

Effects of a Classroom-Based Stress Management Program by Cognitive Reconstruction for Elementary School Students

Shinya Takeda,* Risa Matsuo† and Minako Ohtsuka‡

*Department of Clinical Psychology, Tottori University Graduate School of Medical Sciences, Yonago 683-8503, Japan, †Department of Child studies, College of Humanities, Okinawa University, Naha 902-8521, Japan, and ‡Hyogo Earthquake Memorial 21st Century Research Institute, Hyogo Institute for Traumatic Stress, Kobe 651-0073, Japan

ABSTRACT

Background The present study evaluates the effects of a classroom-based universal program for stress management among elementary school students.

Methods The participating children (aged 11–12 years) were assigned to either an intervention ($n = 172$) or a control group ($n = 100$). The program involved one 45-minute session during school hours. The program taught students about cognitive distortions and trained them using cognitive reconstruction. Cognitive distortions were characterized so that children could easily understand them. Students were asked to complete the Children's Stress Response Test, comprised of five questions about self-efficacy about cognitive reconstruction before and after the program, to assess the program's effects.

Results The results as observed in the intervention group were as follows: (a) stress responses decreased, (b) self-efficacy in the awareness about one's feelings and thinking improved, (c) understanding how thinking affects feelings was prompted, (d) self-efficacy to review one's thinking improved when they felt uncomfortable, and (e) self-efficacy to change one's negative thinking to adaptive thinking improved.

Conclusion These results suggest that the program was useful for reducing stress responses and improving self-efficacy in cognitive reconstruction among children.

Key words elementary school children; stress management; classroom-based program; cognitive reconstruction

In recent years, school refusal of children has become a problem in Japan. According to a survey by the Ministry of Education, Culture, Sports, Science and Technology, more than half of students' school refusal is due to emotional confusion such as anxiety and stress

responses such as apathy.¹ Therefore, it is essential to teach stress management classes in elementary schools to deal with the problems that children have, such as school refusal, at an early stage.

Cognitive behavioral therapy (CBT) is a technique attracting attention in the area of stress management. Several studies have reported that CBT enhances cognitive flexibility^{2–5} and is effective in the prevention and treatment of depression.^{6–8} Childhood depression increases the risk for future depressive disorders in adulthood.^{9, 10} Therefore, the practice of stress management through CBT can be expected to contribute to children's mental health by encouraging them to practice self-care in the present and future. Classroom-based programs using CBT for children have been reported by Spence et al.¹¹ utilizing problem-solving therapy and Skyrabina et al.¹² focusing on cognitive reconstruction and emotional regulation skills. Stallard et al.⁸ reported that classroom-based cognitive behavioral therapy programs might lead to increased self-awareness and improvement of depressive symptoms. In these previous studies, children who participated in classroom-based programs showed improvements in both depression and anxiety. Furthermore, Spence¹³ reported that a cognitive approach to children could be useful in maintaining their adaptive behavior. Moreover, Leitenberg et al.¹⁴ and Shirk et al.¹⁵ reported that cognitive distortions have a strong effect on children's stress responses such as depression and anxiety. These findings suggest that stress management programs for children need to focus specifically on cognitive aspects.

In Japan, it is becoming increasingly important to introduce stress management into schools. It is practical for homeroom teachers, rather than experts, to implement stress management in school settings. If homeroom teachers administer stress management programs using a classroom-based approach, they can reach a large number of children. However, courses in the core curriculum are increasing yearly, so it is challenging for educators to prioritize stress management classes. Therefore, stress management classes practiced by homeroom teachers need to be structured into a program that can be completed with minimal individual

Corresponding author: Shinya Takeda, PhD

takedas@tottori-u.ac.jp

Received 2020 June 18

Accepted 2020 August 4

Online published 2020 August 20

Abbreviations: CBT, Cognitive behavioral therapy; CSR, Children's Stress Response Test

burden and time commitment. In addition, previous studies in Japan have primarily focused on stress management programs for junior high school students,¹⁶ and few have focused on stress management programs using cognitive reconstruction for elementary school-aged children.

