

## Preventive Psychoeducation Program to cope Mental and Physical Changes after Disasters

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### Introduction

Since the Great-Hanshin-Awaji Earthquake in 1995, we have experienced a lot of big earthquakes. After going through an earthquake, many children need to be mentally treated. Such mental care includes psychological education to learn stress and disaster mechanisms and stress management to cope stress. It has been pointed out that it is extremely important to provide such mental care immediately after a disaster (Tominaga, et al., 2008). Such psychological education has been focusing on clinical senses and not much examination has been done on program effects based on evidence.

On the other hand, parents take an important role in mental care of their children. However, many parents have claimed that they “did not know how to cope” mental and physical changes of their children after a disaster and are concerned if “the children may remain in the same state for the rest of their lives.” It has been clarified that even school teachers were confused about children’s mental and physical changes and could not provide sufficient consultation to the parents (Kobayashi, 2006a, 2006b). Mental and physical reactions are usually temporary and children will regain their normal states when recovering from aftershocks and going back to normal diet and sleep. However, instability of parents may further promote unstable state of mind of children. In case of a wide-scale disaster, it may be too late to provide care after an earthquake occurs. Therefore, it is necessary to promote methods to cope children’s stress caused by disasters.

2. In this study, we developed a program using educational materials, which covers predictable mental and physical changes after earthquakes and how to cope them, provided lectures to children and parents with this program and examined the effects.

### Methods

#### (1) Educational Materials

A lecture was prepared in reference to La Greca & Prinstein (2002), Halpern & Tramontin (2006), Fujimori (2004), Fujimori, Okada, Nishiwaza & Osawa (1998) and Tominaga & Yamanaka

(1999) and consisted of, 1) stress reaction mechanisms, 2) mental and physical changes associated with stress, and 3) methods to cope the mental and physical reaction. We prepared educational materials including these three subjects by using presentation software Microsoft Office PowerPoint 2003 based on the assumption that stress reaction mechanisms may be better understood when using animation functions of the presentation software than using leaflets.

Next, we had a psychiatrist check the materials so that they would not have any psychiatric problems. We further had one elementary school teacher and two junior high school teachers (science and health and physical education) check the materials if they were easy for children to understand. By these checks, validity of the materials was confirmed (Kobayashi, et al., 2009).

## (2) Participants

### 1) Elementary school pupils

A forty-five-minutes lecture was offered to a class of 35 pupils (fifth and sixth grade) at A Elementary School in S city, S prefecture in December 2008. Pre- and post-tests were also conducted in December 2008.

### 2) Junior high school students

A thirty-minutes lecture was offered to 580 students at a whole school assembly at B Junior High School in S city, S prefecture in December 2008. Thirty-four students out of the total took pre- and post-tests in December 2008.

### 3) High school students

A sixty-minutes lecture was offered to 400 students at a whole school assembly at a prefectural school in F city, S prefecture in December 2008. Forty-nine students out of the total only took a post-test.

### 4) College students

A ninety-minutes lecture was offered to 85 students in a teacher-training lecture at S university in S prefecture in January 2009. Sixty-eight students (mainly junior students) out of the total only took a post-test without missing responses.

### 5) Parents of elementary school pupils.

A sixty-minutes lecture was offered to 20 parents with children who go to A Elementary School in S city, S prefecture in October 2008. Seventy parents took pre- and post-tests without missing responses in October 2008. Five parents were in 30's, eight were in 40's, three were in 50's and one was in 60's.

### 6) Parents with disabled children

A sixty-minutes lecture was offered to 35 parents with disabled children in S prefecture in November 2008. The lecture was advertised through a Group of Parents with Disabled Children and the Internet. Twenty-eight parents only took a post-test without missing responses. One parent was in 20's, one was in 30's, 20 were in 40's, five were in 50's and one was in 60's.

#### 7) Community residents

A sixty-minutes lecture was offered to 40 community residents who had participated in a disaster volunteer lecture hosted by the Social Welfare Council in N city, Shizuoka prefecture. The lecture was provided in June 2008. Thirty-four residents only took a post-test without missing responses. Two residents were teenagers, two were in 30's, five were in 40's, ten were in 50's, eleven were in 60's and four were in 70's.

