# Chapter 14
# Effects of Internet-Based Cognitive Behavioral Therapy (iCBT) Among Healthy Workers: Current Research Evidence

**Kotaro Imamura, Norito Kawakami and Akihito Shimazu**

**Abstract** Previous research has shown that cognitive behavioral therapy (CBT) is effective in reducing work-related stress, preventing the onset of major depressive episodes, and increasing positive mental health among workers. An innovative way to deliver CBT-based treatment widely is by using computerized CBT (CCBT) and CCBT via the internet (iCBT). In this part, we will review and introduce the recent iCBT studies, and discuss the possibility of utilization of iCBT program in workplace.

**Keywords** Depression · Internet-based cognitive behavioral therapy · Prevention · Work engagement · Workers

## Introduction

Recently, Internet-based cognitive behavioral therapy (iCBT) has been the focus of constant attention on improving symptoms or preventing onset of mental disorders. Internet-based cognitive behavioral therapy has the special features of high anonymity and high accessibility. In terms of anonymity, iCBT is suitable for addressing psychological problems because it can enable users to avoid the stigma associated with seeing a therapist (Gega et al. 2004). In terms of accessibility, iCBT provides users with the opportunity to obtain treatment at any time and at any place, such as in the workplace or at home, and study the content as much as they want (Spek et al. 2007). Furthermore, iCBT would have merit since it can provide a viable alternate mental health resource for people who have geographical, physical, psychological, and/or financial barriers to seeking traditional, face-to-face care (Ruwaard et al. 2007).

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Previous studies have shown a significant positive treatment effect of iCBT programs on common mental disorders, especially depression and anxiety in the clinical setting (Andrews et al. 2010; Arnberg et al. 2014). A meta-analysis of randomized controlled trials (RCTs) reported that iCBT can improve symptoms of patients who have major depressive disorder (Hedges' $g$ = 0.56–0.99) and anxiety disorders (Hedges' $g$ values were 0.92 for social phobia, 0.83 for panic disorder, and 1.12 for generalized anxiety disorder) more effectively compared with treatment as usual or waiting list (Andrews et al. 2010). Another meta-analysis showed that iCBT can improve mild to moderate depression (Cohen's $d$ = 0.83) and social phobia (Cohen's $d$ = 0.85) more effectively compared with waiting list (Arnberg et al. 2014). Thus, iCBT would be a viable treatment option for depression and anxiety disorders.

Only a few studies reported on effects of iCBT on relapse prevention of depression. One RCT and its follow-up study showed iCBT significantly prevented the relapse of depression (hazard ratio 0.16) after 2-year follow-up (Hollandare et al. 2011, 2013). Thus, iCBT shows promise for preventing relapse of partially remitted depression. Further study is needed to examine whether iCBT could prevent relapse of depression or other common mental disorders among large samples.

Some studies examined the effect of iCBT programs on preventing depression. Using self-reported symptoms of depression as an outcome, one study of adolescents reported a significant prevention effect of iCBT programs, though it included only male participants (Calear et al. 2009). In addition, one study of university students (Lintvedt et al. 2013) and one community-based study (Christensen et al. 2004) reported a significant effect of iCBT programs on improving depressive symptoms in non-clinical settings. However, a search of the literature revealed only one previous RCT (conducted by the authors) (Imamura et al. 2015a), which investigated the effect of an iCBT program on reducing the risk of major depressive episodes (MDEs) diagnosed according to the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, (DSM-IV) diagnostic criteria (American Psychiatric Association 2000). The evidence for the effect of an iCBT on reducing risk of MDE is limited.

Despite a number of benefits of using iCBT, studies in the workplace are still very few. Besides our RCT, two RCTs were conducted in the workplace. One study reported an intervention that consisted of one group session of CBT (150 min) and web-based CBT homework for 1 month significantly improved psychological distress among workers with higher psychological distress (Mori et al. 2014). However, the other RCT reported that an iCBT program failed to show a significant effect on improving psychological outcomes compared with information websites about general mental health (Phillips et al. 2014). A further RCT should be conducted to examine whether an iCBT program can be effective in a larger sample of workers with diverse characteristics. In this chapter, we introduce our original iCBT program for workers and previous RCTs examined to improve subthreshold depressive symptoms, to prevent the onset of MDE, and to increase work engagement among healthy workers.