Considering the above, it is desirable to develop a stress management program that satisfies the following conditions: (a) it can be put into practice by homeroom teachers in their classrooms, (b) it does not have a burdensome structure for homeroom teachers, (c) it focuses on cognitive aspects, (d) it is effective in reducing children's stress responses, and (e) it can be applied to elementary school students. However, to date, there are no reports on stress management programs that take all of these conditions into account. The purpose of this study was twofold: to develop a stress management program using cognitive reconstruction where elementary school teachers could practice, and to evaluate its effect. Cognitive reconstruction is a typical technique within CBT, which attempts to improve unpleasant feelings by modifying cognitions.¹⁷

SUBJECTS AND METHODS

Subjects

Two hundred seventy-two children from 11 public elementary schools in western Japan were included in the study. Of these, 172 were in the intervention group that implemented the program (101 fifth graders, 71 sixth graders, 91 boys, and 81 girls) and 100 were in the control group that did not implement the program (48 fifth graders, 52 sixth graders, 63 boys, and 37 girls).

The elementary school homeroom teachers who conducted the program in the classroom were recruited from a training session done by the first author. At the end of the training session, we explained the program and the purpose of the study. Then, we randomly assigned those who agreed by email to implement the program to the intervention group or the control group. Seven schools were selected for the intervention group to ascertain that the homeroom teachers could implement this program smoothly. Then, we distributed the program manual and PowerPoint presentation to the intervention group teachers. In the intervention group, teachers conducted classes using the program, and in the control group, teachers performed health classes conducted at the discretion of the teachers.

Program procedures

The program consisted of a 45-minute, single-session class and was structured using PowerPoint so that the teachers could deliver the program easily by following

the manual and PowerPoint distributed in advance.

It was designed to help children become aware of the thinking that prompted their disagreeable feelings and turn those feelings into adaptive thinking. It consisted of the following five steps. Within the program, thinking was described as a "message," negative thinking as a "negative message," and adaptive thinking as a "positive message," taking into account the children's ease of understanding.

(a) Introduction

Children worked in pairs to convey the positive and negative messages on the screen to each other non-verbally through facial expressions, gestures, and touch. By doing so, we aimed to draw attention to the fact that the message had both positive and negative content.

(b) Understanding the cognitive model

The cognitive model is that a person's feelings in a situation are determined by his or her cognition of that situation.¹⁷ An understanding of the cognitive model is important in the practice of cognitive therapy. Based on the cognitive model, the teacher explained that we feel good when a positive message comes up, and we feel bad when a negative message appears. The children also learned that depending on their thinking, their subsequent feelings would be different.

(c) Understanding cognitive distortions

The teacher explained that the reason people think differently when they experience the same events is because of cognitive distortions. Four types of cognitive distortions were used: 'jumping to conclusions,' 'should statements,' 'personalization,' and 'labeling,' in reference to Leitenberg et al.¹⁴ Jumping to conclusions is a pessimistic belief with no rational basis. Should statements are the demand for rigid, fixed ideals in the way oneself and others behave. Personalization is the belief that another person's negative behavior is one's own fault. Labeling is putting a negative and extreme label on oneself or others. The cognitive distortions were named 'Yugamin,' because 'distortion' is 'yugami' in Japanese. The four cognitive distortions were characterized as follows (Fig. 1). Jumping to conclusions was characterized as 'Jumper.' Should statements were characterized as 'Bekky,' because 'should' is 'beki' in Japanese. Personalization was characterized as 'Jeebun,' because 'oneself' is 'jibun' in Japanese. Labelling was characterized as 'Labeler.' Additionally, the teacher set up the following events: "I saw my friend across the street while I was walking. I said hello to him, but he didn't answer," and explained specifically what negative

