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## RESEARCH ARTICLE

# Studying Differential Effects of Exposure to Social Violence and Natural Disaster on Mental Health of Children: 2001-2002 Gujarat Earthquake and Riots

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## ABSTRACT

Disaster mental health, particularly focused on children post disasters, remains an understudied area in developing countries like India. The study compares differential impact of a natural disaster versus a spate of communal riots that occurred in Gujarat on 26<sup>th</sup> January 2001 and Feb-June 2002 respectively. Gujarati children of 8-15 years from highly exposed earthquake sites ( $n = 128$ ) and riot sites ( $n = 171$ ) were approached for participation. A matched control sample of 351 non-trauma children were recruited to compare the impact of differential traumas. Trauma and postdisaster adversities were studied using UCLA disaster trauma tool, and Goodman's Strengths and Difficulties Questionnaire was used to assess psychological adjustment difficulties. Frequencies and corresponding percentages were calculated for various types of traumatic experiences reported. Spearman's correlations

calculated to find associations between trauma items on UCLA's brief trauma scale and various strengths and difficulties. Results suggest that 7.6% of earthquake sample and 38.7% from riots sample manifested clinically significant mental health problems. The earthquake sample had 24.8% of those above clinical cut-off for probable PTSD (posttraumatic stress disorder) and the riots sample had 27.3% children who displayed PTSD symptoms.

## **Studying Differential Effects of Exposure to Social Violence and Natural Disaster on Mental Health of Children: 2001-2002 Gujarat Earthquake and Riots**

January 26<sup>th</sup> 2001, Gujarat earthquake, the second largest recorded in India and at that time, the worst natural disaster in India in more than 50 years (Mehta, 2001). There were more than 20,000 deaths and 167,000 people injured. Four districts of Gujarat lay in ruin and altogether, 21 districts were affected. Around 300,000 families and at least 3 million children aged 14 years and under were affected. Widespread religious or ethnic riots are not uncommon in Gujarat or in India. The particular riots under focus here are the 2002 Gujarat riots that started in the town of Godhra with the burning of the Sabarmati express train. Riots continued from 27<sup>th</sup> Feb 2002 until mid-April 2002, enflaming the city of Ahmedabad and its districts. Outbreaks in beginning in 1941 and continuing periodically up to 2002 do not indicate that the violence was spontaneous. Since 1985, the arrays of interest groups engaging in violence have become increasingly complex and multilayered. Ahmedabad city, Naroda Patiya, Naroda Gaon, and Chamanpura were the worst affected areas. The districts of Anand, Dahod, Fatehpura, Mehsana, Panchmahals, Sabarkantha witnessed ceaseless killings, looting, rapes, and violence of all possible orders (Setalvad, 2002, Human Rights Watch, 2002, Kumar, 2007).

A disaster by definition is a complex emergency situation, a social catastrophe marked by the destruction of the affected population's political, economic, socio-cultural, and health care infrastructures (Mollica et al., 2004). Disasters are also seen as acute-onset and time delimited events. But these can also be chronic and not delimited when actual harm or loss may or may not occur and in instances the threat subsides little or not at all (Norris, Galea, Friedman, & Watson, 2006). Communal violence is one example of such events. There is growing evidence (Norris, Friedman & Watson 2002a; Pynoos, Goenjian & Steinberg, 1998)

that disasters of mass violence are more likely to have serious mental health consequences than natural disasters where intentional harm becomes a critical factor.

Although there is evidence that samples were studied immediately following the event up to 7 years postdisaster, 61% were assessed within 6 months, and 28% within 2 months postevent. Long term effects of disasters appear to be rare and the absence of predisaster measures and data further complicates the picture (Norris et al., 2002a, 2006 Galea, Nandi & Vlahov, 2005). Secondary stressors such as chronic problems in living and postdisaster adversities have not been adequately addressed but in instances where they have been studied, these do seem to complicate postdisaster recovery (Galea et al. 2005; Mehta, Vankar & Patel, 2005; Norris et al. 2006). Goenjian et al. (2000, 2001) studied adult survivors 1.5 and 4.5 years after an Armenian earthquake and compared these to survivors of Armenian political violence. They found that after exposure to either severe trauma, adults were at a high risk of developing severe and chronic post-traumatic stress reactions especially chronic anxiety and depressive reactions. In their study no significant differences were found in posttraumatic stress disorder (PTSD) severity, profile, or course in adults exposed to both events. Neuner, Schauer, Catani, Ruf, and Elbert (2006) studied post-tsunami stress in Sri Lankan children and found that the prevalence rate of tsunami-related PTSD (ignoring the time criterion) ranged between 14% and 39% and an additional 5% to 8% had PTSD unrelated to the tsunami. The PTSD symptoms were related to the severity of trauma exposure and family loss, as well as previous traumatic events.

