

Factors associated with high use of a workplace web-based stress management program in a randomized controlled intervention study

Running title: Participation in a web-based program

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Abstract

In web-based health promotion programs large variations in participant engagement are common. The aim was to investigate determinants of high use of a worksite self-help web-based program for stress management. Two versions of the program were offered to randomly selected departments in IT and media companies. A static version of the program including health screening tool, diary and information about stress, was offered to the control group. Additional materials, i.e. interactive, cognitive-based and classical stress management exercises and a chat room, were offered to the intervention group. Baseline data regarding participants' demographics, health (self-ratings and biological measures), lifestyle, work-related factors and group membership, were analyzed to study determinants of employees' participation in the program during a period of 12 months. Multiple logistic regression analysis was used and found intervention group membership, being a woman, having at most a secondary education, regular physical exercise habits and having positive expectations of the program were significant predictors of high use. The findings demonstrate that the interactivity of a web-based program is an important factor for determining participation in a web-based worksite stress management program. The implications for those developing and implementing future web-based health promotion activities are discussed.

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Introduction

The Internet is increasingly used to deliver health promotion interventions [1]. This may be because the internet is able to reach a wide variety of people at low cost and **with convenient administration processes in terms of easy storage of large amounts of information and handy ways of updating information** [2]. Study participants have also been found to prefer web-based programs compared with more traditional programs [3, 4]. Several web-based programs have shown positive effects on health outcomes [5-8]. However, little is known about participants' use of web-based programs. In general, high dropout rates [9, 10] and large variation in participant engagement [11] in web-based interventions have been reported. For all health promotion activities, it is crucial that the intended clients first accept the services provided and then maintain their engagement until the completion of the services [12]. Two review articles of eHealth interventions have concluded that more systematic information is needed regarding who uses the Internet for receiving health information and services [5, 13]. The International Society for Research on Internet Interventions (ISRII) reported that developing ways to reduce attrition, improve adherence, and maintain compliance in web-based interventions is a major objective for the society [14]. Thus in order for web-based health promotion programs to achieve their objectives it is important to understand how to motivate people to participate in a project and how to maintain their engagement during the project.

Two studies of web-based stress management programs have included some analyses of determinants of participation. Chiauzzi et al [15] found that baseline stress levels were not associated with college students' total time spent on a stress management website. Van Straten et al. [16] also found that baseline levels of depression, anxiety, stress or quality of life did not differ between participants who completed a web-based course aiming to reduce

depression, anxiety and stress vs. those who did not complete the course. **These prior studies were not conducted in occupational context and** to our knowledge, no prior studies have investigated determinants of employee participation in web-based stress management programs.

Studies regarding factors associated with participation in web-based programs have focused on, for example, a more general health behavior change program [17], a weight loss program [18] and a smoking cessation program [19, 20]. Findings of these studies suggested that participants with healthier lifestyles [17], higher motivation [18], lower baseline self-efficacy scores [18] women, older participants [17, 18, 20] and those with higher education [20] were more likely to participate. **However, none of these studies were conducted in an occupational context. Thus, there seem to be no prior studies investigating participation in a web-based health intervention offered in a work context.**

Research on determinants of participation in worksite health promotion activities has focused on more traditional programs (i.e. other than web-based programs). Glasgow et al. [21] found from a review of the literature regarding workers' participation in traditional health promotion activities that those most likely to participate were women, the most healthy and the most motivated. Another review article [22] argued that participation in worksite health promotion programs were determined by factors at multiple levels. Firstly, at the *individual* level, factors such as high motivation, high self-efficacy, positive attitudes, better health status and lower stress levels have been suggested to be associated with high participation. Demographic variables such as age, gender and race have shown mixed influence on participation. Secondly, factors at the *interpersonal* level, such as support from co-workers, management, family and friends, positive employee-employer relations and social networks have been

identified as predictors of high participation [22]. At the *institutional* level, characteristics, such as small worksites, flextime/time to participate in work time, incentives to participate and visible top management support were related to high participation. In addition, high demand/low control work was negatively associated with worker participation in health promotion activities at work [22]. A more recent review article [23] regarding studies reporting process evaluations of worksite stress management programs concluded that few studies reported process evaluation measures such as participants' use of the program. Thus it was difficult to identify reliable determinants of effective intervention implementation.

