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Research article

Evaluation of work place group and internet based physical activity interventions on psychological variables associated with exercise behavior change

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Abstract

The purpose of this research was to compare group-based and internet-based physical activity interventions in terms of desirability, participant characteristics, exercise self-efficacy, and barrier self-efficacy. Pretest questionnaires were completed prior to voluntary enrollment into either of the ten-week physical activity interventions. Both interventions were based on Social Cognitive Theory and the Transtheoretical Model. Interventions were followed with posttest questionnaires. Results demonstrated that the internet intervention attracted more participants, but only the group-based participants showed significant increases in exercise and barrier self-efficacy. At pretest, participants who selected the internet intervention were significantly lower in life and job satisfaction than those who selected the group intervention. Results suggest that traditional group-based exercise interventions are helpful for improving cognitions associated with exercise behavior change (e.g., exercise self-efficacy) and that the internet intervention may help employees who fall into an “unhappy employee” typology.

Key words: exercise, self-efficacy, behavior change, workplace, intervention.

Introduction

There is strong evidence that physical activity is effective in reducing the risk of chronic diseases such as cardiovascular disease, high blood pressure, and depression (Warburton et al., 2006). Despite this evidence, a majority of adults do not meet the minimal requirements for physical activity wherein health benefits are thought to occur (Cameron et al., 2007). Although there are many reasons why individuals lead primarily sedentary lives, part of the low level of physical activity in North America is likely related to the increased opportunities to be sedentary, including an increase in sedentary occupations (Biddle and Mutrie, 2001). Indeed, because many North American adults work in primarily sedentary jobs, two reports, the U.S. Surgeon General’s report on “Physical Activity and Health” (1996) and Health Canada’s “Business Case for Active Living at Work” (2001) make recommendations for physical activity initiatives in the workplace.

Such initiatives are further warranted because while sedentary lifestyles have been linked to many chronic diseases, it has also been recognized that sedentary occupations are linked to worker’s compensation claims and increased absenteeism. For example, Musich

et al. (2001) found that physical inactivity, smoking, and life dissatisfaction were controllable health risks that were highly related to workers’ compensation costs. Other researchers found that being overweight or obese and having high stress had the highest correlation with worker absenteeism and that initiating a wellness programme decreased absenteeism (Wright et al., 2002). In an economic analysis of risk factors and health-care expenditures that included data from over 46,000 employees, it was found that employees at high risk for seven modifiable risk factors, including sedentary lifestyle, incurred significantly higher health-care expenditures than those employees at low risk (Goetzel et al., 1998).

Although it has been reported that over 80% of North American worksites with 50 or more employees have some level of health promotion programme (Riedel et al., 2001), typically only between 15% and 30% of eligible employees participate (Gebhardt and Crump, 1990). Further, many of the participants are already active (Sharratt and Cox, 1988). Identified challenges to successful worksite physical activity programmes include limited time for those employees with inflexible schedules, and potential embarrassment due to exercising around coworkers (Wong et al., 1998).

Because of the flexibility and anonymity afforded, one possible avenue for overcoming such challenges is to offer interventions through the internet. Further, tailoring interventions to the Transtheoretical Model (TTM) stages of change (precontemplation, contemplation, preparation, action, and maintenance; Prochaska and Norcross, 1994), have shown to be effective with both web-based interventions (Napolitano et al., 2003; Marshall et al., 2003) and in more traditional forms of interventions such as print handouts (Marcus et al., 1998). For example, a website which included stage matched information resulted in increases in physical activity and motivation to be physically active (Napolitano et al., 2003). However, these authors found that the greatest change was from baseline to one month, and thereafter, there was little change. Qualitative data indicated that this was because the website content was not updated and, therefore, participants did not feel the need to return to the site after the first month.

Other authors have reported that an 8-week web-based intervention tailored to stage of change decreased the amount of time spent sitting, but only a matched print-based intervention resulted in increased physical activity in those who were inactive at baseline (Marshall et al.,

2003). While there are possible advantages to initiating a website intervention in a workplace, one being that employees are already familiar with the main employer website and can easily navigate to the intervention page (Shephard, 1996), it has been found that despite targeted e-mails, employees did not visit a worksite health promotion website very often and use declined rapidly over time (Leslie et al., 2004).

