Effects of web-based supervisor training on supervisor support and psychological distress among workers: A randomized controlled trial

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Abstract

Background. A randomized controlled trial was conducted to determine the effects of web-based supervisor training on worksite mental health on supervisor support and psychological distress among subordinate workers.

Methods. Section chiefs in a computer engineering company were randomly assigned to either a training group (n = 9) or a non-training group (n = 7). The section chiefs in the training group participated in web-based self-learning training on worksite mental health. A total of 92 subordinate workers under the trained section chiefs (the intervention group) and 84 subordinate workers under the untrained section chiefs (the control group) completed a questionnaire at baseline and a 3-month follow-up.

Results. The score of supervisor support greatly decreased in the control group during the follow-up period, and the score changed very little in the intervention group, with a significant intervention effect (P = 0.032). This pattern was more pronounced for one particular item dealing with the extent to which a supervisor listens to personal problems of subordinate workers (the intervention effect, P = 0.012). No intervention effect was observed for the score measuring co-worker support, psychological distress, or other job stressors among subordinate workers (P > 0.05).

Conclusions. It is suggested that the web-based training of supervisors on worksite mental health is useful in improving, or at least maintaining, supervisor support among subordinate workers.

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Keywords: Web-based training; Health education; Job strain; Worksite health promotion; RCT; Japan

Introduction

Previous research has shown that greater supervisor support, as one of the dimensions of worksite social support, has a beneficial effect on worker health [1]. Supervisor support has been associated with a wide range of better health outcomes among workers, for example, less depression [2], less fatigue [3], greater job satisfaction [4,5], lower blood pressure [1,6], fewer musculoskeletal problems [7–9], successful return to work [10], and greater productivity [5].

To prevent adverse health effects of psychosocial job stressors, studies have focused on ways to improve the work environment [11]. One of the key elements that is targeted for improvement in the work environment is supervisor support. Two major roles that supervisors can play in promoting better mental health among workers are: (a) to listen to their subordinates, provide necessary information and advice, and consult with mental health services, if applicable, and (b) to improve difficulties and problems on the job, which might be a source of worker stress, through day-to-day practices related to the management of the workplace [12,13]. Supervisors are a source of emotional, informational, and instrumental social support as well as being key individuals in preventing job stressors in the work environment [14]. In addition to strategies, such as increased communication through meetings or greater opportunities for worker participation, a supervisor education/training program on these topics might be effective for increasing supervisor support and decreasing job stressors, which would ultimately reduce work-related strain and enhance workers’ health and well-being.
However, only a few attempts have been made to evaluate the effects of supervisor training in reducing psychosocial job stressors and improving mental health among workers. Some studies have focused on supervisor training involving the skills of listening to subordinate workers (so-called “active listening’’ training”). Kubota et al. [15] conducted a 2-day workshop on listening skills for supervisors and found that after the training, the supervisors reported that they listened more attentively to their subordinates. This study, however, did not assess the effects of supervisor training on stress reduction or the mental health of their subordinates. The interpretation of the findings was also limited since the study had no control group and there was the possibility of bias, such as a natural course or regression to the mean.

As an innovated method of education, web-based training has recently become a part of health education in industrial settings [16], as well as being used for the general population [17–19]. Web-based training has been reported to be effective for workplace health and safety [16], injury prevention [18], nutrition education [17], and smoking cessation [19]. It may also be useful in training supervisors for enhancing supervisor support and mental health among subordinates. The merit of web-based supervisor training compared with traditional lectures and workshops are: (1) Participants do not have to attend a lecture together, which sometimes results in a significant reduction of time on the job and considerable expenses in traveling to the training site. (2) Web-based training provides greater flexibility for participants: Supervisors can access the training at their own pace and anywhere and anytime they like. (3) Supervisors may repeat the lesson as many as needed. (4) The progress made by supervisors can be monitored by a central personnel office, which controls the entire learning process. On the other hand, the effects of web-based training may be limited because there is no personal interaction with a lecturer, tutor, or other participants. The effectiveness of web-based supervisor training on worksite mental health should be evaluated in a scientific manner to ascertain its efficacy and limitations for stress prevention and the improvement of mental health in the workplace.

Our newly developed web-based training program for supervisors on the subject of worksite mental health, is called “E-learning Worksite Mental Health for Supervisors” (Fujitsu Infosoft Technology Co. Ltd., Japan, 2002). We conducted a randomized controlled trial (RCT) to determine the effects of web-based supervisor training on the improvement of supervisor support and the psychological well-being of subordinate workers.

