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An epidemiologic study of self-reported sleep problems in a large sample of adolescent earthquake survivors: The effects of age, gender, exposure, and psychopathology

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ABSTRACT

Background: This study investigated the prevalence of sleep problems and their associated risk factors in child and adolescent survivors three years after the 2013 Ya'an earthquake.

Methods: A total of 6132 adolescent survivors aged 9–18 years were invited to complete the Pittsburgh Sleep Quality Index, Children's Revised Impact of Event Scale-13, Short Mood and Feelings Questionnaire, and Screen for Child Anxiety-Related Emotional Disorders. Logistic analysis was used to identify possible relationships of sleep disturbance scores with earthquake exposures, mental health and demographic characteristics.

Results: More than a quarter of the sample showed sleep problems of some kind, with 23.1% sleeping fewer than 7 h per night, 32.5% having difficulty falling asleep, 24.2% having difficulty remaining asleep, 25.3% having poor sleep quality, 17.4% having nightmares and 44.6% having difficulty functioning during daytime hours. Older participants were at a significantly higher risk of sleep issues than younger children (OR 2.89), and the subjects had significantly elevated risks of probable anxiety (OR 3.47), probable depression (OR 2.45), and probable posttraumatic stress disorder (OR 1.89). Other risk factors for sleep problems were earthquake exposure variables, including being injured (OR 1.42), having a parent injured (OR 1.27), witnessing death (OR 1.32) or feeling extremely scared (OR 1.22) in the Ya'an earthquake.

Conclusions: Sleep disturbances are common in adolescent earthquake survivors, and they are associated with age, gender, psychiatric symptoms and factors related to earthquake exposure. These results highlight the importance of development- and gender-specific interventions to prevent sleep disturbances after a major earthquake.

1. Introduction

Natural disasters commonly increase the risk of psychological distress, such as posttraumatic stress disorder (PTSD), anxiety and depression, among children and adolescent victims [1–3]. Sleep changes, characterized by shorter sleep duration, difficulty falling asleep, frequent awakenings, and nightmares, within this vulnerable group tend to be a neglected field. In fact, impaired sleep is common in children and adolescents exposed to disasters, both in the immediate aftermath and in the long term [4–6]. Koto et al. [7] reported that 46% of young evacuees had sleep difficulties immediately after an earthquake, and the prevalence of general sleep disturbances in children and adolescents affected by Hurricane Katrina was 46% at 24 months after the event and 50% at 30 months [4]. Other studies have reported lower prevalences of

sleep abnormalities; for example, a longitudinal study of 1573 children and adolescents from two schools exposed to the earthquake in Wenchuan, China, found that the incidence of sleep difficulties was 28.79–30.18% at 18–30 months following the earthquake [5]. Most of these studies involved relatively small convenience samples, which limits statistical power and increases the risk of false-negative and false-positive results. The larger, randomized sampling of youths after a major disaster may help provide a more accurate and representative understanding of the prevalence of sleep disturbances and their associated risk factors.

Such research is important because major disasters can trigger sleep abnormalities that can persist, together with impaired mental health, for many years after a disaster [8–10]. Insufficient sleep has been associated with impaired daytime functioning, elevated blood pressure

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later in life, behavioral problems, emotional disturbances, suicidal behaviors and reduced academic performance in children and adolescents [11–15]. Sleep disturbances are also a hallmark of PTSD [16, 17], and they form an epiphenomenon of anxiety disorder and depression [18–20]. Thus, the assessment of sleep disturbance may help inform and improve posttraumatic psychological interventions in adolescents.

Although numerous studies of sleep changes in children and adolescents have documented elevated levels of sleep disturbances in individuals exposed to nature disasters [4, 21–24], there is little research examining whether trauma exposure increases the risk for sleep disturbances in children and adolescents; the existing results are contradictory. For example, among 1573 adolescents exposed to the 2008 Wenchuan earthquake in China, a strong relationship was reported between aspects of traumatic exposure experiences and the severity of sleeping problems [5]. Another study of 746 adolescents following the Wenchuan earthquake indicated that trauma exposure was not directly associated with sleep problems [25]. Moreover, it is not known whether these studies' findings can be generalized to all adolescent survivors from the earthquake because of convenience and small sample methodologies. The public health importance of preventing postdisaster mental health issues suggests the importance of examining in depth whether the specific exposure to a nature disaster increases the likelihood of sleeping problems among adolescents; there is also a need to provide targeted specialized postdisaster mental health services to subgroups with significant levels of sleeping problems after a major earthquake. In addition to trauma exposure, other potential risk factors associated with sleep or mental health problems, such as age [5], gender [26], and only child status [27], also need to be explored in larger and more representative samples of adolescents following nature disasters.