Work site physical activity interventions based on the internet hold some promise for changing employee behavior. The most effective interventions are those that are stage matched to the individual. However, one of the major criticisms of this approach has been that information contained on the web page becomes stale over time and that employees no longer access the site for this reason. More research is necessary to evaluate the effectiveness of stage-matched web-based physical activity interventions that continuously update the internet information, thereby making it more appealing to the employee for longer periods of time.

When considering physical activity interventions, it is also important to consider self-efficacy which has been shown to serve as a mediator between interventions and behavior (Bandura, 1997). Exercise self-efficacy is the belief that an individual holds in his or her ability to manage and plan regular exercise sessions in their life and is a primary determinant of effective exercise adherence (Dawson et al., 2000). Exercise adherence is also affected by beliefs that one can exercise regularly in the face of numerous obstacles or barriers (barrier self-efficacy) (Dawson, et al, 2000). As such, building confidence to overcome barriers to walking and improving confidence to schedule and plan regular exercise sessions is paramount to educational and activity interventions. Self-efficacy has also been shown to increase with the stages of behavior change outlined by the TTM (Marshall and Biddle, 2001). One of the few longitudinal tests of the TTM with exercise suggested that self-efficacy was a good predictor of stage transition (Plotnikoff et al., 2001).

An additional consideration for workplace health promotion and exercise research is the issue of self-selection. Due to the generally low participation rates in such programmes as outlined above, it is important to determine who may be interested in participating. Thus, although self-selection is often said to be a limitation of research, the converse may also be true. Self-selection of intervention type strengthens the external validity of the findings by more readily representing the actual volitional control that individuals hold with respect to their choice of intervention formats.

Based on these considerations, the purpose of this research was to compare the efficacy of a group-based educational exercise intervention with an internet-based intervention in terms of positively influencing stage of behavior change and exercise and barrier self-efficacy. An additional purpose was to determine if a web-based intervention attracted different participants than those who enrolled for a group-based on-site intervention. Two important questions to be answered were a) Are employees more interested in on-line interactions than structured group meetings? and b) Are there differences between intervention participants in terms of readiness to change,

demographics, and psychosocial characteristics such as self-efficacy?

It was hypothesized that: 1) The internet-based intervention, rather than the group-based intervention, would attract individuals in earlier stages of behavior change because the internet-based intervention provides the option to maintain anonymity which is an important need for some employees, particularly those who are currently inactive; 2) the internet-based intervention would attract more participants than the group-based intervention because of the relative ease of access and flexibility it afforded (Napolitano et al., 2003); and 3) both interventions would lead to increased exercise and barrier self-efficacy.

Methods

Procedures

All staff and faculty at one university (approximately 1200 individuals) were sent pretest questionnaires and informed consent statements through the university mail system. A cover letter included in the questionnaire package invited employees to participate in the study and also included preliminary information about upcoming physical activity interventions. All employees were encouraged to complete the questionnaire regardless of their intent to participate in the forthcoming exercise interventions. This procedure was selected because it provided a novel approach to data gathering in that we were able to capture information about individuals who do not choose to be in an exercise intervention programme. This group of participants is largely ignored in exercise adherence research.

After the pretest questionnaires were returned, a one month promotional campaign was launched. The promotional campaign consisted of fifty posters placed around campus in staff rooms and other locations, and an e-mail sent to all employees advertising the programme and the website launch. At this stage, the website was restricted to only the main page which included information about the programmes and an "FAQ" section that any interested employee could access. One month after the launch of the promotional campaign the group-based and internet-based interventions were started. Interventions were run for ten weeks. Participants were permitted to enroll in only one of the interventions (i.e., if they were in the group intervention they could not also access the restricted parts of the website). Finally, one week after the last intervention week, posttest questionnaires were sent out through the internal mail system to the entire organization once again. This also allowed for some interesting observations of possible health changes that occurred to individuals within the organization who did not select a physical activity intervention programme.