Methods

Study design and participants

The study site was a computer software engineering company located in Okayama City, Japan that had a total of 219 employees. All section chiefs (n = 16) of this company were randomly assigned to a training group (n = 9) or a non-training group (n = 7). Managers ranked higher than section chief were excluded from the web-based training and subsequent analyses. In November 2002, the section chiefs in the training group were asked to participate for one to four weeks in the web-based supervisor training. The training was provided from an Internet server PC at the Okayama University Graduate School of Medicine and Dentistry, Japan. Eight section chiefs completed the 4-week training session; one remaining section chief, who was originally assigned to the training group, did not receive the training. During the same period, the section chiefs in the non-training group participated in a 2-h training session regarding a method of relaxation, instead of the web-based training.

In November 2002, before the beginning of the web-based training for section chiefs, all employees were asked to participate in a baseline survey of job stress and mental health. The survey was conducted using Internet technology. Employees were asked to access the server at Okayama University Graduate School of Medicine and Dentistry, complete a web-based questionnaire, and then submit it. Three months after the end of the web-based supervisor training, a similar follow-up survey was conducted in February 2003.

A total of 100 subordinate workers was working for the nine section chiefs in the training group (intervention group workers); 90 subordinate workers were working for the seven section chiefs in the non-training group (control group workers). Among them, 90 (90%) and 90 (100%), respectively, participated in the first baseline survey of stress and mental health (before supervisor training), and 89 (89%) and 85 (94%), respectively, participated in the second survey at the 3-month follow-up. The numbers of subordinate workers who participated in both baseline surveys and follow-up were 82 (82%) and 84 (93%) in the intervention group and control group workers, respectively. These workers were subjects of an intention-to-treat (ITT) analysis. There were 16% and 24% women workers in the intervention and control groups, respectively; the average age was 32.7 (7.0) and 32.7 (6.1) in the intervention and control groups, respectively; 69 (84%) technicians and 13 (16%) clerks were in the intervention group; 58 (69%) technicians and 26 (31%) clerks were in the control group; and 42 (54%) in the intervention group and 41 (49%) in the control group worked 60 or more hours of overtime per month. Seven workers in the intervention group were working under a section chief who was originally assigned to the training group but did not receive training. Thus, data from 75 subordinate workers in the intervention group (excluding these seven workers) and 84 workers in the control group were used for a per-protocol (PP) analysis.

The study design and procedure were reviewed and approved by the Human Ethics Committee for Epidemiological Research at the Okayama University Graduate
School of Medicine and Dentistry, Japan. We did not obtain written informed consent from supervisors or subordinate workers; however, all employees were told about the study procedure and were clearly informed that participation in the study was entirely voluntary. For ethical reasons, after the study was completed, the web-based training was provided to the section chiefs in the control group; and a training session on a relaxation method was provided for those in the training group.

Web-based supervisor training

All section chiefs accessed the Internet training from workplace PCs. Most of the supervisors received the training from workplace PCs; some received it from PCs at home. During a 4-week training period, a study coordinator watched their progress and encouraged them by e-mail to complete the training. The contents of the web-based training included a variety of topics that supervisors were required to know based on “The Guidelines for Promoting Mental Health Care in Enterprises” by the Japan Ministry of Labor [20]. These topics included (a) essential knowledge about mental health, (b) importance of occupational mental health, (c) roles of supervisors in occupational mental health, (d) consultation with workers (listening and advice to workers, recognition of mental health problems among workers) and use of mental health services, if necessary, (e) support for workers who were returning to work after receiving treatment for mental health problems, (f) improvement of the work environment for stress prevention, and (g) self-care or awareness of stress and coping with it. The web-based training applied here consisted of nine chapters following a general introduction (see Appendix A). In the first chapter, trainees read a tragic story about a worker with depression to see a typical problem related to mental health in the workplace. Then, in each chapter, trainees studied a specific topic and, at the end of each chapter, they took four or five quizzes to confirm their understanding. The average time to complete the entire training was 3 to 5 h. We advised supervisors to study three to five chapters a week and spend 2 to 4 weeks in completing the entire program. We asked the supervisors in the intervention group not to discuss the training with anyone else so that there would be no bias as workers reported stress and psychological distress nor any contamination of the information reported by the supervisors in the control group.