Kar et al. (2007) studied post traumatic stress in 447 children and adolescents (7-17 years) 1 year after the Orissa super cyclone (1999) and found that children who were highly

exposed reported more depressed affect and significantly higher PTSD symptoms (43.7% vs. 11.2%) than those in low exposure areas.

Building on this emerging evidence on lasting effects of exposure to violence, we hypothesized that those affected by riots would present significant mental health problems and display lasting posttraumatic stress symptoms. We also hypothesized that there would be a dose-response relationship, such that the greater the loss in terms of direct harm/physical damage reported, the greater the traumatic stress children would experience. We also explored whether higher postdisaster adversities further contributed to adverse mental health outcomes.

## **Method**

### **Participants**

Participants at the earthquake site were approached nearly 3.4 years after the earthquake. Of the original 128 children selected for participation in this study, only 79 participants could complete the testing process due to various reasons, such as absence of parental consent, refusal to sign consent forms, and the inability to track some participants after inclusion in the study. See Figure 1 for an outline of the study design.

Several children did not know their exact date of birth; information about age was sought in intervals. Ages  $8 \leq 10$  represented 4.7 % of the sample (this group also found it hard to comprehend and participate in testing so many had to be excluded), 27.3% between  $10 \leq 12$  years,  $12 \leq 14$  formed the largest age group with 52.3% and 15.6% of participants were between ages 14-16. Hindus were a majority (85.1%) with the remainder Muslim. Selected participants were from three different districts of Kutch. Lodai, the closest to the epicenter, Bhuj, the capital and 65kms away and Khengarpur a further 30 kms. Girls and boys were equally distributed.

Participants at the riots site were interviewed 4.2 years after riots took place in the city. The Ahmedabad based women's co-operative, SEWA, assisted in collecting data as the organization ran a long term rehabilitation project for riots survivors in the area. The social workers made the initial contact with the children, followed by the researcher. Initially, 200 children from ages 8-16 years were contacted though only 171 children and their guardians consented to participate, Hindu children represented 21.1 % of the sample and the remaining 78.9% were Muslims. The sample was chosen by design to represent those who were affected by the 2002 Hindu-Muslim riots. Girls represented 50.3% of total sample.

Age was slightly less well matched across the sample. Many children did not know their actual age, due to poor literacy rates, late school enrollment & high school dropout rates of children above 14. Age was thus calculated in intervals. Children aged  $12 \leq 14$  formed the largest group with 39.2 % ( $n = 67$ ) followed by those 14 and above who represented about 30.4% ( $n = 57$ ), ages  $10 \leq 12$  represented 22.2% of the total sample ( $n = 38$ ) and the smallest group comprised of children ages  $8 \leq 10$  who represented 8.2 % of the total sample ( $n = 14$ ).

In total 351 participants were recruited as a control comparison sample. The mean age of the comparison sample was 12.83 ( $SD = 1.64$ ). A sample of 117 children who matched the rural earthquake group and another 131 children matched to the urban riots group were generated from the common pool of 351 (matched on socioeconomic status, ethnicity, age and education).

## **Measures**

A disaster trauma assessment and referral tool for children and adolescents was originally designed by Steinberg et al. (2005) in the aftermath of Hurricane in the US. The tool used an abridged form of the UCLA PTSD Reaction Index (Steinberg, Brymer, Decker, &

Pynoos, 2004). It has excellent internal consistency and strong convergent validity (Balaban et al., 2005; Steinberg et al., 2004). Developed for use with the New Orleans African-American working class population, the tool was designed for people in poverty and socioeconomic stress. The first section is a sociodemographic profile with 30 questions that assess the material, physical and familial loss and damage post disaster. The second section comprises of a brief version of PTSD assessment scale with 21 items based on the UCLA PTSD Reaction Index (Steinberg et al., 2004).

