Behavior Change; Fitness

Get Moving: A Web Site That Increases Physical Activity of Sedentary Employees

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Abstract

Purpose. *Develop and test a Web site to encourage physical activity (PA) by sedentary workers.*

Design. *Randomized control design with 30-day follow-up.*

Setting. *Large manufacturing plant.*

Subjects. *Included 221 workers; average body mass index was 29.5.*

Intervention. *Get Moving was a repeat-visit Web site providing information and support to develop a personalized PA plan.*

Measures. *Self-reported: PA, depression, anxiety, stage of change, attitudes, knowledge, self-efficacy, intention, perceived barriers to PA, and motivation.*

Analysis. *Multivariate analysis of covariance and univariate analysis of covariance models were used to compare the two study conditions on posttest outcomes, controlling for baseline levels.*

Results. *Compared with the control group, the treatment group showed significant improvement. The multivariate test was significant ($p < .001$), with a large effect size ($\eta^2 = .42$). The treatment group differed significantly from the control participants on 11 outcomes ($p < .005$), with large effect sizes for PA status, min/d, and knowledge, attitudes, and behavioral intention. Medium effect sizes were measured for perceived barriers, depressive symptoms, motivation, and self-efficacy. Multiple visits resulted in significantly improved PA, motivation, self-efficacy, and intention, compared with one-time visits.*

Conclusions. *The Get Moving Web site had positive effects and was well received. Interventions Web site have potential to increase the PA of sedentary individuals in worksites and elsewhere, but more research is needed into mediators of Web-based interventions. (Am J Health Promot 2011;25[3]:199–206.)*

Key Words: Physical Activity, Internet, Sedentary, Employees. Manuscript format: research; Research purpose: intervention testing/program evaluation; Study design: randomized trial; Outcome measure: cognitive, behavioral; Setting: workplace; Health focus: fitness/physical activity; Strategy: skill building/behavior change; Target population age: adult

PURPOSE

Physical activity (PA) reduces mortality risk and premature onset of chronic health problems.[1–4] It is associated with improved mood states[5,6] and decreased risk of functional decline.[3,4,7] Unfortunately, 49% of adults younger than age 65 and 39% of those age 65 and older do not meet recommended PA guidelines.[2]

Although the most effective PA intervention mediators are yet to be determined,[7] Web-based programs offer a cost-effective means to individualize behavioral interventions. [8–11] The relative efficacy of various computerized approaches has been explored, including the capacity of the telephone,[12,13] the Internet,[14–17] hand-held computer technology,[18] and monitoring devices to capture and send data to a Web-based coaching program.[19] More research has been called for on ''tailored Internet interventions in 'real life' settings with no research components present.''[14(p 949)]

Worksites, which often have existing communication and employee-support networks in place, are potentially excellent venues in which to promote PA.[20,21] Results of Web-based workplace PA interventions, however, have been mixed, for reasons that include design and methodological issues, as well as indeterminate participation rates and lack of employer support.[8–10]

For this research, we developed and tested a stand-alone fully automated Internet-based intervention designed to improve PA of sedentary workers. It involved a ''real-world'' effectiveness trial[22,23] at a large manufacturing plant. We hypothesized that theoretically relevant measures would indicate im-

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This manuscript was submitted December 17, 2004; revisions were requested July 5, 2008, and May 15, May 21, and June 2, 2009; the manuscript was accepted for publication June 3, 2009.

0890-1171/11/$5.00 + 0
DOI: 10.4278/ajhp.04121736

provement in PA by the Web site users, positive engagement in the program, and satisfaction with the Internet intervention.

METHODS

Design

This intervention comprised a randomized treatment-control design with 1-month follow-up. After procuring institutional review board approval, project staff recruited employees working at a large manufacturing plant. Participants were randomized into treatment (intervention Web site use) or control (no intervention) conditions, and after providing informed consent they were assessed at baseline (T1) and at follow-up (T2). Treatment subjects were encouraged to return weekly to the computer lab to use the Web site prior to the follow-up assessment.