Assessment of supervisors’ knowledge and attitude to worksite mental health

Supervisors’ knowledge and attitudes concerning mental health in the workplace were assessed at the baseline and just after completing the web-based training by surveying the section chiefs in the training group. A questionnaire was sent by e-mail. It consisted of eight questions on the following issues: (a) understanding how to listen to subordinates; (b) positive attitudes toward listening to subordinates; (c) understanding how to provide support to a subordinate who was returning to work after experiencing mental health problems; (d) understanding how to work with occupational health professionals; (e) understanding possible sources of stress in the work environment; (f) positive attitudes to improving the work environment to prevent psychosocial stress; (g) understanding the nature of stress and the way to deal with it; and (h) awareness of and coping with their own stress. The questions regarding these issues were asked so that the participants could use a four-point response system from 1, which indicated “not at all” to 4, which indicated “very well or very much”. Eight section chiefs in the training group completed the questionnaire, and one who did not receive the training did not.

Assessment of worksite support, other job stressors, and psychological distress

The questionnaire included measures of worksite support and worker psychological distress. Supervisor support was assessed using a three-item 4-point Likert-type scale. The scale was developed as a part of the Brief Job Stress Questionnaire (BJSQ) [21], based on items derived from a scale of perceived supervisor support developed by House [22]. The scale consisted of items on (a) the extent to which an employee felt at ease when talking with a supervisor, (b) the extent to which the supervisor could rely on when things got tough at work, and (c) the extent to which supervisors were willing to listen to an employee’s personal problems, with a four-point response option (from “strongly agree” = 4 to “strongly disagree” = 1). A total score ranging from 3 to 12 was calculated. A higher value was indicative of greater supervisor support (please note that the original scoring system was developed so that a high score indicated low supervisor support; however, the system was changed into one in which a high score indicated high supervisor support for ease of understanding). In addition, in order to clarify the dimensions of supervisor support sensitive to the web-based training, each item was also used for analyzed. Co-worker support was also assessed using a similarly developed three-item four-point scale, with a total score ranging from 3 to 12. The scales of supervisor support and co-worker support showed acceptable levels of internal consistency reliability (Cronbach’s alpha, 0.78–0.84 and 0.71–0.79, respectively) and factor-based validity.

An 18-item scale from the BJSQ was used to measure the psychological distress of subordinate workers. This scale gauges psychological complaints experienced by workers in the previous month. Five sub-scale scores are used to calculate: vigor (3 items), anger-irritability (3 items), fatigue (3 items), anxiety (3 items), and depression (6 items). The response option was based on frequency and scored on a Likert-type response option, ranging from “very often” = 4 to “almost never” = 1. The coefficients of alpha for each
sub-scale were 0.92–0.93, 0.84–0.85, 0.85–0.88, 0.74–0.75, and 0.88–0.90, respectively. In this study, we calculated a total score (ranging from 18 to 72) of these 18 items as a measure of psychological distress.

The BJSQ also includes measures of qualitative and quantitative work overload and job control. Quantitative job overload was measured using a three-item scale (consisting of items on “working hard”, “amount of work”, and “no sufficient time to complete work”) with a four-point response option (from “strongly agree” = 4 to “strongly disagree” = 1). Qualitative job overload was measured on a three-item scale (consisting of items on “concentration”, “task complexity”, and “always thinking about work during work”) with the same response options. Similarly, job control was measured using a three-item scale (consisting of items on “work at own pace”, “making decisions at work”, and “influence over worksite policy”) with the same response options. A total score ranged from 3 to 12, with the high score indicating a greater degree of qualitative or quantitative job overload, or job control. These scales showed acceptable levels of internal consistency reliability (Cronbach’s alpha, 0.83, 0.73–0.74, and 0.58–0.69, respectively) and factor-based validity. In addition, the questionnaire asked how many overtime hours a subject had worked in the previous month at the baseline and at the follow-up, using response categories of none, 1–19, 20–39, 40–59, 60–79, 80–99, and 100 or more hours. The median value of each overtime response category was used for the analysis (e.g., 30 h were assigned if a respondent reported the category “20–39 hours”).

