

Efficacy of Cognitive Behavioral Therapy Training Using Brief E-mail Sessions in the Workplace: A Controlled Clinical Trial

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Abstract: In the present study, we conducted a clinical controlled trial to evaluate the effects of cognitive behavioral therapy (CBT) training in improving depression and self-esteem in workers. A total of 261 workers were assigned to either an intervention group (n=137) or a waiting-list group (n=124). The intervention group was offered participation in a group session with CBT specialists and three e-mail sessions with occupational health care staff. Between-group differences in the change in Center for Epidemiologic Studies Depression Scale (CES-D) and Self-Esteem Scale from baseline to three months after the end of training were assessed by analysis of covariance. All subjects in the intervention group completed the group session and 114 (83%) completed the three e-mail sessions. CES-D score decreased by 2.21 points in the intervention group but increased by 0.12 points in the control group, a significant difference of –2.33 points (95% confidence interval: –3.89 to –0.77; $p < 0.001$). The between-group difference in change of self-esteem scores was not significant. Results of the present study suggest that CBT training cooperatively provided by CBT specialists and occupational health care staff using brief e-mail is effective in improving feelings of depression in workers.

Key words: Cognitive behavioral therapy, Mental health, White-collar workers, Workplace

Introduction

Although many measures have been implemented in the workplace to aid in early detection and intervention with regard to maintaining mental health, still more effective preventative measures are obviously necessary to reduce the risk of psychological distress due to work-related stressors. To this end, a program is needed to aid workers in personally enhancing their ability to cope with stress and thereby reduce the stress response.

Several studies have cited the efficacy of cogni-

tive behavioral therapy (CBT) in reducing feelings of depression and anxiety in patients with mood and anxiety disorders^{1,2}). CBT training is also reported to be effective in improving self-esteem³). CBT techniques aid in re-arranging one's thought patterns, resulting in subsequent improvement in self-esteem⁴). Given these previous findings, CBT training is expected to be effective as a mental health measure in the workplace⁵), however, its efficacy has yet to be fully demonstrated⁶).

At present, two obstacles impede effective implementation of CBT training in the workplace. First, most workers do not have enough time to properly receive CBT training. Second, of the number of trained CBT specialists is insufficient to shoulder the burden of con-

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ducting CBT.

The issue of too little time may be addressed by conducting training via e-mail. In recent years, several reports have cited the efficacy of website-based CBT training, suggesting its efficacy in improving mild depression or anxiety^{7,8}. However, self-help-style CBT training via a one-way website is not sufficient, due to relatively low program participation^{9,10} and a low percentage of users able to complete the program¹¹. In many of these previous study reports, analysis was performed only for users who had completed the program, necessitating further efficacy analyses which including dropouts¹². An e-mail-based program may represent a more effective means of training, as the one-to-one interaction between participant and instructor may allow for greater motivation toward the task at hand and greater individual support¹³. Further, e-mail imposes fewer restrictions on time or place, providing the great advantage of workers being able to address issues at their convenience. Despite these promising advantages, however, few studies have been conducted with a focus on e-mail-based CBT training.

To overcome the issue of a paucity of trained CBT specialist available to conduct training, occupational health care staff such as occupational physicians and nurses may be employed in the workplace. In Japan, many workplaces employ occupational health care staff for maintaining workers' health. While these staff members are not CBT specialists themselves, they may aid in resolving the paucity of CBT specialists in the workplace if they can adequately perform CBT training with appropriate support from CBT specialists.

In the present study, CBT training consisting of one group session and three e-mail sessions was cooperatively provided in the workplace by CBT specialists and occupational health care staff. The aim of this study was to evaluate the efficacy of the CBT training in improving depression and self-esteem in workers.

Methods

Participants and study design

All participants in the present study were white-collar office workers at a non-ferrous metal manufacturer in Japan. This company recommends its clerical, technical, and research staff aged between 30 and 35 yr undergo several in-house training sessions for improving mental health. The present study enrolled those employees who opted to receive the CBT training we provided and consented to the written objectives and procedures of the study. Employees with health-related occupational restrictions or who had a history of or were currently receiving treatment for a mental disease were excluded

from the study. No additional exclusion criteria were cited.

Personnel not directly involved in the study randomly assigned the participants in each division by employee number to either the intervention or control group. To evaluate training efficacy, changes in the severity of depression and the employee's self-esteem after training were compared between the two groups.