Interventions

The interventions for both programmes were based on social cognitive theory integrated with the TTM. The internet-based intervention included the main website where participants entered an assigned participant number to get further information. Also on the site was links to other exercise websites (e.g., Canadian health network's exercise section). The website was added to frequently

(on average once per week) in an effort to keep the website fresh and to increase the likelihood that participants would return. Participants could log onto the site as often as they wished and website “hits” were counted. The website was discontinued once the study was completed. The group-based intervention consisted of a weekly meeting led by one of the researchers who has expertise in exercise interventions and social cognitive theory (KD). Each meeting included a leader presentation and group discussion of the week’s theme.

The two interventions were similar in terms of weekly themes. Group presentations and internet interventions were based on the following information: week 1 – introduction, week 2 – monitoring sedentary behaviors, week 3 – identifying barriers, week 4 – goal setting, week 5 – thought stopping and rewarding oneself, week 6 – overcoming obstacles, week 7 – planning and scheduling behaviors, week 8 – social support, week 9 – other behavior changes such as diet, and week 10 – planning for the future and for difficult situations. These were developed through the researchers’ own knowledge and adapting material from two stages of change based physical activity interventions: *Active Living Every Day* (Blair et al., 2001) and *Motivating People to be Physically Active* (Marcus and Forsythe, 2003).

Both internet- and group-based participants were required to complete a stages of change algorithm (Marcus et al., 1992) when logging on to the website (internet intervention) and signing into the class (group based intervention). This information was used to determine the stage relevant exercise information that was provided for the participants. All participants received a handout (group) and additional information (internet) that was tailored to their specific stage as indicated by their response to the algorithm (precontemplation, contemplation, preparation, action, and maintenance). While each weekly handout/information followed the weekly prescribed theme, they differed for each stage of change to reflect differences in cognitive and behavioral processing associated with each stage. Participants in the precontemplation, contemplation and preparation stages tend to use cognitive processes (e.g., increasing knowledge), whereas, participants in the action and maintenance stages tend to use more behavioral processes such as reinforcing success (Marshall and Biddle, 2001). Thus, for each week of the interventions, additional information was provided to the participant that was relevant to their unique motivational processes. The links to additional health and physical activity websites that were provided to the internet group were also given to the group-based intervention. Therefore, the two interventions were as similar as possible in terms of information delivery and stage matched material.

Pretest measures

The pretest measure consisted of: 1) demographic items (age, gender); 2) a stages of exercise change algorithm (Marcus, et al., 1992); 3) exercise self-efficacy: ten items measuring representing planning and scheduling behaviors relevant to exercise scored on a scale of 0% (not at all confident) to 100% (absolutely confident) ($\alpha = 0.93$; Shrigley and Dawson, 2004); 4) barrier self-

efficacy: eleven items measuring confidence to overcome specific barriers to exercise scored on the same 100% confidence scale as the exercise self-efficacy measure ($\alpha = 0.95$; Shrigley and Dawson, 2004); and 5) selected items from a health risk appraisal developed for worksites by Centers for Disease Control and modified by the University of Michigan Health Management Research Centre for the Employer (Edington et al., 1999). The health risk appraisal is a self-report measure of such things as life satisfaction (scored on a scale from 1=completely satisfied through 4=not satisfied), job satisfaction (1=agree strongly through 4 = disagree strongly), and overall physical health (1=excellent through 5 = poor), in addition to smoking, diet, and drinking habits.

Posttest measures

The posttest measures included the same items as at pretest with the addition of three questions developed to assess exposure to the *Stepping into Health* promotional campaign: “Were you aware of the *Stepping into Health* Programme recently offered?” If the participant answered no, he or she was directed to skip to the stages of change algorithm. If the participant answered yes, he or she was also asked: “Regardless of whether you actually participated in the programme (by attending a group meeting or by logging onto the website), did the *Stepping into Health* Programme result in you thinking about physical activity while at work?” If the answer was yes: “Please rate how positive or negative these thoughts were about physical activity?” answered on a five-point Likert scale from 1 (very negative) to 5 (very positive).

Statistical analyses

The analyses were conducted with the Statistical Package for the Social Sciences (SPSS), version 15.0. Two sets of analyses were done. Because we were interested in who was attracted to the different intervention groups, one set of analyses was with all participants who completed pretest questionnaires. Differences between groups on categorical data (gender, stages of change) were examined using chi-square analyses. For differences between continuous variables (exercise self-efficacy, barrier self-efficacy, life satisfaction, and job satisfaction) a MANOVA was conducted with intervention group that participants subsequently chose (group-based, internet-based, and no intervention) as the independent variable.