The research was grounded in the social cognitive theory (SCT)[24,25] and the theory of reasoned action (TRA).[26,27] SCT emphasizes the influence of self-efficacy beliefs on behavior change. TRA posits that personal attitudes predict behavioral intention, which in turn influence PA behaviors.[28] In addition, the transtheoretical model[29] suggests that adoption of new behaviors progresses through five stages of change, with the possibility of both sequential and nonsequential movement through the stages. The stage of change continuum relevant to PA[7,30] includes precontemplation (i.e., inactive, not considering change), contemplation (i.e., inactive but considering change), preparation (i.e., inconsistently active), action (i.e., consistently active for <6 months), and maintenance (i.e., active for ≥ 6 months[31]).

Sample

Participants were recruited via flyers, e-mail announcements, newsletter articles, word of mouth, and an advertisement on the company Web site. The worksite included a mix of more than 5000 blue collar and white collar employees and contractors, but demographics of the workforce were not available.

Interviewers used questions adapted from the Physical Activities Readiness Questionnaire (PAR-Q)[32] to query potentially interested employees by telephone to determine whether they were healthy enough to participate. The PAR-Q is a seven-item instrument designed to identify individuals who should consult with a physician before beginning PA. Interviewees were also queried to determine whether they were sedentary (i.e., $\leq$90 minutes of PA weekly).

Of the 413 applicants, 185 (44.7%) were omitted from consideration. Of those, 65 declined to participate and 37 were too active. Another 83 potential subjects who were eliminated included 64 taking blood pressure or heart medicine, 2 with heart conditions, 6 with chest pressure/pain, 6 with joint/bone problems, 2 with other health problems, and 3 who were older than 69 years.

The remaining 228 employees were randomly assigned to treatment and control conditions. A secure server supplied by the research team and linked to the company's intranet collected data from on-screen informed consents and T1 and T2 assessments. Individualized passwords enabled participants to respond to assessments from personal or public workstations or in company computer labs.

After submitting their T1 assessment, treatment participants were scheduled to use the intervention Web site at a company-specified computer lab. The Web site encouraged these participants to return weekly to use it, and reminder e-mails were sent by the research team on four consecutive Mondays after the first visit. However, the location of the computer lab—near the middle of a building that was approximately 1 mile long by several hundred yards wide—may have been a deterrent to return visits. Participants had to walk from their work area and ascend a flight of 32 stairs to reach the lab. Accommodations for individuals with mobility impairments were not available.

Treatment participants were scheduled for their T2 assessment 28 days after first using the intervention Web site (35 days after T1 assessment). Control participants were scheduled for their T2 assessment 35 days after completing T1. All participants received mailed reminders 1 week before their T2 assessment and e-mailed reminders 1 day before the assessment. Participants were paid $25 for each assessment (i.e., $50 total).

Measures

Primary Outcome Measures. *Current Exercise Status Scale (CESS).* Current PA was assessed by using the CESS question, ''In the past month, how often did you make an effort to do each of the following?'': (1) engage in PA, (2) stretch your muscles, (3) strengthen your muscles. Responses to the three items were scored on a six-point Likert scale ranging from 1 (never) to 6 (always). Reponses were averaged to form a scale score (Cronbach $\alpha = .73$; control group test-retest $r = .63$).

PA: minutes per day. A single CESS item asked, ''On a typical day, about how many minutes do you spend purposely being physically active?'' Responses were scored on a seven-point scale (0,1–5, 6–10, 11–15, 16–20, 21–25, more than 25); control group test-retest $r = .53$.