#### (3) Lecturing methods

Forty-five- to sixty-minutes lectures were offered depending on the students by using PowerPoint slides. The materials were also handed out to students for their record.

#### (4) Questionnaires

3. In order to understand how well students know about mental care after disasters, we prepared a questionnaire based on the educational materials. The questionnaire consisted of eleven questions about stress reaction mechanisms, sixteen questions about mental and physical changes and sixteen questions about handling methods and respondents were asked to answer by checking "I agree," "I disagree" or "Neither." The questionnaire was prepared by using standard answer sheet research software, SQS (Shared Questionnaire System) and the responses were collected by using a scanner, Fujitsu ScanSnapS500. The data were all statistically analyzed by SPSS ver.14.

## Results and discussions

#### (1) Changes in knowledge after lectures

The questionnaire was conducted on three groups, "elementary school students," "junior high school students" and "parents of elementary school children." We conducted a *t* test pre- and post-tests on each group with mean score of "stress reaction mechanisms," "mental and physical changes" and "handling methods" as dependent variables. A "elementary school students" group indicated a significantly high score for the post-test related to the three standard scores of "stress reaction mechanisms" ( $t(35)=3.60, p<.001$ ), "mental and physical changes" ( $t(35)=3.34, p<.01$ ) and "handling methods" ( $t(35)=3.81, p<.001$ ) (see Table 1).

Table 1: Changes in Knowledge of Elementary School Students after Lectures

	Stress reaction mechanisms		Mental and physical changes		Handling methods	
	PRE	POST	PRE	POST	PRE	POST
MEAN	5.06	7.56	6.92	10.06	8.78	11.97
SD	2.43	3.24	3.32	4.62	3.56	3.92
t	3.60***		3.34**		3.81***	

$p<.05^*$ ,  $p<.01^{**}$ ,  $p<.001^{***}$

A “junior high school students” group indicated a significantly high score for the post-test related to “stress reaction mechanisms” ( $t(33)=3.06, p<.01$ ) and “handling methods” ( $t(33)=2.16, p<.05$ ). However, it did not indicate significant difference in “mental and physical changes” ( $t(33)=1.35, n. s.$ ) (see Table 2).

Table 2: Changes in Knowledge of Junior High School Students after Lectures

	Stress reaction mechanisms		Mental and physical changes		Handling methods	
	PRE	POST	PRE	POST	PRE	POST
MEAN	5.68	7.53	7.03	8.53	9.47	11.91
SD	2.08	3.06	4.34	5.61	4.44	4.64
t	3.06**		1.35		2.16*	

$p<.05^*$ ,  $p<.01^{**}$ ,  $p<.001^{***}$

A “parents of elementary school students” group indicated a significantly high score for the post-test related to the three standard scores of “stress reaction mechanisms” ( $t(14)=2.32, p<.05$ ), “mental and physical changes” ( $t(14)=2.18, p<.05$ ) and “handling methods” ( $t(14)=4.60, p<.001$ ) (see Table 3).

Table 3: Changes in Knowledge of Parents of Elementary School Students after Lectures

	Stress reaction mechanisms		Mental and physical changes		Handling methods	
	PRE	POST	PRE	POST	PRE	POST
MEAN	9.13	10.47	12.53	15.00	12.73	15.00
SD	1.92	0.92	3.74	2.65	1.91	0.00
t	2.32*		2.18*		4.60***	

$p<.05^*$ ,  $p<.01^{**}$ ,  $p<.001^{***}$

From these results, understanding of “stress reaction mechanisms” and “handling methods” was proven to have significantly increased on the post-tests in all three groups. This confirmed that students had obtained some knowledge by the lectures. While understanding of “mental and physical changes” was significantly high in “elementary school students” and “parents of elementary school students” groups, but it was not in “junior high school students” group. This is assumed to be attributable to the difference in lecture styles rather than developmental issues. The lecture was only offered to junior high school students at a whole school assembly. In terms of developmental stages, elementary school students indicated high increase in understandings for the three standard scores compared to junior high school students. The lecture was offered to elementary school students in a class instead of a whole school assembly. This possibly indicates junior high school students 1) were lectured in an environment where they could not easily focus on and 2) had a thirty-minute lecture, which was shorter than the lectures for other groups and was not enough to provide sufficient explanations. In other words, it indicates

that lectures should be provided to children in small classes to ensure better understanding.

