PTSD and Depression Among Displaced Chinese Workers After the World Trade Center Attack: A Follow-up Study

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ABSTRACT We conducted a follow-up assessment to assess the development of Posttraumatic Stress Disorder (PTSD) and depression among Chinese immigrants after the World Trade Center attack. Sixty-five Chinese displaced workers who were originally interviewed in May 2002 were re-interviewed in March 2003. Whereas depression scores decreased over time, average PTSD scores remained unchanged. The trajectory of posttraumatic stress symptoms was more complex, with an increasing number of individuals who show no or little emotional health problems and another increasing group of individuals with exacerbated posttraumatic stress symptoms. Although the mean values of the re-experiencing and hypervigilance cluster did not change over time, the mean value of the avoidance/numbing cluster increased significantly from time 1 ($M=4.60$, $SD=4.98$) to time 2 ($M=6.34$, $SD=4.24$), ($F_{1,61}=5.69$, $P=.02$). A higher proportion of subjects met diagnostic criteria of PTSD at time 2 (27%) than at time 1 (21%). The study highlights the importance of ongoing mental health surveillance of diverse cultural and linguistic groups after a major traumatic event.

KEYWORDS Chinese-American, Depression, New York, PTSD, Terrorism, WTC attacks.

The impact of the attack on the World Trade Center (WTC) on September 11th, 2001 affected the Chinese community in lower Manhattan in multiple ways: through their proximity and exposure to the WTC attack, the economic impact of the event, and language and cultural barriers in accessing services. In May 2002, 8 months after the WTC attack, Safe Horizon, one of the principal relief agencies providing services to victims after the WTC attack, conducted a survey of immigrant Chinese workers to identify the psychological sequelae of the WTC attacks.¹ A random sample of 77 Chinese participants, selected from the Safe Horizon database of WTC victims who were financially impacted by the attack, were interviewed at a local community agency. To describe the trajectory of mental health problems over time, a repeat assessment was conducted 10 months after the initial assessment.

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In this follow-up assessment, 18 months after the attack, we explore how post-traumatic stress symptoms and depression develop over time in a population of highly exposed individuals. We had hypothesized that 10 months after the initial assessment, posttraumatic stress symptoms would still be elevated. Research suggests that the mental health impact of terrorist attacks and other disasters can endure for months and years after the attack.²⁻¹⁰ We also expected that depression would be significantly associated with posttraumatic stress symptoms.^{7,11-15}

METHOD

Design

Sixty-five of 77 respondents (84%) who were interviewed in May 2002 could be scheduled for a follow-up interview in March 2003. Details about participant recruitment and survey administration can be found elsewhere.¹ The 12 individuals who did not participate in the reassessment did not differ from the 65 responders on demographic variables, exposure, social support, or mental health indicators (depression, Posttraumatic Stress Disorder [PTSD]) at the time 1 assessment.

Measures

The interview consisted of a semistructured interview and two scales to measure PTSD and depression, respectively. PTSD was measured with the PTSD Checklist—Civilian version (PCL-C)¹⁶ and depression with the Beck Depression Inventory (BDI).¹⁷ These instruments had been translated and piloted in the time 1 assessment.¹

RESULTS

Sample

The 65 participants were between 23 and 68 years old at the time of the interview, with a mean age of 50 (SD=8.6). The majority was female (80%) and spoke Cantonese (94%). The average number of years of schooling was 7.5 (0–12 years, SD=2.7).

Depression and Traumatic Stress

If one or two items of the PCL-C or BDI were missing, means replacement was conducted. Two summary scores of the PCL-C were deleted because the instrument had more than three missing items, resulting in 63 valid cases for the PCL-C and 65 valid cases for the BDI. Both scales had good internal reliability in this sample (.93 for BDI and .93 for PCL-C), and respondents' scores on the two scales were significantly correlated with each other ($r=.59$, $P<.01$).

Compared to the 8-month assessment, depression scores had decreased considerably in the 18-month follow-up assessment. The BDI summary scores ranged from 0 to 25 (out of a possible high of 63), with a mean of 8.4 (SD=6.0). The majority (62%) scored at a level of “no or minimal depression”; nobody scored in the severe depression category in the follow-up assessment (Table 1).