Several previous studies have found that interactivity (e.g. tests, forums, games, feedback) may maintain participants' interest and reduce attrition in **general** web-based health promotion programs [24-26]. In fact, interactivity together with accessibility have been proposed to be the most attractive features of the Internet [27, 28]. In addition, two recent systematic, three-round Delphi studies [24, 25] among experts from internet intervention research and practice concluded that the provision of regular new content and the possibility to monitor personal progress toward behavioral change are important factors to encourage a revisit to a health promotion web program. Provision of regularly updated information has been found also in other studies to be an important factor to keep users interested in health promotion internet sites [29]. Also visual materials (e.g. graphs, videos, pictures) and tailored feedback are important in encouraging repeated visits to a health promotion web-program [25]. However, according to our knowledge no prior studies have investigated the interactive aspects of web-based stress management programs as determinants of user participation **in an occupational context**.

The aim of the present study was to investigate possible factors encouraging use of a worksite self-help web-based program for stress management and health promotion. A prior evaluation of the current intervention has demonstrated beneficial physiological and psychological effects [8]. Figure 1 presents the conceptual model of the study and table 1 presents details of each of the independent variables included in the current study.

The model includes factors concerning the individuals using the program and factors related to the content of the program. Individuals' background variables, gender, age, education level and income levels, were included since several prior studies have showed those to predict participation in web-based health promotion programs. Variables regarding stress levels and health were included in the model even though prior studies regarding participation in a web-based stress management programs have not found that these variables predicted participation. However, several previous studies regarding other type of health promotion web programs and traditional worksite health programs have identified health and lifestyle as predictors of participation. Variables regarding lifestyle were included since a healthier lifestyle has been shown to predict participation. We also included variables regarding how individuals perceive the work environment. According to well established occupational stress theories factors such as work reward, perceived ability to influence work and self-confidence are related to employees' health [30, 31]. We hypothesized that work-related factors such as work reward and control over work tasks might have importance for participating in a work site health program. Finally, individuals' motivation and attitudes regarding the programs have found to predict individuals' participation. We lacked measures regarding motivation and attitudes, but were able to include a variable regarding individuals' expectations regarding the benefits of using the program. Expectations have been found to be important for recovery from illnesses, i.e. those with high expectations recover faster than those with lower recovery

expectations [32-34]. Thus, it is hypothesized that higher expectations could contribute to higher participation rates. Content of the programs is expected to affect the rates of participation, i.e. those receiving interactive components of the program (intervention group) are hypothesized to use the program to a higher degree than those receiving only the static version of the program (control group).

Method

Study groups and participants

Study participants were recruited from selected companies insured by the study's source of funding Alecta (an occupational pension plan company). These companies were information technology and media companies in Sweden. The management of ten companies were asked if they were interested in participating in the study. Within each company that expressed interest in participating, 2-4 departments were chosen for the study and all employees at those departments had the possibility to participate.

Altogether, 317 participants from 22 departments enrolled in the study. Fourteen participants were excluded because of communication-related problems, i.e. wrong e-mail addresses and other IT related problems that meant that e-mails were not delivered properly (n=7) or changing their minds regarding participation or resigning their job before initiation of the study (n=7). Thus 303 persons finally participated in the study. The participants had professions such as IT technicians, programmers, system developers as well as journalists/reporters, news presenters, sound technicians and photographers. Many participants from the IT-companies were located in the work sites of their customers for longer or shorter periods. For the media companies some participants, such as photographers

and reporters, worked in different locations. The common feature for all participants was regular and daily computer usage at work.

Study procedure

The participating departments were, within each company, randomized by lottery to either the intervention or control group. Thus each company had at least one intervention and one control group. All departments received a 30-minute information session including 10 minutes for questions and answers. These information sessions included general information about the study as well as general information on stress and health. **After the oral information each participant received written information about the project and consent forms.** No incentives were offered to the participants with exception of the extensive blood sampling including feedback of the results, which seemed to be a motivator for many participants. All the participants were informed, orally as well as in writing, that participation was voluntary and withdrawal was possible at any time. The ethics committees of Uppsala University (dossier number 01-188) and Karolinska Institute (dossier number 01355) approved the research project.

