplace culture of health. Interventions offered in group format during the work day can also help to create new and strengthen existing natural supports. Coworkers can provide each other social support and reinforcement for new behaviors, thereby promoting a culture of health [22]. Previous research that focused on building, strengthening and maintaining social support has been successful at health behavior changes [22]. Organizational leadership involvement and policies and alterations in the work environment that support healthy behaviors are other critical components of worksite wellness programs [23].

Self-management, based on social learning theory, may be an approach to behavior change that meets these requirements [24]. Social learning theory uses 'self-efficacy' as a mechanism for behavior change. Self-efficacy emphasizes the expectations a person has about being able to achieve a specific behavior or psychological state. These expectations or level of confidence of personal efficacy influence whether a behavior will be initiated, how much effort will be applied and how long the behavior will be sustained [24]. Self-efficacy can be enhanced in a group setting through programming that includes (i) skills mastery, (ii) modeling, (iii) alternate explanations for physiologic symptoms and (iv) social persuasion [25]. Research has revealed that behavioral activities (specific goal-setting, contracting, behavioral feedback from others, etc.) are more effective than traditional cognitive strategies such as health education [3, 26, 27].

The Stanford Patient Education Research Center has implemented self-management programs that are based on the social learning theory. This intervention, the Chronic Disease Self-Management Program (CDSMP), has been effective in improving health behaviors among persons with diabetes, arthritis, asthma, heart disease and chronic pain [26, 28–30], as well as reducing outpatient and inpatient service needs [25, 31].

The self-management model uses a lay-facilitated intervention delivered in six weekly group sessions, focusing on improving confidence and success by self-directed action planning, problem-solving and social support [30]. The pragmatic self-management approach focuses on enhancement of participants' confidence in their ability to succeed at their health goals, or self-efficacy [25]. Self-management programs are typically offered through six weekly 2.5-h meetings with 12–15 members.

Self-management programs are usually implemented in clinical and community settings among people with chronic conditions [32]. Despite self-management's exceptionally strong empirical

support, this approach has not been fully tested as a 'preventive' health strategy to promote health and well-being among the general population in workplace settings. If self-management approaches can be modified for health promotion and for the prevention of chronic health conditions, this model could prove an excellent fit for the needs and priorities of workplace wellness programs. Current programs, however, need to be adapted, as the standard weekly 2-h meeting format is time and cost prohibitive for most worksites.

Some worksite wellness programs have used selected components of self-management programs, but few recent studies examined low-cost interventions that included use of lay facilitators, self-efficacy, goal setting, action planning, social support and group sessions held at the worksite [33–35]. Combining these components may result in an affordable, time-efficient, convenient intervention which builds on natural supports and impacts the culture of health. Research is needed that investigates the feasibility and effectiveness of self-management programs adapted for the workplace [32].

Act Healthy is an intervention that adapted the central components of the CDSMP into a standardized health promotion intervention implemented in a workplace setting with a heterogeneous employee population [25, 36]. This study tested the following research questions:

(1) Do participants in the *Act Healthy* intervention group show significantly greater between-group improvements in health self-efficacy and health behavior frequency at post-intervention compared with the wellness standard of care comparison group during the same time period?
(2) Do participants who receive the intervention report within-group increases in self-efficacy and health behavior frequency from pre-intervention to post-intervention?
(3) Does the intervention produce significant self-efficacy and health behavior improvements at 3-month follow-up compared with pre-intervention?

Materials and methods

Participants

The study was conducted at a large Midwestern university. Recruitment of participants was conducted through campus-wide listserv advertisements and e-mails disseminated by a network of over 600 university wellness program volunteers. The recruitment information advertised free 6-week classes to help people learn how to manage their own health. Eligibility criteria consisted of benefit-eligible employment at the university and willingness to attend an enrollment meeting and participate in weekly classes for 6 weeks.

A total of 125 persons attended a pre-enrollment meeting, where they signed informed consent materials and completed baseline measures. Biostatisticians designed the block randomization procedure. Ninety-one participants (73%) remained in the program through the post-intervention survey. The majority of participants were White, college-educated women. Table I contains the demographic information for the 91 participants, 50 of whom received the intervention immediately following enrollment and 41 who received the intervention 6 weeks later. Some of the analyses were conducted with the sample of 91 participants and a subset of the analyses was conducted with study participants who completed the follow-up data collection ($n = 69$).