The second set of analyses included only those participants who returned complete pretest and posttest questionnaires. These analyses examined changes as a result of the interventions. Changes in stage of exercise behavior from pretest to posttest were calculated such that it was examined whether participants regressed in stage (e.g., moved from action to preparation), didn’t change stage, or progressed in stage (e.g., moved from preparation to action). Differences in these three categories by intervention group were examined using a chi-square analysis. The analysis for changes in continuous dependent variables (confidence, exercise self-efficacy, barrier self-efficacy, job satisfaction and life satisfaction) consisted of a repeated measures MANOVA with intervention group (group-based, Internet-based, and no intervention) as the between participants variable measured across

pretest and posttest (within participants variable).

Results

As a statistical check we ran a series of chi-squares and ANOVAs to ensure that there were no differences between participants who returned both sets of questionnaires (collapsed across all intervention groups) and those who only returned pretest questionnaires (collapsed across all intervention groups). There were no differences between these two groups in terms of gender, $\chi^2 = 1.16$, $p > 0.05$, or stages of change, $\chi^2 = 8.34$, $p > 0.05$. Similarly, there were no significant differences between the two groups in confidence, $t(191) = 0.43$, $p > 0.05$, barriers, $t(192) = 0.27$, $p > 0.05$, life satisfaction, $t(192) = 0.75$, $p > 0.05$, or job satisfaction, $t(192) = 0.69$, $p > 0.05$.

Pretest only data

Thirty-one participants enrolled in the Internet-based programme and seventeen enrolled in the group-based intervention. At pretest, 147 other participants completed questionnaires but did not enroll in either programme (no intervention group).

There was a significant gender imbalance in choosing to enroll in an intervention with many more women than men enrolling in either the Internet-based or group-based intervention than was statistically expected, $\chi^2(2) = 12.29$, $p < 0.005$. There was also a significant difference in the stages of change by intervention with more participants in the preparation stage choosing to enroll in either intervention than was statistically expected, $\chi^2(8) = 31.93$, $p < 0.001$. The nonintervention participants were also overrepresented with more participants in the precontemplation and maintenance stages. Interestingly, eleven participants were in the precontemplation stage at pretest but none of them chose to participate in either intervention.

The results of the MANOVA showed that the dependent variables were significantly different between groups, $F(8, 178) = 2.36$, $p < .05$, $\eta^2 = 0.05$. When the results for the dependent variables were considered separately, there were no significant differences between intervention groups for exercise self-efficacy, $F(2, 191) = 0.44$, $p > 0.10$, $\eta^2 = 0.01$, or barrier self-efficacy $F(2, 191) = 1.18$, $p > 0.10$, $\eta^2 = 0.005$. However, there were significant differences between groups for life satisfaction, $F(2, 191) = 8.64$, $p < 0.001$, $\eta^2 = 0.08$ and for job satisfaction,

$F(2, 191) = 3.40$, $p < 0.05$, $\eta^2 = 0.03$. Those participants who chose to enroll in the internet-based intervention had significantly lower life satisfaction and job satisfaction than either the group-based intervention or no intervention participants. Means and standard deviations for the pretest only variables are shown in Table 1.

Changes due to interventions

One hundred and seventy-one participants returned posttest questionnaires. Of these, 14 were internet-based participants, six were group-based intervention participants and 56 were no intervention participants who had also completed pretest questionnaires. Attendance for the group-based intervention was fairly steady with an average of 11.5 participants in attendance per week. Internet-based participants logged onto the website an average of 1.88 times per (median = 1.5) week.