All participants that returned the consent form received an email welcoming them to the study and explaining how to log in and use their personal webpage for the stress management program. In the personal page, the baseline questionnaire and the intervention program could be accessed.

Content of the web-based program

Intervention and control groups were both offered a static version of the program. The intervention group also received an interactive component of the program. The static version

of the program consisted of three tools. 1) A ten-item screening questionnaire with instant feedback. The screening instrument included the following VAS questions: How do you feel right now?, How did you sleep last night?, How is your ability to concentrate right now?, How stressed do you feel right now?, What is your energy level right now?, Do you have control over your life right now?, How satisfied are you with your social life right now?, How is your work pace right now?, How efficient are you at work right now? and How is your work satisfaction right now? The purpose was that participants would always answer to the screening tool when using the program. It took only approximately 10–15 seconds to fill in the screening questionnaire. Feedback was offered in the form of graphs illustrating individuals' current and retrospective ratings. A comparison of individuals' own results with aggregated mean values of all respondents in the database, and those with the same socioeconomic profile, as well as with the means of one's own department/company. For ethical and personal integrity reasons, results were not presented for groups consisting of less than 10 participants. 2) Both groups also accessed a diary that was connected to the screening questionnaire so that ratings and notes could be compared and examined retrospectively. The diary could be used for stress management but also as a tool for improving self-knowledge and how different events affect health and well-being. 3) Both groups were offered popular scientific information on stress and health compiled by various researchers. All participants were also given the option to activate a reminder at an interval of choice. The reminders were delivered via e-mails with encrypted automatic log in links so that participants could access the screening tool as easily and effortlessly as possible.

Participants in the intervention group were also offered web-based self-help exercises that aimed at decreasing unwanted stress and promoting health and recovery through health promotion initiatives. The exercises included techniques for improving relaxation, sleep,

cognitive reframing, time-management, emotional control and self-knowledge, strengthening self-esteem, life reflection and dissociation. The content of the web-based tool was developed by the third author and most techniques are commonly utilized techniques in cognitive and behavioral therapy and stress management. These techniques were modified so that they could become more or less self-instructing to be used for self-help purposes. The exercises were chosen and adjusted on the basis that they had to be time efficient in order to be utilized by the study participants. Every exercise was labeled with information regarding time for completion (time span 1–60 minutes). Some of the cognitive exercises, e.g. improving self-confidence, were designed such that they took 5–10 minutes initially and then could be conducted in a matter of seconds. The exercises were often presented in three pedagogic formats to fit participant preferences. Thus they could be viewed in html, downloaded as a PDF or experienced as a Flash animation with both picture and sound. A demonstration of some of the exercises (in Swedish) can be accessed free of charge on www.healthwatch.se. The intervention group also accessed a chat room to communicate with each other, but this feature was not particularly utilized. This is probably due to the fact that too few participants visited it at the same time considering the limited number of participants in the intervention group. Thus, the main thing that distinguished the groups was the addition of the interactive exercises in the intervention group.

Assessment of participants' use of the program

Participation in the program for both groups was assessed via the frequency of replying to the screening tool during a 12 months period.

Assessment of factors potentially determining use of the program

Self-ratings

On three occasions, at commencement and every six months thereafter, the participants completed a longer questionnaire including approximately 100 questions covering sociodemographic variables and areas such as lifestyle, self-ratings of health, wellbeing, stress and performance at work (for a more detailed description see Hasson et al. 2005). Participants filled out the questionnaire online on their personal webpage. A total of 16 variables from the baseline questionnaire were analyzed as independent variables in the present study (table 1). These variables include demographic factors, perceptions of health and stress, lifestyle (smoking habits, regularity of physical exercise habits, stress management ability, communication ability and social support from family or friends), work related factors and expectations of the program decreasing stress. Response alternatives were most often Visual Analogue Scales (VAS). Multiple-choice questions were used for demographic factors and smoking habits. The response alternatives are presented for each of the independent variables in table 1.