The study protocol was reviewed and approved by the Institutional Ethics Committee of Kitasato University.

Intervention

CBT training consisted of one three-hour group session provided by CBT specialists and three e-mail sessions provided by the occupational health care staff in the workplace. Group sessions were jointly conducted by two CBT specialists (one psychiatrist, one psychotherapist), and e-mail sessions were conducted by one occupational physician and three occupational health care nurses. Prior to the study, the occupational physician and nurses received a three-hour lecture about CBT from the CBT specialist. Intervention was provided from July to December 2007.

Group session

The contents of the CBT training program are shown in Table 1. The group session was a three-hour training program consisting of three parts involving explaining CBT, assessing thinking tendencies, and practicing preparation of the column sheet. Group sessions were repeated five times with approximately 20 to 40 participants per session. In the group sessions, participants were divided into four to six groups for group discussion, with four to six participants per group.

In the first part of the group session, participants learned about the relationship between cognition and automatic thought or mood, as well as about the basic concepts of CBT. In the second part, participants were taught to recognize their own thinking patterns using a checklist. A partially modified Thinking Errors Scale (TES)¹⁴ was used to aid in this part of the program. The checklist consisted of 19 questions regarding cognitive distortion, such as, "I fixate on a single negative thing and tend to dwell and brood over that one thing only," and, "I tend to draw broad conclusions from my limited experience". Participants then discussed their results with other members in the group to learn how thinking patterns differ from person to person. In the third part of the session, participants practiced filling out a "column sheet". These column sheets, often used in CBT sessions, consisted of seven columns headed "situation", "mood", "automatic thought", "evidence that supports your thought", "evidence that is against your

Table 1. The contents of the program

| | | | |
|-----------------------------|---|--|---|
| Group Session (3 h) | Part 1. Lecture The relationship between cognition, mood, and behavior What is Cognitive Behavioral Therapy? Part 2. Self-check on your thinking patterns Part 3. Work & Discussion: How to fulfill the column sheet? “What kind of stresses do you have in business situations?” /Stress situation record “What do you think during stressful situations?” /Automatic thoughts record “What kinds of distorted cognitions can you find in automatic thought?” /Distorted cognitions record “What kinds of adaptive thought did you arrive at from the process?” /Adaptive thoughts record Fulfill the column sheets | | |
| | 1st session | 2nd session | 3rd session |
| Personal Sessions by e-mail | <ul style="list-style-type: none"> • Summary of group session • Assigning homework | <ul style="list-style-type: none"> • Feedback on completion of the column sheet • Providing two examples from the column sheet • Assigning homework | <ul style="list-style-type: none"> • Feedback on completion of the column sheet • Promoting further learning: introduction of books and internet-sites on cognitive therapy |
| Home work | Fulfill the column sheet | Fulfill the column sheet | — |

thought”, “alternative thought”, and “mood change”. Participants first received instruction on how to fill out the column sheet using a single common experience. Each participant then chose one stressful event that he or she had recently experienced at work and completed the column sheet with regard to that event. On completion, several participants gave a presentation outlining the contents of their column sheet. Through examples provided by others, participants were expected to deepen their own understanding of the diversity of automatic thoughts generated from work-related stress as well as the processes conducive to balancing these thoughts.

E-mail sessions (personal sessions conducted via e-mail)

Participants who completed the group session were asked to continue the training and receive three e-mail sessions by the occupational health care staff in the workplace.

The first e-mail was sent to all participants immediately after the group session, summarizing the group session by reviewing an explanation of CBT and the procedures for preparing the column sheet, as well as assigning homework. The first homework assignment was to submit within one week a completed column sheet concerning one stressful event recently experienced at work. Participants were asked to fill in the “situation”, “mood”, “automatic thought”, “evidence that supports your thought”, “evidence that is against your thought”, “alternative thought”, and “mood change” columns by themselves. Participants also elaborated on the stressful situation with descriptions such as, “I was

suddenly directed to present a new theme without being alerted in advance”, or, “I feel that my manager has not been duly evaluating my work”.

The second e-mail, sent approximately 7 to 10 d after the first, included brief comments on the column sheet submitted by each participant and encouraged him or her to continue to complete the homework assignments. In addition, the second round of homework was assigned, with participants asked to submit another completed column sheet. To assist other participants in further understanding how to properly prepare a column sheet, several particularly exemplary column sheets were attached with participants’ permission to the e-mails.