Procedures

This study used a randomized, wellness standard of care comparison, prospective cohort design. See Fig. 1 for research design.

Geographic block randomization prevented exposure of the intervention by incidental office contact between individuals in the intervention group and those in the wellness standard of care comparison group. To achieve this end, the large central workplace consisting of 357 buildings co-located on 1,262 acres was divided into four geographic areas: northeast, northwest, southeast and southwest. In consultation with a biostatistician, allocation was by random assignment of geographic areas to intervention or wait-list condition. As a result of

Table I. *Demographic variables for intervention and wellness standard of care comparison groups, all participants*

Factor	Intervention group. M (SD), $n = 50$	Wellness standard of care comparison group. M (SD), $n = 41$	All participants, M (SD), $N = 91$
Age	44.68 (10.63)	47.05 (10.78)	45.73 (10.70)
No. of years education (in years)	16.22 (2.85)	16.06 (3.01)	16.15 (2.91)
Length of employment (in years)	6.57 (6.39)	7.29 (5.76)	6.90 (6.09)
No. of hours employed per week	39.49 (6.56)	39.50 (2.48)	39.49 (5.14)
Gender *n* (%)			
Female	46 (92%)	39 (95%)	85 (93%)
Male	4 (8%)	2 (5%)	6 (7%)
Race/ethnicity *n* (%)			
White, non-Hispanic	48 (96%)	33 (82%)	81 (89%)
African American	1 (2%)	4 (9%)	5 (6%)
Latino	1 (2%)	3 (7%)	4 (4%)
Asian	0	0	0
American Indian or Alaska Native	0	1 (2%)	1 (1%)

Note. M, mean; SD, standard deviation; *n*, number of cases.

this randomization, two campus geographic sectors were assigned to the intervention condition and to the wellness standard of care comparison condition. The northern areas were assigned to the intervention group condition and the southern areas to the wellness standard of care comparison group. Potential study participants attended an enrollment meeting where they read and signed informed consent materials. Assignment to treatment conditions (immediate intervention versus wellness standard of care comparison) was made before completion of the pre-intervention survey. Following the completion of the pre-intervention survey, subjects were notified of their study group—intervention or wellness standard of care comparison. The intervention group received the intervention immediately after completing the enrollment survey.

Six weeks after the enrollment survey was completed by both groups, the wellness standard of care comparison group completed the pre-intervention survey to evaluate if changes had occurred. This comparison group then received the intervention. For the intervention group, the enrollment survey scores were used for the pre-intervention scores. Post-intervention data were collected at 6 weeks after enrollment for the intervention group and at 12 weeks after enrollment for the wellness standard of care comparison group. Follow-up data were collected at 12 weeks after enrollment for the intervention group and at 18 weeks after enrollment for the wait-list control group. All data were self-report, and were coded with unique identifiers to maintain participants' confidentiality. Study procedures were conducted with oversight by the Institutional Review Board.

Wellness standard of care comparison group and Act Healthy intervention group

The wellness standard of care was the array of services available to all employees, defined as an annual health risk appraisal that includes biometric screening and access to wellness programs in areas such as nutrition, physical activity, stress management and smoking cessation [23].

The authors developed a co-leader manual and a participant manual that detailed the structure of the six weekly classes. Both the co-leader training and the *Act Healthy* classes were piloted with a group of nine employees and university wellness staff. The manuals were revised based on feedback obtained from the pilot.

Co-leaders were employees who already had a relationship with the university wellness program,