## (2) Differences in students' understandings

In order to examine if understanding levels were different depending on the student groups after lectures, we compared standard scores of post-tests. As some questions were added to "community residents" and "parents of elementary school students", which were not included in the questionnaires, we eliminated two questions from "scores about mental and physical changes after disasters" and four questions from "scores about method to cope stress after disasters." "I agree" was counted as one point for each score. We conducted one-way analysis of variance with student groups as independent variables and standard scores as dependent variables.

As a result, we confirmed a significant difference among student groups in terms of "reaction mechanisms" ( $F(6, 260)=14.59, p<.001$ ) and conducted Tukey's multiple comparison test and found significant differences between "elementary school students," "junior high school students," "high school students," and "college students," "parents of elementary school students," "parents of disabled children" and "community residents." This implies that post-test scores were high for students over twenty years old. In other words, lectures targeted at people over twenty years old (college students or older) are extremely effective in promoting proper care (see Table 4).

**Table 4: Comparison of Post-test Scores on  
"Standard Related to Stress Reaction Mechanisms"**

	1) Elementary school students	2) Junior high school students	3) High school students	4) College students	5) Parents of elementary school students	6) Parents of disabled children	7) Community residents	F	
N	36	34	49	68	17	28	35		
MEAN	7.6	7.5	7.6	10.1	10.5	10	9.3	14.59***	1) 2) 3) <
SD	3.2	3.1	2.4	1	0.9	1.3	2		4) 5) 6) 7)

$p<.05^*$ ,  $p<.01^{**}$ ,  $p<.001^{***}$

In terms of scores on "mental and physical changes," "college students" had the highest score while "junior high school students" had the lowest score. As a result of one-way analysis of variance, we confirmed a significant difference among groups ( $F(6, 260)=25.87, p<.001$ ) and conducted Tukey's multiple comparison to find significant differences among "elementary school students," "junior high school students," "high school students," "college students," "parents of elementary students" and "parents of disabled children." Furthermore, "community residents" had higher scores than "junior high school students" and "high school students", but lower than "college students" (see Table 5). This implies that "mental and physical changes" as well as "reaction

mechanisms” indicated high scores on people over twenty years old and that mental and physical changes are easier for this group of people to understand. Although we did find a difference between “junior high school students” and “high school students” and “community residents” group, we did not find any significant difference with elementary school students. About half of “community residents” group were aged sixty or older. People who need assistance in escaping and living in case of disasters are not only children but also senior citizens over sixty years old. Therefore, the fact that “community residents” have lower score than other groups is likely to be attributable to the older age composition.

**Table 5: Comparison of Post-test Scores on  
“Standard Related to Mental and Physical Changes after Disasters”**

	1) Elementary school students	2) Junior high school students	3) High school students	4) College students	5) Parents of elementary school students	6) Parents of disabled children	7) Community residents	F	
N	36	34	49	68	17	28	35		
MEAN	9.11	7.74	8.10	13.79	13.35	12.54	11.31	25.87***	1) 2) 3) <4) 5) 6)
SD	3.96	4.89	3.36	0.59	1.97	2.49	3.97		2) 3) <7) <4)

$p < .05^*$ ,  $p < .01^{**}$ ,  $p < .001^{***}$

In terms of “handling methods,” “parents of elementary school students” had the highest score while “high school students” had the lowest. As a result of one-way analysis of variance, we confirmed a significant differences among the groups ( $F(6, 260) = 13.80, p < .001$ ) and conducted Tukey’s multiple comparison to find significant differences among “elementary school students,” “junior high school students,” “high school students,” “college students,” “parents of elementary school students” and “parents of disabled children.” Furthermore, “community residents” had higher score than “high school students” while lower than “parents of elementary school students” (see Table 6).

