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Title page

School mental healthcare services using internet-based cognitive behaviour therapy for young male athletes in Japan

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Main text

Abstract

Aim: Preventive intervention and treatment using internet-based cognitive behaviour therapy (iCBT) can be performed easily among school students, as they are quite familiar with internet tools. This study aims to investigate the effectiveness and contribution of iCBT to mental healthcare in a school setting.

Methods: Eighty Japanese high-school boys who were participating in a sports specialist course were enrolled in this study. The participants were randomly assigned to either the iCBT intervention group or the control group. Both programs were administered for 4 weeks. To evaluate the effects of the iCBT intervention, both physical and mental health problems as well as self-efficacy were assessed.

Results: The mean number of accesses during the intervention period was 16.9, and the mean access frequency (percentage obtained from the number of times the website was accessed during the intervention period) was 40.1% for the iCBT group. A statistically significant group-by-time interaction was observed in favour of the iCBT group using the Kessler-6 (K6) scale to assess depression and anxiety.

Conclusions: The results suggest that a school mental healthcare program using iCBT is

suitable for students and useful for helping them to cope with various stresses and for reducing depressed moods and anxiety among young people, especially athletes, who are considered to need special mental health support.

Keywords

Cognitive behaviour therapy; depression; early intervention; internet; young people

INTRODUCTION

Mental illnesses during adolescence, such as depression, anxiety, and psychosis, are increasingly attracting global interest. Counselling and group psycho-education have been incorporated early into school settings to prevent mental illnesses[22]. The Central Council for Education of Japan reported that various rapid changes in the social environment (e.g., urbanization, aging population, informatization, and globalization) have also been affecting the physical and mental health of school children[6]. In their report, the incidence of mental healthcare issues, such as disorderly lifestyles, bullying, and truancy from school, was shown to be increasing. The prevalence of depression during adolescence ranges from 1% to 6%, which is not insignificant[26,31]. The strategy for mental healthcare in schools is to ensure prevention. An educational approach is important to enhance self-care skills for mental problems, and it is the first part of primary prevention. While such approaches have received particular attention, a reduction in teaching hours arising from changes in the Japanese government's curriculum guidelines has meant that students are not provided with sufficient educational content for them to acquire the knowledge and attitudes required for choosing appropriate actions to cope with mental distress. Furthermore, in cases of secondary prevention, where mental distress is already present, students may have difficulty attending a clinic because of a lack of time[4]. Some subjects who have managed to visit a clinic have

reported experiencing various problems, such as violent behaviour, mania, aggression, or suicidal ideation, in association with the use of medications, such as antidepressants[44]. Consequently, early detection and intervention are not being performed adequately, and children are not receiving treatment at an appropriate stage of their disease[42].

Cognitive behaviour therapy (CBT) is an established treatment for improving depression and anxiety disorder. Studies on CBT have demonstrated positive treatment gains across anxiety, depressed mood, and general functioning outcomes[8], although there is still not enough evidence to support its implementation[18]. Its effectiveness for preventing mental illnesses in healthy individuals is comparable to that in patients receiving medical treatment[20]. The effectiveness of CBT-based psychological education programs for young people has also been confirmed through numerous randomized, controlled trials aimed at prevention in general[25]. Numerous studies have reported the effectiveness of internet-based CBT (iCBT) and computerized cognitive behaviour therapy (CCBT), which have been recently developed[2,32,37,48]. Preventive intervention and treatment using iCBT can be easily performed even among school students, as young people are often familiar with internet tools. Furthermore, as iCBT does not require clinic visits, students can avoid problems associated with a lack of time and stigmas. Thus, iCBT appears to be a useful means of intervention for students. Although some studies of online programs have shown considerable drop-out rates

and modest effects, there is some evidence to support the effectiveness of CCBT for the treatment of psychiatric problems, such as depression[23]. iCBT studies targeting young people have also revealed the effectiveness of such programs[10,47].

iCBT can lead to an improvement in depression and anxiety during adolescence and is considered to be an effective intervention for preventing mental illnesses[39]. However, to the best of our knowledge, an iCBT study targeting Japanese students has not yet been performed, despite a need to consider cultural differences. The participants in this study, who were high school athletes, often experienced prolonged periods of stress because of tough competition. Meanwhile, the prevalence of mental disorders among young athletes is controversial in Japan. A previous study reported that young athletes had a higher incidence of neuroticism than the general youth population[17]. On the other hand, young elite athletes have been reported to suffer from mental disorders at a comparable or lower rate than the general youth population[29].

