A study of posttraumatic stress symptoms among young adults in Japan : correlates and effects on mental health and quality of life

Ryoko TAGUCHI¹, Naoko SAKAMOTO², Iori SATO³ and Kiyoko KAMIBEPPU³

Objective : To ascertain posttraumatic stress symptoms (PTSS) as a result of experiencing intensely stressful events and to determine the correlates and effects of PTSS on mental health and quality of life (QOL).

Design : A cross sectional study.

Subjects and Methods : An online survey of survey panelists ages 25-29 who registered with an online survey company.

Results : 1) Seventy percent of subjects had experienced stressful events, and the most stressful events they experienced related to “school” and “personal relationships” (in that order). Subjects with an IES-R score of 25 points or more, suggesting PTSD, accounted for 28% of subjects. 2) Severe PTSS were associated with a lower level of education. 3) Mental health and the mental component of health-related QOL tended to worsen with more severe PTSS. Overall mental health was also better with higher awareness of support from family. 4) Awareness of support from family or others was not found to moderate the effects of PTSS on mental health and health-related QOL.

Conclusions : These findings suggested that a relatively high percentage of individuals experienced intensely stressful life events besides those that are considered to have a profound impact. Findings also suggested that some individuals with those experiences develop somewhat more intense stress symptoms and that these symptoms may affect mental health and quality of life.

Key words : life events, mental health, posttraumatic stress, quality of life, social support

I Introduction

People are subjected to various stressors as part of their lives and continue to live while coping with them. However, people sometimes experience sudden, devastating events such as a natural disaster, traffic accident, bullying or violence, or suffering as a crime victim over the course of their lives. Some individuals cannot cope with those stressors, so they develop mental and physical

manifestations of stress responses.

Characteristic mental disorders arising from experiencing a sudden, devastating event are a condition termed posttraumatic stress disorder (PTSD). PTSD was defined in DSM-III, the diagnostic criteria of the American Psychiatric Association, in 1980¹⁾. Over the past few decades, PTSD has been expanded beyond symptoms noted only in particular instances, such as soldiers returning from war and individuals who have survived dan-

¹ Department of Food Science and Nutrition, Doshisha Women's College of Liberal Arts

² School of Health Sciences, Gunma University

³ Department of Family Nursing, Graduate School of Medicine, the University of Tokyo

gerous situations²⁾. Some people exhibit posttraumatic stress symptoms (PTSS), i.e. manifestation of stress symptoms, in response to a rather routine incident or illness even if they are not diagnosed as having PTSD³⁻⁵⁾. Therefore, it has been considered that PTSD/PTSS is not necessarily limited to particular symptoms in response to certain events, and also it is associated with various factors such as a family history of mental problems⁶⁾ and an individual's personality⁷⁾; PTSD/PTSS is now considered a health problem that a wide variety of people may experience^{8,9)}. The definition of PTSD is changing as studies yield new findings, and the range of events that may trigger PTSD has also expanded and changed¹⁰⁾.

Previous studies on PTSD have run a wide gamut. Initially, studies revealed specific responses to certain events, such as characteristic neurosis after combat. Over the past few years, studies have explored the similarities and general nature of the effects of various events^{9,11,12)}. Epidemiological studies of the general population, which includes individuals who have experienced various types of events, have been conducted primarily in the US. An initial study reported that the prevalence of PTSD in one's lifetime was about 1%^{6,13)}, and PTSD was considered a rare disorder. However, subsequent studies reported a higher prevalence, such as 5.0% among men and 10.4% among women⁹⁾ or 6.2% among men and 13.0% among women⁸⁾. A relatively high percentage of individuals reportedly suffered trauma, as indicated by figures such as 60.7% of men and 51.2% of women⁹⁾ and 89.6%⁸⁾ in the US.

Most previous studies on PTSD in Japan were limited to particular population¹⁴⁻¹⁶⁾. Studies of the broader general population have been limited to studies of young women (college students and graduates) and male and female college students^{17,18)}. Epidemiological studies of the gen-

eral population reported that the prevalence of PTSD in one's lifetime was 1.4% in Japan¹⁹⁾, with a gender breakdown of 0.4% of men and 1.6% of women²⁰⁾.

Reported correlates of and risk factors for PTSD in the general population include being female, being young, having a low socioeconomic status, being a minority, having a history of exposure to traumatic events, experiencing severe trauma, and additional life stress after a traumatic experience²¹⁾.

In the area of stress research, social support in the form of ties with others or support from others is thought to moderate the effects of stress by reducing stressors in stressful situations and reducing the stress response²²⁾. Social environment, e.g. social support, is also an important factor associated with lessening of the symptoms of PTSD and promoting psychological adaptation^{21,23-25)}. Some studies have indicated that social support acts as a protective factor against PTSD while others have indicated that it acts as a risk factor; one study has indicated that it acts as both a risk factor and protective factor²⁶⁾. The findings are inconsistent.

Furthermore, PTSD and PTSS, i.e., partial PTSD are associated with higher rates of depression and lower QOL among Vietnam veterans²⁷⁾, earthquake survivors²⁸⁾, and cancer survivors²⁹⁾. General population who experience PTSS also appear to have poorer mental health and lower QOL³⁰⁾, suggesting the need to examine the effect of PTSS on mental health and QOL even if their symptoms do not meet full PTSD diagnostic criteria.

Thus, the purposes of the current study of young adults were (1) to examine prevalence/types of stressful events and PTSS, (2) to clarify differences in PTSS for individual attributes/characteristics and social support, and (3) to examine the relationship of PTSS to mental health and health-related QOL. This study also sought to examine (4)

social support's moderation of the effects in (3).

This study focused on young adults aged 25–29 in order to examine the effects of differences in socioeconomic variables such as level of education, occupation, and income since they have almost reached their highest level of education and they have some variation in their individual attributes. In addition, a representative epidemiological study conducted in the United States showed that the prevalence of PTSD is highest in the 25–34 year age group⁹⁾. This age group may thus be considered appropriate for the present study.