Extensive blood sampling was collected from the study participants. In addition, some physiological markers were collected. Blood samples were collected from study participants between 07:00-11:30 am at each specific worksite (or nearby). The longer questionnaires were filled out during the same time period in order for the outcome of the blood and questionnaire data to be as comparable as possible. The sampling procedures are described more thoroughly in Hasson et al. [8]. Two biomarkers, S-prolactin and S-cortisol as well as waist-hip ratio and BMI, were analyzed as independent variables in the present study (table 1).

Statistical analyses

In order to ensure that the intervention and control groups were comparable at baseline either chi-squares (categorical independent variables) or t-tests (continuous independent variables) were conducted.

This study investigated the effect of a wide array of predictors on the use of a web-based program. Twenty independent variables were included in the bivariate analyses. These variables utilized both categorical and continuous levels of measurement. In examining the dependent variable it was found that the spread of the scores was not normally distributed (Kolmogorov-Smirnov, $p < 0.001$). Further examination of the scores of between zero and 214 screening tools completed showed a break at 60 completions meaning that it was possible to split the dependent variable in two with one group (Low) being those who completed the questionnaire less than sixty times over the twelve months of the study (N=254, 83.8%) and the other group (High) being those who completed the screening tool more than sixty times during the same period (N=49, 16.2%).

The first analysis was to run three t-tests using the bivariate Low/High completion of the screening tool as the split variable and the responses on the VAS question for “How stressed are you at the moment?” at baseline, six months and twelve months as the dependent variable. This was to test whether or not being in the high use group resulted in a significant difference in self-reported stress at times two and three whilst checking there was no difference at baseline. This enabled analysis of any differences in self-reported stress levels between the intervention and control groups during the conduct of the web-based stress-management program

Multiple logistic regression (MLR) analysis was then used to determine predictors of being in the High-use group for the web-based stress-management program. The study, therefore, analysed data to determine predictors of filling in the screening tool, an indicator of utilisation of the web-based stress management program, more than sixty times in the year of the study.

The first step in the MLR analysis was to study the associations between each of the twenty independent variables with the dependent variable (level of use of the web-based program) in separate bivariate equations. Those independent variables associated ($p \leq 0.10$) with the dependent variable at this stage were entered into an MLR equation with the dichotomous dependent variable recording Low-use or High-use of the web-based program.

Backward Stepwise (conditional) analysis (with Entry=0.05 and Removal=0.10) was used for MLR analysis to determine the most parsimonious equation predicting High-use of the web-based health program. Significance of the model χ^2 was used to indicate overall significance of the models, goodness of fit of multivariate models was determined using the Hosmer and Lemeshow test whilst estimates of the amount of variance in the dependent variable accounted for by the independent variables in the model was assessed using both Cox and Snell and Nagelkerke r^2 . The strength of individual variables in predicting high use of the web-based program was assessed by examining the odds ratios for each predictor. All analyses was carried out using PASW[®] version 17.0.

Results

The mean number of times participants replied to the screening tool during the study was 32.1 times and ranged from not at all (0) to 214 replies. The participants' baseline demographic characteristics are described in Table 2. There were no significant differences between the

intervention and control groups in demographic background measures at baseline. In addition, the intervention and the control group did not differ regarding the independent variables, except on the expectations that the program would decrease their own stress levels.

Expectations of program decreasing stress were significantly ($t=2.1, P=0.04$) higher in the intervention group. Using multivariate logistic regression allows for control of this difference as multivariate logistic regression allows for calculation of the effect of a variable in the presence of other variables and particular attention was paid to this potential confounder.

The baseline stress levels did not differ between the groups that were to become the high and low use groups. At the midpoint of the study there was a trend ($p=0.10$) towards the low use group reporting higher levels of stress (mean 54.8) compared to the high use group (mean 48.7). By the end of the program this trend had firmed to a significantly ($p=0.05$) higher reporting of stress in the low use group (mean 53.0) compared to the high use group (mean 45.1).