## Procedure of Development of the New iCBT Program for Workers

A new iCBT program was developed by authors during January to August in 2011. First, the structure and concept of the iCBT program were discussed, especially in terms of the number of lessons, their contents, participants' workload per lesson, homework assignment, and components of CBT. To develop the iCBT program for workers, the contents of the iCBT program must fit their usual work situation. The CBT components in this program also need to be adapted to be useful at work. The contents of this iCBT program were presented in the form of a cartoon story that showed a worker(s) learning how to cope more effectively with stress using a CBT with the help of a clinical psychologist. On making the contents of each component of the iCBT program, the author, who practiced CBT as a clinical psychologist in a clinical setting, wrote each script with professional help. After that, based on the scripts, the storyboards of every single scene were made by another clinical psychologist who was trained in CBT. Referring to the storyboards, the author developed each of the contents.

## Overview of New iCBT Program for Workers

The iCBT program called "Internet CBT Program: Useful Mental Health Solutions Series for Business" is a 6-week web-based training course that provides CBT-based stress management skills (see Table 14.1; Fig. 14.1) (Imamura et al. 2014). This program is structured in six lessons, with one lesson per week. About 30 min are needed for each lesson, including the homework. This program can be used anywhere the internet is available. One of the unique features of the program is that training is provided along with a Manga (Japanese comic) story of a psychologist and a client to facilitate the understanding of the participants. Several merits of using a comic story with Manga characters have been acknowledged in research on education in school. First, it helps motivate participants to stay in the program (Hutchinson 1949). Second, it facilitates easy learning. A program with text combined with comic stories is easier for learners to understand compared with a text-only program (Hutchinson 1949; Sones 1944). Third, using a comic story fosters learners' interest in the program (Sones 1944). These merits might be applicable to education in the workplace because most Japanese people of working age are familiar with comics. The CBT skill components included in the program are: self-monitoring, cognitive restructuring, assertiveness, problem-solving, and relaxation. At the end of each lesson, participants will be asked to submit homework on a voluntary basis, and will receive feedback from trained staff (e.g., clinical psychologists) to facilitate their understanding. Feedback will be sent to the participants within 2 days after their submission.

**Table 14.1** Contents of the iCBT program

| Lesson no. | Title | Contents |
|---|---|---|
| 1 | Learning about stress | Learning about psychological stress model modified for this iCBT program. A guiding character, clinical psychologist Miss Rino, speaks about the relationship between stressors and stress reactions |
| 2 | Knack for self-case formulation based on a CB model | Learning about cognitive behavioral model and how to do self-monitoring based on CBT. Miss Rino introduces a five-part CB model using a vignette of a worker with a work-related problem |
| 3 | Try cognitive restructuring part 1 | Learning about cognitive restructuring. Miss Rino gives a lecture on a cognitive ABC model by Beck AT (Activating/Actual event, Belief, and Consequence) and on identifying the automatic thoughts that cause a negative mood |
| 4 | Try cognitive restructuring part 2 | Learning about cognitive restructuring and relaxation using breathing method. Miss Rino teaches participants how to change an automatic negative thought into an actual thought |
| 5 | Knack for communication | Learning about active listening and assertiveness. Miss Rino also teaches active listening and assertiveness skills based on the DESC (Describe, Express, Specify, and Choose or Consequence) script |
| 6 | How to solve your problem effectively | Learning about problem-solving methods. Miss Rino teaches participants how to sort out the problem and make a list of solutions using problem-solving methods |

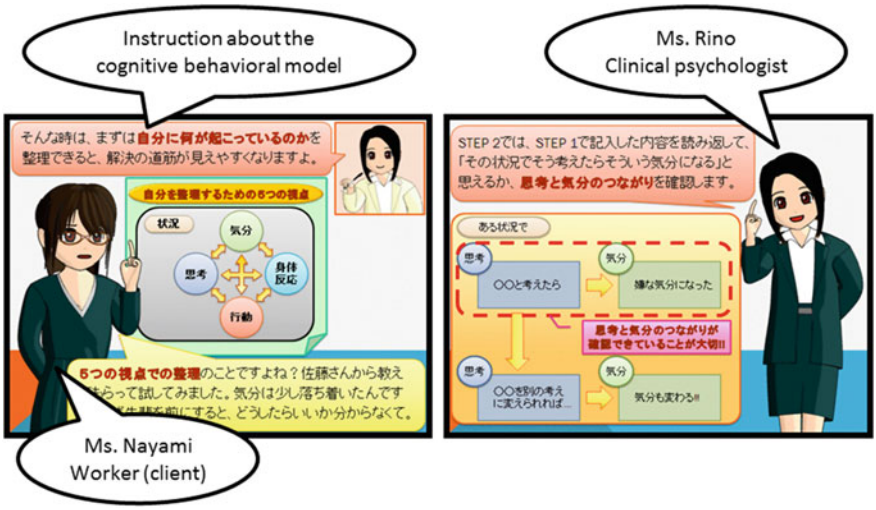


**Fig. 14.1** A snapshot of an Internet-based cognitive behavioral therapy (iCBT) program developed in Manga (the Japanese comic)

## Study 1: The Effects of the iCBT Program on Improving Subthreshold Depressive Symptoms Among Healthy Workers

The purpose of this study was to develop a new Internet-based computerized cognitive behavioral therapy (iCBT) program in Manga format for workers and to examine the effects of the iCBT program on improving subthreshold depression using a randomized controlled trial (RCT) design among workers employed in private companies in Japan (Imamura et al. 2014).