Depression and anxiety. Regular PA is known to have a positive effect on depression and anxiety.[5,6,33] To assess the effect of the intervention Web site on feelings of depression, participants were asked to rate their experience during the past month with two items (''having a lot of energy'' and ''feeling downhearted and blue''), which were adapted from the SF-12 Mental Health subscale,[34] and a single item from the SF-36 Mental Health[35] scale (''being a happy person''). Answers to each item were rated on a six-point scale ranging from 1 (none of the time) to 6 (all of the time). The SF-12 achieved a multiple R^2 of .918 in predictions of the SF-36 Mental Component Summary score, which has been validated in numerous publications.[35] In addition, participants were asked to indicate ''During the past week, how have you felt, all things considered?'' on a seven-point Likert scale with responses ranging from 1 (extremely depressed) to 7 (extremely happy). A scale score for depression was constructed by summing items that were first reversed as needed (so that a higher score represented higher depression) and then standardized ($\alpha = .79$; control group test-retest $r = .67$).

Two items were included to evaluate the effect of the Web site program on anxiety. One item adapted from the SF-36[35] asked how often participants felt calm and peaceful during the past month, and another item asked how often they felt stressed (control group test-retest $r = .67$). Ratings were made on a six-point scale ranging from 1 (none of the time) to 6 (all of the time).

Stage of change. This construct was measured using a four-item instrument[36] with a 2-week kappa index with reliability of .78.[37] Concurrent validity of this instrument has been demonstrated by a significant association with the 7-Day Physical Activity Recall interview and with positive changes in estimated peak maximal oxygen consumption.[38]

Secondary Outcome Measures. *Attitudes and perceived knowledge.* SCT[24,25] and TRA[26,27] suggest that an individual's attitude and perceived knowledge will shape behavioral self-efficacy and intention. A battery of items was presented as agree-disagree statements designed to assess specific elements addressed on the intervention Web site. Participants indicated their responses to each item on a seven-point Likert scale ranging from 1 (completely disagree) to 7 (completely agree). Six attitudinal items ($\alpha = .66$; control group test-retest $r = .64$) included ''I look for ways to include more physical activity into my everyday life,'' ''I purposely do a number of active things throughout each day,'' ''I purposely try to spend less time sitting down,'' ''Getting enough physical activity is really inconvenient,'' ''You can't take small steps toward being physically fit. The only way to do it is to dive into it, all or nothing,'' and ''I don't ever think I can achieve a healthy level of physical activity.'' The items were averaged to form a single scale score. Ten items to measure changes in perceived knowledge ($\alpha = .69$; control group test-retest $r = .70$) included ''To get fit, I have to accept a certain amount of pain and discomfort,'' ''Just doing more physical activity throughout the day isn't good enough. You have to have a workout routine,'' ''I have to learn a lot of information in order to get the benefits of physical activity,'' ''Cleaning house, gardening, and playing with kids are not active enough to count as exercise,'' ''I can do physical activity while I'm watching TV,'' ''To be helpful, physical activity must include aerobic workouts,'' ''To get fit, you need to work out 3 times a week for 20 minutes each time,'' ''If I don't sweat, it's not exercise,'' ''There's no point in exercising unless I'm going to eat really healthy too,'' and ''I'm too busy to get any physical activity into my average day.'' For analysis, items were coded so that a higher score indicated a more positive attitude or accurate knowledge about PA, and they were averaged to form single scale scores for attitudes and perceived knowledge, respectively.

Behavioral self-efficacy. To examine the SCT construct of self-efficacy,[24,25] participants responded to four items asking ''If you wanted to, how confident are you that you could (a) do a healthy amount of PA on a regular basis, (b) be physically active 1–3 times per week, (c) purposely do a total of 30 minutes of PA in your typical day, and (d) by 3 months from now, do a healthy amount of PA on a regular basis?'' Responses were rated on a seven-point Likert scale ranging from 1 (not at all confident) to 7 (extremely confident). A scale score for each individual was constructed by averaging the items ($\alpha = .94$; control group test-retest $r = .70$).

Behavioral intention. To assess the TRA construct of behavioral intention,[26,27] a single questionnaire item asked participants to indicate ''In the next week, how likely is it that you will spend time being physically active once a day?'' Responses were measured with a seven-point Likert scale ranging from 1 (not at all likely) to 7 (extremely likely); control group test-retest $r = .59$.