The Strengths and Difficulties Questionnaire is a short behavioral screening questionnaire consisting of 25 items developed by Goodman (1997). Children themselves filled out the SDQ version. They rated the presence of certain behaviors on a 3-point scale. The time period is the last 6 months. The 25 items are divided between the following five scales: emotional symptoms, conduct problems, hyperactivity, peer problems, and pro-social behavior. The first four scales were also added together to generate a total difficulties score. This score is a measure of overall child mental health problems that has been shown to have good psychometric properties in studies from around the world (Mullick & Goodman, 2005; Goodman et al., 2009). TDS were allocated to a reference range, a borderline range, or a clinical range of the scoring distributions based on the British normative sample. Cutoffs were set at the 90th percentile for the clinical problems and at the 80th percentile for the borderline problems (Goodman, 2002a & b).

## **Procedure**

The instruments went through a rigorous translation process including establishment of semantic equivalence with the aid of 3 Gujarati-English bilingual teachers. Psychosocial adjustment and mental health of children exposed to riots was assessed using a new translation of Gujarati Strengths and Difficulties Questionnaire self-administered version. The

research was planned around the same time when Steinberg, Brymer, Decker, and Pynoos (2005) completed developing a survey on trauma of hurricane Katrina survivors; after consultation with various trauma researchers the UCLA assessment tool was found to be appropriate for use in Gujarat. It was revised and adapted with permission from the authors and was customized for each sample with event-specific language.

For the riots sample, SEWA social workers, who had undergone training, and the researcher filled up the questionnaires. For the earthquake sample, head teachers of five schools were contacted; two teachers were trained in nuances of psychological testing and assisted during testing. Children directly in the presence of the researcher or the trained teacher filled out the questionnaires. Of the 79 earthquake participants who filled the Strengths and Difficulties Questionnaire, only 70 filled the trauma assessment to a satisfactory level. From a pool of 171 riots participants, 119 children filled in the Strengths and Difficulties Questionnaire such that the subscales and the total difficulties score could be calculated and 69 children completed the trauma assessment properly such that a posttraumatic stress severity score could be calculated.

### **Statistical Analysis**

Frequencies and corresponding percentages were calculated for various types of traumatic experiences reported on the PTSD assessment. Descriptives were calculated for SDQ- TDS and 5 subscales. The categorical data on EQ/RTART was analyzed using  $\chi^2$  tests and those in rank-order were tested using Kendall's  $\tau$ -b. Spearman's correlations were calculated to find associations between the trauma items (TTS) on the brief PTSD scale in the EQ/RTART and the SDQ items and to see overlaps in adjustment related and traumatic stress related psychopathology. *T*-tests and ANOVA, comparing the two trauma groups and



later comparing these to the control group, were performed to evaluate the score differences on TTS and SDQ-TDS. Further group differences were tested using Sheffe's *post hoc* comparisons and planned contrasts were carried out between the two trauma and control groups.

## Results

A significant difference between the two trauma groups on SDQ-TDS was found,  $t(196) = -3.12, p < .001$  with riots sample ( $M = 13.78, SD = 4.99$ ) showing greater difficulties than earthquake sample ( $M = 11.92, SD = 4.47$ ). Only 7.6% of the earthquake sample seemed to fall in the abnormal SDQ-TDS band in comparison to the 38.7% of riots group and significant differences between the two groups were detected with  $\tau\text{-b} = (2, N = 196) = 3.46, p < .01$ .

For the 69 participants who completed RTART, the mean TTS score was found to be 21.36 ( $SD = 13.68$ ). 27.3% of children were found to have clinically significant traumatic stress symptoms whereas 24.3% of earthquake sample were above the cut-off point for probable PTSD ( $M = 19.76, SD = 9.67$ ). The mean TTS score on the trauma questionnaire was found to be elevated in riots group ( $M = 21.36, SD = 13.68$ ) in comparison to the earthquake group ( $M = 19.76, SD = 9.67$ ) and no significant differences between the two groups on traumatic stress experienced with,  $t(137) = -0.80, ns$ , and the same in the case of clinically significant trauma score,  $\chi^2(1, N = 139) = 0.19, ns$ .

Tables 1 and 2 shows significant correlations between the individual trauma questionnaire items and SDQ-total difficulties score in earthquake group. As these are strong correlations values, they serve as indicators for possible psychopathology or adjustment difficulties seen in this sample. Correlations between children's level of trauma and SDQ

scores in riots group indicates avoidance behaviors, psychosomatic and emotional difficulties such as falling asleep, having more aches & pains, feeling nervous and sad. Gender and age did not appear as significant factors in the analyses.