Changes in dependent variables

There were no significant changes in stage by intervention group, $\chi^2(4) = 6.32$, $p = 0.17$. Although the chi-square analysis on change of stage by intervention group was not significant, looking at the data did indicate that there was a trend for progression of stage in the group-based intervention and there is strong evidence that self-efficacy increases with stage of behavioral change (Marshall and Biddle, 2001), therefore it was decided to include change of stage as a covariate in the repeated measures MANCOVA, the results of which were significant, $F(8, 130) = 2.34$, $p < 0.05$, $\eta^2 = 0.12$. Change of stage was a significant covariate, $F(4, 61) = 3.21$, $p < 0.05$, $\eta^2 = 0.17$ within this analysis. When the results for the dependent variables were considered separately, significant differences were observed between groups across time for exercise self-efficacy, $F(2, 66) = 3.82$, $p = 0.05$, $\eta^2 = 0.08$, barriers self-efficacy, $F(2, 66) = 3.11$, $p = 0.03$, $\eta^2 = 0.10$, and marginally significant for life satisfaction, $F(2, 66) = 3.73$, $p = 0.07$, $\eta^2 = 0.07$. There were no significant changes for job satisfaction, $F(2, 66) = 0.99$, $p = 0.38$. The group-based intervention participants had significant increases in their confidence to exercise (exercise self-efficacy) and to overcome barriers (barrier self-efficacy), but there were no significant changes for the other two groups. The Internet-based group had a positive change in overall life satisfaction but the other two groups did not. Means and standard deviations for pretest and posttest data for these analyses are shown in Table 2.

Table 1. Pretest data by intervention group.

	Intervention			
	Group-based (n =16)	Internet (n = 31)	No Intervention (n = 147)	
Percent female *	90	88	62	
Age M (SD)	47.18 (11.6)	45.43 (8.6)	45.52 (9.4)	
Stages of Change (N) +	Precontemplation	0	11	
	Contemplation	1	17	
	Preparation	7	23	
	Action	6	17	
	Maintenance	2	11	
Continuous variables M (SD)	Exercise Self-Efficacy	768.75 (165.6)	780.00 (189.2)	806.18 (198.5)
	Barrier Self-Efficacy	627.28 (194.6)	633.71 (169.2)	693.12 (256.0)
	Life satisfaction * †	2.06 (.57)	2.58 (.80)	2.07 (.59)
	Job Satisfaction * †	1.94 (.85)	2.16 (.52)	1.82 (.68)

* $p < 0.05$. † a higher score indicates greater dissatisfaction.

Table 2. Pretest and posttest data by intervention group for only those participants who completed both sets of questionnaires.

		Intervention		
		Group-based (n = 6)	Internet (n = 14)	No Intervention (n = 56)
Barrier Self-Efficacy *	Pretest	630.00	593.93	709.74
	Posttest	798.33	535.14	735.4
Exercise Self-Efficacy *	Pretest	701.67	765.71	826.71
	Posttest	900.33	724.43	847.86
Life Satisfaction	Pretest	2.17	2.36	2.04
	Posttest	2.00	2.07	2.05
Job Satisfaction	Pretest	1.50	2.14	1.79
	Posttest	1.83	2.07	1.80
Stage of Change Pretest (N)	Precontemplation	0	0	1
	Contemplation	0	1	3
	Preparation	2	7	12
	Action	2	1	5
	Maintenance	2	5	35
Stage of Change Posttest (N)	Precontemplation	0	0	1
	Contemplation	0	2	2
	Preparation	0	2	9
	Action	4	6	11
	Maintenance	2	4	33
Change in Stage (N)	Regressed	1	3	8
	No change	2	7	40
	Progressed	3	4	8

* $p < 0.05$.

Discussion

The physical activity interventions offered to participants were focused on positively influencing knowledge and confidence regarding physical activity. Therefore, our data collection and analyses were focused on shifts in psychological variables and readiness to change rather than the more distal variable of physical activity behavioral change. Overall, the analyses showed some interesting results that partially supported our hypotheses and can provide guidance when considering worksite physical activity interventions.

At pretest, we found more than a statistically expected number of participants in the preparation stage in both of our intervention groups. This makes sense in the context of the TTM which identifies participants in the preparation stage as those who plan on change and are taking steps toward that goal. Participants were likely to enroll in the intervention programmes as one of those steps. These results are similar to the findings of other researchers (e.g., Sciamanna et al., 2002) who reported that participants in the preparation stage of behavior change were the most likely to use a physical activity information website. Thus, although it was thought that the internet-based intervention might have the possibility to attract participants in an earlier stage such as contemplation, where seeking knowledge is an important process of change, the results of the current research indicate that more work is needed to determine how to create interventions in which participants in earlier stages of change will voluntarily enroll.