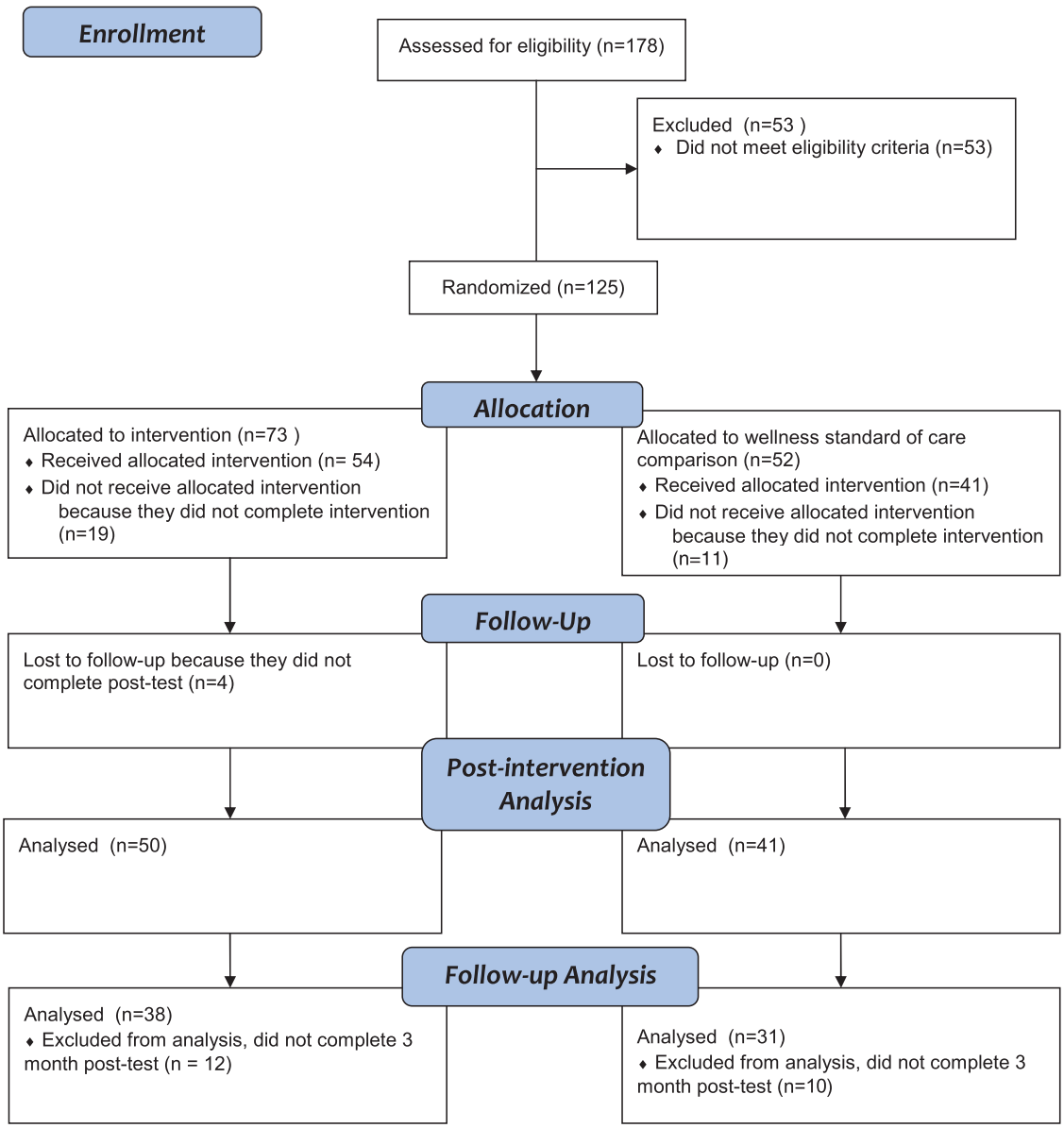

Fig. 1. Consort table.

such as being a Wellness Ambassador or teaching an exercise or health class sponsored by the wellness program. These individuals were recruited with an e-mail and a follow-up phone call to further explain the co-leader role and give the opportunity for potential co-leaders to ask questions. Co-leaders participated in 4 h of training provided by one of the authors of this manuscript, who was a coauthor on the original self-management book, the seminal work in this area [37]. The length of training time contrasts with the CDSMP that includes 4 days of training. The training utilized both the co-leader and

the participant manuals and included an informal dinner, since the training was held at the end of the workday. Co-leaders received a $100 gift card as a thank you for volunteering their time with *Act Healthy*.

Act Healthy modified the self-management paradigm by: (i) addressing health behavior from a prevention perspective, rather than targeting chronic disease, and by (ii) adapting the model for the workplace setting. The self-management model was adapted by making it shorter, more affordable and integrating the intervention either into the work day during employee lunch breaks or immediately after the workday, with group meetings occurring at the worksite.

