

APPLICATION OF THE CHINESE POSTTRAUMATIC STRESS DISORDER CHECKLIST TO ADOLESCENT EARTHQUAKE SURVIVORS IN CHINA

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We investigated the incidence of posttraumatic stress disorder among 2,448 middle-school students in Sichuan Province, China, soon after the Wenchuan earthquake occurred on May 12, 2008. We also tested the reliability and validity of a Chinese version of the Posttraumatic Stress Disorder Checklist–Civilian Version (Weathers, Litz, Huska, & Keane, 1994) with this group. PTSD occurred more frequently among females compared with males, and among those exposed directly, indirectly, or not at all to the earthquake, the highest incidence of PTSD was among the group exposed directly. Among 3 groups aged between 11 and 13, 14 and 15, and 16 and 18, the highest incidence of PTSD was in students aged 14 and 15. Compared with other groups those with the highest incidence of PTSD were students with low socioeconomic status, who witnessed the earthquake, had heavy loss of their houses and other possessions, and whose family members were casualties. Factor analysis showed that the 3-factor model of the PCL-C had good construct validity. The internal consistency of Cronbach's alpha and split-half reliability was also satisfactory. Therefore, the PCL-C was determined to be a reliable instrument to detect PTSD among Chinese adolescents exposed to the earthquake.

Keywords: posttraumatic stress disorder, Chinese Posttraumatic Stress Disorder Checklist–Civilian Version, earthquake survivors, middle-school students, adolescents.

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The Wenchuan earthquake measuring 8.0 on the Richter Scale occurred on May 12, 2008 in the Sichuan province of China. It was one of the deadliest and most devastating natural disasters in China and killed at least 68,700 people, including more than 5,000 adolescents. Posttraumatic stress disorder (PTSD) is a psychiatric disorder that develops in some people following exposure to a traumatic event, such as military combat, violent crime, assault, or a natural disaster (American Psychiatric Association, 2000). Because adolescence is a period when individuals are coping with significant physical and psychological developmental changes, adolescents are likely to develop PTSD after exposure to traumatic events (Joseph, Brewin, Yule, & Williams, 1993; Lonigan, Shannon, Saylor, Finch, & Sallee, 1994). According to the criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 2000) and the Chinese Classification and Diagnostic Criteria of Mental Disorders (CCMD; Chinese Psychiatry Society, 2001), the main clusters of PTSD symptoms are reexperiencing/intrusion of the traumatic event, avoidance/numbing, and increased hyperarousal. Defining symptoms include trauma-associated dreams and nightmares, efforts to avoid reminders of the stressful experience, and heightened physiologic arousal episodes during the month after the event (Smith, Redd, DuHamel, Vickberg, & Ricketts, 1999).

The PTSD Checklist (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993) and Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979) are two major tools used to diagnose PTSD. It is difficult to identify and assess PTSD in people in mainland China because the Chinese (Mandarin) version of the PTSD measure is not well-established. Although the IES has been used widely to examine traumatic events, the items included do not have direct reference to the diagnostic criteria in the DSM-IV (Wu & Chan, 2003; Wu, Chan, & Yiu, 2008).

However, the PCL, a 17-item self-report rating scale, matches the diagnostic criteria of the DSM-IV and is, therefore, a more reliable measure and is also more likely to produce results indicating greater validity than the IES. Because it takes only about 5 minutes to administer the PCL, compared to 40 to 60 minutes for diagnostic interviews, such as those used in the Clinician-Administered PTSD Scale (Foa, Riggs, Dancu, & Rothbaum, 1993; Smith et al., 1999; Wu, Chan, & Yiu, 2008), in our study we used the civilian version (Weathers, Litz, Huska, & Keane, 1994) of the PCL to examine PTSD.