Barriers to PA. A goal of the intervention Web site was to change perceptions about potential barriers to PA, which research suggests cause many individuals to fail to adopt and/or maintain PA habits.[33,39,40] To test the effects of the intervention on perceived barriers, participants were asked to rate how likely each of 15 possible barriers was to prevent them from being physically active in the next month. The barriers included ''lack of time,'' ''too expensive,'' ''lack of will power or self-discipline,'' ''not having anyone to be physically active with,'' ''not making physical activity a priority,'' ''lack of a good (or safe) place to do physical activity,'' ''fear of pain or injury,'' ''the weather,'' ''lack of support from other people,'' ''feeling embarrassed or self-conscious,'' ''feeling too tired or stressed,'' ''feeling hopeless about my physical condition,'' ''feeling guilty because others want me to do something else,'' ''feeling that physical activity is boring,'' and ''feeling that physical activity is not fun.'' Responses were given on a seven-point Likert scale ranging from 1 (completely unlikely) to 7 (completely likely). Responses were averaged to form a single scale score ($\alpha = .83$; control group test-retest $r = .71$).

Motivation to be physically active. A single item asked, ''How motivated are you to be physically active in your everyday life?'' Responses were scored on a seven-point Likert scale ranging from 1 (extremely unmotivated) to 7 (extremely motivated); control group test-retest $r = .52$.

Intervention

The *Get Moving* intervention Web site was accessible by standard desktop computers using the Internet, and it offered education, support, and guidance via text, video, and Flash animations. No keyboarding skills were needed because the computer's mouse could be used to select on-screen icons. As in motivational interviewing,[41,42] information and support were presented in a peer-to-peer rather than an expert-to-novice context. Users were encouraged to make choices to match their level of commitment. Web site messaging was designed to enhance self-efficacy and behavioral intention to become more active. The instructional design was based on the premise that Web site users were already in the contemplation stage, and if they had begun to develop a personal PA plan, they were in the preparation stage. At return visits, messages presumed that participants were in the early action stage yet needed encouragement and support to continue with their PA plan.

The program design offered multiple ways to learn about PA, and it encouraged use of linear pathways to develop a personal PA plan. Because

we designed the site for sedentary users, we assumed that most had not developed adequate PA habits and would relate best to nontraditional video models (i.e., not thin, not athletic) and to activities not associated with gyms, specialized clothing, or equipment. Users selected PAs from checklists. Traditional PA activities (e.g., jogging, basketball, aerobics) were listed as options, but they were not emphasized in text and video presentations. Overall, *Get Moving* encouraged small behavioral steps, with no minimum to get started. The stated goal, however, was to make PA a habit over a period of months by building gradually to nationally recommended levels of $\geq$30 minutes of moderate intensity PA at least 5 days per week.[2,43]

Text and video messages were tailored to users' preferred PA type (e.g., general fitness, strengthening, stretching) and activity, current activity level, and perceived personal barriers to PA. For instance, users could find encouragement to overcome self-perceived barriers to PA (e.g., too tired, no will power, self-conscious, not fun) and could view as many as six different video testimonials offering tips in the form of personal stories about overcoming specified barriers. A password entry system stored user data for return visit access.

The Web site helped users set PA goals for the following week and to devise an activity schedule, including day, time, and type of PA, for desired time slots. A return visit was also scheduled. At each visit to the Web site, users were encouraged to print a personalized summary, including daily PA schedule, tips for overcoming user-anticipated barriers, and selected articles from an information library.

When users returned to the Web site, they were queried about PA since the previous visit. The program compared the responses with their stored PA data from the previous visit and then provided tailored positive support even if their PA goals had not been met. Users were encouraged to review common barriers and address the previous week's obstacles. Whether users chose the same or amended PA goals for the following week, a new PA schedule for the following week could be created, including encouragement to return on a chosen day about 1 week later.

Get Moving comprised 597 Web pages. Content included more than 300 textual elements of information and encouragement, 113 video tips/support testimonials, 246 graphic elements, and 215 Flash animations with information, inspirational quotes, and demonstrations.