II Methods

1. Subjects and methods

We conducted a cross-sectional investigation using online surveys. In the present study, subjects were taken from among cancer survivor controls in a study on the QOL of childhood cancer survivors. An open invitation to complete anonymous self-administered online surveys was given to childhood cancer survivor controls that matched our requests for area of residence, age and occupation from among those registered with an online survey company. The survey was completed by 796 men and women aged 16–41 who had never had childhood cancer. We then excluded one person whose response was invalid. We also excluded the 16–24 year age group ($n=488$) from the remaining 795 respondents. Next, we performed re-sampling to maintain the sex and age composition based on the sex and age group distribution of the Japanese population³¹⁾ and procured the maximum number of subjects. This resampling resulted in few respondents in the 30 year or older age group so this group was also excluded, leaving a sample of 177 men and women aged 25–29, from which 121 were selected at random to maintain sex composition. In other words, the sample size was determined by the maximum number of peo-

ple that could be extracted from a sample of controls to match the objective of the present study.

2. Instruments used in this study

1) Individual attributes/characteristics : Subjects were asked their age, sex, highest level of education reached, occupation, income, marital status, and whether or not they had an illness requiring regular visits to the hospital.

2) Experience with intensely stressful events of the past : Subjects were asked whether or not they had experienced intensely stressful events in their life. Those who responded that “yes” were asked to identify the most stressful by choosing from 12 items. The events they chose were ultimately classified into 1 of 6 categories, “personal relationships,” “school,” “bereavement,” “self,” “family,” and “other,” in accordance with a previous study³²⁾.

3) PTSS : The Japanese-language version³³⁾ of the Impact of Event Scale-Revised (IES-R)³⁴⁾ was used to examine long-term mental and physical responses in individuals who responded that “yes,” they had experienced intensely stressful events in their life. The IES-R is a self-administered questionnaire used to screen for PTSD. Subjects were asked about 22 potential impacts they may have suffered over the past week. Answers were rated on a 5-point scale. Each answer was scored from 0–4 points and total points were calculated (range : 0–88). A higher score suggests PTSD. The reliability and validity of the Japanese-language version of the IES-R have been demonstrated and the usefulness of 24/25 points as a cutoff when screening for PTSD and partial PTSD has been indicated^{33,35)}. In the current study, Cronbach's α was 0.94.

4) Social support :

(1) Family support : A Japanese translation³⁶⁾ of the Family APGAR³⁷⁾ was used. The Family

APGAR consists of 5 items such as “I am satisfied with the help that I receive from my family when something is troubling me.” Answers are given on a 3-point scale. Each answer was scored from 0–2 points and total points were calculated (range : 0–10). A larger number of total points indicates better family functioning. In this study, Cronbach’s α was 0.90.

(2) Support from others : The Japanese-language version³⁸⁾ of a 6-item short form³⁹⁾ of the Social Support Questionnaire (SSQ)⁴⁰⁾ was used. This scale consists of two components to measure social support in terms of the number of people who provide support when needed (availability of support, denoted here as SSQ-N) and the level of satisfaction with support provided by those people (satisfaction with support, denoted here as SSQ-S). Responses for SSQ-N were the number of people from “none” – “6 or more people.” The answer was scored from 0 to 9 points (9 or more people = 9 points) (range : 0–9). Responses for SSQ-S were rated on a 6-point scale. The answer was scored from 1 to 6 points (range : 1–6), and the mean of total points was calculated. In the current study, Cronbach’s α for SSQ-N was 0.89 and that for SSQ-S was 0.97.

5) Mental health : The Japanese-language version of the K10⁴¹⁾ was used. The K10 is a scale that was developed in the US to screen for mental illness⁴²⁾. The reliability and validity of the Japanese-language version of the K10 have been demonstrated⁴³⁾. Subjects were asked about their mental state over the past 30 days, and their answers were rated on a 5-point scale. Each answer was scored from 0–4 points (range : 0–40) and the mean of total points was calculated. A higher score indicates a greater likelihood of mood and anxiety disorders. In the current study, Cronbach’s α was 0.93.

6) Health-related QOL : The Japanese-language

version of the SF-36v2⁴⁴⁾ was used. The SF-36 is a scale that was developed in the US to measure overall health-related QOL. The reliability and validity of the Japanese-language version of the SF-36 and its eight subscales have been demonstrated^{45,46)}. Responses to 36 questions were given on a 5–6-point scale. The raw score was calculated in accordance with standard procedures in the user’s manual⁴⁴⁾, and subscales were scored using norm-based scoring (NBS). NBS allowed discernment of increases or decreases from the Japanese norm, which had a baseline of 50 points⁴⁴⁾. Scores for the Physical Component Summary (PCS) and Mental Component Summary (MCS) were also determined via a technique using factor coefficients⁴⁴⁾. A higher score on either indicates better health. Cronbach’s α for the 8 subscales was 0.73–0.97.

3. Methods of analysis

Individual variables were simply tallied first. For health-related QOL, one sample *t*-tests were used to examine the mean difference between the sample and the Japanese norm in 2007⁴⁴⁾. Then, subjects were divided into two groups, one with individuals who had a low IES-R score (an IES-R score of 24 points or less) and another with individuals who had a high IES-R score (25 points or more) ; the proportion of subjects in the groups was compared (χ^2 test). Afterwards, the groups (high and low IES-R scores) were tested for differences in means (*t*-test) with regard to mental health and 8 subscales of health-related QOL, the Physical Component Summary and Mental Component Summary.

