

Subjective Assessments of Threats and Their Association to Posttraumatic Stress Disorder Symptoms: The Case of the 2011 Japan Earthquake and Nuclear Disaster

To the Editor: On March 11, 2011, Japan was struck by a magnitude 9.0 M_w earthquake. The results were severe, as more than 15,000 people were killed by the earthquake and the following tsunami.¹ The aftermath of the disaster was a level 7 nuclear meltdown in Fukushima, matching only the Chernobyl disaster.^{1,2} However, a recent report of the World Health Organization showed that, to date, no deaths from immediate exposure to radiation were detected and that the deaths of the 6 workers in the nuclear facility at Fukushima were not related to direct exposure to radioactive radiation.³ Moreover, the media coverage of the nuclear threat led to mass panic among the Japanese population and triggered memories of Hiroshima and Nagasaki.^{4,5} The media's focus on the nuclear threat is important to note in light of the fact that although more than 15,000 people were killed during the earthquake and subsequent tsunami, no fatalities were detected from direct exposure to radioactive radiation. We conducted a study to address the lacuna in the literature concerning the subjective assessment of threat and the reactions elicited from it.

Our aim was to examine if there is a potential difference in the subjective assessment of the levels of 2 threats, natural disaster versus nuclear disaster, and whether the 2 types of threat show different associations with posttraumatic stress disorder (PTSD) symptoms. On the basis of previous study,⁶ we hypothesized that subjective threat assessment of nuclear disaster will be higher than subjective threat assessment of natural disaster. In addition, we hypothesized that the association between subjective threat assessments of nuclear disaster and PTSD symptoms would be stronger than the association between threat assessments of natural disaster and PTSD symptoms, controlling for exposure level.

Method. A convenience sample of 140 Japanese was collected during the week of April 24–30, 2011. Each participant was initially screened by a Japanese interviewer for history of physical or mental disorders and substance abuse. Six participants were excluded from this survey because of a positive history of the aforementioned conditions, and 12 more participants had a substantial number of missing data, leading to a final sample of 122 participants.

The participants (mean \pm SD age = 28.7 \pm 9.0 years, 64.2% women, 29.1% married) filled in a short questionnaire that collected demographic data. Threat assessments about the likelihood of future disasters were measured by the question, "How worried are you about the occurrences of the following future disasters? (1) natural disaster (composite of earthquake and tsunami disasters) and (2) nuclear disaster." Both threats were rated on a 5-point Likert scale ranging from 1 (not at all) to 5 (very much). A similar method was used for risk perception in a previous study.⁷

Posttraumatic stress disorder symptoms were assessed with the 22-item Impact of Event Scale—Revised.⁸ This scale was rated from 0 (not at all) to 4 (extremely) and represents the participants' distress during the past 7 days regarding the Fukushima disaster ($\alpha = .915$). This measure was found to be suitable during previous use in other major disasters such as the 2010 Haiti earthquake.⁹

Exposure level was measured by the distance to Fukushima in kilometers (mean = 271.09; SD = 127.77).

We used repeated-measures analysis of covariance to compare the mean levels of self-assessed threats (natural disaster vs nuclear disaster) while controlling for exposure level and tested to see if there was a significant difference between them.¹⁰ We then conducted correlation comparison between each subjective assessment of threat (natural disaster vs nuclear disaster) and PTSD symptoms while controlling for exposure level. We tested for significant differences between the correlations using Steiger's Z .¹¹

Results. Contrary to our hypothesis, there was no difference in the mean of the subjective threat assessments (mean \pm SD for nuclear disaster = 3.4 \pm 1.2 vs natural disaster = 3.5 \pm 1.1; $F = 0.978$, $P = .325$, partial $\eta^2 = 0.010$, observed power = 0.165). After controlling for exposure level, we found significant correlations between subjective assessment of nuclear disaster threat and PTSD symptoms ($r = 0.319$, $P = .002$) and between assessment of natural disaster threat and PTSD symptoms ($r = 0.435$, $P < .001$). The difference between the correlations was not significant (Steiger's $Z = -1.56$, $P = .118$).

Our results may indicate that subjective assessments of threats take a mental toll in the aftermath of a disaster. This finding is of importance to mental health professionals, in that it suggests that explaining the actual risks from radiation (in the case of Japan, no casualties) and natural disasters (more than 15,000 casualties) may help to reduce fear, anxiety, and excessive referral to the mental health system. Although the sample size was small and the design cross-sectional, our study may be of interest because it represents the first time that subjective assessments of threats are presented while the actual risks of the threats are known.

This study may encourage future longitudinal investigations focusing on the long-term effects on the mental health system and the psychological and psychiatric sequelae of the 2011 Japan earthquake and nuclear disaster.^{1,5}

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