The aims of this study were to investigate the effectiveness and contribution of iCBT to mental healthcare in a school setting. This study was designed to develop and examine the implementation of an iCBT-based intervention for high school students at a universal level, although all the participants in this study were athletes.

METHODS

Participants

Participants were recruited from the Kiryu Daiichi High School in Gunma, Japan. This school is a private coeducational school offering 12 courses. One of these courses is a sports specialist course. This course consists of six athletic events (baseball, soccer, basketball, rugby, judo, and track and field), and each of these events is practiced at a national competition level. The total number of first-year students in the sports specialist course was 80 boys.

The institutional review board of the Toho University School of Medicine approved the protocol for the study. The study was performed in accordance with the latest version of the Declaration of Helsinki. After providing the subjects and their guardians with a complete description of the study, written informed consent was obtained from each of the subjects and their guardians.

Procedures

The randomization was performed using each student's school ID number. The participants were assigned to the intervention group (n = 40) or the control group (n = 40) based on whether their ID was odd-numbered or even-numbered. The participants were asked to

complete the self-assessment questionnaire before and immediately after the program. All the participants were boys, and no significant difference in age was seen between the two groups (15.7 and 15.8 years, respectively). The study period was planned to coincide with an appropriate period based on the high school's yearly schedule (i.e., avoiding examination periods and sports tournaments, etc.).

The intervention consisted of group education regarding CBT and online homework using the iCBT over a one-month period (Table 1). The group education consisted of a 180-min group class presented by a trained school nurse. First, the participants learned about the relationships among emotions, cognition and behaviour, which form the basic theory of CBT. We excluded technical terms from the explanations and included practical examples to facilitate understanding during the session. Second, the participants completed a column worksheet to aid in the application of CBT theory to real-life situations. Column worksheets are often used for cognitive restructuring in CBT; the participants are asked to complete columns for situation, mood, automatic thought, evidence that supports their automatic thought, evidence that is against their automatic thought, adaptive thoughts, and mood changes. The participants then recorded their daily experiences and situations on this sheet and learned how to best utilize the sheet. For this group education, the participants were asked to select easy and insignificant situations, as they would discuss their concerns with

the group members later. Regarding automatic thought, we introduced certain thought patterns that can cause stress (such as all-or-nothing thoughts, should-be thoughts, self-criticism, and over-interpreting) to help subjects become aware of their own thought patterns. During this process, we provided numerous opportunities for participants to discuss their concerns and to listen to others' opinions. At the end of the education course, we shared the process as well as the results of the group education with the group members using the completed thought balance sheets. We also demonstrate how to use the iCBT and asked them to access the iCBT using their own cell phones. If they did not have a cell phone, they were provided with a laptop computer by the school. Regarding online homework using the iCBT, the participants were asked to practice the column method using a self-help-style program by reflecting on any significant school-related stress they experienced over the one-month period after the group education. The homework was expected to help familiarize participants with the column method. As content for this homework, we used the Depression & Anxiety Network: Mental Health Skill-up Training program (http://www.cbtjp.net/), with permission. This website, which was developed by a Japanese authority on CBT and is accessible to the general public, provides self-help-style training programs on coping with stress not only for those with depression or anxiety disorders, but also for healthy people with casual concerns or difficulties. The recommended web program helps participants to

complete the thought balance sheets easily by providing contextual explanations and advice on the use of the column method. The participants were able to complete their sheets by simply entering information as directed on the screen. The column method was expected to help the participants overcome their difficulties by changing negative and dysfunctional thinking patterns into flexible ones[9]. During the intervention period, homeroom teachers, advisors, or school nurses reached out to the subjects and sent them reminder emails once a week, since this approach has been effective for encouraging subjects to access the iCBT program in previous studies[40,43,45].

We arranged the iCBT program to focus on the contents of the thought balance sheet and guidance from the website and to secure a personal account for each participant. Each account was completely private, and the system administrator, homeroom teachers, advisors, and school nurses were not allowed to access it. The system administrator could verify only the number of times each participant accessed and completed the thought balance sheet.

The control group did not receive an intervention. However, because of ethical considerations, the same program (group education and online homework using the iCBT) was provided to the control group after the study was completed.

Table 1 about here

Measures

To evaluate the interventional effects of the program, the following assessment scales were used for the intervention and control groups. The main assessments were performed in early October 2014 (before implementing the program) and in early November 2014 (immediately after completing the program). As a supplementary goal, we briefly assessed the participants' general conditions in early January 2015.

