



Fatigue and relating to others 3 months after the 2011 great east Japan earthquake

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ABSTRACT

Most inhabitants of Tohoku district suffer from chronic fatigue after the 2011 Great East Japan Earthquake. Chronic fatigue following disasters may lead to serious illness, even death. Posttraumatic growth appears to counteract fatigue. We predicted that the chronic fatigue would be inversely related to the posttraumatic growth factor “relating to others,” as represented by mutual helping and a strong sense of connection with humanity. Young 59 healthy volunteers, residing in Miyagi prefecture, were recruited 3 months after the disaster. We measured the subjects’ total scores on the Japanese version of the Checklist Individual Strength questionnaire (CIS), the Trait Anxiety (T-A) subscale of the State–Trait Anxiety Inventory (STAI), the Center for Epidemiologic Studies Depression Scale (CES-D), and four subscores on the posttraumatic growth inventory (PTGI). Stepwise regression analyses were conducted with score on the CIS as the dependent variable and other scores as independent variables. Scores on the “relating to others” factor of the PTGI showed a significant negative relationship with the CIS score, whereas the scores on the T-A subscale of the STAI and the CES-D were positively related to the CIS score. Human ties and mutual help were negatively related to the degree of the chronic fatigue.

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1. Introduction

The Great East Japan Earthquake, a massive 9.0+ magnitude (Richter scale) earthquake, occurred in the Pacific Ocean near Northeastern Japan at 2:46 pm on Friday, March 11, 2011, causing serious damage to almost all of the Tohoku area and some parts of the Kanto area. This earthquake, the greatest ever to occur in Japan, was followed by a large tsunami and then the nuclear accident at Fukushima. More than 20,000 people were killed or went missing as a result of the tsunami and fires after the earthquake, and more than 240,000 homes were damaged or destroyed. Because inhabitants of the Tohoku area were stressed by frequent aftershocks and concerns over radiation exposure, the effect of the disaster did not end within a few months (Kyutoku et al., 2012).

This huge, complex disaster inevitably had negative psychological effects on the general population as well as on the direct victims (Kyutoku et al., 2012).

Most inhabitants in the Tohoku area have been subject to much stress, and cumulative stress leads to chronic fatigue. Chronic fatigue is sometimes irreversible, and the compensation mechanisms that are useful in reducing acute fatigue are not effective (Mizuno et al., 2011). Elevated levels of fatigue are common after involvement in a disaster (Spinhoven and Verschuur, 2006). Fatigue has been shown to be a main precipitating factor for medically unexplained symptoms (MUS) after life events, especially traumatic events (Mayou and Farmer, 2002). Whereas most studies of psychiatric effects after disasters have focused on post-traumatic stress disorder (PTSD), depression, and anxiety (Foa et al., 2006; Nemeroff et al., 2006), only some studies have focused on fatigue (Mayou and Farmer, 2002; van den Berg et al., 2005, 2008, 2009; Spinhoven and Verschuur, 2006; Kyutoku et al., 2012). These examined predisposing, precipitating, and perpetuating

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factors for fatigue among survivors of a disaster (van den Berg et al., 2008, 2009). The survivors of disasters reported more MUS such as fatigue compared with controls (van den Berg et al., 2005).

Chronic fatigue does not easily disappear, in contrast to acute fatigue, which is reversible after suitable rest (Beurskens et al., 2000). In this study, we were interested in factors that counteract chronic fatigue in the aftermath of disaster, particularly social factors including human ties. This idea stemmed in part from our experiences and news of this disaster. In the weeks that followed this disaster, messages of support and donations naturally flooded in from all over the world (Ito, 2011). Many volunteers traveled to the tsunami areas to help with construction (Matanle, 2011), to give the grieving people hope and courage, and to remind them they were not alone. We actually felt our fatigue was alleviated by social factors. Previous studies appear to be supportive of such an alleviating effect of social factors in disasters. Tedeschi and Calhoun (1996) reported that when people were confronted with traumatic events, the continuing need for discussion of the consequences of these events can lead persons to become more self-disclosing than they may have been before. With self-disclosure, people recognized their vulnerability in a traumatic situation and could express more emotion and accept help (Tedeschi and Calhoun, 1996). Consequently, achieving a strong sense of human ties gradually promoted a feeling of solidarity among family and community members (Tedeschi and Calhoun, 1996). Moreover, Collins et al. (1990) suggested that part of the positive development of social relationships came from these increased interpersonal relationships and efforts directed at improving relationships. The association between social support and positive health outcomes has often been demonstrated (Ozbay et al., 2008). For example, residents with strong human ties were significantly less likely to die from cardiovascular illness, stroke, and cancer (Berkman, 1995). Thus, the positive psychological effects of human ties and mutual help may contribute to coping with stress (Ozbay et al., 2008) and seem to reduce chronic fatigue.

Such beneficial social factors appear to overlap with the “relating to others” factor seen in measurements of posttraumatic growth. Although traumatic events can produce many negative physical and psychological consequences such as fatigue and PTSD (Tedeschi and Calhoun, 1996), posttraumatic growth refers to the positive change that may also be experienced as a result of a struggle with trauma. In particular, relating to others is crucial for young people to cope with stress because relationships serve as a buffer against the negative effects of stress (Shulman, 1993). When mutual support is available and meets their needs, they cope with stress in more active, flexible, and positive ways (Shulman, 1993).

