Effects of a Supervisory Education for Positive Mental Health in the Workplace: A Quasi-Experimental Study

Akizumi TsUTSUMI, Soshi TAKAO, Sachiko MINEYAMA, Kyoko NISHIUCHI, Hirokazu KOMATSU and Norito KAWAKAMI

Okayama University School of Medicine and Dentistry, Social and Environmental Life Sciences, Social Medicine and Longevity Sciences, Hygiene and Preventive Medicine, Japan

Abstract: Effects of a Supervisory Education for Positive Mental Health in the Workplace: A Quasi-Experimental Study: Akizumi TsUTSUMI, et al. Okayama University School of Medicine and Dentistry, Social and Environmental Life Sciences, Social Medicine and Longevity Sciences, Hygiene and Preventive Medicine—Single-session supervisory education was developed in conjunction with the Japanese national guidelines for the promotion of employee mental health. Totally 267 voluntary supervisors in a prefectural office were presented with comprehensive information on the role they had to fulfill to promote mental health in the workplace. Totally 864 office employees (53%) were evaluated to determine whether education had had an effect on their psychological distress and job performance. The findings from the departments in which more than one-third of the supervisors had attended education were compared to those from the departments in which no more than one-third of the supervisors had attended education. Three months after the education, the levels of psychological distress and, to a lesser extent, self-reported job performance improved among employees in the departments in which at least one-third of the supervisors attended the education compared to those from departments with lower attendance rates of the supervisors. For the psychological outcome, the positive educational effect was supported by statistically significant interaction terms between time and department category with adjustment for the confounders. Favorable changes were noted among supervisors who received the education in knowledge, attitude, and behavior regarding mental health practices. The behavioral changes were related to decreasing workplace problems and referral of employees to the liaison office and associated medical institutions. Despite several limitations, the findings suggest that providing supervisors with appropriate information has a positive effect on employee psychological well-being. (J Occup Health 2005; 47: 226–235)

Key words: Work environment, Supervisor education, Intervention, Psychosocial, Stress management, Job performance, Return to work, Active listening

Supervisors play a key role in managing stress within their organizations. They are aware of workplace problems and can propose feasible approaches for reducing stress. Supervisors are in a good position to identify employees with developing mental health problems, and there are many problems that will not change without supervisory action. Evidence shows that greater supervisory support has a beneficial effect on a variety of employee stress reactions, such as depression, fatigue, and psychological distress. Supervisors are also important human resources for employees’ successful return-to-work or greater productivity. Thus, providing supervisors with appropriate information and skills would be an effective means for enhancing mental health within an organization.

Even though supervisory education or training is supposed to be effective for promoting mental health, few studies have investigated the effects within an organization. Kawakami et al. showed, in a controlled study, that supervisory participation in activities to improve the workplace environment had a favorable effect relative to depression and the use of sick leave. Kubota et al. conducted two 2-day workshops (30 h of training) on ‘active listening’ in which they aimed to make supervisors master how to listen to employees as they expressed their psychological problems and how to respond to them. They obtained the expected results. This study, however, had...
no controls and did not assess the effects of supervisor training on the stress reaction or behaviors of employees, which is one of the final goals of any workplace improvement activity. Moreover, many hours were spent on these trainings. In most workplaces, however, a single session of education is conducted because of budgetary and time limitations, and there is generally no evaluation of the effectiveness of the education.

From such a perspective, we developed a single-session supervisory education program to promote mental health in the workplace and evaluated its effects. The education includes a concise lecture to inform the supervisors of their role in mental health practices in the workplace based on the Japanese national guidelines for the promotion of employee mental health and a brief lecture on active listening focusing on how to counsel subordinates.

To evaluate the effects of the supervisory education within an organization, we employed a quasi-experimental design in which departments were classified according to the supervisors’ attendance rates for the education. One of the objectives of supervisor education is to increase skills for interpersonal relationships; however, currently enterprises utilize a team-based approach to projects that does not necessarily comprise a fixed man-to-man relationship between a supervisor and a subordinate. Furthermore, in an organization, there are many issues that cannot be dealt with by a single supervisor. Thus, we suspect that supervisory education has no beneficial effects within an organization unless a certain percentage of supervisors participate. To the best of our knowledge the percentage of supervisors required to participate in education in relation to its effectiveness has not been investigated, thus, one-third of the supervisors attending the education was defined as the reference point. We aimed to evaluate the effect of our supervisor education by comparing the psychological distress of employees and their self-reported job performance in departments where at least one third of the supervisors had attended education against those from employees whose supervisors had a lower attendance rate.