Kessler-6 (K6) scale

The primary outcome was measured as the change in the Kessler-6 (K6) score, which measures psychological distress. It consists of six questions regarding depressive and anxiety symptoms that a person has experienced in the most recent 4-week period. The self-reporting style of the questions assists in the identification of current mental health problems and whether treatment is necessary. Developed as a screening tool for depressive disorders and anxiety disorders[27], the K6 scale is widely used to assess psychological stress[11,28]. The Japanese version of the K6[12] was used in this study. It also is comprised of six questions regarding depressive and anxiety symptoms, such as "Did you feel nervous?" and "Did you feel hopeless?" It is measured on a 5-point scale (0: none of the time; 1: a little of the time;

2: some of the time; 3: most of the time; and 4: all the time). A study on the cut-off point used to diagnose clinically significant psychological distress among respondents has suggested an appropriate cut-off point of 4 or 5 (maximum score, 24)[24].

General Health Questionnaire, 12 items (GHQ-12)

The General Health Questionnaire (GHQ) is a questionnaire scale designed to assess physical and mental health problems and to evaluate clients prone to neurosis and depression[13,14,16]. When tabulating the subjects' scores, their answers were measured using a 4-point scale, and the GHQ scoring system was adopted. The GHQ-12 is the simplest version of the scale, and its validity has been verified by the World Health Organization[15]. According to Jackson *et al*.[21], a GHQ-12 score of ≥ 3 is deemed to represent a possibility of impaired mental health.

Generalized Self-Efficacy Scale (GSES)

The Japanese version of the Generalized Self-Efficacy Scale[36] was used to measure self-efficacy. Generalized self-efficacy affects actions in general and everyday situations over a long period of time, regardless of individual problems and circumstances, and represents a cognitive tendency of personality characteristics. The GSES was developed to demonstrate

that the self-efficacy scale created by Sherer *et al.*[41] was sufficiently applicable and useful, independent of gender and age, when applied to a Japanese community sample. The scale is comprised of 23 questions, each measured using a 5-point scale. A higher total raw score for each question indicates a higher level of self-efficacy.

Numerous studies have examined the associations between self-efficacy, anxiety, and depression as well as the effect of CBT on self-efficacy[30,33,35]. We intended to examine the effect of the iCBT on not only psychological distress, but also self-efficacy. Therefore, we included the Generalized Self-Efficacy Scale (GSES) in the present study.

Statistical analyses

SPSS was used for the statistical analyses. An unpaired *t*-test was used to compare the demographics and the psychological data between the two groups. For a comparison of the interventional effects of the program, a two-way repeated analysis of variance (ANOVA) was used.

RESULTS

Program implementation

All 40 subjects (100%) in the intervention group participated in the group learning. The

frequency of iCBT access was < 10 times for 7 subjects, 10–20 times for 17 subjects, and ≥20 times for 16 subjects. The mean access number during the intervention period was 16.9, and the mean access frequency (percentage obtained from the number of times that the website was accessed during the intervention period) was 40.1%. All 80 participants completed the assessment at baseline and the one after the intervention period (Figure 1). No significant differences in the assessment scores at baseline were seen between the two groups.

Although we scheduled the intervention so that it would not conflict with stressful events, such as examinations and sports tournaments occurring during the intervention period, it was difficult to avoid unpredictable stressful events.

Figure 1 about here

Effectiveness of intervention

A two-way repeated measures ANOVA was used to compare the effects of the intervention between the two groups. A statistically significant interaction was observed in the K6 scores for group × time (F (1, 78) = 7.279; P = 0.009) (Table 2). Regarding the K6 score, there were no significant changes between the pre- and post-intervention time points in the intervention

group (P = 0.223). On the other hand, there was a significant exacerbation between the 2 time points in the control group (P = 0.013). A significant difference between the K6 scores at baseline was not seen between the two groups (P = 0.191). However, there were no significant interactions in GHQ-12 and GSES between the two groups.

Table 2 about here

DISCUSSION

This study was designed to develop and implement a mental healthcare program comprised of group learning and an iCBT-based intervention for high school students and to investigate the program's effectiveness. The results showed a deterioration in the K6 scores for depression in the control group but a preservation of the scores in the intervention group. These results suggest that the iCBT might have alleviated various distresses experienced by the students that seem to be associated with adolescent insecurity, while the students who did not receive any special care might have encountered such distresses and might have experienced an exacerbation of their mental health problems. The iCBT seems to be a convenient and efficient means of coping with psychological distress, such as depressed mood and anxiety. A meta-analysis review found it difficult to improve depressed mood using

a prevention program for the general population[19]. However, CBT-based programs targeted at the universal level have recently been developed, and their effectiveness has been revealed in many randomized controlled trials[5]. The results of this study suggest that an iCBT-based mental healthcare program might be promising not only for young athletes, but also for the general youth population. This generation is familiar with internet tools, and such people can use internet programs easily without resistance. Moreover, they do not have to visit a clinic or to see a counsellor or doctor; therefore, they can also avoid concerns associated with stigmas or “wasted time” that might arise from visiting a clinic.