Many researchers have shown that the PCL has satisfactory reliability and validity (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Forbes, Creamer, & Biddle, 2001; Keen, Kutter, Niles, & Krinsley, 2008; Lang, Laffaye, Satz, Dresselhaus, & Stein, 2003; Palmieri, Weathers, Difede, & King, 2007). For example, Weathers, Litz, Herman, Huska, and Keane (1993) found that the PCL has a high test-retest reliability ($r = 0.9$) and validity (kappa coefficient = 0.6) for the diagnosis of PTSD from the structured clinical interview for DSM-III-R

(Spitzer, Williams, Gibbon, & First, 1990). However, different models have been used to assess PTSD symptom scores. For example, Cordova, Andrykowski, and Jacobsen (1997) used a three-factor model and King, Leskin, King, and Weathers (1998), Asmundson et al. (2000), and Wu et al. (2008) used a four-factor model.

The focus in the present study was mainly on two areas. The first was exploring risk factors for PTSD among middle-school students who survived the Wenchuan earthquake in China and then evaluating the incidence of PTSD among this group. The second was examining the psychometric properties of the Chinese version of the PCL.

Method

Sample and Procedure

The survey was conducted in July 2008, two months after the Wenchuan earthquake. All participants were recruited from a junior and a senior high school in Dujiangyan and from a junior high school and a secondary technical school in Wenchuan. The total sample size was 2,448 (1,110 males and 1,338 females). The participants ranged in age from 11 to 18 ($M = 15.02$, $SD = 1.79$).

Measures

The PCL-C was translated into Chinese (Mandarin) from the original English version and also with reference to the Hong Kong (Cantonese) version for use in this study. Because of differences in language and culture, three teachers and 10 graduate students in the Department of Psychology at South China Normal University evaluated the translated items to ensure that they had retained the meaning of the original items. The final Chinese PCL was read by 12 middle-school students, who were living in the earthquake zone, to rate whether the translation of the PCL was understood as intended. The Chinese PCL is a self-report measure of PTSD symptoms, with items rated on a scale ranging from 1 = *not at all* to 5 = *extremely*.

In addition, we designed a questionnaire to provide us with demographic information (gender, age, school grade, and family economic status), trauma experience, and disaster losses (death or injury of family members, damage to the family home, and loss of possessions). The questions that related to family economic status (below average income, average income, above average income) and trauma experience (eyewitness, account from another person, no exposure to tragic scenes) were assessed on 3-point scales. Damage to the family home and loss of possessions were both assessed on 5-point scales (1 = *no damage*, 5 = *collapse* and 1 = *no loss*, 5 = *complete loss*, respectively).

SPSS version 13.0 was used to analyze the data.

Results

Incidence Rate of PTSD and Influencing Factors

Of the 2,448 participants, we found that 198 students (8.1%) met the criteria for PTSD. Table 1 contains the sociodemographic characteristics and experiences of the earthquake as assessed by students. There was a statistically significant gender difference in the PCL score, $t = 3.853$, $p < .001$. The incidence of PTSD was higher among girls than boys, but the difference was not statistically significant ($\chi^2 = 3.146$, $p = .207$).

Table 1. *Sociodemographic Characteristics and Experiences of Adolescents Assessed for PTSD after the Earthquake*

	PCL-C scores	PTSD (%)
Gender		
Boys	30.25 ± 11.18	7.1
Girls	32.02 ± 11.35	9.0
Age (years)		
11-13	31.90 ± 11.07	8.1
14-15	33.22 ± 12.01	11.5
16-18	29.89 ± 10.84	6.4
School attended		
Junior high school	32.71 ± 11.40	9.9
Senior high school	29.67 ± 10.94	6.2
Family economic status		
Below average income	36.85 ± 13.71	18.8
Average income	33.33 ± 11.21	9.4
Above average income	29.58 ± 10.27	5.7
Death or injury of family members		
No	29.68 ± 10.50	5.8
Yes	35.19 ± 12.40	13.5
Damage to family home		
Collapsed	36.31 ± 12.70	17.5
Severe	31.80 ± 11.41	8.5
Moderate	30.50 ± 10.28	5.4
Minimal	28.98 ± 10.41	5.1
No damage	26.94 ± 9.46	4.4
Loss of possessions		
Complete loss	38.36 ± 13.98	22.6
Loss of most possessions	34.87 ± 12.09	13.8
Loss of some possessions	30.99 ± 10.87	6.3
Loss of a small number of possessions	27.97 ± 8.81	2.9
No loss	25.35 ± 7.97	2.6
Exposure to tragic scenes		
Eyewitness	32.41 ± 11.78	9.9
Account from another	28.47 ± 9.36	3.9
No exposure	27.31 ± 11.10	3.4