The third e-mail, sent approximately 7 to 10 d after the second, included comments on the second column sheet submitted by each participant. To summarize the program, the objectives of CBT and how to fill out a column sheet were explained a final time. In addition, reference books and literature were also recommended for participants who wished to continue learning about CBT.

Comments made by the health care staff to participants in the e-mail sessions were discussed beforehand with the CBT specialists. The staff offered advice to participants who failed to demonstrate adaptive thinking or advice or who completed the column sheet without exhibiting any mood change. If participants presented a question which the occupational health care staff was unable to answer, the personnel consulted the specialists via e-mail.

In this CBT training, participants learned the con-

cepts of CBT and how to fill out a column sheet during the group session, and then acquired the skills to think adaptively regarding work-related stress by repeatedly filling out the column sheet in e-mail sessions.

For ethical reasons, after the program and all related analyses were completed, the same training provided to the intervention group was subsequently provided to the control group.

Outcomes

Using a self-reported questionnaire, we assessed outcomes in the intervention and the control groups at baseline and at one week and three months after the end of training.

Primary outcomes were depression as measured by the Center for Epidemiological Studies Depression Scale (CES-D)¹⁵⁾ and self-esteem as measured by the Self-Esteem Scale¹⁶⁾. Training efficacy was evaluated based on the change in each scale from baseline to three months after the end of training.

Secondary outcomes were an understanding of stress control skills and the will to apply these stress control skills. These endpoints were assessed by two originally drafted questions: "I know how to expand the repertoire of my ways of thinking", which assessed understanding of stress control skills, and "I am trying to expand the repertoire of my ways of thinking by considering things from different points of view", which assessed the will to apply these stress control skills. Assessment was made using a Likert scale with one point assigned if the statement was "not applicable" and five points if it was "applicable".

Statistical analysis

Between-group differences for the intervention and control groups in the change in CES-D or Self-Esteem Scale scores from baseline to three months after the end of training was assessed by analysis of covariance (ANCOVA), with the baseline score in each group as the covariate. Similarly, ANCOVA was also used with the baseline score in each group as the covariate to determine between-group difference in the change in scores regarding understanding of stress control skills or the will to apply these stress control skills. Intention-to-treat analysis was performed using the last-observation-carried-forward method (data from one week after the end of the program was used for participants for whom no three-month follow-up data was available). SPSS Ver. 12 (SPSS Inc., Chicago, IL, USA) was used for analyses. All tests were two-tailed with significance set at 0.05.

Results

The study flow for the present study is depicted in Fig. 1. Of the 270 white-collar workers who initially consented to participate in the study, 9 workers had a diagnosed mental disease or were receiving counseling and were thus excluded from the study. The 261 remaining workers from 12 departments were then allocated to either the intervention group (137 workers) or control group (124 workers) by department group. With regard to male-to-female ratio, 96 of the 137 intervention group participants (70%) and 82 of the 124 control group participants (66%) were men.

All subjects in the intervention group completed the group session and 114 completed all three e-mail sessions. Three subjects failed to respond to the one-week or three-month questionnaires and were therefore excluded from analysis. Of the 23 who failed to complete all three e-mail sessions, the two who responded to the questionnaire were nevertheless included in the analysis (one participated in one session and the other participated in two), but the remaining 21 who did not respond were excluded. In the control group, 33 of 124 subjects failed to respond to the questionnaire at follow-up and were therefore excluded from the analysis. The most common reason given for failure to respond to the follow-up questionnaires or participate in the e-mail sessions was "too busy working". Ultimately, 113 and 91 subjects in the intervention and control groups were included in analyses, respectively.

Demographic characteristics of the participants are shown in Table 2. Mean age was 33.2 yr (SD=1.75) in the intervention group and 33.1 yr (SD=1.71) in the control group. No significant differences were noted between the two groups with regard to age, sex, educational status, years of employment, baseline score for each measurement, and the percentage of participants with CES-D scores exceeding the cut-off value of 19. Among Japanese workers, a CES-D score exceeding 19 has been validated as the cut-off point for depression, as evaluated through a structured interview²⁴⁾. For the combined groups, no significant difference was observed in age, sex, educational status, or years of employment between the 60 subjects excluded from and the 201 subjects included in analyses.