To examine the effects of individual variables (including PTSS) on mental health and health-related QOL, multiple linear regression analyses were performed with the K10 and health-related QOL as dependent variables. For health-related

QOL, the MCS (the mental component of health-related QOL) score served as a dependent variable because we focused on mental aspects. Prior to multiple linear regression analysis, the correlations between K10 and MCS scores and the variables related to individual attributes/characteristics used in this study were analyzed. Variables that had a probability of being significantly associated with K10 and MCS scores of 10% or less were included in the aforementioned model of multiple linear regression analysis. A significant and relatively strong correlation was noted between SSQ-N and SSQ-S, both of which are variables related to support from others, so only SSQ-S was used in multiple linear regression analysis.

A model that included an interaction term for interaction between 2 variables related to social support, i.e. Family APGAR and SSQ-S, and PTSS was also studied to examine social support's moderation of the effects of PTSS on mental health and health-related QOL. Analysis was done with Stata version10, and the level of significance was 5% (two-tailed).

III Results

1. Attributes/characteristics of individual subjects (Tables 1 and 2)

Mean age was 27.2 years (SD : 1.5). There were roughly equal numbers of males and females. 57% of subjects had an education level of university graduate or higher. 53% of subjects were full-time employees or self-employed/employed in a family business, 15% were part-time employees, and 28% were unemployed. The largest group of subjects (41%) had an income of less than 1 million yen ; some subjects (24%) had an income of 3-5 million yen. About 80% of the subjects were unmarried.

The level of satisfaction with support from family was a mean of 7.6 points (SD : 7.8). The mean

SSQ-N, indicating the number of others from whom support was expected when needed, was 2.5 people (SD : 1.6). The level of satisfaction with support expected to be provided by those people was 4.3 points (SD : 1.3). The mean score on the K10, an indicator of mental health, was 7.6 points (SD : 7.8).

Scores for the 8 subscales of health-related QOL were low (below the norm of 50 points) except for the subscales of physical functioning and bodily pain. Comparison to the norm for 20-29-year olds, as indicated in Table 2, revealed that subjects had lower scores for all subscales except bodily pain. In particular, physical functioning, general health perceptions, vitality, social functioning, and mental health were significantly lower than the normal scores. Moreover, subjects had significantly lower scores on the PCS and MCS in comparison to the norm for 20-29-year olds. The gap in MCS scores was larger than that in PCS scores.

2. Prevalence/types of stressful events and PTSS (Table 3)

Of the subjects, 70.2% (85/121) had experienced intensely stressful events in their lives. The most stressful of those events related to "school" (37.7%) and "personal relationships" (30.6%). Although not shown in the table, such events were experienced at a mean age of 20.0 years (SD : 5.3, range : 6-29), 7.7 years (SD : 5.0, range : 1-22) prior to when the study was conducted.

The 85 subjects who had experienced stressful events had a mean score on the IES-R of 16.7 points (SD : 15.2, range : 0-64). Of these individuals, 28.2% had a score of 25 points or more, suggesting PTSD.

3. Correlates of PTSS (Table 4)

Comparison of individual attributes in the subjects with high IES-R scores and with low IES-R

Table 1 Attributes and characteristics of individual subjects (N=121)

		(Range) or category	mean $\pm$ SD or n (%)
Individual attributes			
Age (years)		25-29	27.2 $\pm$ 1.5
Sex		Male	62 (51.2)
		Female	59 (48.8)
Level of education		Middle school graduate	1 (0.8)
		High school graduate	26 (21.5)
		Graduate of a 2-year college or technical college	19 (15.7)
		University graduate	65 (53.7)
		Graduate of graduate school	4 (3.3)
		Other	6 (5.0)
Occupation		Student	3 (2.5)
		Full-time employee	61 (50.4)
		Part-time employee	18 (14.9)
		Self-employed (retail/service industry) /employed in a family business	3 (2.5)
		Unemployed	34 (28.1)
		Other	2 (1.6)
Income		<1 million yen	49 (40.5)
		1-2 million yen	16 (13.2)
		2-3 million yen	24 (19.8)
		3-5 million yen	29 (24.0)
		>5 million yen	3 (2.5)
Marital status		Unmarried	92 (76.0)
		Married	29 (24.0)
Have an illness requiring regular visits to the hospital		No	104 (86.0)
		Yes	17 (14.0)
Social support			
Family support	[Family APGAR]	(0-10)	7.6 $\pm$ 7.8
Support from others	[SSQ-N]	(0-9)	2.5 $\pm$ 1.6
	[SSQ-S]	(1-6)	4.3 $\pm$ 1.3
Mental health			
K10		(0-40)	7.6 $\pm$ 7.8

scores revealed significant differences in their level of education. Individuals with a low IES-R score generally had a higher level of education. Subjects were asked whether or not they had an illness requiring regular visits to the hospital ; a significant number of individuals with a low IES-R score had no such illness. No significant differences in social support were noted between individuals with a high IES-R score and those with a low IES-R score. However, individuals with low

IES-R scores had a higher mean score for family support.

4. Effects of PTSS on mental health and health-related QOL and their moderation by social support (Tables 5 and 6)

Comparison of individuals with high and low IES-R scores in terms of their mean subscale and summary scores for mental health and health-related QOL revealed that individuals with a high

Table 2 Health-related QOL of subjects

Subscale	Subjects (N=121)	General public ages 20-29 (N=270) ¹	p ²
	mean ± SD	mean ± SD	
Physical functioning [PF]	51.2 ± 10.7	55.0 ± 5.6	0.00
Role functioning (physical) [RP]	49.7 ± 11.2	51.5 ± 9.6	0.07
Bodily pain [BP]	53.0 ± 8.7	52.0 ± 9.5	0.20
General health perceptions [GH]	47.9 ± 10.4	52.3 ± 10.7	0.00
Vitality [VT]	45.2 ± 10.4	48.5 ± 10.8	0.00
Social functioning [SF]	46.7 ± 11.2	49.5 ± 10.0	0.01
Role functioning (emotional) [RE]	48.0 ± 12.2	49.3 ± 10.3	0.22
Mental health [MH]	44.5 ± 10.8	48.7 ± 10.4	0.00
Physical Component Summary [PCS]	52.3 ± 8.5	54.2 ± 6.8	0.02
Mental Component Summary [MCS]	44.0 ± 11.4	47.0 ± 11.3	0.00