Groups of 6–12 participants met weekly at the workplace for 50 min (during lunch or directly after work) to develop action plans, review the previous week's action plans, offer mutual support and share health resources. Each group member received a participant manual that detailed the content of the six classes. Like self-management programs, the central practice of *Act Healthy* is a weekly action-planning activity. Experiential learning components conducted in classes included developing problem solving skills to self-select a goal to work towards in the next 3–6 months and to translate the goal to action steps. Participants' self-defined goals varied and included increasing exercise, spending more time with family, eating a healthier diet, drinking more water, decreasing emotional reactivity, engaging in spiritual practices, organizing workspace and getting regular health checkups.

Act Healthy used strategies to increase self-efficacy such as skills mastery, modeling and social persuasion. Skills mastery occurred by encouraging participants to select incremental, realistic action steps that they felt they could achieve. Participants specified what, when, where and how much or how long they would participate in their chosen behavior. Group members were then asked to rate their level of perceived confidence for completing their action plan on a 10-point scale. Co-leaders and group members provided guidance to revise plans if participants rated their confidence at less than 8 of 10. Each week's session ended with participants sharing health information on topics selected by the group, which ranged from sleep and healthy eating to workplace communication and mid-day relaxation strategies. To maintain quality control and ensure the standardized administration of the intervention, each volunteer co-leader was paired with a co-leader employed by the research project.

Some action plans identified by participants were implemented outside of the workplace and in home and community settings. One of the intentions of *Act Healthy* was to strengthen natural supports by involving employees participating in group sessions with their coworkers to identify health-related goals and action steps. Because individuals in the sessions were typically coworkers, modeling and social support for new health behaviors were built both during the group and outside of the group sessions [22]. Many *Act Healthy* groups set up e-mail lists and opted for a 'buddy system' for accountability between meetings. This approach encouraged generalization of newly acquired health behaviors in real-world family and community environments, bridged the gap between worksite and personal life implementation and leveraged personal social support networks among family and friends.

Measures

Demographics

An 18-item questionnaire was administered to gather general demographic information. Questions included items about age, gender, racial and ethnic background, number of years of education and length of employment at the university.

Self-Rated Abilities for Health Practices

The Self-Rated Abilities for Health Practices (SRA) is a 28-item scale measuring self-reported confidence in one's ability to perform tasks in four health domains (exercise, well-being, nutrition and health practices) [38]. Responses are provided on a 5-point Likert-type scale, ranging from 0 (not at all able) to 4 (completely able). Internal consistency is 0.94 by Cronbach's *alpha* with construct validity

Table II. *Within- and between-group differences on health self-efficacy and health behaviors*

	Enrollment		Pre-intervention[a]			Post-intervention[b]			Follow-up[c]	
Variable	M	SD	M	SD	P^{d}	M	SD	P^{de}	M	SD
HPLP-II										
Intervention	2.77	0.43	2.77	0.43		3.02	0.44	0.00	3.00	0.47
Wellness standard of care comparison	2.59	0.36	2.66	0.40		2.99	0.45	0.19	2.97	0.43
P^{f}	0.64				0.00					
SRA										
Intervention	2.80	0.60	2.80	0.60		3.19	0.40	0.00	3.11	0.48
Wellness standard of care comparison	2.78	0.58	2.86	0.51		3.30	0.48	0.23	3.24	0.51
P^{e}	0.96				0.00					

Note. M, mean; SD, standard deviation; *P*, probability.
[a]Pre-intervention represents immediately before the intervention for the intervention group and 6 weeks after enrollment for the wellness standard of care comparison group. This 6 weeks is the time period that the intervention group received the intervention. Enrollment data and pre-intervention data for the intervention group is the same data because this group received the intervention immediately after completing the baseline survey. [b]Post-intervention data were collected at 6 weeks after enrollment for the intervention group and at 12 weeks after enrollment for the wellness standard of care comparison group. [c]Follow-up data were collected at 12 weeks after enrollment for the intervention group and at 18 weeks after enrollment for wait-list control group. [d]Represents the *P* value for between-group differences at post-intervention for the intervention group and pre-intervention for the wellness standard of care comparison group. [e]Represents the *P* value for within-group differences between pre-intervention and post-intervention for the intervention group and the wellness standard of care comparison group. [f]Represents the *P* value for between-group differences at enrollment.

within acceptable ranges among community-living adults [38]. The internal consistency *alpha* for this study was 0.93 and the test–retest reliability was 0.73. Improvements in self-efficacy were defined by a statistically significant increase in SRA scores.