In the bivariate analysis five independent variables were associated ($p\leq 0.10$) with high level of use of the program (table 3): intervention group membership, being female, having no higher than high school education, having regular physical exercise habits and having higher expectations of the program decreasing own stress levels.

Once entered into a multivariate equation all five variables remained in the equation (table 4). The equation was re-run without the two variables whose significance level was closest to 0.10: intervention group membership or being female. This resulted in an equation with the three remaining variables being significant ($p\leq 0.05$) but with a model chi square significantly

lower than the full model indicating that the excluded variables added information to the three variables that were significant regarding chances of being in the high use group.

The full model had a chi square of 21.75 ($p=0.001$) and the Hosmer and Lemeshow test was not significant ($p=0.46$) both of which indicate that the five predictor variables were associated with level of use of the program. In terms of how much of use of the program can be predicted with these five independent (predictor) variables Cox and Snell r^2 suggests 8% and Nagelkerke r^2 suggests 13.1%.

Discussion

The aim of the present study was to investigate determinants of high participation in a worksite self-help web-based program for stress management. The final MLR equation demonstrates that women who exercise on a regular basis, have not had any education after secondary school and expect the program will reduce their own stress are those most likely to participate in a web-based stress management program from which they are likely to see a reduction in their own stress levels. Furthermore, whether one belonged to the intervention group in contrast to the control group predicted higher participation. This illuminates the importance of interactivity for increasing participation, since the main thing that distinguished the groups was the addition of interactive exercises in the intervention group. In sum, these findings suggest that individual factors such as gender, education, exercise habits and expectations and the interactive content of the web-based program are important factors determining employees' participation in a web-based stress management program.

One of the strongest predictors of participating in the web-based program was belonging to the intervention group in contrast to the control group. The intervention group had higher baseline expectations of the program reducing stress and it is possible that this could have explained effect of group membership. However, our analyses demonstrated that expectations of the program decreasing stress were not an intervening variable, and that information regarding group membership added to a model with expectations of stress amongst the predictors. Thus, there was more to being in the intervention group than just increased expectations. The main thing that distinguished the groups was the addition of the interactive stress management and health promotion exercises in the intervention group. The findings of the present study suggest that the interactive exercises were one of the most important determinants of high participation in the stress management programs. These findings are in line with prior studies suggesting that that interactivity may reduce attrition in web-based health promotion programs [24, 25]. **This finding has practical implications for those developing web-based health tools. Addition of interactive exercises where participants can learn techniques for improving their health and well-being might increase utilization of a program.**

The findings also demonstrated that being female, not possessing tertiary education and engaging in regular physical exercise predicted higher participation in the stress management program. **There is support in the literature regarding women more often participating in both web-based health interventions [17, 18, 20, 35] and traditional (not web-based) health promotion programs [21]. Thus, it seems that women are more likely to participate in all type of health promotion activities than men. It is possible that content of health promotion programs appeal women more than men. It is also possible that women are in general more interested in health related issues and therefore participate more in health interventions. It is**

suggested that future studies investigate how to improve men's participation in health promotion programs.

Our findings regarding participants with lower education level using the program to a higher extent than others was a bit perplexing. It is not in line with a prior study of web-based smoking cessation program suggesting that participants with higher education were more likely to participate [20]. There might be some selection bias that may partly explain this finding. In the media companies, which constituted about half of the participants, career development has traditionally not primarily been based on high academic education. Often apprentice systems, internal education and other non-university education have been utilized instead. Thus the participants that had only finished primary or secondary school may still have been well educated, but they did not have academic degrees. It is important to consider this when interpreting this result. It is also possible that the focus and the content of the program plays a role with regard to who, in terms of education level, choose to use the program. There is also the possibility that the present stress management program was more accessible to those with lower levels of education.

It should be considered that our program was conducted in an occupational context, which was not the case with the smoking cessation program. Since there are few studies on education and use of web-based programs, it is difficult to determine what role education level has for use of web-based health promotion programs in occupational and other more general health promotion contexts. Clearly more research is needed regarding participants' education levels in relation to their use of different type of web-based health interventions. This would enable development of web programs that are appreciated by users with different educational levels .