The change in each outcome from baseline to the end of the program for the intervention and control groups is shown in Table 3. CES-D score decreased by 2.21 points in the intervention group but increased by 0.12 points in the control group, showing a significant between-group difference of -2.33 points (95% confidence interval [CI]: -3.89 to -0.77; $p<0.001$). Self-Esteem score increased by 1.73 points in the interven-

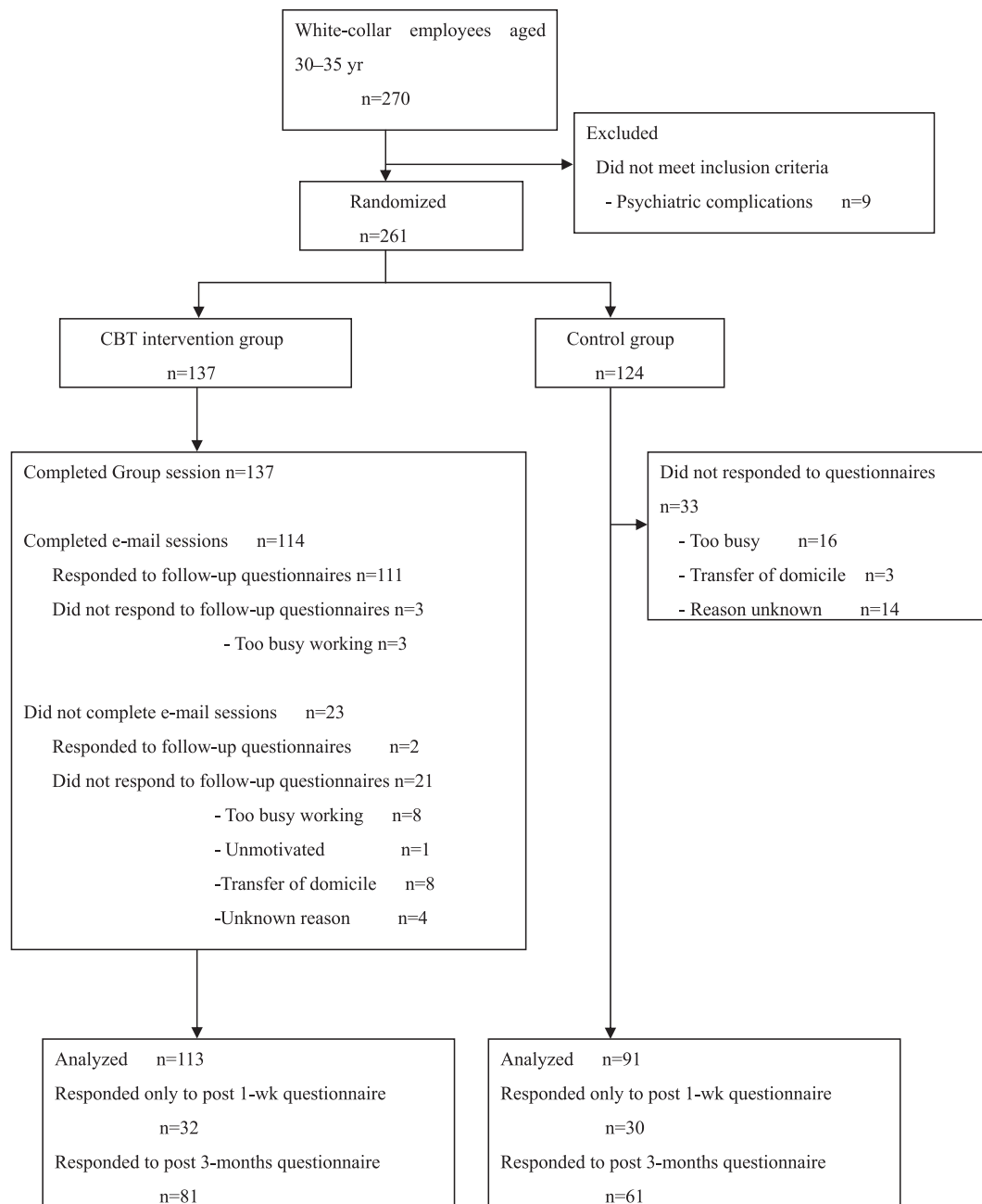


Fig. 1. Flowchart of participant recruitment, allocation, and outcome assessments.

tion group and by 0.76 points in the control group, showing a non-significant between-group difference of 0.97 points (95%CI: -2.17 to 0.23; $p=0.11$).