Analysis

Multivariate analysis of covariance (MANCOVA) and univariate analysis of covariance (ANCOVA) models were used to compare the two study conditions on posttest outcomes, controlling for baseline levels. MANCOVA was used to determine the multivariate effect size and univariate ANCOVA models were used to determine each outcome. Because the two conditions differed with respect to body mass index (BMI) at T1, baseline BMI was included as a covariate in analyses. To test the hypothesis that treatment participants were more likely than control participants to move into the action or maintenance stage, the stage scale was dichotomized (action/maintenance = 1, precontemplation/contemplation/preparation = 0) at T1 and T2; logistic regression was used to examine the association between intervention condition and stage status at T2, controlling for stage status and BMI at T1. Because multiple outcome measures were examined, a Bonferroni correction to α was applied to the main effects analyses, which resulted in a critical p value of .005 (.05/11).

RESULTS

Subjects

Attrition from the study was modest. Of the 228 individuals accepted for the study (111 treatment, 117 control), 222 (97%) clicked ''I agree'' after reading the online consent, and 221 completed the T1 assessment (106 treatment, 115 control). Data from 211 of 228 (93%) of the subjects were used for analysis. Ten treatment participants were eliminated from the analysis because they failed to use the *Get Moving* Web site.

The participants' demographics are described in Table 1. The average BMI, calculated from self-reported height and weight, was 29.5 (SD = 6.2). As a group, the participants were nearly obese by National Heart, Lung, and Blood Institute standards, according to which BMI = 25–29.9 is overweight and BMI $\geq$ 30 is obese.[44] Analysis of T1 fitness differences showed that the treatment group had a significantly higher BMI, $t(204) = 2.10$, $p = .037$. The treatment and control subjects did not differ significantly on any of the other pretest demographic variables.

Efficacy of the *Get Moving* Web Site

An overall multivariate model was tested, followed by 11 univariate models for the continuous outcome measures. The multivariate test was significant in that the treatment participants were found to have significant and large gains compared with the control participants, ($F[11, 169] = 11.02$, $p < .001$, partial $\eta^2 = .42$). As can be seen in Table 2, the treatment group differed significantly from the control participants on all 11 outcomes at $p < .005$. Large effect sizes in the predicted direction were obtained for the primary outcomes of the CESS ($\eta^2 = .26$) and minutes of PA per day ($\eta^2 = .22$) and for the secondary outcomes of knowledge ($\eta^2 = .21$), attitude ($\eta^2 = .15$), and behavioral intention ($\eta^2 = .15$). Medium effects were obtained for barriers to PA ($\eta^2 = .13$), depressive symptoms ($\eta^2 = .08$), motivation to be physically active ($\eta^2 = .08$), and behavioral self-efficacy ($\eta^2 = .06$). Small effects were obtained for the feeling stressed and feeling calm/peaceful depressive symptoms (both $\eta^2 = .05$).

With respect to predicting action stage status at T2, treatment participants were 10.95 times more likely (95% confidence interval = 4.00–30.00) to be in the action or maintenance stage at T2 compared with control participants, after controlling for stage at T1 and BMI (likelihood ratio χ^2 [1, N = 196] = 30.98, $p < .001$).

Return Visits

Treatment participants were encouraged by the *Get Moving* Web site to make return visits. Of 96 treatment participants, 59 (61%) returned for at least one repeat visit, although no incentives were provided to do so. To

Table 1
Demographic Information for *Get Moving* Study Participants (n = 211)