**Methods**

**Subjects**

This study was conducted in a prefectural office with 1,644 employees. The prefectural office had implemented employee mental health programs and established a liaison office for referral to medical institutions and counseling services. Health care staff members had requested that supervisory education be established as a part of the overall program. After a few meetings with the staff members, a decision was made to implement supervisory education specific to the needs of the prefectural office. A total of 473 supervisors, ranging from subsection chiefs to counselors, were defined as the target supervisors of the supervisory education program. The objectives of the program were explained to all the employees at the onset. They were informed of the intent to promote conditions that would lead to better mental health, and they were asked to complete two questionnaires, pre- and post-education, to evaluate the program. We tried to evaluate the intervention effects within the organization, and for this purpose we considered the department as an appropriate unit for evaluation. However, random allocation of the departments was not accepted. To compensate for the shortcomings of a simple before-after comparison, we decided to set up a control group without notifying the participants (see the analyzed subjects section). The responses to the questionnaire surveys were considered to be an agreement to participate in the study. Permission for this study was obtained from the Okayama University committee on ethics.

**Procedure**

Two sets of information were distributed after the pre-education survey. The supervisors received the guidelines for the promotion of mental health in the workplace. The guidelines contained information regarding the role of supervisors in the promotion of mental health in the workplace. The supervisors were encouraged to improve their working environments wherever possible according to the guidelines. All of the employees, including the supervisors, received a brochure on mental health. The brochure included a general explanation of stress and stress reactions, information on recognizing and coping with stress, and guidelines for consulting with specialists.

The supervisors were then invited to attend single-session education. The education took place during working hours. The same standardized contents (see the supervisory education section) were offered on five separate days in November and December 2002. Each supervisor was assigned to attend one of the education days. If they missed the scheduled day due to their work, they could attend a make-up session on another day. Participation was not mandatory in order not to interfere with a supervisor’s duties. A total of 267 supervisors (56%) volunteered to participate. A post-education survey was conducted in March 2003 using the same questionnaire packet.

**Supervisory education**

The supervisory education included a basic lecture on mental health practices and a lecture on active listening. The lectures were standardized and based on detailed protocols, manuals, and prepared teaching materials. They included a simulation game or quizzes to make the attendees think about the topics. A PC projector was used, and recipients received a printed synopsis of the information covered in the lecture.
**Basic lecture:** The 90-min basic lecture was titled "Positive Mental Health in the Workplace: Responsibilities of Supervisors," and it was framed according to the guidelines for the promotion of mental health in the workplace\(^7\). The supervisor's role was outlined with the following information: early awareness of mental health problems among subordinates; support for employees returning to work; consultation for subordinates, including the utilization of mental health consultations from the perspective of recurrence prevention as well as early detection; improvement of the work environment on a daily basis; self-care recommendations; and accurate knowledge of mental health problems. Regarding the consultation for subordinates, careful consideration for confidentiality was stressed. In addition, information was provided about available medical facilities because positive mental health activities in the workplace can be more easily conducted if a mental health consultation system is established and used\(^{1,13}\). Two investigators (AT, ST) took charge of the basic lecture. The lecture consisted of the following nine topics (details in Table 1): 1) case introduction, 2) significance of positive mental health, 3) supervisory roles for positive mental health promotion in the workplace, 4) awareness of and responses to mental health problems of subordinates, 5) support for employees returning to work, 6) improvement of the work environment, 7) self-care recommendations, 8) correct information about mental health problems, and 9) summary and questions.

**Active listening:** In addition to information, supervisors need to be shown how to apply what they learn. Supervisors were expected to be able to implement mental health practices after they developed the appropriate skills. Supervisors need to be taught how to counsel employees; the skill, which is in great demand, is emphasized in the guidelines for the promotion of mental health in the workplace. Previous studies\(^7,12\) have referred to the effectiveness of training in active listening. These studies recommended that training in active listening consist of two 2-d workshops that would include role-playing exercises. Because of time restrictions, the training implemented in the current study was more compact. To emphasize the value of active listening for supervisors, one investigator (SM, a psychologist) lectured for 45 min on 1) the role of the supervisor in listening to subordinates for positive mental health, 2) theory and techniques of active listening\(^{19}\), 3) empirical evidence on the effects of successful active listening, and 4) situations in which active listening can be applied.

