

## Symptoms of Post-traumatic Stress Disorder and Anxiety among Adolescents following the 2010 Yushu Earthquake

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Received Date: October 7, 2014, Accepted Date: October 22, 2014, Published Date: October 31, 2014

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### Abstract

**Background:** This study was undertaken three years after the Yushu earthquake with the aim of exploring the differences in post-traumatic stress disorder (PTSD), anxiety symptoms between different groups. The survey was conveyed in Yushu Tibetan autonomous regions Ethnic School and the number of the participants was about one thousand.

**Method:** T-test and chi-square test are mainly used to examine the correlation. In particularly, comprehend bivariate correlation analysis.

**Results:** Three years following the disaster, 8.9% of participants reported PTSD and 49.3% displayed anxiety symptoms. A difference analysis of PTSD and anxiety symptoms across gender and grade subgroups suggested that there were no significant gender differences in the anxiety and PTSD scores. However, there was a significant grade difference for anxiety symptoms.

**Conclusion:** This study demonstrated the prevalence of PTSD was low among Tibetan adolescent. But the better of living environment and the customs habits did not change their anxiety level. This study may be useful for strengthening directing and evaluating mental health needs, as well as providing information on the psychological impact of the earthquake on this particular ethnic group in China.

**Keywords:** Adolescents; Post-traumatic stress disorder; PCL-C; Anxiety symptoms; SAS

### Introduction

On April 14th, an earthquake measuring around 7.0 on the Richter scale struck Yushu in Qinghai Province, with the earthquake epicenter being located very near the town. By the afternoon of the 14th, this 7.1 magnitude earthquake had caused many aftershocks in Yushu County. According to China seismological bureau networks, by the 19th, there had been about 1206 aftershocks, 12 of which had been greater than a 3.0 magnitude. By May 30, 2010, there had been 2698 confirmed deaths, and 270 people were confirmed missing. Further, the Yushu earthquake caused heavy property losses and many residents' houses had substantially collapsed. Schools, hospitals and other public service facilities had also been severely damaged, part of the highway had subsided and water and power supplies and communication facilities had been destroyed. According to the Qinghai Yushu earthquake disaster assessment report, the Yushu earthquake affected a 35,862 square kilometer area which included 27 villages and towns in 7 counties, including the Tibetan Autonomous Prefecture in Qinghai Province, Nangqian, Qumalai county and Ganzi Tibetan Autonomous Prefecture Shiqu County in Sichuan Province.

Natural disasters give rise to many problems such as loss of life, personal injury, and psychological morbidity [1]. Previous systematic reviews have documented that post-traumatic stress disorder (PTSD) is the most commonly studied and probably the most frequent psychopathology in the aftermath of disasters [2,3]. PTSD was

introduced to the Diagnostic and Statistical Manual for Mental Disorders-III (DSM-III; American Psychological Association [APA], 1980) primarily in response to the large number of Vietnam veterans with symptoms that did not cleanly map onto any of the disorders included in the DSM-II [4]. Over the following years, more information about PTSD was gathered as such symptoms were recognized in not only war veterans, but also in people who had survived other types of traumatic events such as natural disasters, rape and assault [5]. The findings of many studies have shown that PTSD symptoms are common in earthquake survivors [6,7], and the rate of PTSD documented in earthquake survivors has been found to range from 10% to 87% [8,9]. The common risk factors for post-earthquake PTSD are being female [3,10] and having a low education level, amongst others. A higher degree of exposure to a disaster is consistently associated with the likelihood of PTSD [3]. Recently, studies have also found that experiencing fear during an earthquake was among one of the strongest predictors of PTSD. Previous studies have also suggested that low social support over the year following the Wenchuan earthquake was another risk factor in the development of PTSD, which is similar to previous findings [7].

Recent studies suggest that children and adolescents may develop posttraumatic stress symptoms after exposure to earthquakes, with reported rates ranging from 21% to 70% [11].

An increasing number of studies have reported PTSD prevalence rates and have identified PTSD risk factors among child survivors of earthquakes [12,13], terrorist attacks [14], hurricanes [15], floods [16], and other general traumatic events other than natural

disasters [17]. Although the prevalence rates have varied across the studies, a consistent finding is that female survivors appeared to be at a higher risk of developing PTSD and anxiety than male survivors [13,18,19].