Here, we focus on the differences and similarities between social supports and relating to others in the context of posttraumatic growth. In terms of differences, relating to others implies a significant change in the focus on subjective relationships, including an increased subjective sense of compassion, intimacy, and closeness. These positive changes result from struggles related to major life crises or traumatic events (Tedeschi and Calhoun, 1996) and may be difficult to visualize (Dakof and Taylor, 1990). However, social supports include not only subjective relationships but also objective information, appraisals, and tangible supports. In terms of similarities, both relating to others and social support include subjective perceived support, which is related to adjustment (Scrignaro et al., 2011).

We hypothesized that the “relating to others” dimension of the posttraumatic growth inventory (PTGI) is negatively related to the degree of chronic mental fatigue in young residents. Posttraumatic growth is significantly related to mental health because posttraumatic growth is regarded by many authors of studies of posttraumatic growth as an adaptive response to traumatic events (Zoellner and Maercker, 2006). Moreover, to our knowledge, no

study has examined the relationship between posttraumatic growth and chronic fatigue in residents in the disaster areas. Hence, our goal was to study the relationships between relating to others and the degree of chronic fatigue in the aftermath of a disaster.

We also considered the associations among chronic fatigue, depression (Fuhrer and Wessely, 1995; Ferentinos et al., 2010), and trait anxiety (Jiang et al., 2003) because they were correlated in previous studies in ordinary life.

2. Methods

2.1. Subjects and methods

Fifty-nine subjects (42/17, male/female), age 21.14 ± 1.69 (mean $\pm$ S.D.) years, were recruited from undergraduate and postgraduate students from the Tohoku University community by the notes on highly visible walls of the University in Miyagi prefecture. All participants were in Miyagi prefecture (a disaster area) when the earthquake occurred, and all stayed from at least March 11th, 2011 to June and screened for absence of neuropsychiatric disorders using the Mini International Neuropsychiatric Interview (M.I.N.I.) (Sheehan et al., 1998; Otsubo et al., 2005). We confirmed that all subjects were not exposed to life-threatening trauma due to the earthquake and tsunami, and no subject had any history of psychiatric illness including PTSD according to the M.I.N.I. In sum, the participants did not suffer from severe psychiatric disorders, they were not seriously damaged by this disaster, and they were members of the general population.

All subjects who lived around Sendai city were strongly affected by Great East Japan Earthquake. In a cross-sectional study conducted 3 months post-disaster using an online questionnaire targeted at the general population, Kyutoku et al. (2012) demonstrated that posttraumatic stress symptoms were significantly greater in those in the primary affected area (where the seismic intensity was greater than or equal to 6 according to the Japan Meteorological Agency [JMA]) than in those in secondary (where the seismic intensity was larger than or equal to 4 but below 6 according to the JMA) or non-affected (where the seismic intensity was below 4 according to the JMA) areas. All subjects in our study lived in the primary affected area. Actually, the young undergraduate and postgraduate students at Tohoku University were considered to have developed chronic fatigue from the cumulative stress of the disaster because subjects similar to them demonstrated psychological stress induced by the earthquake as measured by an increase in salivary cortisol levels at 3 months after the earthquake compared with levels before the earthquake (Kotozaki and Kawashima, 2012). Then, we reviewed CIS studies from our laboratory conducted before the disaster (pre) and identified 26 subjects (21/5, male/female) aged 21.2 ± 1.6 (mean $\pm$ S.D.) years who had been interviewed 116 ± 34 (mean $\pm$ S.D.) days before the disaster from among the 59 subjects in this study who had been interviewed 3 months after the disaster.

Written informed consent was obtained from each subject in accordance with the Declaration of Helsinki (as revised in Edinburgh 2000). This study was approved by the Ethics Committee of Tohoku University.

2.2. Assessments

Diagnostic structured interviews were conducted to assess subjects' chronic fatigue, posttraumatic growth, depression, and anxiety 104 ± 9.0 (mean $\pm$ S.D.) days after the earthquake.

2.2.1. Chronic fatigue assessment

The Checklist Individual Strength (CIS) questionnaire, which was developed by Vercoelen et al. is the most frequently used chronic fatigue questionnaire worldwide (Vercoelen et al., 1994; Beurskens et al., 2000). The questionnaire has been used both for patients with chronic fatigue syndrome (Prins et al., 2001; The et al., 2007) and for healthy subjects (Beurskens et al., 2000; Lee et al., 2007; Aratake et al., 2007). The CIS consists of 20 statements, which are divided into the following four dimensions: subjective fatigue, physical activity, motivation, and concentration. The following are examples of items on the CIS: “I feel tired” (subjective fatigue factor); “I do quite a lot within a day” (physical activity factor); “I feel very active” (motivation factor); “I can concentrate well” (concentration factor). The total score is an index of chronic fatigue (Beurskens et al., 2000; Aratake et al., 2007), and higher scores indicate greater fatigue. We used the Japanese version of the CIS (Aratake et al., 2007) to rate subjective symptoms the subjects reported that they had during the previous 2 weeks, rating each from 1 to 7.

2.2.2. Posttraumatic growth assessment

The original PTGI is a 21-item scale that measures the degree of positive change as a means of determining individuals' success in coping with the aftermath of trauma by reconstructing or strengthening their perception of self, others, and the

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