¹ National norm for 20-29 year-olds (Fukuhara and Suzukamo, 2004)² One sample t-test**Table 3 Experience with/types of stressful events and posttraumatic stress symptoms (PTSS)**

	Category or (theoretical range)	n (%) or mean ± SD
Stressful events		
Were experienced ¹	Yes	85 (70.2)
	No	22 (18.2)
	Don't remember	14 (11.6)
Type ²	School	32 (37.7)
	Personal relationships	26 (30.6)
	Family	12 (14.1)
	Self	7 (8.2)
	Bereavement	5 (5.9)
	Other	3 (3.5)
PTSS [IES-R] ²	(0-88)	16.7 ± 15.2
	≥25 pts	24 (28.2)
	≤24 pts	61 (71.8)

¹ N=121² N=85 (85 individuals responded that "yes," they "had experienced stressful events")

IES-R score had a significantly higher score on the K10. Individuals with a high IES-R score tended to have significantly lower scores for physical role functioning, bodily pain, general health perceptions, and emotional role functioning.

In a model with the K10 score as a dependent variable, multiple linear regression analysis indicated that the score on the K10 tended to be higher with more severe PTSS. Individuals who were married tended to have a lower score on the

K10 compared to those who were unmarried. Individuals with greater family support tended to have a lower score on the K10. A model with the MCS score as a dependent variable revealed that the MCS score tended to be lower when individuals had more severe PTSS and an illness that required regular visits to the hospital. Interaction terms for possible interaction between PTSS and family support and between PTSS and support from others was included in these models ; neither factor was

Table 4 Individual attributes and social support score in terms of IES-R scores (N=85)

(Range) or category			Individuals with a high IES-R score (n=24) mean±SD or n (%)	Individuals with a low IES-R score (n=61) mean±SD or n (%)	p ¹
Individual attributes					
Age (years)	25-29		27.0±1.6	27.4±1.4	0.22
Sex	Male		8 (33.3)	31 (50.8)	0.15
	Female		16 (66.7)	30 (49.2)	
Level of education	Middle school graduate		1 (4.2)	0 (0.0)	0.03
	High school graduate		7 (29.2)	10 (16.4)	
	Graduate of a 2-year college or technical college		5 (20.8)	10 (16.4)	
	University graduate		9 (37.5)	36 (59.0)	
	Graduate of graduate school		2 (8.3)	0 (0.0)	
	Other		0 (0.0)	5 (8.2)	
Occupation	Student		1 (4.2)	2 (3.3)	0.42
	Full-time employee		8 (33.3)	32 (52.5)	
	Part-time employee		7 (18.8)	9 (14.8)	
	Self-employed (retail/serv- ice industry)/employed in a family business		0 (0.0)	2 (3.3)	
	Unemployed		8 (33.3)	15 (24.6)	
	Other		0 (0.0)	1 (1.6)	
Income	<1 million yen		9 (37.5)	25 (41.0)	0.45
	1-2 million yen		6 (35.0)	7 (11.5)	
	2-3 million yen		4 (16.7)	9 (14.8)	
	3-5 million yen		5 (20.8)	17 (27.9)	
	>5 million yen		0 (0.0)	3 (3.0)	
	Marital status	Unmarried		17 (70.8)	
	Married		7 (29.2)	12 (19.7)	
Have an illness requiring regular visits to the hospital	No		17 (70.8)	53 (86.9)	0.08
	Yes		7 (29.2)	8 (13.1)	
Social support					
Family support	[Family APGAR]	(0-10)	5.9±3.4	6.9±2.7	0.14
Support from others	[SSQ-N]	(0-9)	2.2±1.5	2.4±1.4	0.61
	[SSQ-S]	(1-6)	4.2±1.4	4.4±1.3	0.60

¹ t-test or χ^2 test

significant in the models.

IV Discussion

1. Subject attributes/characteristics

The current study examined the effects of PTSS on mental health and health-related QOL and found that the mean score on the K10 was 7.6 points. This score is somewhat higher than the 5.8 points indicated by a previous study of the general public⁴³⁾ and higher than the scores split by sex

(5.3 points for men and 4.6 points for women)⁴³⁾ in Japan. Comparison of the norm for 20–29-year olds and the current results for health-related QOL indicated that subjects had lower scores on almost all of the subscales associated with the PCS and MCS. Scores for components of the MCS in particular tended to be low. Subjects of the current study were online survey respondents. Previous research noted bias attributed to “survey respondents” when using respondents to an online survey

Table 5 Scores for mental health and health-related QOL in terms of IES-R scores (N=85)

	Individuals with a high IES-R score (n=24)		Individuals with a low IES-R score (n=61)		P ¹
	mean	SD	mean	SD	
Mental health					
K10	14.8	10.0	6.7	6.1	0.00
Health-related QOL					
Physical functioning [PF]	50.2	8.8	52.8	10.1	0.26
Role functioning (physical) [RP]	45.8	13.4	52.0	8.7	0.04
Bodily pain [BP]	49.8	10.2	54.5	7.2	0.04
General health perceptions [GH]	42.5	12.5	49.1	9.8	0.01
Vitality [VT]	40.7	13.1	45.7	9.1	0.10
Social functioning [SF]	46.3	12.4	46.9	10.5	0.82
Role functioning (emotional) [RE]	41.0	15.3	50.9	9.5	0.01
Mental health [MH]	39.5	13.1	45.3	9.5	0.06
Physical Component Summary [PCS]	50.4	9.3	53.9	7.3	0.07
Mental Component Summary [MCS]	38.4	14.3	44.9	10.1	0.05

¹ t-test**Table 6** Correlates of mental health and health-related QOL (Mental Component Summary) (N=85)