**Outcomes**

Each employee in the study received a questionnaire seeking information about psychological stress reaction and job performance.

**Psychological stress reaction:** An 18-item questionnaire from the Brief Job Stress Questionnaire\(^4\) was used to measure an individual's reaction to psychological stress. This scale lists psychological complaints experienced during the last month and includes five sub-scales: 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 was scored on a Likert scale of 1 (very rarely) to 4 (almost all the time). Ratings for respective items were summed to provide an index for each psychological stress reaction. The alpha coefficients were 0.92–0.93, 0.84–0.85, 0.85–0.88, 0.74–0.75, and 0.88–0.90. As it is difficult to discriminate between the symptoms in a real workplace\(^{15}\), a single index of psychological distress was derived by summing the individual ratings (the vigor score was reversed). The coefficient alphas were .92 and .93, at the respective surveillances. The results of the psychological reactions were fed back to the responders about a month after each survey, as indicated in the usage manual\(^{14}\).

**Job performance:** To assess the behavioral outcome, a self-reported job performance checklist was given to individual employees. The checklist was taken from the World Mental Health Survey Instrument\(^6\) and included the following: quantitative and qualitative efficiency during the last 30 d (10 items), self-evaluated job outcomes relative to those of other employees (1 item), and special work success or failure during the last 30 d (2 items). Although a categorical rating is employed by the instrument, a single index of job performance was derived by summing the individual ratings for this study. Internal consistency was found to be moderate, with an alpha coefficient of 0.75–0.78.

**Covariates**

Sociodemographic variables were determined via a standardized questionnaire that included information on age, sex, academic educational attainment, length of employment, overtime work, occupation, occupational class, and psychosocial job characteristics.

**Job Content Questionnaire:** To evaluate the psychosocial job characteristics, a Japanese version of the Job Content Questionnaire\(^7\) was used. It was based on Karasek’s demand-control model\(^{18}\). This questionnaire includes the following subscales: job demands regarding quantitative and qualitative workloads (5 items), job control regarding decision-making authority and skill discretion (9 items), and social support from supervisor and coworkers (4 items each). Each item was scored based on a 4-point response ranging from 1 (strongly disagree) to 4 (strongly agree). The alpha coefficients were 0.68–0.72 for job demands, 0.71–0.75.
At the beginning of the lecture, a case of depression induced by work-related stress is introduced in order to build up a concrete image of the themes the attendees should learn regarding mental health problems. Issues that are raised in the lecture, such as the significance of positive mental health and the role of supervisors in positive mental health in the workplace, are introduced.

Emphasis is placed on three significance areas of positive mental health in the workplace: securing the health, life, and lifestyle of the employees, developing a productive and vibrant workplace/organization, and managing risk in the workplace. Supervisors are responsible for subordinates’ safety as an acting employer.

Supervisors have two important roles in relation to positive mental health in the workplace: improvements to the workplace environment and individual consultation and response. Consideration of the privacy of subordinates is emphasized because otherwise they may become reluctant to tell the supervisors the truth.

A simulation game provides an opportunity to think about the process from awareness of a case to returning to work. Early awareness of the case, how to deal with the case, and how to consult with the medical staff are explained. In addition, the participants are informed of medical institutions or liaison offices both within and outside the workplace.

A model support system for returning to work is illustrated, and supervisors are encouraged to establish such a system. Emphasis is placed on the importance of preventing a recurrence after reinstatement by exemplifying a set of careful reinstatement decisions, taking into consideration the time of starting work, restrictions on work conditions, and a follow-up period with regular consultation and reports. Consent of the supervisor, medical staff, and the employee is emphasized.

The working environment includes all factors that affect health, such as physical surroundings, work procedures, work hours, work patterns, and organization. As a convenient tool for the evaluation of stress factors in the working environment, the work-related stress checklist is introduced. The checklist contains 12 items, and the measures are comparable with the average of the representative Japanese workplace to evaluate the psychological stress level in the workplace. Some successful examples are introduced for the improvement of stress factors in the working environment. The goal is to get the supervisors to understand the importance of observing the workplace on a daily basis from the viewpoint of stress.