PTSD usually includes three dimensions flashback avoid and hyper arouse according on DSM-IV anxiety is the expectation of future threat It is often accompanied by muscular tension, restlessness, fatigue, and problems in concentration. Anxiety can be appropriate, but when it is too much and continues too long, the individual may suffer from an anxiety disorder [20]. Posttraumatic stress disorder (PTSD) is a common psychiatric disorder following traumatic events, and causes feelings of intense fear, helplessness, or loss. Posttraumatic stress disorder seriously interferes with an individual's daily life functions, with the affected often being comorbid and suffering from depression and anxiety [21]. The primary purpose of this study was to report the prevalence of PTSD and anxiety in adolescents 3 years after the Yushu earthquake in Qinghai Province, According to an existing knowledge in the field, we try to explore the characteristic of different group adolescents including to examine the effect of gender and grade on PTSD and anxiety symptoms.

## Methods

### Procedure and sample

This study was approved by the Human Research Ethics Committee of Sichuan Normal University. Permissions and supports were also obtained from the school boards and Chengdu Women Federation. Data collection for the study was conducted on November 12, 2011, about 3 years after the Yushu earthquake. With the assistance of the teachers at Juyuan ethnic school, questionnaires were administered by class in the presence of at least one member of the local child mental health team. The questionnaires were completed anonymously in a quiet classroom according to conditions set by the researchers. All students were asked to complete the questionnaire carefully according to their first reaction. If their feelings had changed very much in recent month, they were asked to complete the questions according to their situation in the previous week. Younger participators were asked to completet he questionnaires with the assistance of the trained students who were psychological postgraduate from Sichuan Normal University. Participators were also advised that they could free to withdraw from the study at any time during the data collection.

The total study population was 1000 students aged between 11-20 years old, all of whom attended classes at Juyuan ethnic school. All students came from Yushu, the area which had been most affected by the earthquake. Of the 1000 students, 850 completed the measures for PTSD and anxiety, a response rate of 85%.The sample consisted of 382 (45%) boys with a mean age of 16.05 years (SD=1.8) and 468 (55%) girls with a mean age of 15.5 years (SD=1.8). The mean age of all students was 15.73.

## Measure

### Demographics

Basic demographic information; gender, age, ethnicity, education level and monthly income; was elicited using a questionnaire.

## Post-traumatic stress disorder

PTSD symptoms were assessed using the PTSD Check List-Civilian Version (PCL-C), which consists of 17 items corresponding to each symptom, and PTSD criteria B, C, and D [22,23]. Responses to each item on the PCL-C were recorded on a five-point Likert scale ranging from 1 ( not at all ) to 5 ( extremely ) indicating the degree to which a respondent had been bothered by a particular symptom over the previous month. A symptom was deemed present when a respondent reported an item as being experienced moderately, quite a bit, or extremely (3, 4, or 5, respectively ) in the past month [22]. The test-retest reliability of the total PCL-C was 0.708.The homogeneity reliability (**Cronbach's $\alpha$** ) of the PCL-C was 0.893.The internalreliability of this instrument was 0.80. The internal reliabilities of the three subscales were0.81, 0.80, and 0.82, respectively. In the current study, PTSD was defined using the Diagnostic and Statistical Manual-IV criteria. To be categorized as having symptoms consistent with a diagnosis of PTSD, a respondent had to report at least 1 of 5re-experience symptoms, at least 3 of7 avoidance symptoms and at least 2 of 5 arousal symptoms with a rating of at least "moderately". A cut off score of 50 and over was used to strictly define the PTSD [7]. Scores were summed with a final range of 17 to 85.

## Self-Rating Anxiety Scale (SAS)

This is a 20-itemself-report scale, which provides an overall measure of anxiety. It is scored on a 4-point scale (never, sometimes, often, always), scored 1, 2, 3,4, respectively. The total score indicates the severity of the anxiety symptoms and ranges from 0 to 80. We calculated the standard score using the total score multiplied by 1.25. In the present study, standard scores above 50 (including 50) were considered to indicate anxiety symptoms. In other words, 50 was the cutoff point for the assessment of anxiety symptoms. Scores of 50-59 indicated a light level of anxiety; scores of 60-69 indicated a moderate level of anxiety; and scores over 70 indicated a severe level of anxiety. The internal consistency of the scale in the present sample was high (Cronbach's  $\alpha$ =0.851).

## Statistical analysis

We calculated the descriptive statistics for PTSD and anxiety symptoms. T-tests were performed to investigate the gender and grade differences in the PTSD and anxiety symptoms. Bivariate correlation analyses were performed to examine the relationship between PTSD and anxiety symptoms. To examine gender and grade differences in the scale scores for PTSD and anxiety, we used t tests and reported the effect sizes. All tests were 2-tailed, and significance was set at 0.01. We used SPSS 17 for data analysis. First of all, the descriptive statistics were presented from the demographic variables. Then the PCL-C scores of the 850 subjects exposed to Yushu earthquake three years after the earthquake event were analyzed and the SAS scores calculated.