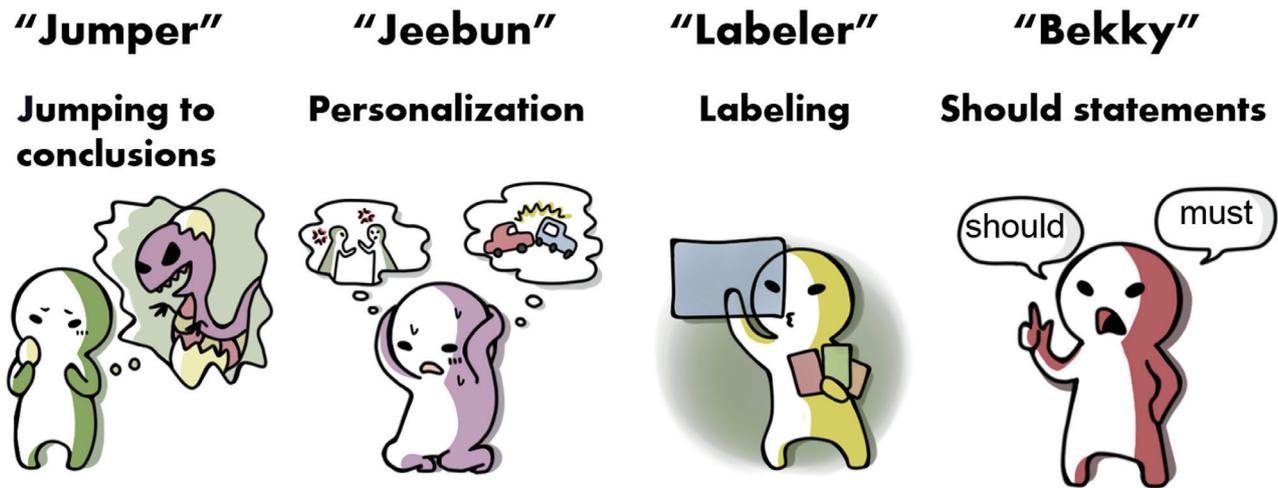


Fig. 1. Four characterized cognitive distortions. This figure shows the characterization of cognitive distortions. Jumping to conclusions is a pessimistic belief with no rational basis. Should statements are the demand for rigid, fixed ideals in the way oneself and others behave. Personalization is the belief that another person's negative behavior is one's own fault. Labeling is putting a negative and extreme label on oneself or others.

thoughts are more likely to occur during this event when we are affected by each Yugamin.

Moreover, the teacher expressed the change in feelings using a “thermometer of feelings” and told them that when they are affected by Yugamin, they experience negative messages. When those negative messages appear, the thermometer of feelings drops to negative.

(d) Producing adaptive thinking

The teacher told students that when a negative message turns into a positive message, the thermometer of feelings goes up to positive. The children were then asked to consider the type of positive message that would raise the thermometer of their feelings in the events described in (c). The four points were: “If a good friend had the same problem as you, what would you say to him or her?,” “There is no right or wrong in a positive message,” “Think of one positive message for each person,” and “If it doesn't come to mind, you can think about it with a group of friends,” were given as hints for thinking about positive messages.

The teacher asked a few children to respond spontaneously to what positive message came to mind. After, the children were asked to imagine how the thermometer of feelings would change according to the positive message they had conceived by coloring their thermometers.

(e) Creating cognitive attitudes that produce adaptive thinking

Children were asked to work with their group to create the character who could produce adaptive thinking. The

teacher instructed, “Let's think of a character who can produce a positive message, just like a negative message comes to mind when you befriend Yugamin.” The children worked with their peers to create names and illustrations of characters who would produce adaptive thinking. The children discussed and considered the positive messages the character could produce during stressful events. At the end of the session, each group was asked to present the character that they had created.