Health Promoting Lifestyle Profile II

The Health Promoting Lifestyle Profile II (HPLP-II) is a 52-item questionnaire using a 4-point Likert-type scale ranging from 1 (never) to 4 (routinely). This scale measures self-reported frequency of participating in health behaviors in six domains (health responsibility, physical activity, nutrition, spiritual growth, interpersonal relations and stress management) [39, 40]. Respondents are instructed to rate the frequency with which they engage in each behavior. Used extensively in health behavior research, the HPLP-II has an internal consistency *alpha* of 0.94 and a test–retest reliability of 0.89 [41]. The HPLP-II has demonstrated high construct reliability, internal consistency and test–retest reliability [41]. Total scores were used in the data analysis to minimize risk of Type I error. The internal consistency *alpha* for this study was 0.94 and the test–retest reliability was 0.76. Improvements in health behavior frequency were defined by a statistically significant increase in HPLP-II total scores.

Data analyses

Preliminary analysis

All analyses were conducted with oversight from biostatisticians.

Table II displays the means and standard deviations for the outcome measures at all time points for each group. Analysis began with an investigation of distributions to assess normality. In general, the data met normality assumptions of the General Linear Model. A multivariate analysis of variance revealed no significant differences between the intervention and wellness standard of care comparison groups at baseline on each measure (SRA: $F = 0.003$, $P = 0.96$; HPLP-II: $F = 3.53$, $P = 0.64$), enabling further analysis without the need to control for pre-existing between-group differences.

A mulitivariate analysis of variance was conducted to determine if the intervention and wellness standard of care comparison groups differed at baseline by age, numbers of years education, length of

employment, number of hours worked each week and how participants would rate their health. The overall model was not significant, $F_{(1,\ 90)} = 1.93$, $P = 0.09$, indicating that there were no differences between groups along these variables. Groups also did not differ at baseline on measures such as gender ($c^2_{(1,\ N=91)} = 0.36$, $P = 0.55$). There was a larger proportion of White participants in treatment group (96%) versus the wellness standard of care comparison group (82%), ($c^2_{(1,\ N=91)} = 5.54$, $P = 0.02$), but the effect size for this difference was low ($\varnothing = 0.24$).

Correlations were examined between demographic variables, self efficacy and health behavior variables at baseline. Participants with more education had higher SRA scores, or more confidence in being able to perform tasks in health domains ($r = 0.31$, $P = 0.003$). No other significant correlations were found between demographic and outcome variables. We examined change scores from baseline to post-intervention and follow-up in order to take into account this relationship between education and SRA scores.

An analysis of variance was used for each group to determine if each group remained stable during the waitlist period. The immediate intervention group reported significant improvements after receiving the intervention. A multivariate analysis of covariance was conducted on scores collected from both groups at 6 weeks after enrollment, covaried on pre-intervention scores, to determine if there was significant change in health efficacy and health behavior frequency between the two groups.

Data from both groups were then combined and a multivariate analysis of covariance was conducted to determine if the intervention results in significant changes for all participants from pre-intervention to post-intervention. Finally, to determine if the intervention provided effects over a 3-month period, a repeated measures analysis was conducted using the SAS PROC MIXED procedure, with separate analyses for each outcome (HPLP-II and SRA). The REPEATED statement was employed to model covariance structure. The covariance structure was selected for the model by Akaike information criteria [42]. Three levels (pre-intervention, post-intervention and follow-up) of the within-subjects factor time formed the fixed effect in the model. If the overall 'time' effect was significant in the model, pairwise comparisons between each time point were performed.

Results

Research Question 1

Did participants in the intervention group show significantly greater improvements in health self-efficacy and health behavior frequency at post-intervention compared with the wellness standard of care comparison group during the same time period? After 6 weeks from baseline, surveys on outcome measures were compared between the immediate intervention and the wellness standard of care comparison group to determine if the intervention was more effective than the waitlist period. The groups differed significantly on both outcome measures (SRA: $F = 12.45$, $P < 0.001$; HPLP-II: $F = 25.28$, $P < 0.001$), indicating that the intervention received by the immediate intervention group was more effective than the same amount of time passing for the wellness standard of care comparison group.