Statistical analysis

Average item scores of knowledge and attitude toward worksite mental health were compared between the baseline and immediately after completing the web-based training among eight section chiefs in the training group (paired t test), excluding one section chief who neither received the training nor responded to the questionnaire. An average score of supervisor support, as well as the average item scores of the three supervisor support questions, and co-worker support, were compared by group (the intervention and control groups) and time (at baseline and at the 3-month follow-up) among subordinate workers. The intervention effect was tested by examining the interactive effect between groups (the intervention and control groups) and time (baseline and 3-month follow-up) by using a repeated analysis of variance (ANOVA). Average scores of psychological distress and other job stressors (overtime hours in the previous month, qualitative and qualitative job overload, and job control) were also compared by group and among subordinate workers by using a repeated analysis of variance (ANOVA). The statistical analysis was conducted using the SPSS version 10 statistical package (SPSS Inc., Chicago, U.S.A.).

Results

Change in supervisors’ knowledge and attitude

A comparison of knowledge and attitude toward worksite mental health at baseline and just after completing the web-based training indicated that understanding of how to listen to subordinates and how to support subordinates returning to work after experiencing mental health problems significantly increased after the web-based training (Table 1).

Changes in worker perception of worksite support

In the ITT analysis, while the score of supervisor support greatly decreased at the follow-up from the baseline among subordinate workers in the control group, the score decreased to a lesser degree among those in the intervention group (Table 2). The intervention (time × group interaction) effect was significant (P = 0.032). This tendency was more prominent for the item evaluating supervisor willingness to listen to an employee’s personal problems. The score hardly

<table>
<thead>
<tr>
<th>Question*</th>
<th>At baseline</th>
<th>Immediately after training</th>
<th>Pb</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Understanding how to listen to subordinates</td>
<td>2.9</td>
<td>3.4</td>
<td>0.046</td>
</tr>
<tr>
<td>(b) Positive attitude toward listening to subordinates</td>
<td>3.5</td>
<td>3.6</td>
<td>0.317</td>
</tr>
<tr>
<td>(c) Understanding how to support workers who are returning to work after experiencing mental health problems</td>
<td>2.5</td>
<td>3.5</td>
<td>0.046</td>
</tr>
<tr>
<td>(d) Understanding how to work with occupational health professionals</td>
<td>3.3</td>
<td>3.5</td>
<td>0.317</td>
</tr>
<tr>
<td>(e) Understanding the psychosocial work environment</td>
<td>2.9</td>
<td>3.1</td>
<td>0.157</td>
</tr>
<tr>
<td>(f) Positive attitudes toward improving the work environment</td>
<td>2.9</td>
<td>2.9</td>
<td>1.000</td>
</tr>
<tr>
<td>(g) Understanding how to deal with stress</td>
<td>2.6</td>
<td>3.1</td>
<td>0.102</td>
</tr>
<tr>
<td>(h) Being aware of and coping with stress</td>
<td>3.0</td>
<td>3.1</td>
<td>0.317</td>
</tr>
</tbody>
</table>

* Each question was asked using a four-point response options: from 1 = “not at all” to 4 = “very well or very much”.

* P value by paired t test was shown.
changed in the intervention group but decreased in the control group. The intervention effect was significant ($P = 0.012$). On the other hand, this tendency was less clear for other two supervisor support items. In the PP analysis, similar results were observed. The intervention effects on the supervisor support score and the item score dealing with listening to personal problems were marginally significant ($P = 0.050$) and significant ($P = 0.015$), respectively. There was no significant intervention effect for co-worker support in the ITT analysis ($P = 0.617$) or PP analysis ($P = 0.995$).

**Changes in worker psychological distress**

No significant intervention effect of the web-based supervisor training on subordinates’ psychological distress was observed in the ITT analysis ($P = 0.402$): the average scores were 43.6 (10.8) and 44.7 (11.4) at the baseline and follow-up respectively, in the intervention group; 43.2 (10.8) and 45.3 (10.7) at the baseline and follow-up, respectively, in the control group. The intervention effect was not significant in the PP analysis ($P = 0.347$). No significant intervention effect was observed for any of the five sub-scales of psychological distress ($P > 0.05$).