### **Comparing Strengths and Difficulties Across the Disaster Trauma Groups**

Mean scores and *t*-tests performed on SDQ-TDS and its five subscales are given in Table 3. Significant differences are found on three subscales and TDS. On emotionality subscale,  $t(196) = -3.90, p < .001$ , with the riots sample reporting higher mean score than its earthquake counterpart. On hyperactive behavior, the riots sample reported higher average scores than its earthquake counterpart ( $M = 3.86, SD = 1.74$  vs.  $M = 3.16, SD = 1.66$ ),  $t(196) = -2.79, p < .01$ , whereas in the case of the conduct subscale, the average score of the riots group ( $M = 2.70, SD = 1.98$ ) was higher than that of earthquake group ( $M = 1.61, SD = 1.44$ ),  $t(196) = -4.48, p < .001$ . The TDS score also differed,  $t(196) = -4.79, p < .001$ . Again, the riots group had a higher average score ( $M = 13.78, SD = 5.0$ ) than its earthquake counterpart ( $M = 10.47, SD = 4.39$ ).

### **Comparing the Range of Traumatic Experiences Across Two Disaster-Trauma Groups**

The groups differed in the number of immediate family members injured,  $\chi^2(2, N = 161) = 15.75, p < .01$ . Of those affected by riots, 66.7% reported injuries to their immediate family members, in comparison to the 35.2% of those affected by the earthquake (see Table 4). From the earthquake sample, 1.6% experienced loss of their fathers whereas this figure was 21.1% in riots sample,  $\chi^2(2, N = 299) = 26.00, p < .01$ .

The Earthquake group (48%) had seen significantly higher numbers of multiple injuries and deaths of family members during the disaster than riots sample (21.6%) as  $\chi^2(2, N = 81)$

= 5.85,  $p < .05$  whereas 52% of earthquake and 78.6% of riots sample had not reported multiple deaths or injuries in their families. In terms of exposure to violence, significant difference was detected  $\chi^2(2, N = 160) = 46.45, p < .01$  as riots sample (30%) got exposed to severe violence, whereas earthquake group did not report any incidence of violence. Significant differences were seen in the amount of destruction witnessed, as earthquake sample saw greater destruction of their neighborhood (66.2%) versus riots sample at 28.9%,  $\chi^2(2, N = 161) = 22.29, p < .01$ .

There were significant differences  $t(194) = -2.13, p = .03$  found on the emotional subscale, where earthquake sample had a higher mean score ( $M = 3.42, SD = 2.16$ ) than its matched control ( $M = 2.79, SD = 1.76$ ). The SDQ scores of riots affected children, with its matched control, revealed significant differences on the Emotional and Hyperactivity subscales with  $t(248) = -3.63, p < .001$  and  $t(248) = -1.79, p = .01$  with higher mean scores of riots sample than its matched control in both cases (see Table 3).

In terms of how the two disaster groups fare vis-à-vis the larger control sample, it was found that riots group stands out on their TDS ( $M = 13.78$ ) while earthquake group shows 10.47 ( $SD = 4.39$ ) and control sample has a mean value lying in between the two; 11.43 ( $SD = 4.71$ ) and one way analysis of variance revealed a significant difference here,  $F(2, 548) = 14.66, p < .001$ . The mean value of riots group is higher than earthquake or control group in emotional, conduct, hyperactivity and peer scales and on TDS. Significant differences on the scores between the groups were seen across all four subscales and on TDS except for peer relations. Further analyses using the Scheffé post hoc criterion for significance indicated that riots affected group had significantly higher scores on the SDQ- TDS ( $M = 13.78, SD = 5.0$ ) than the two other groups with earthquake, ( $M = 10.47, SD = 4.39$ )  $p < .001$  and control group ( $M = 11.43, SD = 4.71$ ) at  $p < .001$ .

On hyperactivity subscale, omnibus  $F(2, 548) = 4.36, p < .05$  and post hoc test revealed that earthquake group significantly differs from riots at  $p < .001$  and control at  $p < .05$  (with the former reporting lowest mean scores of  $M = 3.16, SD = 1.66$ ).