In 2013, the Ya'an region in southwestern China was hit by a destructive earthquake measuring 7.0 on the Richter scale. The present study involved a survey of many children and adolescents who survived the 2013 Ya'an earthquake three years after the earthquake to determine the prevalence of multiple sleep problems and explore the associations between such problems and age, gender, only child status, type of earthquake exposure and mental health problems. To our knowledge, this study is the first of its type in this region of the world.

2. Methods

2.1. Participants and procedures

Data in this study were collected as part of an ongoing large-scale study on psychological adjustments among child and adolescent survivors of the Ya'an earthquake. Participants were selected from three primary, five junior high, two senior high and one six-year high schools in the counties of Baoxing, Lushan and Tianquan, which border each other and are located in the Sichuan Province in southeastern China; these were the three areas most severely affected by the Ya'an earthquake.

Data were collected between 25 April and 20 May 2016. This project was designed in accordance with the tenets of the Declaration of Helsinki and approved by the Department of Education of Ya'an District, the principals and teachers of the schools involved, and the Research Ethics Committee of Sichuan University.

In each of these three counties, there is only one senior high school, about seven to ten junior high schools and thirty to forty primary schools. Considering the representativeness and convenience of samples in the region, we selected four public schools (1 primary school, 2 junior high schools, 1 senior high school) from each county, with one junior high school from a rural area and one in a town. From each target high school, about a quarter of the students (grades 7–12) were randomly selected using the school classes as sampling units; all students in the sampled classes were invited to participate in the survey. The three primary schools were the largest and most representative in

their counties because students came from various backgrounds. Considering the limited abilities of primary students to understand the survey questions, only students in grades 3–6 were invited to participate in the study.

Parental written consent and oral consent from the subjects was obtained before this study. All questionnaires were distributed by trained psychologists, with the help of teachers, to all students of all ten grades in the participating schools during the last class of the morning or afternoon near the end of the school year. Before filling out the questionnaires, participants were instructed to read the instructions carefully; they were also informed that their participation was voluntary, without any penalties for nonparticipation and that they could quit at any time if they felt uncomfortable. Participants completed the confidential paper-and-pencil questionnaires in the classroom under the instruction of trained clinical psychologists. The questionnaires took approximately 40 min to finish; the younger children took approximately one hour or more. The questionnaires were coded for anonymity in subsequent analysis.

2.2. Measures

2.2.1. PTSD

The severity of posttraumatic stress symptoms was assessed using the Children's Revised Impact of Event Scale (CRIES)-13, which was adapted from the Impact of Event Scale [28]. The total CRIES-13 score can range from 0 to 65, and scores ≥ 30 indicate probable PTSD [29]. The scale has been shown to have reasonably good psychometric properties among Chinese children and adolescents [24, 30]. Cronbach's α in the present study was 0.902.

2.2.2. Depression

Probable depressive symptoms were measured using the Short Mood and Feelings.

Questionnaire (SMFQ) [31]. This scale includes 13 items that assess the degree of depression, such as feeling very tired, having no interest in anything, restlessness, crying, feelings of loneliness, and feelings of doing things incorrectly. Depressive symptoms were evaluated on a 3-point scale (0 = no, 1 = sometimes, 2 = yes). Total scores of 11 or higher indicated probable depression. The scale has been shown to have reasonably good psychometric properties among Chinese children and adolescents [32, 33]. Cronbach's α in the present study was 0.911.

2.2.3. Anxiety problems

Anxiety symptoms were measured using the Chinese version of the Screen for Child Anxiety-Related Emotional Disorders [34], which consists of 41 items with responses on a 3-point Likert scale ranging from 0 to 2. The scale has been shown to have reasonably good psychometric properties among Chinese children and adolescents [2, 5, 35]. A total score of 25 or higher indicated probable anxiety disorder. In the current study, Cronbach's α was 0.939.

2.2.4. Sleeping problems

Sleeping problems were measured using the Chinese version of the Pittsburgh Sleep Quality Index (PSQI) [36]. This scale consists of 19 self-rated questions and five clinician-rated items; the 19th self-reported item and all five clinician-rated items were not scored. The remaining 18 self-reported items were used to calculate seven dimensional scores: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, sleep medication use, and daytime dysfunction. Each dimension was scored on a scale from 0 to 3, with total scores obtained by summing the scores from all seven dimensions. A global PSQI score of 8 or greater indicates sleep problems. The Chinese version of the PSQI has satisfactory psychometric properties [36, 37]. In the current study, Cronbach α was 0.829.

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