



## Research paper

# Posttraumatic stress disorder symptoms in parents and adolescents after the Wenchuan earthquake: A longitudinal actor-partner interdependence model



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## ABSTRACT

**Background:** Previous research has examined the association between parents' and children's posttraumatic stress disorder symptoms (PTSS) after a variety of traumatic events. However, longitudinal parent-child dyadic studies are scarce.

**Methods:** Independent self-reports were collected from parent-adolescent dyads ( $n = 688$ ) after the 2008 Wenchuan earthquake. Adolescents (Mean = 15.22 years; 61.63% female) and one of their parents (Mean = 41.04 years; 58.14% female) each reported on their PTSS at 12 ( $T_{12m}$ ) and 18 months ( $T_{18m}$ ) following the earthquake. Longitudinal actor-partner interdependence models (APIMs) were used to examine PTSS within dyads.

**Results:** The prevalence rates of probable PTSD at  $T_{12m}$  and  $T_{18m}$  were 18.90% and 11.92% in adolescents; as well as 22.09% and 15.12% in parents, showing a significant decline over time. After adjusted for earthquake exposure, both maternal and paternal PTSS at  $T_{12m}$  prospectively predicted adolescent girls' and boys' PTSS at  $T_{18m}$  (mother to daughter:  $\beta = 0.13$ ; mother to son:  $\beta = 0.17$ ; father to daughter:  $\beta = 0.17$ ; father to son:  $\beta = 0.33$ ), while adolescent girls' and boys' PTSS at  $T_{12m}$  only predicted maternal PTSS at  $T_{18m}$  (daughter to mother:  $\beta = 0.20$ ; son to mother:  $\beta = 0.20$ ), but not paternal PTSS at  $T_{18m}$ .

**Limitations:** Self-reported measures other than clinical reviews were used to collect data.

**Conclusions:** This study highlights the mutual impacts of adolescent and parental (especially maternal) PTSS after a disaster. Psychological prevention and intervention for adolescent disaster survivors should adopt a whole family approach.

## 1. Introduction

Posttraumatic stress disorder (PTSD) is prevalent after devastating disasters among children and adolescents, with the prevalence rate ranging from 8.4% to 32.9% (Alisic et al., 2014). Chronic PTSD symptoms (PTSS), if left untreated, could lead to myriad negative consequences, such as interpersonal problems, poor academic achievement, substance abuse, and suicidal ideation and attempts (Pat-Horenczyk et al., 2007; Waldrop et al., 2007; Wolitzky-Taylor et al., 2012). A variety of demographic (e.g., gender, age, and sibling number), psychosocial (e.g., social support and coping skills) and disaster-related variables (e.g., severity of disaster exposure and post-disaster life adversities) have been proved to be associated with children and adolescents' PTSS in the aftermath of disasters (Furr et al., 2010; Hong and Efferth, 2016). Research has also indicated that children's

post-disaster adjustment could be impacted by their family-related factors, such as caregiver-child conflicts (Garfin et al., 2014; Gil-Rivas et al., 2004, 2010), family cohesion (Rowe et al., 2010), and parental psychopathology (Gil-Rivas et al., 2007; Juth et al., 2015). This is especially relevant for children and parents encountering a disaster simultaneously, in which cases children and parents' symptoms may have a reciprocal relationship.

Numerous studies have found that elevated parental (especially maternal) PTSS or distress were significant risk factors for children's clinical symptomatology following disaster exposure (Cobham et al., 2016; Lambert et al., 2014; Leen-Feldner et al., 2013). For example, Li et al. (2010) conducted a retrospective investigation on 3698 families who suffered from the 1998 Yangtze River flood in China, and found that children of parents with PTSD were more likely to develop PTSD, compared to those of parents without this disorder. Kerns et al. (2014)

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examined 460 Boston-area families during a period of 6 months after the 2013 Boston Marathon bombing, and they found that the association between a child's traumatic exposure and his/her PTSS was particularly robust among children of highly distressed caregivers even after controlling for the caregiver's traumatic exposure. In addition, a few prospective studies have also investigated this relationship, but the results were mixed. Landolt et al. (2012) found that initial high PTSS in parents were longitudinally related to poorer recovery from PTSS in children. In contrast, other studies showed that parental symptoms were not significantly associated with children's PTSS over time (Gil-Rivas et al., 2010; Koplewicz et al., 2002).

The interaction between children and their parents following traumatic events is likely to be reciprocal. Consequently, it is also possible that children's posttraumatic stress reaction and/or distress affect their parents' symptoms. In a study of 64 children with pediatric spinal cord injury and their parents (64 mothers, 49 fathers), Boyer et al. (2000) found that the patients' PTSS significantly predicted their mothers' but not fathers' PTSS. Moreover, Koplewicz et al. (2002) longitudinally studied 21 children exposed to the 1993 World Trade Center bombing and their parents. They found that children's PTSS and disaster-related distress 3 months post disaster positively predicted parental PTSS 9 months post disaster. However, there were also some studies that obtained inconsistent conclusions (Juth et al., 2015; Landolt et al., 2012). Using the actor-partner interdependence model (APIM), Juth et al. (2015) examined the interdependent relationship of parents' and children's mental health in 397 parent-child dyads 3 years after a major earthquake. The results showed that parents' PTSS were significantly associated with their children's general distress, whereas children's PTSS were not associated with their parents' general distress.