Analyses confirmed that the wellness standard of care comparison group experienced no significant change during the 6-week initial period (waitlist period) (SRA: $F = 1.50$, $P = 0.23$; HPLP-II: $F = 1.71$, $P = 0.19$). The immediate intervention group reported significant improvements from pre-intervention to post-intervention (SRA: $F = 27.91$, $P < 0.001$; HPLP-II: $F = 26.85$, $P < 0.001$), during the same time period that the wellness standard of care comparison group experienced no change (Table III).

Research Question 2

Did participants who received the intervention report increases in self-efficacy and health behavior frequency from pre-intervention to post-intervention? Having determined that (i) the immediate intervention and wellness standard of care comparison groups did not differ on the outcome measures at baseline, and that (ii) the

Table III. *Paired comparisons on pre- and post health self-efficacy and health behavior changes*

Measure	Estimate	Standard error	*t*-value	$P > \mid t \mid$
HPLP-II				
Pre–Post	−0.29	0.04	−8.07	<0.0001
Pre–F/U	−0.24	0.04	−6.73	<0.0001
Post–F/U	0.05	0.03	1.45	0.1509
SRA				
Pre–Post	−0.41	0.05	−7.79	<0.0001
Pre–F/U	−0.29	0.06	−5.28	<0.0001
Post–F/U	0.11	0.05	2.27	0.0257

intervention was more effective than time waiting for the intervention; scores for the intervention period for both groups (immediate intervention and wellness standard of care comparison) were combined for the follow up analyses. As hypothesized, significant differences from pre- to post-intervention resulted on both measures (SRA: $F = 16.98$, $P < 0.001$; HPLP-II: $F = 30.13$, $P < 0.001$).

Research Question 3

Did the intervention produce significant self-efficacy and health behavior improvements at 3-month follow-up compared with pre-intervention? The overall test for the SRA indicated that there were significant differences across the three time points as hypothesized ($F = 30.89$, $P < 0.001$). Planned paired comparisons indicated that there was a significant increase in participants' health behavior self-efficacy from pre-intervention to post-intervention ($t = -7.79$, $P < 0.001$) and to follow-up ($t = -5.28$, $P < 0.001$). There was a significant difference between follow-up and post-intervention ($t = 2.27$, $P < 0.05$), indicating a decrease in self-efficacy during the follow-up period, although follow-up self-efficacy levels remained significantly improved over pre-intervention.

Similarly, the overall test for the HPLP-II indicated that there were significant differences in health behaviors across the three time points as hypothesized ($F = 36.30$, $P < 0.001$). Planned paired comparisons indicated that there was a significant increase in frequency of health behaviors from pre-intervention to post-intervention ($t = -8.07$, $P < 0.001$) and from pre-intervention to follow-up ($t = -6.73$, $P < 0.001$), indicating that the changes remained stable for up to 3 months after the intervention. There was no significant difference between follow-up and post-intervention ($t = 1.45$, $P = 0.15$) (Table III).

Discussion

Previous studies have utilized social learning theory with the self-management platform among individuals with chronic illness. The unique theoretical contribution of this study was to test an affordable, adapted self-management model, on a different population, in a different setting and with a preventive emphasis. Previous worksite research has only included some of the self-management components. The purpose of this study was 3-fold: (i) to determine if a self-management model successful with chronic disease populations can be adapted with a preventive focus to produce benefits with workforce healthy populations, (ii) to apply a brief, inexpensive, lay-facilitated health intervention in the workplace and (iii) to evaluate gains in self-efficacy and health behavior change from participation in such an intervention over and above the wellness program standard of care.

The intervention group experienced statistically significant increases in self-efficacy and health behavior frequency, whereas the wellness standard of care comparison group remained stable. The 6 weeks of the intervention period yielded more gains in health behavior change and self-efficacy than the same amount of time passing for the wellness standard of care comparison group.

Participation in *Act Healthy* was associated with greater self-efficacy and frequency of health behaviors at a statistically significant level from pre-intervention to post-intervention. Changes in both self-efficacy and health behaviors significantly improved from pre-intervention to 3-month follow-up.