We also examined a wide range of factors related to health and lifestyle as predictors of utilization of the stress program. The findings demonstrated that the only health and lifestyle factor that predicted high participation was regular physical exercise habits. There are previous studies showing that participants with healthier lifestyles [17] and the most healthy individuals [21, 22] are more likely to participate in health promotion programs. Our findings are partly in line with those studies since exercise habits was a significant predictor of using the program. However, no other health or lifestyle factors were related to use of the program. This could indicate that health and possibly more active positive lifestyle variables play some role regarding use of health promotion programs, but it is unclear what aspects of lifestyle are related to different kind of health interventions. It is possible that in the present study the commitment to physical exercise reflected a stronger commitment to health promoting activities in general.

Future studies should focus on web-based health programs' potential to motivate and engage less healthy individuals to participate. The findings also showed that users' baseline stress levels did not predict their participation in the stress management program. Prior studies regarding web-based programs have also found that stress levels were not associated with participation [15, 16]. However, traditional programs, i.e. other than web-based stress management programs, have found that lower stress levels were associated with higher participation [22]. Therefore, it could be speculated that those with highest stress levels are unlikely to participate in a traditional program, but might participate in web-programs. Perhaps the web-based programs are more suitable for this group since web-based programs can be accessed from work or home at any time. Web-based programs have been suggested to provide increased convenience for users and are perceived to increase user control of the

intervention [2]. Perhaps these are important factors that enable persons with higher stress levels to use health promotion web tools.

The regression analyses also revealed that employees with higher baseline expectation of the program decreasing stress participated in the program to a higher extent than those with lower expectations. Prior research has shown that positive expectations predict better outcomes in many health conditions [32-34]. Our findings suggest that expectations play a role in user compliance, which could be one reason for better health outcomes. The findings also have implications for the development and delivery of wider health care services. It has been shown that services that are developed with consideration to clients' expectations are more accepted by the target group than other services [36]. Thus, health expectations may become increasingly important components in attempts to make health promotion activities and health care services relevant for clients. However, since expectations are reported to be a poorly understood phenomenon in relation to the experience of health and health care [36] it is difficult to determine what special emphasis should be directed towards increasing expectations of positive outcome when implementing stress management and other health promotion interventions. It is suggested that presentation of effectiveness of similar prior programs could increase participants' expectations regarding a specific health promotion program. Thus, oral presentations or reading materials of prior effects could be included when starting future health interventions. In addition, future studies should investigate how expectations influence use of health promotion programs and how expectations can be influenced by program implementers.

The findings of the study also showed that none of the work-related factors were related to employees' use of the web-based program. This is opposite to previous studies of traditional

worksite health promotion programs that have suggested that work place characteristics have influence on participation rates. Since a web-based program can be easily accessed from basically anywhere, home for instance , perhaps the impact of work factors diminishes. This is an interesting aspect of web-based programs and needs to be further investigated.

A point of discussion is if there might be unique features about stress management and health promotion versus other health-related web programs that may be associated with different predictors of high use. There are very few studies of users of web-based stress management programs and our findings are viewed in relation to users of other types of health promotion programs, such as weight loss and smoking cessation. It is possible that interventions directed at healthy, working individuals have different predictors of compliance compared with interventions directed to other target groups. This issue should be addressed in future studies of this kind as to increase the understanding of the generalizability of the results.

Limitations

There are some limitations that need to be discussed. Employees' use of the intervention was measured by recording the frequency of replying to the screening tool. The screening tool was the main feature of the program and was also the first page that opened when users logged in to the program. Thus, it is probable that most of the participants filled in the screening tool when using the program. However, there might be some individuals who used other parts of the program and did not reply to the screening tool. Logins were not used as a measure of participation, since we wanted to assess active participation and it is possible to log in without actually participating in the program. More sophisticated measures of participation such as number of page views or average viewing time could have highlighted the participation in the program in more detail.

The intervention group had higher baseline expectations of the program reducing stress. It is unclear how this is possible, since the same information was given to both groups prior to the study start and both groups were treated in the same way. However, there is a possibility that participants reviewed the content of the stress management program in their personal webpage prior to answering the baseline questionnaire that was also accessed from the same place. Perhaps intervention group members appreciated the content more than control group, which could possibly explain why the intervention group had higher expectations compared with the control group.