Because the attendees themselves are exposed to job stress, they are provided with some self-care recommendations, including stress awareness, relaxation, and coping procedures, as well as evidence of the buffering effects of healthy behaviors.

Popular myths and facts about mental health problems are demonstrated in order to eliminate ingrained prejudices against those with mental health problems.
for job control, 0.90–0.91 for supervisory support, and 0.75–0.77 for coworker support. The sum of the weighted item scores was used as a scale score, and the job strain index was calculated as the ratio of job demands to job control.

Supervisory questionnaire: For explanatory purposes when evaluating the feasibility of the supervisory education program, an additional questionnaire was developed for the supervisors. Based on the guidelines for the promotion of mental health in the workplace, comprehensive items were collected about the knowledge and skills required for supervisors, and they were formulated into questions to measure the supervisor’s knowledge, attitudes, and behavior toward current mental-health practices. The questions measuring knowledge consisted of 17 items regarding the minimum required knowledge of mental health, roles of supervisors in mental health practices, and information for referrals to other institutions. Attitudes were measured by five items; the supervisors were asked whether they had any intention to study or improve practices to promote mental health in the workplace. Twenty-three items were used to assess behavior. Supervisors were asked whether they actually did anything to promote mental health in the workplace. Each question was scored on a three- to five-point scale. The scores were then summed across the respective items to produce a possible range of scores from 17 to 68 (α=.91–.92) for knowledge, from 5 to 20 (α=.76–.80) for attitude, and from 23 to 87 (α=.87-.89) for behavior. The total score was also computed by summing up all the items (α=.93). For more detailed analysis of the items, each question was transformed to a dichotomous scale (better and the others). Using this questionnaire, changes were identified 1) from ignorance to knowledge (knowledge), 2) from doing nothing to intending to act (attitude), and 3) acting (behavior or practice). Favorable changes in knowledge were anticipated as a result of the program, including the distribution of the guidelines for the promotion of mental health in the workplace; however, it was anticipated that the provision of practical information and skills during the educational session would lead to an improvement in the attitude and behavior of the supervisors.

Analyzed subjects
In the pre-education survey, 1,148 (70%) of 1,644 employees responded to the individual questionnaire (baseline data). The corresponding number in the post-education survey was 1,112 (68%). Of these, 889 employees (54%; 286 supervisors and 603 non-supervisory employees) responded to both surveys with matching identification numbers. The departments of the prefectural office were divided into two categories according to the number of supervisors who attended the education (no more than one-third and more than one-third). The number of departments in each category was 18 (25%) and 57, respectively, and the average number of employees per department in each category was 11 and 12, respectively. Four departments (10 employees) included no target supervisor for the education, and 15 employees were unclassified due to missing department codes. The final number of analyzed subjects was 864 employees (53%; 286 supervisors and 578 non-supervisory employees). Compared with the excluded subjects who responded to either survey (n=449), the number of supervisors and technical employees was higher (χ²=5.6; p=.018, and χ²=7.7; p=.021, respectively), and the length of employment was longer (t=2.5; p=.011) among the analyzed subjects. There were no differences in sex or the mean levels of age, academic educational attainment, overtime work per month, and psychosocial job characteristics.

Statistical analysis
All participants were assigned an identification number and were treated anonymously in all analyses and the analyses were done for all the employees and subgroups (supervisors and non-supervisors). Continuous variables are listed with means (SD or SE) and categorical variables as frequencies and percentages. The means of each measure were compared by employing the t-test or the paired t-test, when necessary. The differences in the categorical variables were assessed using the χ² test. An analysis of covariance of repeated measurements was used to assess the educational effects on psychological distress and job performance. The statistical significance for the interactive effects between categories according to attendance rate and time was assessed with adjustment for the selected covariates. Length of employment was highly correlated with age (r=0.926, n=864), so this variable was not entered into the model. To test for simple main effects, paired sample t-tests for the high- and low-attendance category were computed. For an explanatory purpose, the feasibility of the education was examined by (1) evaluating the interactive effects on the supervisor’s knowledge, attitudes, and behavior between the supervisory groups (attendees/non-attendees) and time and by (2) evaluating the response changes for each item between the pre- and post-education surveys within the respective supervisory groups (attendees/non-attendees) using McNemar’s χ² test. Values of p<0.05 (two-tailed) were considered statistically significant. Statistical analyses were undertaken with SPSS 12 for Windows.