## Results

### Demographic characteristics

The mean age of the participants was 15.73 years with 45% being male and 55% being female, and 291(34.2%) being middle school students and 559(65.8%) being high school students. Details of the demographic characteristics are presented in Table 1.

	n	%
Gender		
Male	382	45
Female	468	55
Grades		
Middle school (11-15 years old)	291	34.2
High school (15-20 years old)	559	65.8

**Table 1:** Sociodemographic characteristics of the study sample

### Prevalence of PTSD

The probable PTSD prevalence estimate was 8.9% (based on the DSM-IV criteria), which is relatively lower than results reported in

previous studies. Girls were found to have a higher rate (9.6%) of PTSD than boys (8.1%). For the different grades, middle students (5.8%) had a lower rate of PTSD than high students (10.6%) (Table 2).

	N	PTSD	%	$\chi^2$	P
Gender					
Male	382	31	8.1	8.7	0.003**
Female	468	45	9.6		
Grades					
Middle school (11-15 years old)	291	17	5.8	84.5	0.000***
High school (15-20 years old)	559	59	10.6		
Total number of PTSD		76	8.9		

Table 2: Prevalence of PTSD, \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

### 5.3 Prevalence of anxiety symptoms

About 419 students (49.3%) were found to have existing anxiety symptoms, with 57.6% of these reporting a light level, 36.3% reporting a moderate level, and 6.2% reporting a severe level.

	N anxiety(n, %)		Severe	$\chi^2$	P
	Light	moderate			
Gender					
Male 214	126	75	13	6.7	0.003*
	58.9	35.0	6.1		
Female 241	136	90	15		
	56.4	37.3	6.2		
Grades					
Middle school (11-15 years old) 129			3	74.4	0.000***
	86	40	2.3		
High school (15-20 years old) 326	66.7	31.0	25		
	176	125	7.7		
Total number of anxiety 455	54.0	38.3			

**Table 3:** Prevalence of anxiety symptoms, \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

### PTSD and anxiety bivariate correlations analyses

We found a significant positive relationship between PTSD and anxiety. The correlation between the PTSD total score and the anxiety standard score was .527. A further examination of the correlations between the PTSD and SAS score subscales showed that anxiety was largely related to avoidance and numbing ( $r=0.533$ ,  $p<0.001$ ), followed by arousal ( $r=0.464$ ,  $p<0.001$ ) and re-experience ( $r=0.403$ ,  $p<0.001$ ).

### PTSD and anxiety gender and grade differences

We found no significant gender differences for the PTSD and anxiety symptoms. However, there was a significant between middle students and high students in anxiety.

	1	2	3	4	5
1 PCL-T					
2 Re experience	0.90*				
3 Arousal	0.87**	0.64**			
4 Avoidance	0.85**	0.63** 0.40**	0.64**		
5 Anxiety	0.53**		0.46**	0.53*	

**Table 4:** Bivariate correlations analysis (two-tailed test), \*\* Correlation is significant at 0.01 level.

	PTSD			Anxiety		
	T	df	sig	T	df	sig
Gender	-0.356	63	0.723	0.427	417	0.670
Grades	0.382	63	0.704	-2.905	417	0.004**

**Table 5:** T-tests of PTSD and Anxiety symptoms on gender and grade, \* $p<0.05$ ; \*\* $p<0.01$ ; \*\*\* $p<0.001$

Posttraumatic stress disorder has been shown to be comorbid with anxiety. The correlation coefficients among the symptoms of the three disorders were in the range .403 to .533. These findings were consistent with those found in Acerno et al. [17], in which of the adolescents who reported PTSD, 80.9% also reported anxiety [17]. In our study, we also found a significant positive relationship between PTSD and anxiety. Some researchers have indicated that anxiety sensitivity and PTSD symptom severity were reciprocally related in that anxiety sensitivity could predict subsequent PTSD symptom severity [30], with this symptom severity being predicted later than the anxiety sensitivity, a finding which was supported in our results. On the three PCL-C subscales, anxiety was found to be most related to avoidance and numbing ( $r=0.533$ ). PTSD is a common psychiatric disorder following traumatic events and previous studies have found that survivors with PTSD after traumatic events also reported anxiety

### Discussion

We found that the overall prevalence of PTSD was 8.9% 3 years after Yushu earthquake, which was relatively lower than in previous studies. The prevalence of PTSD in boys and girls was 8.1% and 9.6% respectively, which showed a significant difference.