Measurement

The effectiveness of this program was evaluated from two aspects: outcome evaluation and impact evaluation. Outcome evaluation refers to the direct effect of the program on participants' stress responses, and impact evaluation refers to the effect of the program on participants' awareness and self-efficacy in providing self-help using cognitive reconstruction. The authors conducted evaluations both before and after the program.

(a) Outcome evaluation

We used the Children's Stress Response Test (CSR)¹⁸ to evaluate the effects of the program on the stress responses of the participants. The CSR is a self-report questionnaire that captures the stress responses of children from elementary to high school age and consists of 12 items such as “irritated,” “difficult to work hard,” “depressed,” and “stomachache.” The responses were scored from “not applicable at all” (0 points) to “often applicable” (3 points). The CSR consists of three subscales: ‘anger,’ ‘apathy,’ and ‘depression/physical reaction,’ and reliability and validity has been shown.

Table 1. Questionnaire about impact evaluation of the program

Question 1	Do you think that you can be aware of your own feelings?
Question 2	Do you think that you can be aware of your own thinking?
Question 3	Do you think that if your thinking changes, your feelings will change, too?
Question 4	Do you think that when you feel uncomfortable, you can review your thinking ?
Question 5	Do you think you can change negative thoughts to positive ones?

In the present study, the total scores were used to assess the overall stress response. The CSR scores ranged from 0 to 36, with higher scores indicating stronger stress responses. The CSR is applicable from upper elementary to high school. The reason for using this scale is to compare the effects of this program on elementary, junior high and high school students in future studies.

(b) Impact evaluation

We assessed impact evaluation from five questions (Table 1). Question 1 asked about self-efficacy in the awareness about one's feelings. Question 2 asked about self-efficacy in the awareness about one's thinking. Question 3 asked about understanding how thinking affects feelings. Question 4 asked about self-efficacy to review one's thinking. Question 5 asked about self-efficacy to change one's negative thinking to adaptive thinking. For each question, respondents were asked to respond using a four-item method, ranging from "disagree" (0 points) to "agree" (3 points), with a higher score indicating a higher degree for each.

Statistical analysis

To investigate the differences between the intervention and control groups before program implementation, we used Welch's test for each evaluation scale score. If any of the variables showed differences, we adjusted for them as covariates. To examine the effects of the program, we performed a two-factor analysis of covariance using group (intervention and control groups) and time-point (before and after implementation of the program) as independent variables and each evaluation scale scores as dependent variables. Additionally, we calculated Pearson's correlation coefficients (r)¹⁹ as effect sizes if we observed an interaction.

Ethical considerations

Participants received an overview of the study and written explanations that data gathered in this study would be analyzed so that individuals could not be identified, only those who consented would be analyzed, and no disadvantages would arise because of consenting or not consenting to participate in the study. Informed

consent was then obtained. This study was approved by the Institutional Review Board at the Tottori University Faculty of Medicine (No. 1964). The study was conducted in accordance with the ethical standards in the 1964 Declaration of Helsinki.

RESULTS

Differences in each evaluation scale for the two groups before the program

Characteristics were compared between the intervention and control groups (Table 2). No significant differences were observed in the CSR scores ($t = 1.90$, not significant; n.s.) and scores on self-efficacy in the awareness about one's feelings ($t = 1.93$, n.s.) between the two groups.

In contrast, there were significant differences in the scores on self-efficacy in the awareness about one's thinking, understanding how thinking affects feelings, self-efficacy to review one's thinking, and self-efficacy to change one's negative thinking to adaptive thinking. Each score was higher in the control group than in the intervention group. Therefore, a two-factor analysis of covariance was performed using scores on self-efficacy in the awareness about one's thinking, understanding how thinking affects feelings, self-efficacy to review one's thinking, and self-efficacy to change one's negative thinking to adaptive thinking as covariates.