Results
The profiles of the study population are shown in Table 2, according to the department categories as determined by the supervisors’ attendance rates to the education (more than one-third and no more than one-third). Employees
in departments with no more than the one-third of the supervisors attending the education rated higher academic educational attainment, more overtime work, more job strain, and less supervisory support than those in the departments with higher attendance rates. These distributions were mainly attributable to the non-supervisory employees. Among the supervisors, coworker support was higher in the low-attendance

Table 2. Profiles of the study population according to the department categories by attendance rate (more than one-third vs. no more than one-third) of the supervisors for the educational session

<table>
<thead>
<tr>
<th></th>
<th>Departments in which more than one-third of the supervisors attended</th>
<th>Departments in which no more than one-third of the supervisors attended</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
</tr>
<tr>
<td><strong>All employees</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>607</td>
<td>90.1</td>
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<tr>
<td>Women</td>
<td>67</td>
<td>9.9</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
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<tr>
<td>Clerk</td>
<td>420</td>
<td>62.3</td>
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<tr>
<td>Technical</td>
<td>239</td>
<td>35.5</td>
</tr>
<tr>
<td>Blue-collar</td>
<td>15</td>
<td>2.2</td>
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<tr>
<td>Age (yr)</td>
<td>674</td>
<td>42.4</td>
</tr>
<tr>
<td>Education (yr)</td>
<td>674</td>
<td>15.1</td>
</tr>
<tr>
<td>Career (yr)</td>
<td>674</td>
<td>20.0</td>
</tr>
<tr>
<td>Overtime work (h/month)</td>
<td>632</td>
<td>18.8</td>
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<tr>
<td>Job strain index</td>
<td>659</td>
<td>0.48</td>
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<tr>
<td>Supervisor support</td>
<td>667</td>
<td>12.0</td>
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<tr>
<td>Coworker support</td>
<td>663</td>
<td>11.8</td>
</tr>
<tr>
<td><strong>Supervisors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>219</td>
<td>94.4</td>
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<tr>
<td>Women</td>
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<td>5.6</td>
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<td>Occupation</td>
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<td></td>
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<tr>
<td>Clerk</td>
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<tr>
<td>Technical</td>
<td>96</td>
<td>41.4</td>
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<tr>
<td>Blue-collar</td>
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<td>0.4</td>
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<tr>
<td>Age (yr)</td>
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<td>50.9</td>
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<tr>
<td>Education (yr)</td>
<td>232</td>
<td>14.7</td>
</tr>
<tr>
<td>Career (yr)</td>
<td>232</td>
<td>28.4</td>
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<tr>
<td>Overtime work (h/month)</td>
<td>214</td>
<td>14.8</td>
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<td>Job strain index</td>
<td>222</td>
<td>0.46</td>
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<tr>
<td>Supervisor support</td>
<td>229</td>
<td>12.0</td>
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<td>Coworker support</td>
<td>223</td>
<td>11.8</td>
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<tr>
<td><strong>Non-supervisors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>388</td>
<td>87.8</td>
</tr>
<tr>
<td>Women</td>
<td>54</td>
<td>12.2</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
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<tr>
<td>Clerk</td>
<td>285</td>
<td>64.5</td>
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<tr>
<td>Technical</td>
<td>143</td>
<td>32.4</td>
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<td>Blue-collar</td>
<td>14</td>
<td>3.2</td>
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<tr>
<td>Age (yr)</td>
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<td>Education (yr)</td>
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<td>15.3</td>
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<tr>
<td>Career (yr)</td>
<td>442</td>
<td>15.6</td>
</tr>
<tr>
<td>Overtime work (h/month)</td>
<td>418</td>
<td>20.9</td>
</tr>
<tr>
<td>Job strain index</td>
<td>437</td>
<td>0.50</td>
</tr>
<tr>
<td>Supervisor support</td>
<td>438</td>
<td>11.9</td>
</tr>
<tr>
<td>Coworker support</td>
<td>440</td>
<td>11.7</td>
</tr>
</tbody>
</table>

*: p < .05.
category than among the counterparts. Other demographic variables, including sex, age, occupational career, and occupation, were evenly distributed, except for the larger number of women in the non-supervisory subgroup of the low-attendance category.