**Table 6: Comparison of Post-test Scores on  
“Standard Related to Methods to Cope Stress after Disasters”**

	1) Elementary school students	2) Junior high school students	3) High school students	4) College students	5) Parents of elementary school students	6) Parents of disabled children	7) Community residents	F	
N	36	34	49	68	17	28	35		
MEAN	9.28	9.15	8.43	11.59	12.00	11.54	10.17	13.80***	1) 2) 3) <4) 5) 6)
SD	2.90	3.47	2.97	0.80	0.00	1.04	2.72		3) <7) <5)

$p < .05^*$ ,  $p < .01^{**}$ ,  $p < .001^{***}$

This implies that “handling methods” as well as “reaction mechanisms” and “mental and physical changes” indicated high scores among people over twenty years old and that handling methods are easier for this group of people to understand. Furthermore, “community residents” score was between elementary, junior high and high school students and people over twenty years old just like “mental and physical changes.” It indicates that “community residents” understand handling methods more than children groups but less than other groups with people over twenty years old.

### (3) Comparison of rate of correct answers by the questions

As a result of (2) above, we found a significant difference between a group of “elementary school students,” “junior high school students” and “high school students” and a group of “college students,” “parents of elementary school students” and “parents of disabled children.” In order to specify which questions indicated differences in rate of correct answers, we created tables 2-10 through 12 to show the rate of correct answers by each student.

#### 1) Stress reaction mechanisms

As shown in Table 7, the average rate of correct answers was over 80% for the overall questions, which indicates that lectures promoted understanding among many people. The rate of correct answers by respondents showed that people over twenty years old (college students or older) had over 80% while elementary, junior high and high school students had around 70%.

The item with lowest average rate of correct answers was “Stress reactions with various mental and physical symptoms occur when trying to recover from imbalanced state” (65.0%). Here, a group of people over twenty years old (college students or older) had over 65% of correct answers while a group of junior high school students or younger students had less than 50%. Especially junior high school students had 36.4% of correct answers and elementary school students had 38.9%. This low rate of correct answers is assumed to be attributable to the fact that those students do not learn such subjects in science or health and physical education classes. On the other hand, elementary school students had higher rate of correct answers than junior high and high school students on some questions. For example, elementary school students had 63.9% of correct answers on a question, “when people are stressed out, the brain will send some command to nerves to get activated” while junior high and high school students only had a little over 40%. This may be caused by a lecture style of an all-school assembly for junior high and high school students with insufficient time. This style may have disturbed students’ concentration and made it difficult for them to understand the lectures.

Table 7 : Comparison of Rate of Correct Answers on Questions of  
“Standard Related to Stress Reaction Mechanisms”

	1) elementary school students	2) Junior high school students	3) High school students	4) College students	5) Parents of elementary school students	6) Parents of disabled children	7) Community residents	Average
People need stress to some extent	77.8	78.8	77.6	92.6	94.1	85.7	91.4	85.3
Tests, presentations in public or being bullied can be an incident that causes stress	88.9	97.0	91.8	100.0	100.0	100.0	91.4	95.5
Getting involved in disasters, crime or accidents can be an incident that causes stress	75.0	87.9	89.8	100.0	100.0	100.0	88.6	91.7
Even under stress, people can be OK if mental and physical states are balanced.	61.1	60.6	63.3	83.8	76.5	92.9	82.9	74.4
People are capable of bearing up under stress	77.8	87.9	75.5	97.1	94.1	96.4	85.7	87.6
A state where mental and physical states are not balanced due to stress is the “stress situation.”	61.1	69.7	63.3	75.0	93.8	81.5	85.7	73.5
Imbalanced states cause various mental and physical symptoms (stress reactions).	66.7	84.8	85.7	100.0	100.0	100.0	94.3	90.2
Stress reactions –various mental and physical symptoms– occur when people try to recover from imbalanced states.	38.9	36.4	49.0	86.8	94.1	82.1	71.4	65.0
When people are stressed out, the brain will send some command to nerves to get activated.	63.9	46.9	44.9	91.2	100.0	82.1	74.3	70.9
Activated nerves stimulate muscles and organs.	69.4	48.5	55.1	86.8	100.0	89.3	82.9	74.4
A stress reaction is a natural reaction people experience under stress.	75.0	78.8	59.2	98.5	100.0	100.0	85.7	84.2
MEAN	67.7	70.7	68.6	92.0	95.7	91.8	84.9	81.2

