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# Sleep disturbances, posttraumatic stress, and psychological distress among survivors of the 2013 Super Typhoon Haiyan

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## ABSTRACT

Sleep disturbances and their relation with posttraumatic stress and general psychological distress were examined after the 2013 Super Typhoon Haiyan. Sleep disturbances were hypothesized to be associated with posttraumatic stress and general psychological distress in two samples of survivors across two time points ( $N = 361$ ) in the Philippines. Sample 1 ( $n = 223$ ) and Sample 2 ( $n = 138$ ) were collected 18 months and 30 months after the storm, respectively. Results from structural regression modeling indicated that insomnia was associated with both posttraumatic stress and general psychological distress. Poor sleep quality was associated with posttraumatic stress but not with general psychological distress. Findings underscore the longer-term relationship between sleep disturbances and overall sleep quality to posttraumatic stress in the context of a natural disaster. Implications for public mental health interventions in disaster settings are discussed.

## 1. Introduction

Super Typhoon Haiyan (also known as Yolanda in the Philippines; hereafter Typhoon Haiyan) struck central Philippines on November 8, 2013. The storm displaced approximately 12 million people and was considered as the strongest typhoon on record to make landfall (Nakamura et al., 2016). Disasters like Typhoon Haiyan, generate conditions for the emergence of various psychopathologies, like non-specific distress, psychological disorders, psychosomatic symptoms, sleep disturbance, and substance abuse (Neria et al., 2009). For instance, a study conducted 2 to 4 months after the storm showed that survivors of Typhoon Haiyan had higher levels of distress and posttraumatic stress compared to controls (Chan et al., 2016).

The prevalence rates of posttraumatic stress disorder (PTSD) after natural disasters range from 5 percent to 60 percent in the first two years of the disaster (Galea et al., 2005). On the other hand, sleep disturbances are among the most common complaints among survivors and caregivers of trauma victims (Gerhart et al., 2014; Psarros et al., 2016). General psychological distress and other psychological sequela of disasters are less well studied compared to PTSD, but their trajectories are comparable to PTSD (McFarlane et al., 2009).

### 1.1. Psychopathologies and sleep disturbances

Disturbances like nightmares and insomnias are frequent and distressing complaints among those with PTSD (Nappi et al., 2011;

Spoomaker and Montgomery, 2008). The prevalence rates of posttraumatic nightmares among those with PTSD have been estimated to be as high as 72% (Leskin et al., 2002) to 88% (Forbes et al., 2001). Estimates for insomnia among these populations have also been noted to be high (e.g., 70–91%) (Neylan et al., 1998; Ohayon and Shapiro, 2000). Studies on PTSD interventions have shown inconclusive results in improving sleep (Nappi et al., 2011). Even among those in remission from PTSD, some aspects of sleep disturbances can persist (Belleville et al., 2011).

Furthermore, sleep problems are an independent risk factor for the development and maintenance of PTSD (e.g., Germain, 2013; Ross et al., 1989). Both subjective report and objective data, such as those from polysomnography, on sleep quality and continuity suggest that most people with PTSD also suffer from at least one form of sleep problem (Germain, 2013; Krakow et al., 2001a, 2001b, 2004). These findings provide support to the increasingly popular view that sleep disturbance should be regarded as a “hallmark” of PTSD (Ross et al., 1989). In addition to the findings that PTSD may precede or cause sleep problems, a review study suggests a complex bi-directional relationship between the two (Babson and Feldner, 2010). Disturbed sleep is associated with maladaptive stress and trauma responses, with increased risk for psychopathology (Germain, 2013). Sleep disturbances measured soon after exposure to a traumatic event were found to be associated with an increased risk for subsequent onset and maintenance of PTSD (Kobayashi et al., 2008; Koren et al., 2002; Psarros et al., 2017; Wright et al., 2011).

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Sleep disturbance was also linked to physical health problems, general psychological distress and other mental health conditions (Clum et al., 2001; Krakow et al., 2002). For instance, sleep disturbance was associated with daytime distress and impairment (Kobayashi et al., 2008; Mellman et al., 2007). A study conducted two years after the 2009 L' Aquila earthquake in Italy showed deterioration in sleep quality and disruptive nocturnal behaviors among survivors and that such sleep disturbance was a risk factor for the development of depression (Tempesta et al., 2013). Given the centrality of sleep disturbances in the etiology and maintenance of mental health problems, it would be of interest to examine the relationship of sleep and psychopathology in the aftermath of major natural disasters.

### 1.2. Current study

The long-term impact of Typhoon Haiyan on the health of affected communities remains to be examined, especially psychopathologies associated with the large-scale disaster. This study examined the relationships between insomnia, sleep quality, general psychological distress, and posttraumatic stress symptoms 1.5–2.5 years after Typhoon Haiyan among adult survivors. Much like other major natural disasters, we expected Typhoon Haiyan to have long-term consequences among some survivors. Given the centrality of sleep disturbances in mental health after a traumatic experience, we collected data on sleep disturbances, levels of general psychological distress, and posttraumatic stress.