All workers in a company ($n$ = 290) and all workers in three departments ($n$ = 1500) at the headquarters of another large company were recruited by an invitation e-mail. Participants who fulfilled the inclusion criteria were randomly allocated to intervention or control groups ($N$ = 381 for each group). The intervention group studied the iCBT program at a frequency of one lesson per week. Depression (Beck Depression Inventory II; BDI-II) was assessed as a primary outcome at baseline, and 3- and 6-month follow-ups for both intervention and control groups were performed.

As a result (see Table 14.2), the iCBT program showed a significant intervention effect on BDI-II ($t$ = −1.99, $p < 0.05$) with small effect sizes (Cohen's $d$ −0.16, 95 % confidence interval −0.32 to −0.004, at 6-month follow-up). This study first demonstrated that a computerized cognitive behavioral therapy delivered via the Internet is effective in improving depression in the general working population. It seems critical to improve program involvement of participants in order to enhance the effect size of an iCBT program.

**Table 14.2** Effect of the Internet-based computerized cognitive behavioral therapy (iCBT) program on outcome variables ($N$ = 381 in each group)

| | Estimates of fixed effects[a] | | | | Cohen's $d$[b] | | | |
|---|---|---|---|---|---|---|---|---|
| | Effect | (SE) | $t$ | $p$ | T2–T1 | (95 % CI) | T3–T1 | (95 % CI) |
| Depressive symptoms (BDI-II) | −0.51 | (0.26) | −1.99 | 0.047 | −0.14 | (−0.30 to 0.02) | −0.16 | (−0.32 to −0.004) |
| Psychological distress (K6) | −0.29 | (0.17) | −1.72 | 0.09 | −0.01 | (−0.17 to 0.15) | −0.14 | (−0.30 to 0.02) |
| Dysfunctional attitude (DAS) | −1.69 | (0.69) | −2.43 | 0.02 | −0.11 | (−0.27 to 0.05) | −0.20 | (−0.36 to −0.04) |
| Work engagement (UWES) | 0.07 | (0.03) | 2.03 | 0.04 | 0.11 | (−0.05 to 0.27) | 0.16 | (0.0007 to 0.32) |
| Work performance (HPQ) | 0.00 | (0.08) | 0.04 | 0.97 | 0.04 | (−0.12 to 0.20) | 0.00 | (−0.16 to 0.17) |
| Sick leave days | −0.32 | (0.17) | −1.84 | 0.07 | −0.16 | (−0.32 to 0.0003) | −0.14 | (−0.30 to 0.02) |

*BDI-II* Beck Depression Inventory II, *K6* Kessler's psychological distress scale, *DAS* Japanese version of the Dysfunctional Attitude Scale 24, *UWES* Utrecht Work Engagement Scale, *HPQ* Health and Work Performance Questionnaire, *T1* baseline, *T2* 3-month follow-up, *T3* 6-month follow-up

[a]A mixed-model for repeated measures conditional growth model analyses was conducted

[b]Cohen's $d$ only among those who completed the questionnaire at baseline and at follow-up

## Study 2: The Effects of the iCBT Program on Preventing the Onset of MDE Among Workers

The aim of this study was to investigate whether an iCBT program already shown to improve depressive symptoms at 6-month follow-up among workers (Imamura et al. 2014) could decrease the risk of DSM-IV major depressive episode (MDE) through 12 months, including the original 6-month follow-up of the trial plus an extended 6-month follow-up (Imamura et al. 2015a). After the 6-month follow-up (i.e., the end of the RCT), participants assigned to the control group were provided a chance to study the same iCBT program. Because the extension of the follow-up period was decided after the start of this study, we provided the iCBT program to the participants in the control group after the 6-month follow-up according to the original protocol. All participants were followed up at 12 months after the baseline survey. The primary outcome was a new onset of DSM-IV-TR MDE during the 12-month follow-up, as assessed by means of the web version of the WHO Composite International Diagnostic Interview (CIDI), version 3.0 depression section.