Planned contrasts (Contrast 1: earthquake vs. riots, Contrast 2: earthquake vs. control, contrast 3: riots vs. control) showed that there were significant differences between earthquake and riots group, i.e. contrast 1,  $t(546) = 4.22, p < .001$ ) and Contrast 3, (i.e., riots and control groups),  $t(546) = 6.50, p < .001$ , on SDQ emotional subscale. Whereas on the conduct subscale, there were significant differences seen on Contrast 1 with  $t(546) = 4.30, p < .001$ , also Contrast 2,  $t(546) = -2.58, p = .01$  and also on Contrast 3,  $t(546) = 2.86, p < .005$ . On the hyperactivity subscale, however, significant differences were mainly in the Contrast 1, earthquake versus riots with  $t(546) = 2.93, p < .005$  and Contrast 2, earthquake versus Control with  $t(546) = -2.33, p < .05$ .

## **Discussion**

The differences between the two events is that in riots group a much higher percentage of children lie in the abnormal band of SDQ-TDS, indicating considerable mental health problems over earthquake group (38.6% vs. 7.6%) as per Goodman's behavioral bandings (Goodman, 2002a & 2002b). In all the subscales, the riots group reported higher scores.

*a. Evaluation of riots experience:* the results reported in Tables 1 and 2 suggest that in this group (by virtue of the nature of riots itself) there is an excessive direct exposure to violence and greater numbers of reported injuries of immediate family members. Therefore, the children witnessed significantly higher numbers of deaths and grievous injuries of extended family members than earthquake counterparts. What also becomes clearer is that due to such

personal losses, this group faced tremendously higher socio-economic stress than their earthquake counterpart. In terms of understanding the nature of their traumatic experiences, about 27.5% ( $n = 69$ ) were found to be showing significant traumatic distress symptoms, where a greater propensity towards avoidant thinking or refusal within families to talk about riots experience was found. There were heightened worries of what might have happened to their families. Children often felt sad and upset in general and also when reminded of their traumatic experiences.

Negative correlations found between the prosocial behavior and trauma exposure levels measured via TTS suggest that there may be a formation of social, personal, or interpersonal distrust following riots. In earthquake sample, the children reported being affected by and witnessing significant loss, destruction and damage of a physical kind, namely multiple injuries to several family members, collapse of home, destruction of personal possessions and destruction of neighborhood. About one fourth could be classified with significant traumatic distress post earthquake. Though research points out that correlates of post-traumatic stress after natural disasters are comparable to correlates documented after human-made disasters; the prevalence of PTSD documented in studies after natural disasters is generally lower than that documented after human-made disasters (Galea et al., 2005). These correlates include: guilt (Kuo, Tang, & Tsay, 2003), psychiatric morbidity (Cao & McFarlane, 2003; de La Fuente, 1990; Goenjian et al., 2001), difficulties in concentration (McFarlane, 1989) and coping strategies (Benight, Swift, Sanger, Smith, Zeppelin, 1999; Spurrell & McFarlane, 1993).

*b. Observations from field work:* in the researcher's field work experience, earthquake sample appeared less traumatized than riots counterpart. It may be that the former tended to under-report distress (negative large-to-medium effect sizes in emotional and hyperactivity

problems) or due to lack of sufficient awareness about psychological distress. Multiple comparisons and planned contrasts between the three groups show that while heightened emotional difficulties might be common to both trauma groups, the conduct related difficulties dominate riots group. Comparisons on hyperactivity related problems show that earthquake group stands apart with lowest mean scores, suggesting that in the rural context of earthquake, these problems are less reported or seen in children (than urban set-up) or that the group might under-report difficulties in this domain. The researcher found that children in rural context tended to underreport their distress, possibly due to functional literacy or the challenging and resource-constraining environmental conditions in village settings in India (similar experience shared by Goodman et al. (2009) with another rural sample from Goa). In earthquake sample, several students and teachers shared that dreams of lost & dead friends and memories of scenes from the quake disturbed their sleep and some described flashbacks that troubled them during the day as well.

The children were most overwhelmed when describing their separation from parents and the painful reconstruction of their homes, which took several years and during which they had to move from one temporary accommodation to another.

For riots affected children, the actual loss was more palpable and responsibilities felt more from their end than forced on them by their parents. Despite the fact that more than 9 years had elapsed when first contact was made with riots affected children, several children and their families were still fighting for compensation for a lost family member or the physical

damage to their property. These children were working for more than 5-8 hours a day after attending their schools to supplement their family incomes<sup>1</sup>.