With regard to the two originally developed questions scored on a five-point Likert scale, the score for understanding stress control skills ("I know how to expand the repertoire of my ways of thinking") increased by 1.06 points in the intervention group and by 0.04 points in the control group, showing a significant between-group difference of 1.02 (95%CI: 0.81 to 1.23; $p<0.001$). Likewise, the score for will to apply these stress control

skills ("I am trying to expand the repertoire of my ways of thinking by considering things from different points of view") increased by 0.42 points in the intervention group and by 0.07 points in the control group, showing a significant between-group difference of 0.35 points (95%CI: 0.14 to 0.56; $p<0.01$).

Discussion

Results from the present study suggest that CBT training using group and brief e-mail sessions coop-

Table 2. Baseline data of participants

| | CBT group N=137 | Control group N=124 | Total N=261 |
|---|--------------------|------------------------|----------------|
| Characteristics | | | |
| Male, n (%) | 96 (70%) | 82 (66%) | 178 (68%) |
| Age in years, mean (SD) | 33.2 (1.7) | 33.1 (1.7) | 33.1 (1.7) |
| Years of employment, mean (SD) | 11.2 (1.7) | 11.1 (1.7) | 11.1 (1.7) |
| Education: University graduate | 110 (80%) | 111 (89%) | 221 (85%) |
| Baseline score | | | |
| Depression (SD) ¹⁾ | 11.0 (5.5) | 11.0 (6.3) | 11.0 (5.9) |
| CES-D ≥ 19 (%) | 12 (8.7) | 11 (8.8) | 23 (8.8) |
| Self Esteem (SD) ²⁾ | 33.9 (5.9) | 34.1 (6.4) | 34.0 (6.1) |
| Understanding | | | |
| -stress control skills (SD) ³⁾ | 2.8 (0.9) | 2.9 (1.1) | 2.8 (1.0) |
| Will to apply | | | |
| -stress control skills (SD) ⁴⁾ | 3.5 (0.9) | 3.5 (1.1) | 3.5 (1.0) |

¹⁾ Assessed using the Center for Epidemiological Studies Depression Scale.

²⁾ Assessed using the Self-Esteem Scale.

³⁾ Response to "I know how to expand the repertoire of my ways of thinking."
Determined using a Likert scale with one point for "not applicable" and five points for "applicable."

⁴⁾ Response to "I am trying to expand the repertoire of my ways of thinking by considering things from different points of view."
Determined using a Likert scale with one point for "not applicable" and five points for "applicable."

Table 3. Intervention results

| | Intervention group Mean Change (SE) | Controls Mean Change (SE) | Difference (95%CI) | p value |
|---|--|------------------------------|-----------------------|---------|
| CES-D score | -2.21 (0.53) | 0.12 (0.59) | -2.33 (-3.89 - -0.77) | <0.01 |
| Self Esteem score | 1.73 (0.41) | 0.76 (0.45) | 0.97 (-2.17- 0.23) | 0.11 |
| Understanding of the stress control skill | 1.06 (0.07) | 0.04 (0.08) | 1.02 (0.81-1.23) | <0.001 |
| Willing to apply the stress control skill | 0.42 (0.07) | 0.07 (0.08) | 0.35 (0.14-0.56) | <0.01 |

eratively provided by CBT specialists and occupational health care staff is effective in improving depression. Further, this training also appeared to be effective in enhancing understanding of stress control skills and the will to apply these skills. The CBT training in the present study did not, however, significantly effect an improvement in self-esteem.

CBT training in the present study was characterized by individualized e-mail sessions provided to each participant following a group session. While computer-based CBT training has become increasingly popular in recent years, many such programs are primarily or strictly web-based. CBT training based on one-way web learning has been found to have several disadvantages, including difficulty in maintaining participant motivation and difficulty giving timely advice. These issues may be addressed as in the present study, using e-mail-based one-on-one communication between each participant and a staff member¹³⁾. Participants may

have been encouraged by the staff's timely response in this manner.

Having the group session in the present study be conducted by CBT specialists may have contributed to a better understanding of CBT, and learning alongside colleagues may have also motivated the participants to learn CBT. Taken together, these factors may have contributed to effective implementation of CBT training and the significant improvement in depressed mood observed in the present study. Cognitive-behavioral approaches lead to change in thought processes, subsequently reinforcing active coping skills and reducing work-related stress¹⁷⁾. CBT techniques may therefore aid workers in replacing negative thoughts regarding stressful events in the workplace with more appropriate thoughts, thereby improving a depressed mood.