As a result (see Fig. 14.2), the intervention group had a significantly lower incidence of MDE at the 12-month follow-up than the control group (Log-rank $\chi^2 = 7.04$, $p < 0.01$). The hazard ratio for the intervention group was 0.22 (95 % confidence interval 0.06–0.75), when estimated by the Cox proportional hazard model. This study demonstrates that an iCBT program is effective in preventing MDE in the working population. However, it should be noted that MDE was measured by self-report, while the CIDI can measure the episodes more strictly following DSM-IV criteria.

## Study 3: The Effects of the iCBT Program on Increasing Work Engagement Among Healthy Workers

This study reported on an RCT of the effectiveness of the iCBT program on work engagement (Imamura et al. 2015b). Data for this study were collected as secondary outcomes of an RCT primarily examining the effects of the iCBT intervention on improving subthreshold depressive symptoms among healthy workers (Imamura et al. 2014).

As a result (see Table 14.2), the iCBT program showed a significant intervention effect on work engagement ($p = 0.04$) with small effect sizes (Cohen's $d = 0.16$) at 6-month follow-up. On the other hand, mediation analysis showed that a change in depression marginally significantly mediated the effect on work engagement, which explained 26–31 % of the total effect. Improved depression by the iCBT program might contribute to improvement of work engagement to some extent. The iCBT program may be effective in improving work engagement among workers with the universal approach (i.e., targeting the whole working population). A mechanism with which a CBT program could improve work engagement should be investigated further in a future study.

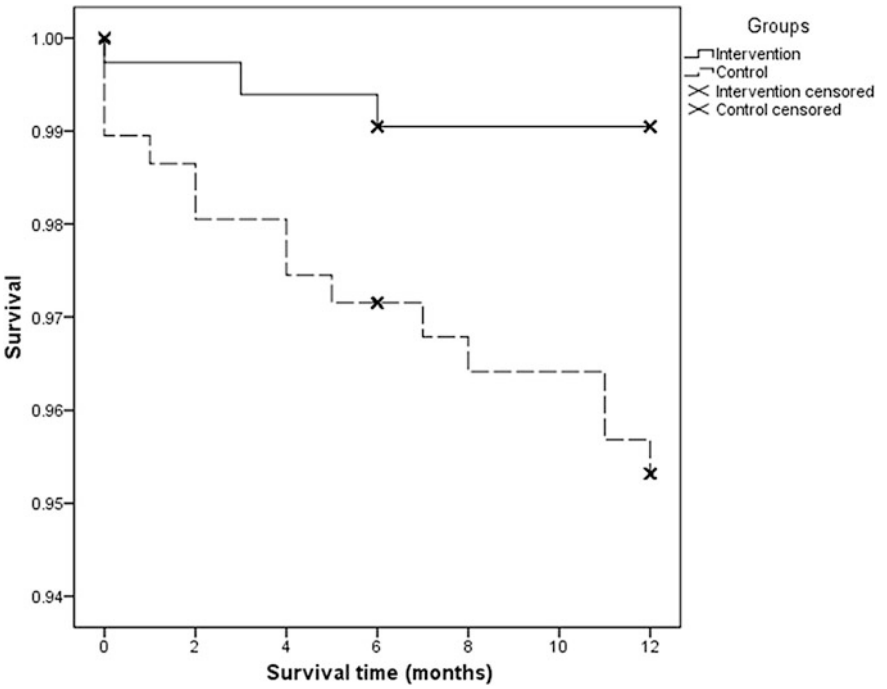


**Fig. 14.2** Kaplan-Meier survival curves for not having major depressive episode (MDE) in the intervention and control groups during 12-month follow-up: Log-rank significance test for the group difference and hazard ratio (HR) and 95 % confidence interval (CI) by using Cox proportional hazard regression analysis

## The Prospect and Challenge of iCBT Research in the Workplace

As noted above, the iCBT program could be effective on improving depressive symptoms, preventing the onset of MDE, and increasing work engagement among healthy workers. Preventing the onset of MDE would contribute to the primary prevention of depressive disorder in the workplace. Even though the effect size on depressive symptoms and work engagement is small, the public health impact may be still meaningful, if the great accessibility and minimal cost of this kind of program are considered. However, there are several challenges in further iCBT study in the workplace. First, the evidence for the effect of iCBT on any outcomes among healthy workers is still very limited. Only a few studies of iCBT in the workplace have been conducted and the iCBT programs for workers are very few. Further, larger-scale RCTs are needed to examine whether a CBT intervention could improve depressive symptoms, prevent the onset of MDE, and increase work engagement and work performance.

## Conclusion

Previous studies show that an iCBT program would be effective on improving depressive symptoms, preventing the onset of MDE, and increasing work engagement in a general working population. These findings indicate a possible large public health impact of applying an iCBT program in improving mental health among workers.

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