		K10				Mental Component Summary [MCS]			
		β	p	r	p	β	p	r	p
Sex	0=female, 1=male	-0.04	0.64			-0.03	0.76		
Marital status	0=unmarried, 1=married	-0.21	0.02			0.10	0.35		
Occupation	0=other, 1=full-time employee	0.00	0.99			0.15	0.15		
Level of education	0=other, 1=university graduate or higher	-0.06	0.49			-0.03	0.81		
Have an illness requiring regular visits to the hospital	0=no, 1=yes	0.12	0.18			-0.26	0.02		
Posttraumatic stress symptoms (PTSS) [IES-R]		0.53	0.00	0.60	0.00	-0.22	0.04	-0.33	0.00
Family support [Family APGAR]		-0.21	0.04	-0.37	0.00	0.14	0.25	0.30	0.00
Support from others [SSQ-S]		-0.01	0.95	-0.23	0.01	0.04	0.71	0.23	0.01
Adjusted R ²		0.44				0.19			

 β : standardized partial regression coefficient, r : correlation coefficient

and suggested the potential for dissatisfaction with life overall to affect responses⁴⁷⁾. The causes of this phenomenon have not been fully investigated but may hold true for the current subjects as well.

2. Prevalence/types of stressful events and PTSS

Of the current subjects, 70% had experienced stressful events. In contrast, a study of Japanese college students indicated that 54%¹⁸⁾ had experienced stressful events and a study of workers indicated that 54% of men and 50% of women³⁵⁾ had

experienced stressful events. In the current study, the percentage of individuals who had experienced stressful events tended to be somewhat higher than the percentages in other studies. Studies in Western countries show the percentage of individuals who have experienced a traumatic event in a general population group to be 50–90%^{8,9)}, which does not differ greatly from what we found. Of the current subjects who responded that they had experienced stressful events, 28.2% had an IES-R score of 25 points or more. In previous studies, this figure was 18%¹⁸⁾ or 13.5% among men and 31.8% among women³⁵⁾. Thus, the percentage of individuals who had experienced stressful events and the proportion of those individuals who were suspected of having PTSD in the current study were somewhat higher than those in previous studies in Japan. However, more than half of the subjects had experienced stressful events but only some were suspected of having PTSD. This finding coincides with previous studies of college students and workers. Different factors may affect the prevalence of PTSD and the percentage of individuals who suffered trauma as discerned by relatively recent studies, including those in the US and Europe. Prevalence may be affected by differences in the intensity of events and diagnostic criteria/methods of assessment while the percentage of individuals who suffered trauma may be affected by socioeconomic conditions in different countries⁴⁸⁾. Thus, a simple comparison of these figures is difficult, as is generalization of the results. Although expanded diagnostic criteria for PTSD may have had an effect and only a small proportion of individuals develop PTSD as a result of experiencing a traumatic event, the common thread is that many individuals have experienced a traumatic event as might lead to PTSD.

A study of intensely stressful events for Japanese college students indicated that 33.3% of

these events related to “relationships” and 20.8% related to “school”³²⁾. In the current study, 30.6% of stressful events related to relationships and 37.7% related to school, so the proportions of these events were the same or higher. In the previous study, 18.6% of events related to “bereavement” and 12.8% related to “self” while in the current study, only 5.9% of events related to bereavement and 8.2% related to self, i.e., events such as experiencing a natural disaster or fire, having a severe injury, or having a severe illness. Thus, stressful events related to bereavement and self were less prevalent in the current study. This finding is presumed to be because the current subjects were respondents ages 25–29. These individuals are presumably being affected by academic issues prior to and during study enrollment as well as issues with personal relationships as they enter society compared to subjects in previous studies who were still in university.

The mean IES-R score in the current study was 16.7 points, which was somewhat lower than the 23.6 points cited earlier³²⁾. In the present study, especially, events related to “bereavement” were less prevalent than those in the previous study³²⁾. It has been reported that events related to “bereavement” have a relatively strong impact on mental and physical states^{49,50)}. This fact presumably affected scores.

3. Correlates of PTSD

Comparison of subjects in terms of their scores on the IES-R revealed significant differences only in their level of education. A low level of education, parental poverty, and premature separation from one's parents are reportedly predictors of the risk of experiencing a traumatizing event and the risk of developing PTSD after that event^{6,7)}. The current study found no differences in socioeconomic variables such as occupation and income,

but variables such as level of education and parental poverty may reflect different aspects of common socioeconomic factors that are associated with one another⁴⁸⁾. The current study suggested similar findings.

4. Effects of PTSS on mental health and health-related QOL and their moderation by social support

The effects of PTSS were determined by comparing the groups with high and low IES-R scores in terms of their scores for mental health and health-related QOL. Individuals with a high IES-R score had poor mental health. In comparison to the norm for 20–29-year olds, individuals with a low score on the IES-R had subscale scores for health-related QOL that were relatively close to the normal score, but individuals with a high score on the IES-R tended to have worse scores for all of the subscales. This finding suggests that more intense mental and physical responses to stressful events over the long term may affect mental health and both physical and mental components of QOL.

On individual components of health-related QOL, individuals with a high IES-R score had significantly lower scores for two of the four indices related to functioning (in this case, physical and emotional role functioning). However, there were no significant differences in the mean scores for physical functioning and social functioning. These findings suggest that PTSS may increase difficulties with roles inside and outside the home.

Multiple linear regression analysis revealed that mental health and the mental component of health-related QOL tended to worsen with more severe PTSS. This finding agrees with those of a previous study⁵¹⁾. The current study also examined social support's moderation of the effects of PTSS on mental health and the mental component of health-related QOL. A model that included an interaction

term for interaction between two variables related to social support, family support and support from others, and PTSS revealed that social support did not moderate the effects of PTSS on mental health and health-related QOL. Family support was found to independently improve mental health. Married individuals tended to have better mental health than unmarried individuals, but no effects of support from others on mental health were noted. This suggested that good relationships with family and satisfaction with support from family may improve mental health.