The current study examined two groups of adult survivors of Typhoon Haiyan at two different time points. We examined the association between insomnia and general psychological distress as well as posttraumatic stress 18 months after the storm (Sample 1). We also looked at the relationship between sleep quality and general psychological distress and posttraumatic stress 30 months after the storm (Sample 2). Participants were attendees of a workshop on psychological first aid and post-disaster relief organized by local NGOs after Typhoon Haiyan. The study was conducted in Tacloban City, which was inundated by storm surges that destroyed much of its physical infrastructure, washed away coastal communities, and caused numerous deaths. The participating survivors lived in areas affected by the typhoon and directly experienced the storm and its aftermath.

We hypothesized that sleep disturbances in the form of insomnia and poor sleep quality were related to general psychological distress and posttraumatic stress in the mid- to long-term after Typhoon Haiyan.

## 2. Methods

### 2.1. Participants

Study respondents were 361 Filipino adults who participated in a disaster-relief training program in the Philippines approximately 18 months ( $n = 223$ ) and 30 months ( $n = 138$ ) after the storm. The workshops were promoted through grassroots organizations, universities, and local churches in Tacloban City. Every participant was involved in or was committed to direct relief and rehabilitation efforts for Typhoon Haiyan, either as community volunteers or as staff of various health, public health, and education sectors, and religious organizations.

The average age of the participants from Sample 1 was 37.1 years ( $SD = 15.1$ ). Age information was inadvertently not collected in Sample 2 but the participants were recruited from the same population as Sample 1. Altogether, females comprised 73.2% ( $n = 221$ ) of the respondents who indicated their gender across the two samples. Time lag between the dates of assessments and the disaster ranged from 16 to 22 months for Sample 1 and 30 to 31 months for Sample 2.

### 2.2. Procedure

The current study was a secondary data analysis of data collected at the aforementioned capacity building training. Since English is the medium of instruction at all educational levels in the Philippines, English-language paper-and-pencil questionnaires were used at the beginning of each workshop as part of a needs assessment. All adult participants in the workshops were recruited to answer the questionnaires. Participants of the workshops were informed that their participation in the study was voluntary and provided oral consent when handed the questionnaire. Those unwilling to participate were informed that they could either return a blank questionnaire or need not return the questionnaire at all. No names were included in the data set used for analysis. Institutional ethics approval to analyze the data was obtained from [masked for review].

### 2.3. Measures

#### 2.3.1. General psychological distress

The six-item Kessler Psychological Distress Scale (K6) was used to evaluate general psychological distress during the past 30 days (Kessler et al., 2002). Respondents were asked the frequency of six nonspecific mental health symptoms on a 5-point scale, which ranged from 0 (None of the time) to 4 (All of the time). Total score ranges from 0 to 24. A higher score indicated a higher severity of distress. Total score of 0–7 indicated that respondents were not likely to have mental illness. Scores of 8 to 12 were an indication of mild to moderate illness (MMI) among respondents, while a total score of 13 and above indicated serious mental illness (SMI; Kessler et al., 2010). K6 was shown to have good psychometric properties in Asian samples (Kang et al., 2015; Kessler et al., 2010; Lee et al., 2012; Patel et al., 2008; Sakurai et al., 2011) with Cronbach's  $\alpha$  ranging from 0.74 to 0.85. Cronbach's  $\alpha$  in this study was 0.88 across both samples.

#### 2.3.2. Posttraumatic stress

For Sample 1, the PTSD Checklist-Specific (PCL-S), a 17-item self-report inventory that asks about a specific, identified event, was used to measure posttraumatic stress resulting from traumatic experiences during the storm (Weathers et al., 1993). PCL was shown to have good psychometric properties across multiple studies (e.g., Ruggiero et al., 2003; Wilkins et al., 2011) and in the Philippines (Hechanova et al., 2015). Respondents were instructed to complete the PCL-S with reference to their experiences during Typhoon Haiyan and its aftermath. Covering the 17 DSM-IV symptoms of PTSD, the items in the instrument were rated on a 5-point Likert scale, ranging from 1 (Not at all) to 5 (Extremely). This study used a total PCL-S cut-off score of 44 (Blanchard et al., 1996) in addition to diagnostic scoring according to the DSM-IV criteria for PTSD. Overall Cronbach's  $\alpha$  in Sample 1 was 0.94 with the intrusion, avoidance and hyperarousal sub-scales, at 0.89, 0.88, and 0.84, respectively.

For Sample 2, the PTSD Checklist for DSM-5 (PCL-5) was used to assess posttraumatic symptoms severity (Weathers et al., 2013). The 20-item questionnaire is the revised and updated self-report measure to assess symptoms of PTSD corresponding to the DSM-5 criteria. Respondents were asked to rate in a 5-point Likert scale for each symptom, ranging from 0 (Not at all) to 4 (Extremely). A composite score was calculated, with higher scores corresponding to more severe symptomatology. Total PCL-5 cut-off score of 30 was used for assessing for posttraumatic stress to allow comparability with the PCL-S scores in Study 1 (Blevins et al., 2015) together with a diagnostic algorithm based on DSM-5 symptom cluster criteria for PTSD. Overall Cronbach's  $\alpha$  in Sample 2 was 0.94, with intrusion, avoidance, mood/cognitive alterations and hyperarousal sub-scales at 0.85, 0.78, 0.86, and 0.83, respectively.

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