A Repeated Measures analysis of variance (ANOVA) was performed to assess the difference between the BDI scores at interviews 1 and 2. The ANOVA revealed a significant difference ($F_{1,60}=11.50$, $P=0.001$), with BDI at time 1 significantly higher ($M=12.70$, $SD=9.97$) than at time 2 ($M=8.44$, $SD=6.88$).

TABLE 1. Depression scores at 8-month and 18-month assessment

Category	8-month assessment	18-month assessment
Minimal (0–9)	29 (48%)	40 (62%)
Mild (10–16)	14 (23%)	20 (31%)
Moderate (17–29)	12 (19%)	5 (8%)
Severe (30–63)	5 (8%)	0 (0%)
Mean	12.7 (SD = 10.7)	8.4 (SD = 6.0)

The summary scores for the PCL ranged from 1 to 49 (out of a possible high of 68), with a mean score of 18.4 (SD=12.5). Summary scores were computed for each of three symptom clusters: Re-experiencing, avoidance/numbing, and hypervigilance. The percentage of individuals who did not report any significant post-traumatic stress symptomatology increased from 5% at time 1 to 16% at time 2. Three fourths of the sample (74%) met the diagnostic criteria of one or two PTSD clusters at time 1. This number dropped to 57% at the time 2 assessment. A clinical diagnosis of PTSD requires that scores meet or exceed cutoff criteria for all three clusters. Twenty-seven percent of this sample ($n=17$) met these criteria and can be classified as having PTSD.

To assess the development of PTSD over time, we performed a Repeated Measures ANOVA on the sum of scores on the PTSD scale at assessment time 1 and assessment time 2. The mean of score on the PTSD scale at time 1 ($M=18.52$, $SD=12.95$) was not significantly different from the score at time 2 ($M=18.43$, $SD=12.59$, $F_{1,61}=.02$, $n.s.$).

Additionally, a Repeated Measures ANOVA was used to test the difference in the summary scores in each of the three diagnostic criteria clusters. In the re-experience cluster, a marginally significant difference was revealed between mean score at time 1 ($M=7.79$, $SD=4.48$) and time 2 ($M=6.78$, $SD=4.26$), ($F_{1,61}=3.14$, $P=.08$), reflecting a decline over time in the re-experiencing symptoms. In the avoidance/numbing cluster, Repeated Measures ANOVA uncovered a significant difference between time 1 mean score ($M=4.60$, $SD=4.98$) and time 2 mean score ($M=6.34$, $SD=4.24$), ($F_{1,61}=5.69$, $P=.02$), demonstrating worsening of symptoms in this cluster. Finally, in the hypervigilance cluster, the difference between mean score at time 1 ($M=6.13$, $SD=5.09$) was not significantly different from that at time 2 ($M=5.29$, $SD=4.58$), ($F_{1,61}=1.91$, $P=.17$). A higher proportion of subjects met diagnostic criteria at time 2 (27%) than at time 1 (21%), meaning that more individuals presented the profile of PTSD (Table 2).

TABLE 2. Meeting PTSD diagnosis over time at 8- and 18-month assessment ($n=63$)

Criterion	8-month assessment	18-month assessment
No PTSD cluster met	3 (5%)	10 (16%)
Reexperiencing	60 (95%)	49 (78%)
Avoidance/numbing	14 (22%)	22 (35%)
Hypervigilance	35 (54%)	32 (51%)
Total PTSD diagnosis (all three clusters met)	13 (21%)	17 (27%)

Multivariate Analysis of PTSD Diagnosis

To explore the trajectory of PTSD over time, we further analyzed the proportion of subjects who met the criteria of PTSD diagnosis at time 1 and time 2, respectively. Six persons met the criteria at both times (25% of those diagnosed at any time), 6 met the criteria at time 1 but not at time 2 (25%), and 12 subjects met the criteria at time 2 but not time 1 (50%). We ran ANOVAs on demographic variables to explore whether any of the groups displays a distinct profile. There was a significant difference ($F_{2,23}=4.16$, $P=.03$) among those receiving the diagnosis at both times ($M=9.75$, $SD=6.26$), those receiving the diagnosis only in time 1 ($M=13.17$, $SD=4.49$), and those receiving the diagnosis only in time 2 ($M=16.5$, $SD=7.55$). Post hoc comparisons were made using the Scheffé test; they revealed that those receiving the diagnosis at both times were significantly younger when they arrived in the United States than were those who received the diagnosis only at time 2.