**Changes in other job stressors**

Averages (SDs) of overtime hours in the previous month for the intervention and control groups were 58.2 (30.1) and 57.7 (28.6), respectively, at baseline; 53.2 (31.4) and 56.3 (29.0), respectively, at follow-up. Average scores (SDs) of quantitative job overload for the intervention and control groups were 9.7 (1.9) and 9.7 (2.2), respectively, at baseline; 9.5 (2.0) and 9.8 (2.0), respectively, at follow-up. Average scores (SDs) of qualitative job overload for the intervention and control groups were 9.5 (1.7) and 9.3 (1.9), respectively, at baseline; 9.5 (1.7) and 9.4 (1.8), respectively, at follow-up. Average scores (SDs) of job control for the intervention and control groups were 7.3 (1.9) and 7.4 (1.6), respectively, at baseline; 7.1 (2.1) and 7.4 (1.7), respectively, at follow-up. No significant difference was observed in these variables at baseline between the two groups ($P = 0.452$–$0.921$). No significant difference in changes in these variables was observed either for the ITT analysis (significance for an interaction between group / time, $P = 0.445$ for overtime hours; $P = 0.243$ for quantitative job overload; $P = 0.595$ for qualitative job overload; $P = 0.393$ for job control) or for PP analysis ($P = 0.605$ for overtime hours; $P = 0.339$ for quantitative job overload; $P = 0.771$ for qualitative job overload; $P = 0.651$ for job control). Even after controlling for these job stressor variables at baseline and follow-up, the intervention effect (an interaction term between group and time) was still significant for supervisor support ($P = 0.013$ for PP analysis).

**Discussion**

This is the first study that reports the effect of web-based training of supervisors on supervisor support and mental health among workers using an RCT. The follow-up rates of subordinate workers were relatively high and comparable in the intervention and control groups. A bias due to lost to follow-up was unlikely. Job overload and job control were similar between the two groups at baseline and at follow-up. Unfortunately, possibly because of the small number of supervisors (or workplaces) in the study ($n = 16$), the baseline level of supervisor support was greater for
subordinate workers in the control group even after randomization. Despite this limitation, the study revealed that the web-based training of supervisors on knowledge and skills of worksite mental health had a favorable effect on subordinates’ perception of supervisor support. Among supervisors who received the training, knowledge and attitude were also improved by the training.

In this study, perception of supervisor support greatly decreased among subordinates in the control group during the 3-month period. The company had a peak of work demands during the follow-up period. Average overtime hours remained relatively high (50–60 h per month) at baseline and follow-up; quantitative and qualitative job overload also remained at the same level. Sustained long work hours and high job overload may cause distress among workers, as reflected in an increase in psychological distress among subordinate workers in both the intervention and control groups at follow-up. The period of sustained high workload may cause a decrease in support from supervisors, as observed among subordinates in the control group, because section chiefs and subordinates may have had little time to talk each other over months. However, among subordinate workers in the intervention group, perceived supervisor support remained at the same level or decreased only slightly. The web-based training might encourage supervisors to provide continuous support to their subordinates even during busy periods, because after the training, supervisors might be better equipped with knowledge and skills of worksite mental health and particularly, to listen to subordinates and provide support to those who have experienced mental health problems. The intervention effect was very clear for the particular item dealing with how willing the supervisor is to listen to a subordinate’s personal problems. The web-based training used here had a focus on listening to and advising subordinates with personal problems, by spending much of the time on these issues. The observed effect is consistent with what the web-based training intended to provide to supervisors. A supervisor’s willingness to listen to a subordinate’s personal problems, which was encouraged through the web-based training, might cause a worker to assume that a supervisor is supportive, which is one of the major roles of supervisor in worksite mental health [12,13].

The supervisors’ understanding of listening skills and support of subordinates who are returning to work after experiencing mental health problems improved after the training. These findings are in agreement with those from a previous study involving a 2-day training program for supervisors that stressed listening skills [15]. While the findings were based on a before and after comparison and provide only limited evidence, they still suggest that web-based training is useful for improving supervisory knowledge of some aspects of worksite mental health. The willingness of supervisors to listen to subordinates changed very little. The fact that the improvement was slight can be attributed to the pre-existing high level of motivation on the part of the section chiefs to listen to their subordinates. This may also be attributable to the fact that the web-based training used here was designed mainly to provide knowledge about worksite mental health. Supervisor’s motivation to carry out what they had learned from the training may have come from a source other than the training, such as an employer’s policy or a company’s increased concern for the mental health of its employees. A further development of the web-based training of supervisors on worksite mental health needs to focus on the motivation side, and the training could be provided in combination with a clear company policy on worksite mental health.