It is of interest that there were differences between groups in terms of who chose to enroll in the interventions. Both interventions attracted mostly women. This differs from the findings of other researchers who have reported approximately equal numbers of men and

women in their interventions (e.g., Marshall et al., 2003; Spittaels and de Bourdeaudhuij, 2006). However, Napolitano and colleagues (2003) had 86% females participate in a website physical activity intervention which reflects the findings of the current study. Our findings may reflect that women are more likely to seek out health information (Tu and Hargraves, 2003). Research is necessary to understand how to engage more men in this process.

There were also significant differences at pretest in terms of job and life satisfaction. Specifically, the internet-based participants were lower than the group-based or no intervention groups in self-reported job and life satisfaction. These results could be considered in the context of findings by Thøgersen-Ntoumani and Fox (2005) who identified four typologies to describe employees in terms of physical activity and mental health. The internet participants from the current study would seem to fall into Thøgersen-Ntoumani and Fox's "unhappy employee" typology which is characterized by life dissatisfaction, low self-esteem and low levels of job satisfaction. The unhappy employees in Thøgersen-Ntoumani and Fox's research did not exhibit lower levels of physical activity than other typologies, however they did have lower levels of physical self-perception. It was of interest that the results of the current study showed that internet-based participants had a significant increase in life satisfaction over the course of the intervention, indicating a positive influence of the information regarding physical activity that they received. Further research is warranted to investigate whether a certain type of employee is attracted to an internet option and whether the increase in life satisfaction was a direct result of the intervention. Should this prove to be the case, increasingly tailored interventions can be created to address the particular needs of such employees.

There was partial support for our third hypothesis

that both groups would show increases in self-efficacy. Our results revealed increases in both exercise and barrier self-efficacy in the group-based intervention group but not the internet-based intervention or no intervention groups. These results may be a result of the structured programme and a reflection of the social support of peers and leaders offered by such a format. For example, other researchers reported that a socially-enriched leadership style (characterized by energy, interaction, and positive feedback) enhanced self-efficacy in exercise participants (Turner et al., 1997). Bray et al. (2005) also reported that an enriched leadership style resulted in greater enjoyment for novice exercisers. Sallis and Owen (1999) reported that social support from friends, family, and peers is repeatedly documented as being positively associated with physical activity. Further, support from an instructor has shown some positive associations with participation in a structured exercise programme. Thus, ability to overcome barriers and plan successful exercise sessions within the group-based intervention group may be partly a function of the leadership and social support received during the group-based meetings.

One limitation of the study was the low response rates to the pretest and posttest questionnaires as well as to complete the actual intervention. These response rates, however, are very similar to the reported response rates of other similar research. For example, Spittaels and de Bourdeaudhuij (2006) reported only a 6% response rate to a website when participants were recruited without personal contact, although face-to-face contact increased access to 46%. Nopilotano and colleagues (2003) had only 96 participants in their study although they recruited employees from several American hospitals using recruitment techniques that ranged from e-mails and voice-mails to flyers and reminders on paystubs. The low response rate of the participants involved in the interventions may reflect the true nature of the employees. The maintenance stage was overrepresented in the nonintervention participants, indicating that many people were already active and did not need such a programme. The overrepresentation of precontemplators also reflects the nature of this stage. Precontemplators do not see the need to change and so would be unlikely to enroll in an intervention.

In general, recruitment and retention of participants is problematic for physical activity interventions (cf. Dawson et al., 2008) and further work is needed to fully understand how to engage possible participants. Although the number of returned posttest questionnaires was small, the number of cases was greater than the number of dependent variables in each cell as required to conduct this type of analysis (Tabachnick and Fidell, 2001). However, some of our nonsignificant findings may have been due to a lack of power or because only the participants who had a positive experience completed the posttest questionnaires.

Conclusion

These results highlighted strengths and weaknesses offered by two types of physical activity interventions. Although the internet may attract and therefore potentially

reach more people, the changes may not be as positive as with a face-to-face intervention. The group-based weekly meeting had more positive results in terms of increased confidence to exercise and ability to overcome barriers to activity. Thus, these results speak to the continued importance of more traditional forms of disseminating information regarding physical activity. However, these findings may be a function of who is choosing to participate in either type of intervention. The internet employees may have fallen into an "unhappy employee" typology at the outset of the interventions but did show significantly improved life satisfaction at the end of the intervention period. The internet therefore offers possibilities for a group that require specifically tailored interventions. This is an important finding in light of research that showed life dissatisfaction was a controllable health risk highly related to workers' compensation costs (Musich et al., 2001).