A repeated measures ANOVA on the subgroup of those who met criteria of PTSD diagnosis at any time was conducted, with time 1 and time 2 PTSD total score as the within subject factor and a 3-level between subject factor. The between subject factor was defined by the time of diagnosis, with those diagnosed at time 1 only, those diagnosed at time 2 only, and those diagnosed at both times forming the three categories.

A significant main effect ($F_{1,18}=40.3$, $P<.01$) and an interaction effect ($F_{2,18}=11.89$, $P<.01$) were revealed. Post hoc Scheffé tests revealed a significant change in the PTSD total score in the entire subsample with the score being significantly higher at time 1 ($M=44.48$, $SD=10.92$) than at time 2 ($M=30.29$, $SD=13.00$). Additionally, those who met the criteria of PTSD diagnosis at both times scored significantly higher at time 1 ($M=56.00$, $SD=11.90$) than did those meeting diagnostic criteria only at time 1 ($M=46.80$, $SD=7.53$), or those meeting diagnostic criteria only at time 2 ($M=38.18$, $SD=6.82$). Similarly, at time 2, those meeting diagnostic criteria of PTSD at both assessments scored significantly higher ($M=39.60$, $SD=2.30$) than both those meeting criteria only at time 1 ($M=13.20$, $SD=6.22$), and those only meeting criteria at time 2 ($M=33.29$, $SD=13.00$). In other words, those diagnosed with PTSD at 8 and 18 months demonstrated higher severity of the symptoms at both times than the two comparison groups.

Interestingly, in the group that met diagnostic criteria only at time 2, there was no significant change in the severity of symptoms as measured by the total score on the PTSD scale ($F_{1,10}=1.18$, n.s.). In the first data collection, their scores on the PTSD scale were significantly higher ($M=38.18$, $SD=6.82$) than those not diagnosed with PTSD at that time ($M=31.20$, $SD=10.76$), ($t_{60}=2.06$, $P=.04$). Presumably, they were showing many symptoms but did not meet the full diagnostic criteria.

DISCUSSION

After a major traumatic event, mental health stress symptoms tend to decrease as time passes. Consistent with this general trend, we observed an overall decrease in depression scores in this sample of 65 Chinese workers between the time 1 assessment (8 months after the WTC attack) and time 2 assessment (18 months after the WTC attack).

The trajectory of posttraumatic stress symptoms was more complex. We found in this sample that the group that met diagnostic criteria for PTSD at time 2 already had elevated scores at time 1. But despite showing many symptoms at time 1 and meeting one or two diagnostic criteria of PTSD, they did not meet full criteria for a PTSD diagnosis at that time. We found that over time the emotional impact of a traumatic event becomes more selective, with an increasing number of individuals who show no or little emotional health problems and another increasing group of individuals with exacerbated posttraumatic stress symptoms. Programs should identify individuals who show high PTSD total scores whether or not they meet diagnostic criteria for PTSD and provide special attention to this group. This finding also highlights the importance of using continuous measures in the assessment of posttraumatic stress symptom severity in a community population instead of dichotomous measures that only provide a clinical diagnosis.

The finding that the group that met diagnostic criteria of PTSD at both times of assessment was significantly younger at immigration was surprising. We can only speculate that because social support mitigates symptoms, those who immigrated at a younger age have less social support. The importance of age at immigration in the development of mental health symptoms should be explored and validated with a larger sample.

It is also important to assess the development of the individual PTSD clusters. Whereas scores for the avoidance/numbing cluster significantly increased over time, re-experiencing and hypervigilance did not show any significant change between the two assessments. In a community sample, 30 months after Hurricane Andrew, Norris and colleagues¹⁸ found diverse developments of PTSD clusters and depression, although these trends differ from those in this study. The authors report that re-experiencing and hypervigilance declined over time but depression and avoidance did not decline.

The sample is largely comprised of middle-aged women who may display a higher proportion of PTSD than other demographic groups in the Chinese community. A survey of Chinatown residents who entered health services after the WTC attacks found that individuals between 30 and 50 years of age carried a higher burden and displayed higher emotional responses after the attack than of younger or older age groups.¹⁹

Considering the dearth of information on the postdisaster needs of the Chinese-American community, this study is nonetheless a first step to fill this gap. The study also highlights the importance of identifying cultural and ethnic groups that may show a unique combination of concerns and stressors and therefore may be in need of targeted and culturally sensitive programs.

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