(%)

## 2) Mental and physical changes

As shown in Table 8, the average rate of correct answers for overall questions was over 70%. The average rate of correct answers for people over twenty years old (college students or older) was over 80% while it was around 60% for elementary, junior high and high school students.

The item with the lowest average rate of correct answers was “the body gets hot or chilly” (63.6%). While a group of people over twenty years old (college students or older) had over 75% of correct answers, a group of high school students or younger had less than 50%. Especially junior high school students had 36.4% and high school students had 40.8%.

In terms of “mental and physical changes,” elementary school students had higher rate of correct answers on quite a few questions than junior high and high school students. This implies that the result was attributable to above-mentioned lecture style rather than contents of educational materials.

**Table 8 : Comparison of Rate of Correct Answers on Questions of  
“Standard Related to Mental and Physical Changes after Disasters”**

	1) elementary school students	2) Junior high school students	3) High school students	4) College students	5) Parents of elementary school students	6) Parents of disabled children	7) Community residents	Average
Headache	63.9	66.7	65.3	98.5	82.4	92.9	74.3	78.9
Stomachache	50.0	57.6	73.5	100.0	94.1	92.9	80.0	79.3
Feel dull and tired	88.9	84.8	87.8	100.0	100.0	89.3	94.3	92.5
The body gets hot or chilly	50.0	36.4	40.8	89.7	82.4	78.6	-	63.6
Cannot sleep with some concerns	63.9	54.5	63.3	100.0	94.1	89.3	85.7	79.3
Wake up in the middle of the night	52.8	42.4	38.3	100.0	94.1	85.7	80.0	70.8
Have scary dreams	47.2	36.4	34.0	100.0	94.1	82.1	77.1	67.8
Irritated	86.1	81.8	91.5	98.5	100.0	92.9	88.6	91.7
Scared of something	58.3	36.4	44.7	98.5	100.0	92.9	88.6	91.7
Many things seem troublesome	83.3	78.8	68.1	97.1	100.0	89.3	80.0	84.8
Get nervous or tense	66.7	48.5	55.3	92.6	94.1	96.4	82.9	76.1
Slow in getting things done	72.2	57.6	55.3	98.5	100.0	85.7	82.4	78.7
Cannot immediately make own decisions	44.4	45.5	53.2	92.6	94.1	82.1	-	69.0
No appetite	52.8	42.4	40.4	98.5	94.1	89.3	82.4	71.5
Cry out of sorrow	50.0	48.5	44.7	98.5	94.1	85.7	62.9	69.7
Unhappy and painful	75.0	60.6	70.2	98.5	100.0	92.9	88.6	83.7
MEAN	62.8	54.9	57.9	97.6	94.5	88.4	81.2	76.8

(%)

### 3) Handling methods

As shown in Table 9, the average rate of correct answers for the overall questions was 83.5%, which indicates that many people were able to understand handling methods.