Social support has been found to have moderating effects on PTSS in earthquake survivors⁵²⁾. It has also been shown to act as an effective emotional regulator to ease fear from trauma⁵³⁾. In particular, perceived social support can better alleviate the adverse effects of PTSS than received social support⁵⁴⁾. This may be because higher levels of perceived support level are associated with a tendency to avoid evasive coping strategies and use effective coping strategies^{24,53)}, and because a higher QOL can be maintained⁵²⁾. In the present study, we examined social support's moderation of the effects of PTSS, rather than the presence or absence of stressful experiences, on mental health and QOL in people that have experienced various stressful events. The current study compared the effects of two forms of social support, family support and general support from others. Social support was measured in the form of support received, the size of support networks that were actually provided, and perceived support, which has been indicated to affect post-traumatic distress⁵⁴⁾. Thus, the current study used two types of scales to examine awareness of and the level of satisfaction with support from others or family members. One reason why we could not verify the moderating effects of social support in the present study may be that stressful events can be divided

into those where social support is effective and those where it is not. Another reason may be that coping needs that arose in the subjects of this study from experiencing a stressful event may include areas that could not be covered in the social support as measured in the present study, for example, those related to self or world view. When investigating a social support stress moderation model, it is recommended to match the social support to the life event⁵⁴⁾. Regarding the moderating effects of social support related to PTSS, further studies are needed to focus on somewhat more specific and serious events to examine more appropriate social support and examine that process.

5. Limitations of the current study

The present study has the following limitations. First, it had a cross-sectional design, so causal relationships could not be identified. The second is that it was an online survey. An experiment comparing online surveys with conventional surveys (visit and interview study of a random sample) found significant differences in the results for the majority of questions in a survey on attitudes, and it was pointed out that online surveys are not suitable at present to be used in lieu of conventional surveys without any reservation or modification⁴⁷⁾. In addition, 57% of subjects in the present study had at least university or graduate school education. This is higher than the 36% given as the ratio of undergraduate and graduate school graduates for the 25–29 year age group in the Japan census⁵⁵⁾. A previous study also showed this trend to be a characteristic of online surveys⁴⁷⁾. Consequently, great care must be given when interpreting the results, which may not apply to the general population. The third limitation is the sample size. As the sample size was small, the power of statistical hypothesis testing may be limited.

Fourth, vulnerability to stress, personality traits, and subjective assessments of events may affect the response to stressful events like PTSS⁷⁾, but such details could not be examined in the current study. Such temperamental and environmental factors need to be studied in the future.

Despite the above limitations, the present study is important as one of few studies examining PTSS determination factors, the effects of PTSS on mental health and QOL, and the moderating effects of social support in young adults of the general population in Japan. Level of education was determined to be a factor associated with PTSS, and PTSS was shown to worsen mental health and the mental component of QOL. As another important finding, the results suggested that support from family in a situation of traumatic stress may function as a resiliency resource.

V Conclusions

Results of an online survey of young adults revealed :

1. Seventy percent of individuals had experienced stressful events. Events related to “school” and “personal relationships” were cited as most stressful. In addition, 28% of those individuals had an IES-R score exceeding the cutoff.
2. Severe PTSS were associated with a lower level of education.
3. Mental health and the mental component of health-related QOL worsened with more severe PTSS. Mental health was better with higher awareness of support from family.
4. Support from family or others was not found to moderate the effects of PTSS on mental health and the mental component of health-related QOL.

These findings revealed that a relatively high percentage of individuals had experienced stressful

events. They also revealed the effects of those events, i.e. mental health worsens when stress symptoms are somewhat more intense. Further studies are needed to yield generalizable conclusions.

VI Acknowledgement

The authors wish to sincerely thank Dr. Yasushi Ishida at Ehime Prefectural Central Hospital and all of the subjects who cooperated with this study.