The changes in psychological distress and job performance are shown in Table 3, according to the attendance rates of the supervisors. Between pre- and post-education survey measurements, the degree of psychological distress decreased in the high-attendance category and remained the same in the low-attendance category. The patterns were almost replicated in both subgroups of supervisors and non-supervisors. The interaction term for time and category was statistically significant in the psychological outcome so higher attendance rates positively affected the outcome. Analyses stratified by the subgroups showed a marginally significant interaction effect among the non-supervisors. The self-reported performance score improved among the non-supervisors of the high-attendance category, while deteriorated among the non-supervisors of the low-attendance category. However, the interaction terms between time and department category were not statistically significant.

For the high-attendance category the paired sample t-tests showed significant improvements in psychological distress ($t=4.95$, $p<.001$) and, to a lesser extent, in self-reported performance ($t=-1.75$, $p=.080$) in all employees. Significant improvements in psychological distress were found among both supervisors and non-supervisors ($t=3.15$, $p=.002$, and $t=3.90$, $p<.001$, respectively). For the low-attendance category no significant simple main effects were shown.

We repeated the analyses using the categorization according to the attendance rate of more ‘immediate’ supervisors, ranging from subsection chiefs to assistant section chiefs. The results were essentially the same as the above analyses (data not shown).

The results of the questionnaire for supervisors are shown in Table 4, according to attendance at the educational session. Statistically significant positive interactions were found in the knowledge and the total scales. Scrutinized analyses in the item level showed that statistically significant improvements were found in 15 of 17 of the items relative to knowledge, one of five of the items relative to attitude, and seven of 23 of the items relative to behavior among the attendants. The item dealing with attitude in which improvement was acknowledged by the attendees was the desire to be aware of an employee’s mental health problems. The items relative to behavior, which improved only among the attendees, included the following: collecting information on workplace problems and trying to solve them, referring the problems to the right staff/facilities, and making reinstatement decisions according to the rules (data not shown). Additional information from the health care department indicated that the number of consultations at the liaison office and the medical institution increased after the education program.

Most psychosocial job characteristics scores decreased between the pre- and post-education surveys, and some changes were statistically significant. Unexpectedly, supervisory support decreased in all employees and among non-supervisors in the high-attendance category (paired t-test, $t=4.32$, $p<.001$ and $t=4.02$, $p<.001$, respectively), and coworker support decreased among the supervisors in the low-attendance category ($t=2.68$, $p=.010$) and among the non-supervisors in the high-attendance category ($t=2.09$, $p=.038$). Monthly overtime work decreased significantly among all employees and the non-supervisors of the high-attendance category ($t=2.15$, $p=.032$ and $t=2.02$, $p=.044$, respectively).

### Table 3. Comparison of departments according to the attendance rates of supervisors for the educational session by repeated ANOVA adjusting for levels of variables at the pre-education survey (estimated mean and SE)

<table>
<thead>
<tr>
<th>Departments in which more than one-third of the supervisors attended</th>
<th>Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological distress</td>
<td></td>
</tr>
<tr>
<td>All employees</td>
<td>576</td>
</tr>
<tr>
<td>Supervisors</td>
<td>183</td>
</tr>
<tr>
<td>Non-supervisors</td>
<td>393</td>
</tr>
<tr>
<td>Performance</td>
<td></td>
</tr>
<tr>
<td>All employees</td>
<td>581</td>
</tr>
<tr>
<td>Supervisors</td>
<td>188</td>
</tr>
<tr>
<td>Non-supervisors</td>
<td>393</td>
</tr>
</tbody>
</table>

The $F$ value is a test of interaction (time * category) after adjusting for levels of variables at the pre-education survey.
Table 4. Comparison of attendant supervisors and non-attendants by repeated ANOVA adjusting for levels of variables at the pre-education survey (estimated mean and SE)

<table>
<thead>
<tr>
<th></th>
<th>Attendees</th>
<th>Non-attendees</th>
<th>Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>Knowledge</td>
<td>150</td>
<td>44.9</td>
<td>0.6</td>
</tr>
<tr>
<td>Attitude</td>
<td>148</td>
<td>13.7</td>
<td>0.2</td>
</tr>
<tr>
<td>Behavior</td>
<td>125</td>
<td>53.5</td>
<td>0.9</td>
</tr>
<tr>
<td>Total</td>
<td>124</td>
<td>112.6</td>
<td>1.5</td>
</tr>
</tbody>
</table>

The F value is a test of interaction (time * category) after adjusting for levels of variables at the pre-education survey.