On the other hand, we failed to show any effect of the web-based training in improving psychological distress among workers, despite measurable effects on supervisor support. These results were somewhat unexpected since previous studies have shown a strong effect of supervisor support on depression [2] and fatigue [3]. There are three possible explanations for this. First, the results may be attributable to the short follow-up period (i.e., 3 months) in the present study. Even if a workers’ perception of a supervisor’s attitude and behavior toward him/her changed, as reflected in perceived supervisor support, more time may be required before the effect of improved social support on psychological distress can be seen. In particular, the web-based training of supervisors used here focused on enhancing supervisors’ skills at listening and talking to subordinates who were experiencing difficulties. Psychological distress among workers may not improve until workers experience difficulties and have a chance to receive emotional or instrumental support from a supervisor. Another possibility is that supervisor support per se is limited in its effect in reducing workers’ psychological distress, while it may be more effective when it is combined with greater job autonomy or other improvements in the psychosocial work environment. The web-based training empathized with the improving the psychosocial work environment and offered relevant information on how do so. However, qualitative and quantitative workload and job control did not improve among subordinates in the intervention group during the follow-up. The information may be still insufficient for supervisors to improve the psychosocial work environment by themselves after receiving the training. This speculation is also supported by the fact that knowledge or attitude to improving the work environment was not significantly improved among section chiefs after receiving the web-based training. Further improvements in the web-based training dealing with the psychosocial work environment may result in increased reduction in the psychological distress experienced by workers. Third, other previous studies have shown the modifying effect of supervisor support on the relationship between job stressors and depression or fatigue [2,3]: supervisor support may be more effective among workers who have a high level of job stress or difficulties in their job. This may attenuate the effect of improved supervisor support for psychological distress in
the intervention group. By focusing on stressed workers, the effect of the web-based training in reducing psychological distress among workers could be detected.

Co-worker support was unaffected by the intervention. The web-based training does not include information about developing mutual support in the workgroup. This is because the web-based training was designed to target supervisors and to provide them with the knowledge and ability to change their attitudes. Co-worker support is important in the workplace; so it might be necessary to add information in the web-based training that deals with teamwork among subordinate workers.

Some of the advantages of web-based training are savings in time and expense as well as convenience, since participants are not restricted by time and place. The web-based training used in this study affected supervisory support in much less time than that required by an earlier study (a total of 30 h) [15]. However, caution is advised before drawing conclusions about the greater efficacy of web-based supervisory training for improving mental health in the workplace. The time commitment required for supervisors to participate in the web-based training were not assessed. Moreover, a participatory workshop, i.e., one requiring interaction among participants, is lacking in web-based training. These aspects of supervisor training may have essential roles. The specific components of web-based supervisory training involving mental health in the workplace need to be further explored to determine whether they are superior to traditional lectures and workshops.

More research is needed to develop a more comprehensive program for web-based supervisor training and to examine its effect on the reduction of job stressors and psychological distress among subordinate workers.

Limitations

As noted above, while section chiefs were randomly assigned to the intervention and control groups, there was a difference in the baseline levels of perceived supervisor support between the two groups. This is attributable to the small number of supervisors (n = 16) that were randomized in this study. However, knowledge and attitude of supervisors at baseline may be different between section chiefs who received the training and who did not. We cannot eliminate this possibility, because we did not measure these variables among section chiefs in the control group. The intervention group included more female workers, while the same tendency was still observed after controlling for gender and age. It is possible that some important characteristics at the baseline were different between the two groups, which might have affected the findings. Next, if supervisors in the intervention group had informed their subordinates that they had undergone the training, the responses of the subordinates in the intervention group to the follow-up survey could have been positively biased. Supervisors in the intervention group were asked not to tell others about the training. Therefore, the possibility of any bias was slight. On the other hand, all supervisors worked in one building office. If supervisors in the intervention group had shared what they learned from the training with supervisors in the control group, the effects of the training would probably have been attenuated. This is also possible, but for the same reason above, it is unlikely. Future research should use a building or a company as a unit for randomization to prevent this type of error. In addition, the outcome measures in this study were all subjective and self-reported. Future studies on the effects of web-based training should include physiological and observational indicators of stress, such as blood pressure and the occurrence of accidents.

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Appendix A. Table of contents of the web-based training on worksite mental health for supervisors

| Introduction | Scope and contents of the training |
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| Chapter 6 | Improvement of the work environment for stress prevention. |
| Chapter 7 | “Self-care”—awareness of and coping with stress. |
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References