References

- Bandura, A. (1997) *Self-efficacy: The exercise of control*. Freeman, New York.
- Biddle, S.J.H. and Mutrie, N. (2001) *Psychology of physical activity: Determinants, well-being, and interventions*. Routledge, New York.
- Blair, S.N., Dunn, A.L., Marcus, B.H., Carpenter, R.A. and Jaret, P.E. (2001) *Active living every day*. Human Kinetics, Champaign.
- Bray, S.R., Millen, J.A., Eidsness, J. and Leuzinger, C. (2005) The effects of leadership style and exercise programme choreography on enjoyment and intentions to exercise. *Psychology of Sport and Exercise* 6, 415-425.
- Cameron, C., Wolfe, R. and Craig, C.L. (2007) *Physical activity and sport: Encouraging children to be active*. Ottawa, ON: Canadian Fitness and Lifestyle Research Institute. Retrieved April 30, 2008 from <http://www.cflri.ca/eng/levels/index.php>.
- Dawson, K.A., Brawley, L.R. and Maddux, J.E. (2000) Examining the relationship among concepts of control and exercise adherence. *Journal of Sport and Exercise Psychology* 22, 1-14.
- Dawson, K.A., Robertson-Wilson, J. and Martin Ginis, K.A. (2008) Physical activity interventions. In: *Sport and exercise psychology: A Canadian perspective*. Ed: Crocker, P. 2nd Edition. Pearson Prentice Hall, Toronto, in press.
- Edington, D.W., Yen, L. and Braunstein, A. (1999) The reliability and validity of HRAs. In: *SPM handbook of health assessment tools*. Eds: Hyner, G.C., Peterson, K.W., Travis, J.W., Dewey, J.E., Foerster, J.J. and Framer, E.M. Pittsburgh, PA: The Society of Prospective Medicine's Institute for Health and Productivity Management. 135-141.
- Gebhardt, D.L. and Crump, C.E. (1990) Employee fitness and wellness programmes in the workplace. *American Psychologist* 45, 262-272.
- Goetzel, R.Z., Anderson, D.R., Whitmer, R.W., Ozminkowski, R.J., Dunn, R.L. and Wasserman, J. (1998) The relationship between modifiable health risks and health care expenditures: An analysis of the multi-employer HERO health risk and cost database. *Journal of Occupational and Environmental Medicine* 40, 843-854.
- Health Canada (2001) *Health Canada's business case for active living at work: Trends and impact—The basis for investment decisions*. Retrieved April 30, 2008 from www.hc-sc.gc.ca/hppb/fitness/work/trends_e.html.
- Leslie, E.L., Marshall, A.L., Owen, N. and Bauman, A. (2004) Engagement and retention of participants in a physical activity website. *Preventive Medicine* 40, 54-59.
- Marcus, B.H. and Forsyth, L.H. (2003) *Motivating people to be physically active*. Human Kinetics, Champaign.
- Marcus, B.H., Rossi, J.S., Selby, V.C., Niaura, R.S. and Rossi, J.S. (1992) The stages and processes of exercise adoption and maintenance in a worksite sample. *Health Psychology* 11, 386-395.
- Marcus, B.H., Emmons, K.M., Simkin-Silverman, L., Taylor, E.T.,