References

- 1) American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, 3rd ed. Washington DC : American Psychiatric Association, 1980.
- 2) Herman JL. Complex PTSD : a syndrome in survivors of prolonged and repeated trauma. *J Traum Stress*, 1992 ; 5 : 377-391.
- 3) Breslau N, Davis GC. Posttraumatic stress disorder in an urban population of young adults : Risk factors for chronicity. *Am J Psychiatry*, 1992 ; 149 : 671-675.
- 4) Amir M, Ramati A. Post-traumatic symptoms, emotional distress and quality of life in long-term survivors of breast cancer : a preliminary research. *J Anxiety Disord*, 2002 ; 16 : 191-206.
- 5) Pelcovitz D, Libov BG, Mandel F, et al. Posttraumatic stress disorder and family functioning in adolescent cancer. *J Trauma Stress*, 1998 ; 11 : 205-221.
- 6) Davidson JRT, Hughes D, Blazer DG, et al. Post-traumatic stress disorder in the community : an epidemiological study. *Psychol Med*, 1991 ; 21 : 713-721.
- 7) Breslau N, Davis GC, Andreski P, et al. Traumatic events and posttraumatic stress disorder in an urban population of young adults. *Arch Gen Psychiatry*, 1991 ; 48 : 216-222.
- 8) Breslau N, Kessler RC, Chilcoat HD, et al. Trauma and posttraumatic stress disorder in the community. *Arch Gen Psychiatry*, 1998 ; 55 : 626-632.
- 9) Kessler RC, Sonnega A, Bromet E, et al. Posttraumatic stress disorder in the national comorbidity survey. *Arch Gen Psychiatry*, 1995 ; 52 : 1048-1060.
- 10) American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, 4th ed. Washington DC : American Psychiatric Association, 1994.
- 11) Blank AS. The longitudinal course of posttraumatic stress disorder. In : Davidson JRT, Foa EB eds. *Posttraumatic Stress Disorder : DSM- IV and beyond*. Washington DC : American Psychiatric Press, 1993 : 3-22.
- 12) Norris FH. Epidemiology of trauma : frequency and impact of different potentially traumatic events on different demographic groups. *J Consult Clin Psychol*, 1992 ; 60 : 409-418.
- 13) Helzer JE, Robins LN, McEvoy L. Post-traumatic stress disorder in the general population. *N Engl J Med*, 1987 ; 317 : 1630-1634.
- 14) Hamanaka S, Asukai N, Kamijo Y, et al. Acute stress disorder and posttraumatic stress disorder symptoms among patients severely injured in motor vehicle accidents in Japan. *Gen Hosp Psychiatry*, 2006 ; 28 : 234-241.
- 15) Kato H, Asukai N, Miyake Y, et al. Post-traumatic symptoms among younger and elderly evacuees in the early stages following the 1995 Hanshin-Awaji earthquake in Japan. *Acta Psychiatr Scand*, 1996 ; 93 : 477-481.
- 16) Suzuki Y, Tsutsumi A, Fukasawa M, et al. Prevalence of mental disorders and suicidal thoughts among community-dwelling elderly adults 3 years after the Niigata-Chuetsu earthquake. *J Epidemiol*, 2011 ; 21 : 144-150.
- 17) Mizuta I, Ikuno T, Shimai S, et al. The prevalence of traumatic events in young Japanese women. *J Trauma Stress*, 2005 ; 18 : 33-37.
- 18) Nakagawa T. Daigakusei ni okeru irrational beliefs to gaisyogo sutoresu syogai (PTSD) tonon kanrensei (The relation between irrational beliefs and the development of posttraumatic stress disorder (PTSD) in university students). *Toraumatikku sutoresu*, 2004 ; 2 : 43-50. (in Japanese)
- 19) Kawakami N. Sokatsu kenkyu hokokusho. Kokoro no kenko ni tuite no ekigaku chosa ni kansuru kenkyu. In : Kawakami N, ed. *Kosei rodo kagaku kenkyuhoi hojokin, Kokoro no kenko kagaku kenkyu jigyo*, Heisei 18 nendo sokatsu/bundan kenkyu hokokusho, Kokoro no kenko ni tuite no ekigaku chosa ni kansuru kenkyu. Tokyo : Kawakami N, 2007 : 1-16. (in Japanese)
- 20) Kawakami N, Ohno Y, Uda H, et al. Buntan kenkyu hokokusho. Chiiki jumin ni okeru kokoro no kenko mondai to taisaku kiban no jittai ni kansuru kenkyu : 3 chiku no sogo kaisei kekka. In :

- Kawakami N, ed. Kosei rodo kagaku kenkyuhoi hojokin, Kosei rodo kagaku tokubetsu kenkyu jigyo, Heisei 14 nendo sokatsu/bundan kenkyu hokokusho. Kokoro no kenko mondai to taisaku kiban no jittai ni kansuru kenkyu. Okayama : Kawakami N, 2003 : 11-44. (in Japanese)
- 21) Brewin CR, Andrews B, Valentine JD. Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *J Consult Clin Psychol*, 2000 ; 68 : 748-766.
 - 22) House JS, Umberson D, Landis KR. Structures and processes of social support. *Annu Rev Sociol*, 1988 ; 14 : 293-318.
 - 23) Hyman SM, Gold SN, Cott MA. Forms of social support that moderate PTSD in childhood sexual abuse survivors. *J Fam Violence*, 2003 ; 18 : 295-300.
 - 24) Runtz MG, Schallow JR. Social support and coping strategies as mediators of adult adjustment following childhood maltreatment. *Child Abuse Negl*, 1997 ; 21 : 211-226.
 - 25) Schumm JA, Briggs-Phillips M, Hobfoll SE. Cumulative interpersonal traumas and social support as risk and resiliency factors in predicting PTSD and depression among inner-city women. *J Traum Stress*, 2006 ; 19 : 825-836.
 - 26) Koenen KC, Stellman JM, Stellman SD, et al. Risk factors for course of posttraumatic stress disorder among Vietnam veterans : a 14-year follow-up of American legionnaires. *J Consult Clin Psychol*, 2003 ; 71 : 980-986.
 - 27) Zatzick DF, Marmar CR, Weiss DS, et al. Posttraumatic stress disorder and functioning and quality of life outcomes in a nationally representative sample of male Vietnam veterans. *Am J Psychiatry*, 1997 ; 154 : 1690-1695.
 - 28) Lai TJ, Chang CM, Connor KM, et al. Full and partial PTSD among earthquake survivors in rural Taiwan. *J Psychiatr Res*, 2004 ; 38 : 313-322.
 - 29) Morrill EF, Brewer NT, O'Neill SC, et al. The interaction of post-traumatic growth and post-traumatic stress symptoms in predicting depressive symptoms and quality of life. *Psycho-Oncology*, 2008 ; 17 : 948-953.
 - 30) Stein MB, Walker JR, Hazen AL, et al. Full and partial posttraumatic stress disorder : findings from a community survey. *Am J Psychiatry*, 1997 ; 154 : 1114-1119.
 - 31) Population Estimates. Statistics Bureau, Ministry of Internal Affairs and Communications. <http://www.stat.go.jp/data/jinsui/index.htm> (cited September 1, 2010) (in Japanese)
 - 32) Taku K, Calhoun LG, Tedeschi RG, et al. Examining posttraumatic growth among Japanese university students. *Anxiety Stress Coping*, 2007 ; 20 : 353-367.
 - 33) Asukai N. Huansyogai : Gaisyogo sutoresu shogai (PTSD). (Anxiety disorder : Posttraumatic stress disorder (PTSD)). *Rinsho Seishin Igaku, Zokango*, 1999 ; 28 : 171-177. (in Japanese)
 - 34) Weiss DS, Marmar CR. The impact of the Event Scale-Revised. In : Wilson JP, Keane TM eds. *Assessing Psychological Trauma and PTSD : A Practitioner's Handbook*. New York : Guilford Press, 1997 : 399-411.
 - 35) Asukai N, Kato H, Kawamura N, et al. Reliability and validity of the Japanese-language version of the impact of event scale-revised (IES-R-J) : Four studies of different traumatic events. *J Nerv Ment Dis*, 2002 ; 190 : 175-182.
 - 36) Nagamine T, Wada Y, Ishikawa Y, et al. Kikanshi zenshoku kanja no sippei ni taisuru kaishaku modoru ni kansuru kenkyu, (The explanatory model for disease among patients with bronchial asthma). *Gekkan tiiki igaku*, 1988 ; 2 : 126-133. (in Japanese)
 - 37) Smilkstein G. The family APGAR : A proposal for a family function test and its use by physicians. *J Fam Pract*, 1978 ; 6 : 1231-1239.
 - 38) Furukawa TA, Harai H, Hirai T, et al. Social support questionnaire among psychiatric patients with various diagnoses and normal controls. *Soc Psychiatry Psychiatr Epidemiol*, 1999 ; 34 : 216-222.
 - 39) Sarason IG, Sarason BR, Shearin EN, et al. A brief measure of social support : Practical and theoretical implications. *J Soc Pers Relat*, 1987 ; 4 : 497-510.
 - 40) Sarason IG, Levine HM, Basham RB, et al. Assessing social support : the social support questionnaire. *J Pers Soc Psychol*, 1983 ; 44 : 127-139.
 - 41) Furukawa T, Ohno Y, Uda H, et al. Kenkyu kyo-ryoku hokokusho, Ippan jinkochu no seishin shikkan no kanbenna sukuriningu ni kansuru kenkyu. In : Kawakami N, ed. Kosei rodo kagaku kenkyuhoi hojokin, Kosei rodo kagaku tokubetsu kenkyu jigyo, Heisei 14 nendo sokatsu/bundan kenkyu hokokusho. Kokoro no kenko mondai to taisaku kiban no jittai ni kansuru kenkyu. Okayama : Kawakami N, 2003 : 127-130. (in Japanese)
 - 42) Kessler RC, Andrews G, Colpe LJ, et al. Short screening scales to monitor population prevalences