In this study, 3 years after the earthquake disaster, we found that approximately half the adolescent sample had anxiety symptoms, which was an unexpected finding. Exposure to unfamiliar people or the possibility of being observed by others characteristically evokes anxiety and differs in severity depending on the number of fearful situations [24]. Although the students had moved from their hometown in Qinghai province to Dujiangyan, Juyuan middle school was a boarding school, and students living conditions in Dujiangyan were better than Yushu, they could contact with their parents at any times such as call. Especially Qinghai Province lies in the northwest of China, and has a dry climate, while Dujiangyan has a somewhat wetter and more humid climate. Therefore, it could be surmised that the difficulties in adapting to the climate may be partly responsible for the high anxiety scores. Several theorists have argued that a person's uncertainty over the ability to control their environment can be related to increased anxiety [25-27]. Therefore, the living environment, habits, climate and social support for the psychological rehabilitation of juvenile play an important role. Because of the differences in physiological growth in adolescent girls, the prevalence of anxiety in girls was found to be higher than in the boys, which was consistent with previous studies [28,29].

symptoms [31]. The high correlation between PTSD and anxiety in our study further supports these results. The symptoms of PTSD can have a strong effect on a person's life, as not only are the symptoms of PTSD distressing, but a person with PTSD may also be more likely to develop other mental disorders, such as anxiety disorders. When we tested for the differences in the severity of PTSD for gender and grade, we did not find a significant gender difference, which is inconsistent with previous studies which found that females tended to have more severe PTSD symptoms than males [32]. Of the 850 adolescents, we found that there were 76 PTSD sufferers with total PTSD scores  $\geq 50$ . As there were only 76 PTSD cases, this maybe one of the reasons for the lack of gender differences. However, as most of participants were from a minority group (Tibetan), they may have a greater sense of unity, in that this ethnic group is very supportive of each other in times of crisis. This means that, regardless of the circumstances, both

genders would help each other to alleviate adverse symptoms, which could help to explain that lack of a significant gender difference in PTSD severity. Another possible mediator is the tendency for females to engage in more rumination than men [33]. A recent study found that women engaged in significantly more deliberate (productive and contemplative) and brooding (negative) rumination [34]. The tendency to ruminate on constructive issues, such as an increased awareness of personal strengths or an appreciation of the importance of social connections, has been suggested as a mechanism leading to greater reports of posttraumatic growth [35]. Previous studies have found that recent deliberate rumination was significantly associated with posttraumatic growth in a sample of bereaved parents belonging to self-help groups; similarly, reflective rumination predicted positive affect and well-being in women who were at high risk for breast cancer [36]. As a mediator, rumination could facilitate the experience of posttraumatic growth and reduce PTSD severity.

We found significant grade differences for anxiety, which was consistent with previous studies. Nursu et al. also observed a significant grade effect for anxiety [37]. In our study, the high school student scores were higher for anxiety than the middle school students. The high school students had been facing college entrance examinations at the time of the earthquake, so the disruption in their studies and the need to relocate to another school to continue could be the reason for the greater anxiety. Further, adolescents at this age are becoming adults and are growing quickly physically and psychologically, and therefore tend to have more psychological concerns than younger students. These issues could be the reason for the higher anxiety scores in high school students.

## Conclusion and Limited

In this study, we mainly analyzed the role of gender and grade. Gender and grade as a major risk factor show a significant PTSD and anxiety differences. However, unlike the earthquake of Wenchuan, governments transfer these students timely, and avoid them exposing in earthquake scene continually. So, low exposure level has an important effect to the prevalence of PTSD, but the better of living environment and the customs habits did not change their anxiety level. This study may be useful for strengthening directing and evaluating mental health needs, as well as providing information on the psychological impact of the earthquake on this particular ethnic group in China.

When interpreting results, we should keep in mind some important limitations. The most important is the lack information on the impact of the earthquake on the subjects enrolled in terms of lost friends or relatives, or if whether their homes had been lost or severely damaged and thus needed home support from relatives or the government. Secondly, a self-report instrument was used, instead of using the rating of the clinician to detect PTSD symptoms. A PTSD self-report may be considered less accurate. Further, the participants may have had problems in reading or understanding the survey as, in fact, some participants chose not to complete the survey. Thirdly, this study was a cross-sectional survey, so we did not know which subject characteristics existed before the earthquake, and which were a consequence of the earthquake. Owing to the lack of pre-disaster data, it is difficult to conclude to what extent the earthquake affected these young people. Finally, we did not conduct a survey in non-disaster areas, thus a comparison based on regional differences was not available.

## Acknowledgments

The research is supported by National Social Science Foundation of China (Grant No. 12XSH019), the ministry of Education of Humanities and Social Science Project of China (Grant No. 12YJA190009). We appreciated these support both in finance and in spirit.

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