Comparing the results, in earthquake sample, children between ages 12 to 14 were the most affected in terms of % in clinically significant TDS and TTS band though no statistically significant differences on age were seen. In riots group, children aged 10 and 11 were amongst those with prevalence of clinically elevated TDS scores and those aged 12 to 14 were amongst those with higher prevalence of clinically elevated TTS. Previous research has pointed to certain survivor characteristics most predisposed to PTSD, such as school-going children and youth, females, ethnic minorities, little previous knowledge of coping with the disaster and poverty or lower socio-economic status (Norris et al. 2002a; Lilic & Ulusoy, 2003; Palinkas & Reznik, 2004; Sumer, Karanci, Berument & Gunes, 2005). A number of these characteristics match the trauma samples described in this study.

*c. Reviewing hypotheses and objectives:* The results confirm that riots group is more affected than their earthquake counterpart. Riots sample shows slightly higher levels of disturbance in emotionality with problems reported in conduct related behaviors too. The combination of emotional strain and problems in affect regulation, impulse control, aggressivity that emanates from conduct difficulties, implies that violence disturbs not only emotionality but thought processes and interpersonal behavior severely since trust and inner sense of security is challenged in a fundamental way (Mercuri & Angelique, 2004; Schechter, 2003; Coates & Schechter, 2004; van der Kolk, 2002, 2005).

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<sup>1</sup> At least 18 children were interviewed at their work place – typically a carpet factory on the outskirts of the city, visit their homes or employers home.

The second hypothesis is that greater loss, in terms of direct harm/damage, caused more traumatic stress (particularly higher arousal and re-experiencing trauma symptoms) as reported by the affected children, would make sense only if the nature of damage is qualified. Though earthquake sample witnessed enormous destruction of life and property, the percentage of clinically significant TTS was higher in those affected by riots who had seen less physical destruction but were intensely exposed to (even if not on a mass scale) violence and witnessed death and injuries of family members and neighbours. It does appear from the data that riots group experienced more adversities, which further aggravated their trauma and left a long-term import of traumatic stress but this needs systematic investigation.

Both events, despite being different in origins, present unique sets of relational deprivation that are yet to be fully understood. There is evidence that violence presents greater vulnerabilities for children and families alike (Norris et al., 2002, 2002, 2006, Catani et al. 2009).

The findings of this paper suggest that exposure to violence has more complex and long-lasting mental health consequences in comparison to exposure to natural disasters. While emotional make-up of the child gets affected posttrauma and disasters, violence appears to disturb affect regulation, impulse control and perhaps also distorts a child's sense of trust and security as manifested in poor prosocial behaviors and conduct problems. This study was resource constrained and data collection was compromised by security concerns, a large number of drop-outs and other constraints. Based on this study we recommend that future studies should examine post disaster adversities systematically and these should be factored in researches on PTSD conducted in developing countries.



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*Table 1. Correlations Between PTSD Symptoms and Strengths and Difficulties in the Earthquake Sample*

| TTS Items  | Strengths and Difficulties Questionnaire |                |
|--|--|----------------|
|  | Total score                              | Clinical range |
| 1. Do you get upset, afraid or sad when something makes you think about the earthquake?              | .36**                                    | .29**          |
| 5. Do you stay away from places, people or things that make you remember the disaster or evacuation? | .26**                                    | <i>ns</i>      |
| 11. Do you often feel irritable or grouchy?  | .38**                                    | <i>ns</i>      |
| 12. Do you often feel sad, down or depressed?  | .27**                                    | <i>ns</i>      |

\* $p < .05$ . \*\* $p < .01$ .