Discussion

The effect of a supervisory education for positive mental health in the workplace was investigated in a quasi-experimental study. Supervisors who attended the educational session were provided with comprehensive information on mental health in the workplace and listened to a lecture on active listening. Even though no individual-based approaches were taken, the level of psychological distress decreased among employees in the departments in which at least one-third of the supervisors attended the educational session. The statistically significant interaction effect remained, after adjusting for possible confounding factors, including psychosocial job characteristics. The self-reported performance score tended to improve among employees in the high-attendance category; no statistically significant interaction effect was observed, however. The explanatory analyses indicated that the education led to changes in supervisors’ knowledge, attitudes, and behavior regarding mental health in the workplace. The number of consultations at the liaison office and the medical institution increased. The data may support the feasibility of the education and provide a possible explanation for the mechanisms of the positive educational effects.

The findings showed the contrasting effect of supervisors’ attendance or non-attendance to the educational session. On an organizational level at least, supervisory education appears to have no beneficial effects unless a certain percentage of supervisors participates, for example, more than one-third in the departments for our education program. Job redesign or changes in the workplace environment are likely to be implemented when a considerable number of supervisors choose to take action. The more supervisors who attend an educational session, the easier it is to distribute information within an organization. It is possible that unfavorable relationships between supervisors and their employees could be compensated for by additional trained supervisors. From the perspective of cost effectiveness, it might be practical to analyze what degree of participation by supervisors is required to achieve an effective stress management program within an organization.

It might be expected that the educational effects will increase in proportion to the number of supervisors who attend the education. We tested this hypothesis by comparing the outcomes among three categories of percentage of supervisors participating no more than one-third, one-third to two-thirds and more than two-thirds. The non-adjusted mean levels of psychological distress similarly decreased in the highest and second-highest categories (from 34.7 point to 33.4 point, $t=4.02$, $p<.001$, and from 34.8 point to 33.3 point, $t=2.89$, $p=.004$, respectively), while the level remained the same in the department with the lowest attendance rate (from 35.5 point to 35.4 point, $t=0.22$, $p=.828$). The overall interaction term for time and category was marginally significant ($\lambda=.993, F=2.7, p=.067$). Analyses stratified by the subpopulations generally replicated the above-mentioned, but insignificant, findings both in supervisors and non-supervisors ($\lambda=.988, F=1.31, p=.273; \lambda=.994, F=1.63, p=.197$, respectively). The paired sample t-tests showed significant improvements in psychological distress among supervisors of the highest category ($t=3.18, p=.002$) and non-supervisors of the highest and the second-highest categories ($t=2.84, p=.005$, and $t=2.80, p=.006$, respectively). In self-reported performance, marginally significant main effect was found only in the highest category of all employees ($t=-1.88, p=.061$). Again, the interaction term was far from statistically significant for performance ($F=0.8, p=.466$). Based on these empirical results, at least for psychological outcome, we maintain that supervisory educational effects within an organization emerge at a certain level of supervisors’ program participation, not in a dose-response manner.

The explanations and actual examples provided in the educational session may have helped the attending supervisors understand the importance of mental health practices in the workplace and motivated them to act. The explanatory analyses suggested that the attending supervisors collected information about problems within the workplace and tried to solve them, which might have led to a reduction in overtime work. The actions or the positive attitude to improving the workplace environment
may have led to a good work atmosphere and a higher degree of psychological well-being within the organization. Even if not established, the process of improving the work environment within an organization results in better morale because employees are more likely to feel valued or they are having their socio-emotional needs, such as self esteem and the need for approval, fulfilled. Another pathway through which the employees’ psychological states improved may have been support resources within and/or outside the workplace. Attending supervisors were more likely to refer individuals with problems to professionals, and the number of consultations within the liaison office and associated medical institutions increased after the education. Referring employees to medical professionals is practical and effective when supervisors themselves are unable to assist employees.