As noted above, previous studies have shown some preliminary evidence for the bidirectional relationship between parents' and children's PTSS. However, these studies have several drawbacks in common. Most of them are limited to the cross-sectional design or small sample size, making it impossible to draw definite conclusions on the causal effect of parents' PTSS on children's PTSS, or vice versa. Additionally, in many previous studies, the nature of traumas or distress experienced by children and parents were different (Boyer et al., 2000; Scheeringa et al., 2015). Also, data were collected based on either child- or parental-reports (Kerns et al., 2014; Li et al., 2010), which might induce biases to the results. As for the relatively few longitudinal studies, regression analysis was usually adopted to separately examine either earlier parental PTSS as a predictor for children's PTSS in a later stage, or earlier children's PTSS as a predictor for parental PTSS in a later stage. Such analytic approach could omit important information on the relationship between parents' and children's PTSS, as that it treats individual parent and child instead of the parent-child dyad as the unit of analysis, without taking into account the interdependent nature of the relationship between parents' and children's mental health.

The longitudinal actor-partner interdependence model (Cook and Kenny, 2005) is ideal for exploring a reciprocal relational phenomenon between interdependent members of a dyad. By applying structural equation modeling, the longitudinal APIM examines both actor and partner effects. The *actor effect* measures how much a person's current symptoms are predicted by his/her own past symptoms (labeled as "a" and "d" in Fig. 1), while the *partner effect* measures how much one person's current symptoms are predicted by his/her partner's past symptoms (labeled as "b" and "c" in Fig. 1). To our knowledge, only one study applied longitudinal APIM to examine the bidirectional association between parents' and children's PTSS. Using this model, Landolt et al. (2012) analyzed 287 pediatric patients (aged 6.5–16 years) with different medical conditions including severe accident, cancer and diabetes. Both patients and their parents' PTSS were assessed at 5–6 weeks and 1 year after the accident or medical diagnosis. The results merely showed significant positive prediction from parents' PTSS to child PTSS, but not from the child to the parents. One possible explanation for the negative result could be that children and parents'

traumatic experiences were not entirely identical. Moreover, previous studies concerning parents' and children's mental symptoms rarely examined various dyadic structures (i.e., mother-son dyad, mother-daughter dyad, father-son dyad, and father-daughter dyad). There is evidence that mothers and fathers may exert different influences on the development of their daughters and sons (Deater-Deckard and Dodge, 1997). As such, parents' or children's gender may play a moderating role in the interdependent relationship between parents' and children's mental well-being.

The Wenchuan Earthquake Adolescent Health Cohort (WEAHC) Study (Fan et al., 2016) provided a unique opportunity for longitudinally investigating the mutual influences of parents' and children's PTSS in a large sample of Chinese adolescents and their parents. The current study aimed to examine the prevalence rates of probable PTSD, and the longitudinal actor-partner interdependent relations of parents' and children's PTSS in 688 dyads. The moderating effects of parents' and children's gender on these relations were also analyzed, so as to provide more thorough understanding of gender-specific mechanisms.

## 2. Methods

### 2.1. Context

An earthquake with a Richter scale magnitude of 8.0 hit Wenchuan County in the Sichuan Province of China on May 12, 2008. According to the State Council Information Office, this disaster resulted in 69,227 deaths, 374,176 injuries and 18,222 individuals' missing in the disaster-exposed areas. Six months after the earthquake, a longitudinal cohort study was set up in Dujiangyan city, one of the ten worst-hit areas in the earthquake. In this district, the earthquake caused 3069 mortalities, 4388 injuries and 429 missing. A great number of adolescents and their parents were directly exposed to the disaster.

### 2.2. Participants and procedure

The current study utilized longitudinal survey data from the WEAHC study (Fan et al., 2016). Surveys were conducted among adolescents and their parents 12 months ( $T_{12m}$ ) and 18 months ( $T_{18m}$ ) after the earthquake. Regarding to the students, informed consent was obtained from both the participating students and their parents. At  $T_{12m}$ , a total of 1573 adolescents from a junior high school (grade 8) and a senior high school (grade 11) participated in this survey, of whom 1436 (response rate = 91.29%) completed self-report questionnaires in classrooms under the supervision of teachers and well-trained psychological investigators. Students were informed that they were free to withdraw from the study at any time. For the parents, one of them were recruited at random. Adolescents were then given letters asking for informed consent from their parents. Because the majority of parents in this area went to work in big cities, almost half of the students were left behind. Consequently, only 783 parents (including 352 fathers and 431 mothers) completed the self-report questionnaires taken home by their children. It took about one week from questionnaires being sent out to being brought back. Due to some invalid questionnaires, 772 adolescents and their parents (including 347 fathers and 425 mothers) were included in the study at  $T_{12m}$ . Chi-square test and *t*-test were used to compare the adolescents whose parents participated with those whose parents did not in major variables at  $T_{12m}$ . The results showed that parents whose child was male ( $\chi^2 = 10.08, p < 0.01$ ) or older ( $t = 12.16, p < 0.001$ ), were less likely to participate. At  $T_{18m}$ , 35 adolescents withdrew from the follow-up survey, mainly due to their absence from school, and 68 parents did not participate, mainly because they went to other cities to work. Little's Missing Completely at Random (MCAR) test was used to analyze the missing values in all variables, and the analysis revealed that the data were indeed missing at random (MAR),  $\chi^2(41) = 53.84, p = 0.086$ . Therefore, 688 parent-child dyads (258 mother-daughter dyads, 142 mother-son dyads, 166 father-

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