With *Act Healthy*, employees set their own goals and determined their personal action plans, making

it highly interactive and self-directed. *Act Healthy* extends health promotion by targeting self-efficacy—a proven agent in sustained health-behavior change [26, 29]. This intervention is low-cost, convenient for employees to access, and may promote peer support for healthy behaviors in the workplace through lay employee leaders and group support among coworkers. Leveraging such incidental workplace social support for healthy behaviors may in turn lead to changes in overall workplace health climate, driven by individual employees rather than by mandates or incentives.

This study resulted in improvements in self-efficacy and health behaviors, similar to previous CDSMP studies [26, 29]. Several strategies were effective for implementation in this adapted self-management model. Many volunteer co-leaders and participants were recruited simply with email advertisements. The manualized intervention allowed co-leaders to quickly master group facilitation skills and shortened training duration to levels acceptable for the workplace. Classes were located at convenient locations and times at the worksite, resulting in high attendance. Co-leaders expressed strong interest in leading subsequent groups, and ∼30% of group members requested training to become co-leaders. Such enthusiasm among co-leaders and participants may contribute to rapid snowball capacity growth at minimal cost.

Conclusion

The adapted self-management model has potential to move workplace health promotion beyond traditional information-driven health education or reliance on external rewards. The most widely adopted wellness programs in large employer settings rely heavily on extrinsic rewards which, though effective as an adjunct strategy, are vulnerable to economic downturns and may undermine intrinsic health behavior motivation. Extrinsic incentive-driven behaviors are subject to rapid extinction if the extrinsic reward is cut or eliminated in times of economic stress for the employer. Most employers can neither afford nor are they willing to subsidize health behavior changes indefinitely. This study tested and found effective an intervention that emphasized self-directed goal setting, action planning and accountability without reliance on external rewards or a costly professional class of experts to facilitate the intervention, suggesting that it may be more sustainable in settings with modest program resources.

This proof-of-concept block-randomized trial is but one step in a larger research agenda. Future studies should be conducted with diverse samples from all socioeconomic groups and on samples with more male participants, because this study's sample was mostly educated, female and White. Studies targeting persons who are members of racial/ethnic minority groups and those from lower socioeconomic groups are especially of interest due to higher prevalence rates of heart disease, stroke and diabetes among these populations [43, 44], and modifications to the intervention may be needed to ensure that it is culturally appropriate. For example, many lower-wage blue collar positions allow a 30-min lunch period, which would require adaptation from the 50 min *Act Healthy* class period utilized in this study and would perhaps necessitate other approaches to magnify the impact of attenuated class time.

Future studies should include true random sampling, larger sample sizes and longer follow-up periods. Additional factors to include in future longitudinal studies include worker morale and engagement, physiologic outcome measures, pre- and post-intervention tracking of absenteeism and pre-absenteeism rates, as well as direct medical and pharmacy costs. Finally, while both health behavior frequency and self-efficacy improvements remained stable through 3-month follow-up compared with baseline, there was evidence of some decline in self-efficacy from post-intervention to follow-up. Maintenance interventions that target self-efficacy should be developed and tested. Although a strong association between self-efficacy and health behaviors has been demonstrated in previous studies among people with chronic illnesses [29], this

relationship should be examined among general working populations.

Limitations

Although participants from across the large footprint of the worksite were recruited, participants volunteered for the study and thus cannot be described as representative of all employees who may or may not be interested in health behavior change. Another limitation was the use of self-reported data, as response bias can have a possible unknown influence on the resulting analysis. *Act Healthy* co-leaders were paid $100 to offset extra time required to train and lead groups, which may have had an effect on the intervention. Finally, the wellness standard of care group did not receive an active attention control condition during the 6-week program period. Future studies should have an attention control condition in a group setting to control for general group participation effects.

Despite these limitations, the findings suggest that an adapted self-management approach applied in a workplace setting is promising with respect to increasing self-efficacy and health behaviors at a level sustained through follow-up, and is worthy of further examination. Employers and employees alike are hungry for a translation of effective interventions for the workplace [6, 7]. Programs designed to increase self-efficacy while reinforcing healthy behaviors could yield significant promise in fostering a supportive workplace by using peers as lay leaders and capitalizing on existing workplace natural supports. Workplace wellness programs such as *Act Healthy* that are replicable, scalable, affordable, offer promise as a model for culture change in 21st century health promotion.

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Conflict of interest statement

None declared.

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