Mental healthcare programs that use iCBT, such as MoodGYM and CATCH-IT, have been found to have certain limitations that preclude effective prevention and treatment because of difficulties with forming therapeutic alliances through computer programs alone, numerous dropouts, and a low frequency of access among users[3,23]. In fact, a study that used MoodGYM found that 3,176 individuals accessed the site but only 138 people (4.3%) completed five sessions on the site[7]. The suggested reasons were a lack of knowledge among users, a weak credibility of the prevention program, and a lack of encouragement and feedback[1,46]. In light of these issues, the present study sought to first teach the subjects about the usefulness of cognitive restructuring for coping with stressful events, and the students were asked to recall times when they had experienced a depressed mood during

their daily school life as part of the group learning. By recollecting their thoughts and using iCBT, the subjects were able to understand and experience the importance of cognitive restructuring and the accessibility of iCBT. In addition to this approach, the school staff, including homeroom teachers, counsellors and school nurses, urged the subjects to access iCBT by sending weekly reminder emails. This may have led to the frequency of iCBT use and the stable mental status of the intervention group.

The Survey of Trends in Health and Welfare (Mental and Physical Health) conducted by the Japanese Ministry of Health, Labour and Welfare in 2002 reported that scores for the "Centre for Epidemiologic Studies Depression Scale[38)]," which measures the levels of depression, were highest among adolescents aged 15–19 years. Moreover, the mean score for this scale was very close to the cut-off point. This trend was also seen in the present study. The mean K6 score at baseline in the intervention group and that after the program in the control group were close to the cut-off point. This mood status may be due to stressful events such as examinations, sports tournaments, and matches during the program implementation period. Other possible stressful events at school include interpersonal relations, career choices, school sports team activities, and dating. These matters can involve complicated relationships or interactions and are a part of developmental changes. Considering these circumstances, it is worth mentioning that the K6 score was exacerbated in the control group,

whereas it was preserved in the intervention group. Since the mean K6 scores were close to the cut-off point and might be indicative that the threshold for probable mental illness had been met, it seems possible that the intervention might be treating current symptoms, rather than preventing depression and anxiety among young people. However, as the results did not show any significant improvement of the K6 scores in the intervention group, further research with a more specific assessment is needed. This iCBT-based mental healthcare program may be expandable and versatile, and the Japanese Ministry of Education has started to consider the introduction of tablet devices into public elementary and junior high schools.

Several limitations of the present study may prevent our findings from being fully generalizable. First, all the participants were from only one school, and all of them were young male athletes. Second, we did not conduct our research in a time-interactive way. Further research is therefore required to determine how long the positive effects are maintained. Third, this study was non-blinded, and the participants in the training and control groups attended the same campus and might have shared information. Fourth, the present study did not include a time-matched control intervention to consider the effect of the iCBT itself. Fifth, the intervention period during the current study was relatively short, although the iCBT interventions included in the meta-analysis are typically completed within 3 to 26

weeks[47].

Determining whether an intervention can meet the needs of subjects is crucial, especially during the early stage of mental illness[34]. Further studies are needed to develop optimal mental healthcare for young people.

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Tables

TABLE 1. Contents of internet-based cognitive behaviour therapy (iCBT) intervention

Group education (180 min)	Part 1. Lecture -The relationship between cognition, mood, and behaviour -What is CBT? -Benefits of learning CBT as stress management skills and how to apply it to the real life with examples Part 2. Group work and discussion; cognitive restructuring skill -How to fill out the column worksheet? -Recognizing automatic thoughts of their own -Group discussion about evidence that is against their own thought and adaptive thought -How to use iCBT
iCBT traning (4 weeks)	Each student underwent cognitive restructuring using iCBT

iCBT: internet-based cognitive behaviour therapy

TABLE 2. Effectiveness of the internet-based cognitive behaviour therapy (iCBT) intervention

		Intervention		Controls		ANOVA	
		Mean	SD	Mean	SD	$F_{(1,78)}$	*P*
K-6	Pre	4.9	3.9	3.7	4.0	7.279	0.009
	Post	4.2	3.6	5.2	4.3		
GHQ-12	Pre	3.0	2.4	3.3	2.7	0.294	0.589
	Post	1.6	1.7	2.2	2.3		
GSES	Pre	72.7	9.3	71.9	14.0	0.092	0.762
	Post	72.7	10.0	71.5	12.5		

K6: Kessler-6 scale; GHQ-12: General Health Questionnaire, 12 items; GSES: Generalized Self-Efficacy Scale; Pre: pre-intervention (at baseline); Post: post-intervention (4 weeks); SD: standard deviation; ANOVA: analysis of variance.