- Linnan, L.A., Bock, B.C., Roberts, M.B., Rossi, J.S. and Abrams, D.B. (1998) Evaluation of motivationally tailored versus standard self-help physical activity interventions at the workplace. *American Journal of Health Promotion* **12**, 246-253.
- Marshall, S.J. and Biddle, S.J.H. (2001) The transtheoretical model of behavior change: A meta-analysis of applications to physical activity and exercise. *Annals of Behavioral Medicine* **23**, 229-246.
- Marshall, A.L., Leslie, E.R., Bauman, A.E., Marcus, B.H. and Owen, N. (2003) Print versus website physical activity programmes: A randomized trial. *American Journal of Preventive Medicine* **25(2)**, 88-94.
- Musich, S., Napier, D. and Edington, D.W. (2001) The association of health risks with workers' compensation costs. *Journal of Occupational and Environmental Medicine* **43**, 534-541.
- Napolitano, M.A., Fotheringham, M., Tate, D., Sciamanna, C., Leslie, E., Owen, N., Bauman, A. and Marcus B. (2003) Evaluation of an internet-based physical activity intervention: A preliminary intervention. *Annals of Behavioral Medicine* **25**, 92-99.
- Plotnikoff, R.C., Hotz, S.B., Birkett, N.J. and Courneya, K.S. (2001) Exercise and the Transtheoretical Model: A Longitudinal Test of a Population Sample. *Preventive Medicine* **33**, 441-452.
- Prochaska, J.O. and Norcross, J.C. (1994) *Systems of psychotherapy. A transtheoretical analysis*. 3rd Ed. Brooks/Cole, Pacific Grove.
- Riedel, J.E., Lynch, W., Baase, C., Hymel, P. and Peterson, K.W. (2001) The effect of disease prevention and health promotion on workplace productivity: A literature review. *American Journal of Health Promotion* **15**, 167-191.
- Sallis, J.F. and Owen, N. (1999) *Physical activity and behavioral medicine*. Sage, Thousand Oaks.
- Sciamanna, S.C., Lewis, B., Tate, D., Napolitano, M.A., Fotheringham, M. and Marcus, B.H. (2002) User attitudes toward a physical activity promotion website. *Preventive Medicine* **35**, 612-615.
- Sharratt, M.T. and Cox, M. (1988) Employee fitness: state of the art. *Canadian Journal of Public Health* **79**, S40-43.
- Shephard, R.J. (1996) Worksite fitness and exercise programmes: A review of methodology and health impact. *American Journal of Health Promotion* **10**, 436-452.
- Shrigley, T.L. and Dawson, K.A. (2004) Understanding the role of behavior and cognitions in a group exercise setting. *Journal of Sports Science and Medicine* **3**, 56-61.
- Spittaels, H. and de Bourdeaudhuij, I. (2006) Implementation of an online tailored physical activity intervention for adults in Belgium. *Health Promotion International* **21(4)**, 311-319.
- Tabachnick, B.G. and Fidell, L.S. (2001) *Using multivariate statistics*. Fourth Edition. Allyn and Bacon, Boston.
- Thøgersen-Ntoumani, C. and Fox, K.R. (2005) Physical activity and mental health typologies in corporate employees: A mixed-methods approach. *Work and Stress* **19**, 50-67.
- Tu, H.T. and Hargraves, J.L. (March, 2003) *Seeking health care information: Most consumers still on the sideline*. Center for Studying Health Information Change. Retrieved April 30, 2008 from <http://www.hschange.com/CONTENT/537/#tr4>.
- Turner, E.E., Rejeski, W.J. and Brawley, L.R. (1997) Psychological benefits of physical activity are influenced by the social environment. *Journal of Sport and Exercise Psychology* **19(2)**, 119-130.
- U.S. Department of Health and Human Services (USDHHS) (1996) *Physical activity and health: A report of the surgeon general*. Atlanta, GA.
- Warburton, D.E.R., Nicol, C.W. and Bredin, S.S.D. (2006) Health benefits of physical activity: the evidence. *Canadian Medical Association Journal* **174(6)**, 801-809.
- Wong, M.L., Koh, D. and Lee, M.H. (1998) Assess workers' needs and preferences first before planning a physical fitness programme: findings from a polytechnic institute in Singapore. *Occupational Medicine* **48**, 37-44.
- Wright, D.W., Beard, M.J. and Edington, D.W. (2002) Association of health risks with the cost of time away from work. *Journal of Occupational and Environmental Medicine* **44**, 1126-1134.

Key points

- Group-based physical activity interventions are capable of improving exercise self-efficacy and barrier self-efficacy.
- At pretest, participants who selected the internet physical activity intervention were significantly lower in job and life satisfaction than those who selected the group-intervention.
- While the internet intervention attracted more participants, the group-based physical activity intervention was more successful at changing cognitions associated with successful exercise behavior change.

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