	All Cases (n = 211)			Treatment (n = 96)			Control (n = 115)		
Variable	$\bar{x}$	SD	%	$\bar{x}$	SD	%	$\bar{x}$	SD	%
Age	45.0	9.7		44.8	9.8		45.1	9.7	
Body mass index	29.5	6.2		30.5	6.7		28.7	5.6	
Gender									
Male			57.8			60.4			55.7
Female			42.2			39.6			44.3
Race									
African-American			10.4			10.4			10.4
Asian-American			1.4			0.0			2.6
Caucasian			79.1			80.2			78.3
Latino/Hispanic			6.2			6.3			6.1
Native American			0.5			1.0			0.0
Pacific Islander			0.5			0.0			0.9
Mixed race			1.4			1.0			1.7
Other			0.5			1.0			0.0
Education									
Some high school			0.5			1.0			0.0
High school graduate			6.8			7.3			6.3
Some college			28.5			27.1			29.7
College graduate			41.1			39.6			42.3
Graduate/professional			21.7			24.0			19.8
Trade school			1.4			1.0			1.8
Employment status									
Hourly employee			23.3			20.8			25.5
Salaried employee			73.3			77.1			70.0
Contract employee			3.4			2.1			4.5
Annual family income									
Less than $20,000			0.5			0.0			1.0
$20,000–$39,999			6.6			7.6			5.8
$40,000–$59,999			34.7			29.3			39.4
$50,000–$79,999			23.0			20.7			25.0
More than $80,000			35.2			42.4			28.8

see if additional visits increased the efficacy of the Web site, ANCOVA models comparing those who made one vs. multiple visits were conducted for the primary and secondary outcomes. Compared with those who used the Web site only once, treatment participants who used the Web site multiple times reported significantly greater PA, adjusted posttest $\bar{x} = 5.0$ vs. 4.3 ($F[1, 89] = 3.99$, $p < .049$, $\eta^2 = .04$); increased motivation to be physically active, adjusted posttest $\bar{x} = 5.2$ vs. 4.6 ($F[1, 89 = 5.84]$, $p < .018$, $\eta^2 = .06$); greater behavioral intention, adjusted posttest $\bar{x} = 5.6$ vs. 4.8 ($F[1, 89] = 8.82$, $p < .004$, $\eta^2 = .08$); and greater self-efficacy, adjusted posttest $\bar{x} = 5.0$ vs. 4.3 ($F[1, 89] = 7.45$, $p < .008$, $\eta^2 = .05$).

User Satisfaction

Five T2 items asked treatment participants about their satisfaction with the Web site. Of the 96 participants who used the *Get Moving* Web site for at least one session, 86 (90%) answered the items. On a seven-point scale, with 7 being extremely positive, users were quite satisfied with the Web site ($\bar{x} = 4.95$; SD = 1.08). They found it to be useful ($\bar{x} = 5.09$; SD = 1.15), enjoyable ($\bar{x} = 4.75$; SD = 1.04), and very easy to use ($\bar{x} = 5.88$; SD = .94). They indicated they would recommend it to a friend ($\bar{x} = 5.40$; SD = 1.10).

DISCUSSION

In this research, treatment participants showed significant gains with large effect sizes for primary outcomes relevant to a scale for PA and for minutes of PA, and for secondary outcomes supporting constructs associated with SCT constructs (i.e., knowledge, attitudes, and self-efficacy) and TRA (i.e., behavioral intention). Medium to small effect sizes were measured for other primary and secondary outcomes. Taken together, the results suggest that the intervention positively influenced the PA levels of a sample of sedentary workers, a group that might be expected to be difficult to affect. The fact that 61% of treatment participants walked some distance in a very large building and climbed stairs to use the Web site again without payment is a testament to its motivational impact. The exertion involved would be especially challenging for sedentary individuals, and it may have been a barrier to additional visits. Although results from Internet PA research have been mixed,[8–10] our results add strength to those studies with positive outcomes.

Defining and identifying a sedentary population is an inexact science, but the BMI values suggest that the participants were overweight to obese and therefore appropriate to test the intervention.[45] Being overweight does not in itself identify an individual as sedentary, but being overweight[2,7] and having elevated BMI[46] are associated with insufficient PA.[43,47] Thus, those who tested the *Get Moving* Web site seemed to have the characteristics of users for whom it was designed.

Participants who used the Web site repeatedly showed greater intervention effects, suggesting a dose response. Internet PA interventions with higher levels of program use or dose response tend to have more positive outcomes,[9] but not always.[44] Expected or adequate dosage is often undefined,[9,23] and some research indicates the potential for significant effects from only a single exposure.[48,49] Further, degree of familiarity with using an Internet program might explain some of the variance in observed treatment effects[23] and could influence the dose response.