Figure legends

FIGURE 1. Flow chart for the study.

iCBT: internet-based cognitive behaviour therapy.

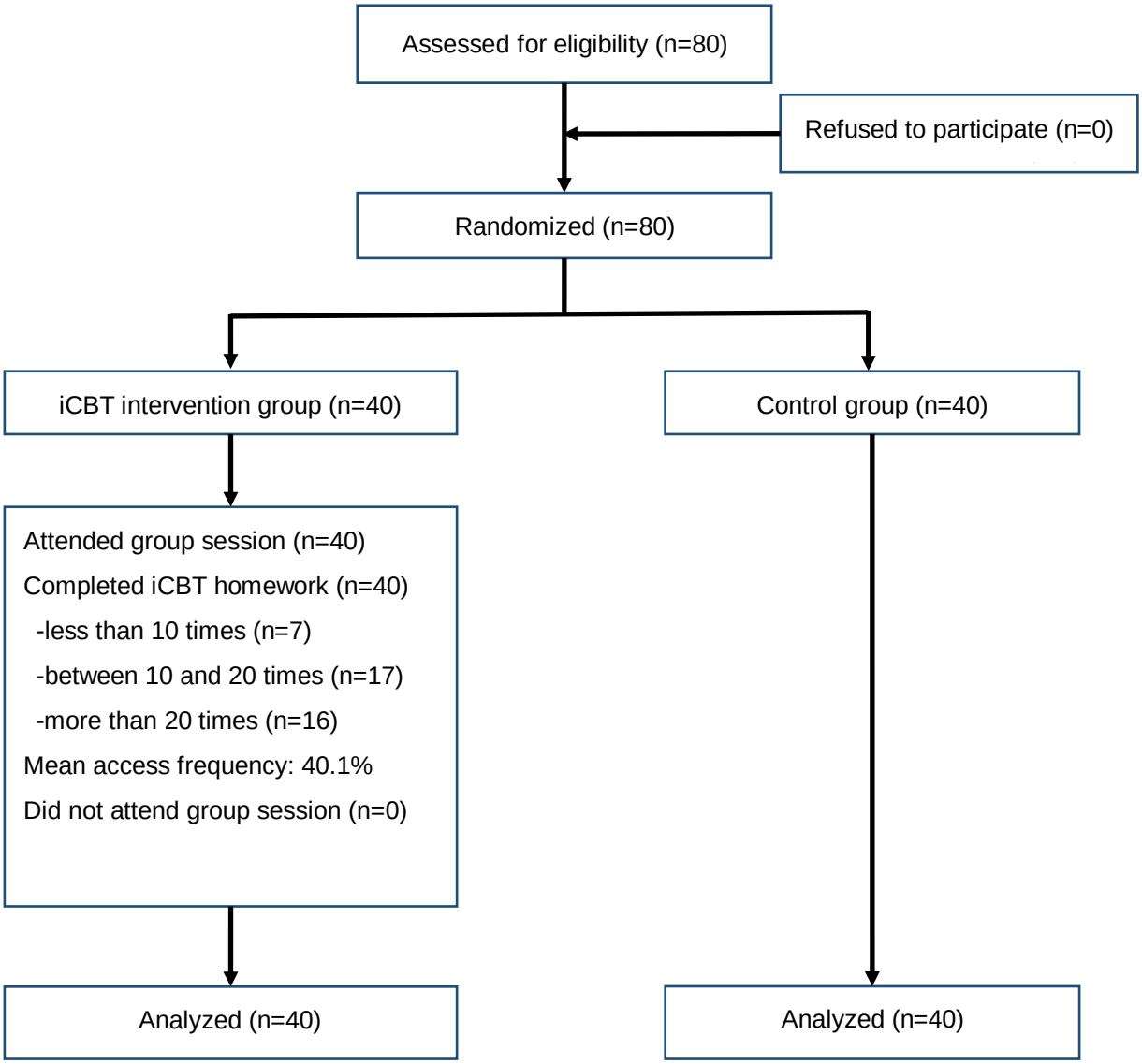

FIGURE 1. Flow chart for the study.

iCBT: internet-based cognitive behaviour therapy.