There were differences according to age in both the PCL scores and the incidence of PTSD. Specifically, adolescents aged 14 and 15 had a significantly higher PCL score than both those aged 11 to 13, $p = .040$, and those aged 16 to 18, $p < .001$. The 11- to 13-year olds also had a significantly higher score than those aged 16 to 18, $p < .001$. In regard to the incidence of PTSD, the 14- to 15-year old group had a significantly higher incidence than either the 11- to 13- or the 16- to 18-year-old group, $p < .05$, and the 11- to 13-year-old students did not differ significantly in rate of incidence of PTSD from the 16- to 18-year-old group.

The PCL scores and incidence of PTSD varied according to educational level. Junior high school students had significantly higher PCL-C scores than did senior high school students ($t = 6.726$, $p < .001$). Similarly, the incidence of PTSD among junior school students was significantly higher than it was among senior high school students ($\chi^2 = 10.890$, $p = .001$).

There were significant economic status differences in the PCL scores and incidence of PTSD. As family economic status increased, the PCL score and incidence rate of PTSD decreased. Specifically, adolescents from a family with an average economic status had a significantly higher PCL score compared with those from a family with an above average income, and adolescents from families with an income below average had significantly higher PCL scores compared with the group from families with an average income, $ps < .001$. The incidence of PTSD among adolescents from families with an income below the average was higher than among those from families with an average income ($\chi^2 = 14.019$, $p < .001$) or an above-average income ($\chi^2 = 66.883$, $p < .001$). The lowest incidence of PTSD was among the group from families with an above average income ($\chi^2 = 8.003$, $p = .005$).

The PCL score and incidence of PTSD varied according to whether or not family members had died or been injured, the extent of damage to the family home, and loss of possessions. Students from families where members were injured or killed in the earthquake had significantly higher PCL scores ($t = 10.887$, $p < .001$) and their incidence of PTSD was higher ($\chi^2 = 40.518$, $p < .001$) than that of students from families where members were not injured or killed. The analysis of variance (ANOVA) results showed that PCL scores were significantly different according to the extent of damage to the home ($F = 32.170$, $p < .001$), namely, adolescents whose homes were extensively damaged had the highest PCL scores. Also, the post hoc test of least significant difference (LSD) in the ANOVA showed that the two groups whose homes were damaged most extensively had statistically significantly different PCL scores, $p < .05$. The incidence of PTSD increased as the severity of damage to the home increased. With regard to the loss of possessions, the PCL scores were significantly different among the five levels ($F = 63.661$, $p < .001$), in that as the magnitude of loss of possessions rose, PCL scores increased. Furthermore, the LSD test showed that

there were significant differences between the two most severe types of loss of possessions, $p < .01$. The incidence of PTSD was also significantly different according to how many possessions were lost.

Level of personal exposure to the tragedy had a significant effect of PCL score and incidence of PTSD. Specifically, students who were exposed to traumatic and tragic scenes of injury or death had significantly higher PCL scores than those who had been told about these by others ($p < .001$) or were neither exposed to nor heard about such scenes ($p < .05$), but no significant differences were found between the latter two groups ($p = .583$). The incidence of PTSD among adolescents who were told about scenes of injury or death was significantly lower compared with the incidence of PTSD among those who witnessed it ($p < .001$), but the groups who had indirect exposure and no exposure were found to have a similar incidence of PTSD ($p = .894$).