Table 2
Pretest and Posttest Descriptive Statistics and ANCOVA Results (n = 211)*

Variable	Pretest		Posttest			Condition			
	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}_{adj}$	*F*	*df*	*p*	η^2
Primary outcomes									
CESS						69.87	1, 195	<0.001	0.26
Treatment	2.05	0.73	3.27	0.94	3.31				
Control	2.18	0.86	2.42	0.92	2.38				
Minutes per day activity						54.76	1, 197	<0.001	0.22
Treatment	2.67	1.57	4.78	1.72	4.86				
Control	2.96	1.79	3.21	1.83	3.15				
Depression						16.13	1, 198	<0.001	0.08
Treatment	0.15	0.74	−0.10	0.73	—				
Control	−0.08	0.80	0.11	0.76	—				
Feeling stressed						11.07	1, 198	0.001	0.05
Treatment	3.60	1.06	3.03	1.06	2.93				
Control	3.30	1.03	3.25	1.01	3.35				
Feeling calm/peaceful						10.30	1, 197	0.002	0.05
Treatment	2.78	0.98	3.24	0.99	—				
Control	3.07	1.06	3.02	1.04	—				
Secondary outcomes									
Attitude						33.93	1, 196	<0.001	0.15
Treatment	4.36	0.94	5.05	0.89	5.07				
Control	1.36	0.94	4.53	0.85	4.50				
Knowledge						50.60	1, 196	<0.001	0.21
Treatment	3.89	0.87	4.75	0.98	4.80				
Control	4.05	0.74	4.10	0.79	4.05				
Barriers to exercise						28.08	1, 195	<0.001	0.13
Treatment	3.93	0.97	3.19	0.97	3.21				
Control	3.99	0.82	3.79	0.91	3.78				
Motivation to exercise						17.37	1, 197	<0.001	0.08
Treatment	3.96	1.45	4.97	1.23	5.00				
Control	4.18	1.22	4.36	1.21	4.32				
Behavioral intention						34.01	1, 195	<0.001	0.15
Treatment	3.80	1.59	5.35	1.43	5.35				
Control	3.80	1.58	4.25	1.60	4.25				
Behavioral self-efficacy						11.74	1, 193	0.001	0.06
Treatment	3.98	1.64	4.73	1.56	4.75				
Control	4.02	1.36	4.18	1.57	4.16				

* ANCOVA indicates analysis of covariance; CESS, Current Exercise Status Scale; and $\bar{x}_{adj}$, mean adjusted for pretest score and body mass index. An η^2 of 0.01 corresponds to a small effect; 0.06, a medium effect; and 0.14, a large effect.

Overall, this research suggests the potential efficacy of a Web site designed to increase PA among sedentary workers. The results are even more persuasive considering that the intervention was not supported by a worksite campaign to motivate and support participants.[20,21] Although employees were restricted to using a computer lab in our research, easier access to a Web site from desktop workstations or from home would likely enhance the number of repeat visits. This type of readily accessed, stand-alone automated PA intervention could be put to use in medical clinics or community centers or on agency Web sites to promote change in PA across a large population. This change could produce important public health effects, particularly if it occurs among those who are most sedentary.[7]

Limitations of this research include use of self-reported PA data, several single-item measures, and the short follow-up period. Results using more validated scales and a 6-month to 1-year follow-up would have provided stronger evidence for the maintenance of positive outcomes. Moreover, the sample may not be representative because only a small percentage of employees at the factory participated, the computer lab was not accessible to all employees, and most employees who participated were salaried Caucasians with some college education. Finally, participant program-use data were not collected, which negated the potential to identify efficacious program components and mediators responsible for the intervention effects.