- and trends in non-specific psychological distress. *Psychol Med*, 2002 ; 32 : 959-976.
- 43) Kawakami N, Kondo K, Yanagida K et al. Buntan kenkyu hokokusho, Seijinki ni okeru jisatsu yobo taisaku no arikata ni kansuru seishinhokenteki kenkyu. In Ueda S, ed. *Kosei rodo kagaku kenkyu kenkyuho hojokin. Kokoro no kenko kagaku kenkyu jigyo*, Heisei 16 nendo sokatsu/buntan kenkyu hokokusho, Jisatsu no jittai ni motozuku yobo taisaku no suishin ni kansuru kenkyu. Tokyo : National Institute of Mental Health, National Center of Neurology and Psychiatry, 2005 : 147-170. (in Japanese)
 - 44) Fukuhara S, Suzukamo Y. Manual of the SF-36v2 Japanese version. Kyoko : Institute for Health Outcomes & Process Evaluation research, 2004. (in Japanese)
 - 45) Fukuhara S, Bito S, Green J, et al. Translation, adaptation, and validation of the SF-36 Health Survey for use in Japan. *J Clin Epidemiol*, 1998 ; 51 : 1037-1044.
 - 46) Fukuhara S, Ware JE Jr, Kosinski M, et al. Psychometric and clinical tests of validity of the Japanese SF-36 health survey. *J Clin Epidemiol*, 1998 ; 51 : 1045-1053.
 - 47) Honda N, Motokawa A. Internet chosa ha shakai chosa ni riyoku dekiru ka-jikken chosa ni yoru kenshou kekka, JILPT Research Report, 17. Tokyo : The Japan Institute for Labour Policy and Training, 2005. (in Japanese)
 - 48) van der Kolk BA, McFarlane AC, Weisaeth L. *Traumatic Stress : The Effects of Overwhelming Experience on Mind, Body and Society*. New York : Guilford Press, 1996. (Translated by Nishizawa S. *Toraumatikku sutoresu : PTSD oyobi torauma hanno no rinsho to kenkyu no subete*. Tokyo : Seishin Shobo, 2001. (in Japanese))
 - 49) Natsume M, Murata H, Sugimoto K, et al. Kinrosha ni okeru sutoresu hyokaho (dai ippo), Tensuho ni yoru sutoresudo no jikohyoka no kokoromi. *Sangho igaku*, 1988 ; 30 : 266-279. (in Japanese)
 - 50) Shiraishi J, Natsume M, Murata H, et al. Daigakusei ni okeru sutoresu hyokaho (dai ippo), Tensuho ni yoru sutoresudo no jikohyoka no kokoromi. *Osaka daigaku kenko taiikubu kiyu*, 1988 ; 5 : 35-44. (in Japanese)
 - 51) Dobie DJ, Kivlahan DR, Maynard C, et al. Posttraumatic stress disorder in female veterans. *Arch Intern Med*, 2004 ; 164 : 394-400.
 - 52) Zhao C, Wu Z, Xu J. The association between post-traumatic stress disorder symptoms and the quality of life among Wenchuan earthquake survivors : the role of social support as a moderator. *Qual Life Res*, 2013 ; 22 : 733-743.
 - 53) Charuvastra A, Cloitre M. Social bonds and post-traumatic stress disorder. *Annu Rev Psychol*, 2008 ; 59 : 301-328.
 - 54) Kaniasty K, Norris FH. Social support and victims of crime : matching event, support, and outcome. *Am J Community Psychol*, 1992 ; 20 : 211-241.
 - 55) Population Census of Japan, Results of basic complete tabulation on industries 2010. Statistics Bureau, Ministry of Internal Affairs and Communications. <http://www.stat.go.jp/data/kokusei/2010/index.htm> (cited October 1, 2012) (in Japanese)

(Received 7. 23. 2013 ; Accepted 3. 20. 2014)