**Table 9 : Comparison of Rate of Correct Answers on Questions of  
“Standard Related to Methods to Cope Stress after Disasters”**

	1) elementary school students	2) Junior high school students	3) High school students	4) College students	5) Parents of elementary school students	6) Parents of disabled children	7) Community residents	Average
Consume water and food	75.0	66.7	70.2	88.2	100.0	100.0	85.7	82.2
Do some exercises	83.3	84.8	87.2	97.1	100.0	100.0	94.3	92.0
Take deep breaths	88.9	72.7	76.6	100.0	100.0	92.9	94.3	89.4
Talk to someone trustworthy such as family, friends, teachers or neighbors	75.0	87.9	68.1	97.1	100.0	100.0	82.9	86.4
Ask others for help	77.8	66.7	48.9	94.1	100.0	92.6	71.4	77.6
Try to not see too much images of disaster on TV or newspapers	61.1	69.7	42.6	94.1	100.0	89.3	76.5	74.9
Spend some time with someone you feel comfortable	72.2	78.8	78.7	100.0	100.0	100.0	85.3	87.8

(%)

	1) elementary school students	2) Junior high school students	3) High school students	4) College students	5) Parents of elementary school students	6) Parents of disabled children	7) Community residents	Average
It is OK to not talk when you need to be alone or do not feel like talking	75.0	87.9	89.4	100.0	100.0	100.0	91.4	92.0
Talk to someone such as family, teachers or friends when you do not mentally or physically feel good for a long time	83.3	75.8	68.1	100.0	100.0	96.4	-	86.9
Try to not hold up too much	80.6	81.8	76.6	98.5	100.0	92.9	91.4	88.6
Realize how you feel	66.7	81.8	80.9	97.1	100.0	92.9	91.4	87.1
Think about ways to cope stress (listen to music, take a nap, etc.)	91.7	84.8	89.4	97.1	100.0	96.4	74.3	90.5
Keep rhythm of daily life	80.6	78.8	70.2	95.6	100.0	100.0	82.9	86.0
Try to be not afraid to talk about disaster experience to others	41.7	51.5	48.9	29.4	94.1	82.1	-	49.8
When it is hard to talk to others, consult with school nurse or counselor	55.6	75.8	46.8	97.1	-	92.9	-	75.0
Realize if your body is in good or bad shape	88.9	81.8	89.4	92.6	100.0	92.9	-	90.4
MEAN	74.8	76.7	70.7	92.4	99.6	95.1	85.1	83.5

(%)

4. A group of people over twenty years old (college students or older) had over 85% of average correct answers while elementary, junior high and high school students also had over 70% of correct answers, which indicated that handling methods were better understood than reaction mechanisms or mental and physical changes. The item with the lowest average rate of correct answers was “try to be not afraid to talk about disaster experience to others” (49.8%) and college students had the lowest score of 29.4%. This is assumed to be attributable to insufficient explanation in the lecture.

## Conclusion

This study examined the program contents to promote such mental care “before” wide-scale earthquakes and reviewed if the program could provide knowledge and methods of mental care to people from children to senior citizens.

The results showed that junior high and high school students who were offered lectures at all-school assembly had lower rate of correct answers than elementary school students on some of the questions. It is appropriate to assume that it is attributable to lecture styles rather than developmental issues. In other words, when applying this program to high school students or younger people, small class lectures instead of whole school assembly should be employed. This study has confirmed based on the evidence that small class lectures are effective to promote children’s understanding without fail.

The results also showed that a group of people over twenty years old (college students or older including parents) had higher understanding of lectures. It indicates that

educating parents about stress reaction mechanisms and handling methods is extremely effective. Consultation with parents is important when assisting children. From these findings, we confirmed that parents could increase their knowledge by taking one-hour lecture and assume it to be extremely important to promote such programs for parents through study sessions.

Furthermore, college students also showed high understandings. In case of Sichuan Earthquake in China, college student volunteers took major roles in care of children (Tominaga, Y., Takahashi, S., Kobayashi, T & Yuanhong, J., etc, 2008). In Japan, college students are also expected to be valuable local resources in promoting mental care for children in case of disasters. As even one-hour lecture was proven to have promoted understandings by college students, it is assumed to be necessary to conduct this program through college classes to promote understandings of mental care.

This program was conducted targeted at various people and confirmed to promote understandings of mental care. Therefore, this program may be used as an educational material when providing lectures to children at school in an attempt to develop mental care after disasters by clinical psychotherapists.

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