Our lecture on active listening seemed ineffective, judging from the supervisory feedback, which indicated that there had been no change in their behavior regarding listening to subordinates. Although the educational effect should be evaluated on a standardized scale, it was plausible that the listening attitude or behavior was hard to master in the short time devoted to it. Even though supervisors may understand the importance of consulting with employees regarding psychosocial problems, knowledge only does not lead to actual behavioral changes. Besides lecture, role-playing exercises constitute an important part of the training, in which supervisors can find how to do active listening by themselves. Without exercises, supervisors may perceive the task as a difficult one that is not part of their regular duties.

In relation to the issue, also unexpected was the significant decrease in supervisory support in the departments in which more than one-third of the supervisors attended the educational session. It was anticipated that the education would enhance supervisory support as a mechanism that would lead to a reduction in stress in the workplace, but this did not seem to be the case in the current study. Some supervisory action, such as referring an employee to medical professionals, may have been perceived as less supportive by the non-supervisory employees. The fact that most psychosocial job characteristics scores decreased between the pre- and post-education surveys may indicate their regression to the mean. If our supervisory education increases skills of interpersonal relationships via enhanced support or active listening attitudes, the educational effects could be more precisely evaluated when immediate supervisor-subordinate relations are indentified then incorporated into study design. Future study should try to explore the effects of supervisory education on immediate subordinates.

The most problematic limitation is the study design. The intervention and control groups could not be assigned on a random basis. In fact, the psychosocial job characteristics were less favored in the low-attendance category. It is possible that a hectic situation prevented the supervisors from attending the educational session and adversely affected the psychological reactions of the employees. Although a beneficial effect of attendance on the session remained after adjusting for the psychosocial job characteristics, we have no guarantee of controlling for unknown confounders. In addition, voluntary participation for the supervisory education is likely to suffer from selection bias. We cannot deny that the attendees were more eager to solve mental health problems than were the non-attendees.

As for the outcome measurement, only self-reported indices were employed, which warns of some response bias. The unexpected support score changes contradicted this assumption. An effort to measure the outcome among all employees, instead of only among supervisors, may help overcome the problems associated with self reporting. The feedback for the individual psychological/behavioral reactions may be another source of bias. However, the effect was not considered large since the feedback did not indicate the individuals’ relative position (rank) of the indices in the workplace. In addition, affirmative responses for some items in the supervisory questionnaire, particularly those dealing with behavior, depended on whether the supervisors had had experience dealing with subordinates with mental health problems. Thus, it is possible that the results may have been different according to experience in the workplace. It is unlikely, however, that cases of mental illness went up or down because of bias. Rather, occurrences would be more likely to appear under harsher work conditions (i.e., groups experiencing a high degree of job strain). Finally, some questionnaires were originally developed (i.e., groups experiencing a high degree of job strain). Particular, the sensitivity of the job performance checklist needs to be evaluated in a Japanese setting.

Although the response rate of each survey was satisfactory, only one half of the target population was analyzed for this study. A comparison between the analyzed and the excluded subjects indicated no systematic differences in terms of psychosocial job characteristics, but this sample attrition limited the study validity. A follow-up was conducted on the effects just three months after the education. Lack of longer follow-up data makes it impossible to reach any conclusions about the long-term effects of the education. Our trial may have had an initial educational effect. A more permanent effect or the necessity for continuing education should be evaluated.

No qualitative information was available. For example, no steps were taken to confirm which activities most effectively contributed to better mental health. The staff
of the health care department reported that it was difficult to
determine why supervisor support had decreased in
departments where more than one-third of supervisors
attended the education. Interviews with the supervisors
and employees may yield insights about the effectiveness
of the education and/or the unexpected findings.

In the midst of difficulty in conducting a psychosocial intervention study with ideal randomized controlled trial
design in real fields\textsuperscript{24}, our trial provided suggestive
evidence that providing supervisors with appropriate
information had a positive effect on employee psychological well-being. Considering the importance
of promoting mental health in the workplace, further
efforts should pursue the verification of the pure effects
of supervisory education with a more rigorous design.

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