Psychometric Properties of the Chinese PCL

An exploratory factor analysis was conducted to evaluate the factor structure of the PCL. Factors were extracted using maximum likelihood analysis followed by varimax rotation to facilitate their interpretation. Three components of reexperiencing, avoidance, and hyperarousal explained 49.116% of the total variance and were moderately associated, with results of analysis ranging from .520 to .695.

Internal consistency was examined by Cronbach's alpha and split-half reliability. The Cronbach's alpha coefficients showed that the internal consistency reliabilities were high. They were .873, .779, .839, and .916 for reexperiencing, avoidance, hyperarousal, and all PCL items, respectively. The split-half reliability of the PCL was also high, and split-half correlations were .848, .779, .782, and .855 for reexperiencing, avoidance, hyperarousal, and all PCL items, respectively. These results indicated that the internal consistency for each component and for all PCL items were satisfactory and each item was consistent with all other items.

Discussion

The findings in our study indicated that the incidence of PTSD among middle-school students who experienced the Wenchuan earthquake was relatively high. This shows that adolescents' mental health is strongly associated with life events. It is possible that adolescents do not have psychological endurance and psychology-transfer ability to cope with a traumatic life event, such as an earthquake. In this case, although the students could not go to school because it was closed after the earthquake, they still had study pressure, especially those who were preparing for the entrance examination for a higher level school. This type of stress could also have a serious impact on adolescents' mental health.

We found that the girls in our study group had significantly higher PCL scores than the boys. This is consistent with the findings of other researchers (Reinherz, Paradis, Giaconia, Stashwick, & Fitzmaurice, 2003). A possible explanation is that males and females have different physiological properties and experience a different sociocultural impact. For example, as females are more likely to have a low estimation of their own self-worth, they may react with more sensitiveness and anxiety than males when they are exposed to disasters (Feingold, 1994).

We were interested to find that 14- to 15-year-old adolescents had the highest PCL scores and the highest incidence of PTSD among our participant groups. This is possibly because those in this age group would have been experiencing a significant physical and emotional transition from childhood to adolescence. Also, in addition to coping with the adverse impact of the earthquake, the transition-related stress of their entry to senior high school may have strongly influenced their mental health.

Conversely, we found that senior high school students were less vulnerable to PTSD than were junior high school students. This may be because senior high school students are more mature and emotionally stronger. The results also showed that the incidence of PTSD was significantly different according to family economic status, experiencing death or injury to family members, and loss of home and other possessions. These results are consistent with those of other researchers (Thienkrua et al., 2006). Researchers who have connected witnessing a tragedy and PTSD have produced conflicting results, with some reporting severe PTSD in witnesses (Fan, Liu, Zheng, & Cui, 2009), and others not reporting this outcome (Thienkrua et al., 2006). We found both PCL scores and PTSD incidence were significantly high among students who witnessed the tragedy.

We found that the Chinese PCL had high internal consistency and therefore concluded that this measure is suitable for use as a screening tool for PTSD symptoms in Chinese adolescents who have experienced an earthquake. We used the three-factor model and our results are consistent with those gained in other studies where this model has been used (Cordova, Andrykowski, & Jacobsen, 1997). Moreover, data collected in this study can also serve as a baseline for comparison with other samples of middle-school students who experience an earthquake, and as a reference point for victims, in particular Chinese, of other traumatic events.

Our findings have contributed to Chinese PTSD research. However, several limitations inherent in the test environment and rapid assessment should be considered when interpreting the results. Firstly, the content of our investigation can be expanded by examining which mental traits may be risk factors for PTSD. Secondly, this was a cross-sectional study and we only examined participants' PTSD symptoms two months after the earthquake. Therefore, long-term effects

and developmental patterns of PTSD were not examined. Research in which three or more waves of data and latent growth curve modeling are used would provide more information on the changes of adolescents' PTSD over time.

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