Table 2. Correlation Coefficients for RTART PTSD scale and SDQ TDS scores

| TTS item  | Strengths and Difficulties Questionnaire |                |
|---|--|----------------|
|   | Total score                              | Clinical range |
| 1. Do you get upset, afraid or sad when something makes you think about the riots?                                | .29*                                     | ns             |
| 3. Do you have upsetting thoughts or pictures that come to your mind about what happened?                         | .26*                                     | ns             |
| 4. Do you try not to think about or talk about what had happened?   | .31*                                     | .25*           |
| 15. Do you stay away from places, people or things that make you remember the riots or evacuation?                | .27*                                     | .26*           |
| 7. Do you have difficulty falling asleep at night to find that you wake up in the night because of what happened? | .27*                                     | ns             |
| 8. Do you often feel jumpy or nervous?  | .35*                                     | ns             |
| 11. Do you often feel irritable or grouchy?   | .34**                                    | .28*           |
| 12. Do you often feel sad, down or depressed?   | .36**                                    | .35**          |
| 14. Since the disaster, have you more aches and pains like stomach-headaches etc.?                                | .25*                                     | ns             |

Note. PTSD = posttraumatic stress disorder;

\* $p < .05$ . \*\* $p < .01$ .

Table 3 T-test results and SDQ Mean Scores across Earthquake and Riots & Matched Control Samples

| SDQ subscales | Earthquake<br>( <i>n</i> = 79)<br><br><i>M</i> ( <i>SD</i> ) | Riot<br>( <i>n</i> = 119)<br><br><i>M</i> ( <i>SD</i> ) | <i>t</i>             | <i>r</i>           | % non overlap <sub>a</sub> | Earthquake C<br>( <i>n</i> = 117)<br><br><i>M</i> ( <i>SD</i> ) | Riots C<br>( <i>n</i> = 131)<br><br><i>M</i> ( <i>SD</i> ) |
|---------------|--|---|----------------------|--------------------|----------------------------|---|--|
| Emotional     | 3.42 (2.16)  | 4.71(2.37)  | -3.90 <sup>**1</sup> | -                  | 33.0%                      | 2.79 (1.76)   | 3.68(2.14)   |
|               |  |   |                      | 0.27 <sup>**</sup> |                            |   |  |
| Conduct       | 1.61 (1.44)  | 2.70(1.98)  | -                    | 0.29 <sup>**</sup> | 38.2%                      | 1.65 (1.34)   | 2.35(1.72)   |
|               |  |   | 4.48 <sup>**1</sup>  |                    |                            |   |  |
| Hyperactivity | 3.16 (1.66)  | 3.86(1.74)  | -2.79* <sup>1</sup>  | -0.20*             | 27.4%                      | 3.49 (1.37)   | 3.48(1.58)   |
| Peer          | 2.28 (1.74)  | 2.51(1.61)  | -0.97                | -                  |                            | 2.01 (1.49)   | 2.40(1.58)   |
| Prosocial     | 8.20 (1.88)  | 7.98(2.03)  | 0.76                 | -                  |                            | 8.63 (1.50)   | 8.32(1.75)   |
| TDS           | 10.47<br>(4.39)  | 13.78(5.0)  | -                    | 0.33 <sup>**</sup> | 43.0%                      | 9.94 (3.59)   | 11.92<br>(4.47)  |
|               |  |   | 4.79 <sup>**1</sup>  |                    |                            |   |  |



p value \*\*1 =  $p < 0.001$  , \*1 =  $p = 0.01$

*Table Sample Differences in Traumatic Experiences*

| Disaster trauma survey items  | Total trauma<br><i>N</i> | Earthquake group<br><i>n(n%)</i> | Riot Group<br><i>n(n%)</i> | $\chi^2$ |
|---|--------------------------|----------------------------------|----------------------------|----------|
| Immediate Family members injured  | 161                      | 25 (35.2)                        | 60 (66.7)                  | 15.75**  |
| Fathers dead in the disaster  | 299                      | 2 (1.6)                          | 36 (21.1)                  | 26.01**  |
| Grievous injuries sustained by fathers or father's death vs. death/injuries of other family members | 81                       | 20 (35.7)                        | 36 (64.3)                  | 21.99    |
| Witnessed death or injuries of others   | 160                      | 26 (37.1)                        | 39 (43.3)                  | 0.62     |
| Seen multiple injuries or deaths in the family  | 81                       | 12 (48.0)                        | 12 (21.6)                  | 5.85*    |
| Separated from parents/family during the event  | 161                      | 9 (12.7)                         | 18 (20.0)                  | 1.52     |

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|                            |     |         |          |         |
|----------------------------|-----|---------|----------|---------|
| Exposed to severe violence | 160 | 0 (0.0) | 27(30.0) | 46.45** |
|----------------------------|-----|---------|----------|---------|

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\* $p < .05$ . \*\*\* $p < .001$ .



Figure 1 Outline of the Study Design