Outcome evaluation

Changes in the CSR scores in the intervention and control groups before and after program implementation are shown in Table 2. The interaction between group and time-point was significant for the CSR scores [$F(1,266) = 17.92$, $P < 0.001$]. Moreover, Pearson's correlation coefficient showed a small effect size ($r = 0.25$). The test for simple main effects using Bonferroni revealed no change in the score in the control group before and after the program implementation; however, in the intervention group, the score was significantly lower after program implementation than before [$F(1,266) = 91.16$, $P < 0.001$].

Table 2. Differences in each group

	Intervention group (<i>n</i> = 172)		Control group (<i>n</i> = 100)	
	Pre	Post	Pre	Post
[Outcome evaluation]				
CSR	3.71 (4.60)	1.70 (3.08)	2.72 (3.84)	2.29 (3.79)
[Impact evaluation]				
Self-efficacy in the awareness about one's own feelings	1.76 (1.04)	2.20 (0.96)	1.97 (0.77)	2.04 (0.93)
Self-efficacy in the awareness about one's own thinking	1.52 (1.03)	2.16 (0.95)	1.81 (0.86)	1.84 (0.95)
Understanding how thinking affects feelings	1.84 (1.14)	2.37 (0.94)	2.29 (0.84)	2.16 (1.02)
Self-efficacy to review one's thinking	1.32 (1.00)	2.05 (0.98)	1.70 (0.89)	1.83 (1.04)
Self-efficacy to change one's negative thinking to adaptive thinking	1.55 (1.06)	2.37 (0.84)	1.97 (0.81)	2.05 (0.98)

Standard deviations are in parentheses. CSR, Children's Stress Response Test.

Impact evaluation

Changes in each impact evaluation score in the intervention and control groups before and after program implementation are shown in Table 2. The interaction between group and time-point was significant for all impact evaluation scores [score on self-efficacy in the awareness about one's feelings: $F(1,266) = 9.09$, $P < 0.01$; score on self-efficacy in the awareness about one's thinking: $F(1,267) = 19.54$, $P < 0.001$; score on understanding how thinking affects feelings: $F(1,267) = 23.40$, $P < 0.001$; score on self-efficacy to review one's thinking: $F(1,267) = 20.19$, $P < 0.001$; score on self-efficacy to change one's negative thinking to adaptive thinking: $F(1,267) = 24.10$, $P < 0.001$]. Moreover, Pearson's correlation coefficient showed a small effect size (score on self-efficacy in the awareness about one's feelings: $r = 0.18$; score on self-efficacy in the awareness about one's thinking: $r = 0.26$; score on understanding how thinking affects feelings: $r = 0.28$; score on self-efficacy to review one's thinking: $r = 0.27$; score on self-efficacy to change one's negative thinking to adaptive thinking: $r = 0.29$). The test for simple main effects using Bonferroni revealed no change in the score in the control group before and after the program implementation; however, in the intervention group, all impact evaluation scores were significantly higher after program implementation than before [score on self-efficacy in the awareness about one's feelings: $F(1,266) = 38.61$, $P < 0.001$; score on self-efficacy in the awareness about one's thinking: $F(1,267) = 73.21$, $P < 0.001$; score on understanding how thinking affects feelings: $F(1,267) = 46.82$, $P < 0.001$; score on self-efficacy to review one's thinking: $F(1,267) = 92.22$, $P < 0.001$; score on self-efficacy to change one's negative thinking to adaptive thinking: $F(1,267) = 105.46$, $P < 0.001$].

DISCUSSION

In the present study, we developed a classroom-based stress management program practiced by elementary school teachers and evaluated its effect on stress responses and self-efficacy about cognitive reconstruction in children. The results of the present study indicate that this program may have a positive effect on reducing stress responses and enhancing self-efficacy about cognitive reconstruction in children.