Biological markers were used in the present study as health variables. The levels of biomarkers may differ between individuals for several reasons, including for example hereditary factors as well as lifestyle, circadian and seasonal variation and stress. Thus, it is possible that some participants have hereditary higher or lower levels of for instance blood lipids. This factor is especially relevant when analyzing on an individual level. On a group level, however, we reason that these markers commonly reflect health and lifestyle. We also used self-ratings to assess health and lifestyle, and systematic findings between biomarkers and self-ratings would have been the strongest evidence. However, only the self-rating regarding physical exercise was included in the final regression model.

Participants had access to the program from any computer they used. Thus, it is possible that they used the program at home and/or at work. It would have been interesting to assess the possible influence of the place or time of the day/night the program was used on participation rates. Unfortunately we have no data about where the participants used the program. In addition, the study was conducted in IT and media companies including professions such as

IT technicians, journalists/reporters, sound technicians and photographers. The results of the study might not be applicable to other types of employees.

Conclusions

These findings suggest that individual factors including gender, education, exercise habits, and expectations and the interactive features of a web-based program are important for determining employees' participation in a web-based stress management program. Program content, i.e. degree of interactivity, is a factor that can be influenced by intervention designers and implementers and should be considered in future web-based interventions when efforts to optimize user involvement are made. This study confirmed the findings of prior studies regarding interactive program features increasing participation rates. The study also confirmed the impact of some individual factors such as being female and having healthier lifestyle, on use of health promotion programs. The findings also suggest that work-related factors do not correlate with utilization of a web-based work site stress management and health promotion program.

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Table 1 – Baseline variables tested in the present study

	Variables (Self-ratings, physiological measures and blood measures)
<i>Demographic factors</i>	Sex, age, educational level and annual income
<i>Stress and health</i>	Self-ratings of current health (VAS) and levels of stress (VAS). Biomarkers: S-prolactin and S-cortisol
<i>Lifestyle</i>	Self-ratings of smoking habits (yes/no), regularity of physical exercise habits (VAS), stress management ability (VAS), communication ability (VAS) and support from family or friends (VAS). Physiological measures: Waist-hip ratio and BMI
<i>Work-related factors</i> <i>Expectations</i>	Self-ratings of work reward (VAS), influence on work situation (VAS), self-confidence at work (VAS) and general mood on the way to work (sad—happy, VAS) Expectation of stress program decreasing own stress level.(VAS)

Table 2 – Participants' baseline demographic characteristics

Characteristic	<i>n</i>	%
<i>Age</i>		
≤ 30	77	26
31-45	116	38
≥ 46	110	36
<i>Sex</i>		
Male	187	62
Female	116	38
<i>Education*</i>		
Compulsory school/High school	143	48
Academic degree	156	52
<i>Annual income*</i>		
< 25,000 USD	63	21
25,000 – 40,000 USD	182	61
> 40,000 USD	54	18
<i>Group</i>		
Intervention	129	43
Control	174	57

* 4 missing values

Table 3 Independent variables associated in bivariate analysis with high use of using the program

Independent variable	Significance	Odds Ratio (95%CI)
Intervention group membership	0.03	2.02 (1.09-3.75)
Being female	0.05	1.87 (1.01-3.46)
Having primary school or high school education	0.01	2.28 (1.20-4.34)
Having regular physical exercise habits	0.10	1.01 (1.00-1.02)
Higher expectation of program decreasing own stress level	0.01	1.02 (1.01-1.03)

Table 4 MLRs analysis: predictors of high participation in a web-based stress management programs

Predictors of high use	Significance	Odds Ratio (95%CI)
Intervention group membership	0.08	1.84 (0.94-3.58)
Being female	0.08	1.85 (0.94-3.66)
Having primary school or high school education	0.01	2.54 (1.25-5.19)
Having regular physical exercise habits	0.04	1.01 (1.00-1.02)
Higher expectation of program decreasing own stress level	0.07	1.02 (1.00-1.03)

Figure 1. The conceptual model of the study