Relatively few studies have investigated the efficacy of e-mail-based CBT training in the workplace. Ruwaard *et al.* conducted seven-week standardized

CBT treatment via e-mail and found that depression level as assessed with Depression Anxiety Stress Scales (DASS-42) decreased from 11.8 points to 7.8 points throughout the study period¹³.

Although a meta-analysis has cited the efficacy of CBT training in reducing work-related stress¹⁷, the CBT training reviewed in this report was provided by specialists in personal interviews, with a mean total of 7.6 interviews conducted. However, holding such frequent face-to-face sessions in the workplace is impractical. E-mail-based CBT training free from the constraints of time or place and with fewer sessions may help to increase the use of CBT in the workplace, providing more workers with an opportunity to engage in such training. In the present study, 114 subjects (83%) completed all three e-mail sessions, indicating that this program allowed for easy worker participation.

CBT training has been extensively studied in patients with mental disease, but seldom in workers. To clarify the efficacy of CBT training in their study conducted among workers, Shimazu *et al.* conducted one group session consisting of CBT and several other components, with results showing that although the training was effective in helping participants to understand skills to cope with stress, psychological stress was transiently increased among participants¹⁸. In the present study, CBT training using a column sheet was repeated in multiple e-mail sessions, which may have contributed to the significant effects observed.

CBT training in the present study was cooperatively provided by CBT specialists and non-specialist occupational health care staff. Providing workplace CBT sessions on a continuous basis by CBT specialists is impractical²⁰⁻²², but CBT training provided by non-specialists alone has been reported ineffective¹⁹. However, the positive results achieved in our study suggest that training administered by non-specialists can be effective given appropriate support from CBT specialists, in turn indicating that non-specialist occupational health care staff can contribute to the implementation of effective CBT training in the workplace.

In the present study, CBT training was not effective in improving self-esteem, an observation possibly attributable to insufficient frequency or duration of sessions. Self-esteem is a fundamental component of human nature and therefore may require more continuous intervention to achieve a significant change. Although Proudfoot *et al.* reported that CBT training improved self-esteem³, this training was extremely time-consuming, involving 7 three-hour training sessions.

Several limitations to the present study warrant mention. First, randomization in our study was not perfect; participants were randomly assigned in each division by

employee number to either the intervention or control group without registering at Randomized-Clinical-Trial registration center or using computer-generated random numbers. Second, attributes inquired of participants were limited, making for a relatively homogeneous study population. Participants were white-collar workers engaged in research and development or clerical work in a single company, and were familiar with computers and able to efficiently comprehend information presented on the screen²³. We therefore cannot necessarily ensure that similar results will be obtained among workers in other industries or occupations. In addition, workers were 30 to 35 yr old, leaving the efficacy of this method in other age groups unknown. Third, the duration of follow-up was short, amounting to three months in the present study. Since the efficacy of intervention may decrease over time, longer follow-up is more desirable. However, as follow-up is prolonged, the follow-up rate tends to decrease. In this study, the percentage of respondents to the follow-up questionnaire was not very high overall, and actually relatively low in the control group. Although no significant difference in the baseline data was observed between responders and non-responders, possible response bias cannot be ruled out. Fourth, original statements were used to assess the understanding of the stress control skill and the will to apply it. Finally, several possible confounding factors, including daily life stressors and working hours, were not assessed in our study.

In the present study, participants had a relatively high CES-D score at baseline with a mean (SD) score of 11.1 (5.9), which may have contributed to an improvement in depressed mood. Assessment of CES-D score has been shown to vary from country to country. In Japan, Wada *et al.* evaluated the validity of cutoff points for CES-D score by comparing the score with the results of diagnostic and structured interviews²⁴ and reported that the valid cutoff point was 19 points in Japanese workers, indicating that participants in our study were not particularly depressed. In addition, ANCOVA was performed with the baseline CES-D score as the covariate to adjust for the effect of depressed state at baseline.

In future studies, better results may be obtained by holding more than the single group session and three e-mail sessions provided in the present study. However, given the impracticality of providing frequent sessions to workers in the workplace, this issue merits further consideration.

In recent years, workers have been required to improve their ability to adapt to increasingly complicated work environments. Great social importance lies therefore in enhancing the ability of workers to use their skills in face of stressful events and training work-

ers to reflect on their thinking patterns and acquire the skills to assess a situation in a balanced manner. Results from the present study suggest that CBT training may be effective in this endeavor, but further large interventional studies involving participants reflecting a range of ages and occupations are yet needed to clarify these findings.

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