Questions remain not only about efficacious program components, but also about optimal structure and even programmatic philosophy. Research suggests that Internet PA interventions might stand alone as we have shown or be enhanced by supplemental components that provide education, coaching, and monitoring.[12–19] Our research used a browser instead of a tunnel navigation architecture,[50] which structures the order of program presentation. The programmatic philosophy accepted any minimum commitment to start a personal PA plan, even if it didn't add up to recommended minimums for beneficial PA.[43] Positive outcomes resulted, but the impact of our programmatic design decisions is unknown.

Future research using methodology adapted for eHealth could address these concerns.[23] For example, an Internet smoking cessation intervention study[51] used the Multiphase Optimization Strategy model to empirically identify the active components of the smoking cessation program.[52] This type of creative thinking and sophisticated analysis might well be applied to Internet PA research to improve our understanding of how to design more effective Web-based interventions.

SO WHAT? Implications for Health Promotion Practitioners and Researchers

What is already known on this topic?

Recent research has explored the efficacy of various computerized approaches for PA interventions, but the most effective PA mediators are still unknown. Internet PA interventions are appealing because of their potential to provide cost-effective individualized behavioral programs, but research on this approach in real world settings has been limited.

What does this article add?

A fully automated stand-alone Web site to improve PA was well received by sedentary factory workers. It had at least short-term benefits, with large to moderate effect sizes. This research thus supports use of the Internet for delivery of PA interventions.

What are the implications for health promotion practice or research?

Results from other Web-based PA interventions have been mixed, however, so potential users of this technology should be cautious about their expectations. Internet interventions also add a new layer of issues for researchers related to the design of a Web site's architecture and decision-rules to maximize efficacy.

Acknowledgments

This study was funded by a grant from the National Heart, Lung and Blood Institute to Oregon Center for Applied Science (R44HL56535). Special thanks to Brian Johnson, Tasha Beauchamp, Gretchen Boutin, Rob Hudson, Karen Hunter, and Diana Robson for help with program development and the evaluation. Dennis Ary made helpful comments on earlier versions of the manuscript. Statements herein are those of the authors and do not necessarily represent the National Institutes of Health.

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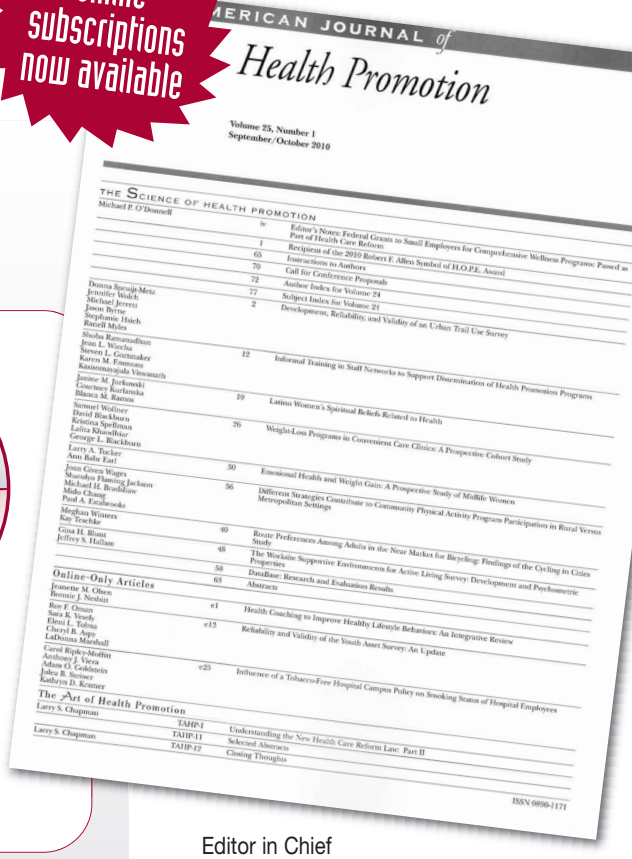

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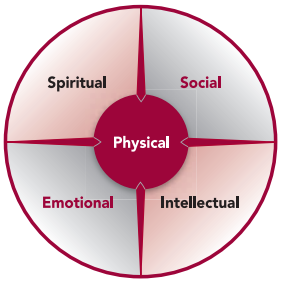

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