Changes in CSR scores were not noted in the control group, whereas those in the intervention group decreased after the program, although the effect size was small. Previous studies have primarily focused on stress management programs for junior high school students, and few have focused on stress management programs using cognitive reconstruction for elementary school-aged children. Moreover, previous stress management programs have consisted of several sessions consisting of multiple techniques.^{11, 12, 20} For example, the stress management program by Miura and Agari for junior high school students consisted of two lessons on teaching students about psychological stress mechanisms and training them in progressive muscle relaxation.¹⁶ They reported that this stress management program was effective in reducing stress in junior high school students. In contrast, the program used in this study was completed in a single lesson and was found to be effective in reducing stress in elementary school students. This program also differs from previous research in that it increased self-efficacy in using cognitive reconstruction. These suggest that this program has the potential to be a cost-effective stress management program.

In Japanese elementary schools, mandatory courses have increased recently, so allocating time for stress management-related courses is challenging.

This program is designed to be completed in a single class so that teachers can complete it with minimal burden and without drastically revising their teaching plans. Furthermore, we focused on cognitive aspects to increase stress management effectiveness, with home-room teachers being responsible for implementing the program. The results suggest that this program may be useful as a stress management with the effect of reducing children's stress responses.

In terms of impact evaluation, scores on self-efficacy about cognitive reconstruction did not change in the control group. In contrast, those in the intervention group increased after the program, although the effect size was small. The first step in using cognitive reconstruction as a means of self-help is to become aware of one's uncomfortable feelings and the thinking that has affected those feelings. Additionally, a deeper understanding of the cognitive model that feelings are affected by thinking will promote the motivation to reflect on cognition when one experiences unpleasant feelings and will enable one to engage in adaptive thinking. Therefore, increased self-efficacy in these areas suggests that this program may be effective in helping elementary school children to perform self-help through cognitive reconstruction.

In this program, we replaced thinking with the word 'message,' and the children conveyed positive and negative messages to their partners through facial expressions, gestures, and touches. Communicating positive and negative messages to each other through non-verbal communication, the children could realize that there are contrary contents in their thoughts and that the individual feelings they experience are different as a result. Then, through events that are familiar to the children, we devised a way to visually depict that different thinking occurs due to cognitive distortions and that feelings change under the influence of thinking using a character called Yugamin and a tool called a 'thermometer of feelings.' These constructs may have enhanced self-efficacy in the awareness about one's feelings, self-efficacy in the awareness about one's thinking, and understanding of how thinking affects feelings.

It is necessary to reduce the influence of thoughts by examining their validity to perform cognitive reconstruction. Examining the validity of thoughts requires the ability to recognize the irrationality of thoughts in accordance with reality.¹⁶ By identifying the cognitive distortions that affect a thought, one can recognize its irrationality. In this program, we externalized cognitive distortions as characters and explained how thinking tends to arise from these distortions through events familiar to children. Moreover, one of the features of

this program is that the children created characters that produce adaptive thinking more easily. It is challenging to learn self-help with cognitive reconstruction using individual stressful events that children experience in a single short class period. Therefore, the children were asked to imagine cognitive attitudes that can be applied to any event by creating a character. The structure of this program using these characters may have enhanced self-efficacy to review one's thinking and to change one's negative thinking to adaptive thinking.

Finally, this study had some limitations. The effects of the program were measured through changes in stress responses before and after class, so it is challenging to evaluate rigorously whether the acquisition of targeted cognitive skills was effective in reducing the children's stress responses. Therefore, it is necessary to conduct a follow-up investigation after a certain period after the implementation of the program to examine whether the children are utilizing these newly obtained cognitive skills and whether the reduction of stress responses is sustained. A unique feature of this program is that it is completed in a single class. Therefore, the differences between this program and other multiple-class stress management programs in terms of long-term effects need to be examined in the future. This study did not examine how strictly the teachers implemented the program. Since strict adherence may affect the effectiveness of the program, this factor as it relates to effectiveness should be explored in subsequent studies.

Acknowledgments: The authors thank the teachers and children for their cooperation with this study.

The authors declare no conflict of interest.

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