

# Earthquakes and Children: The Role of Psychologists With Families and Communities

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The 2008 Sichuan Province earthquake and 2005 Pakistan earthquake are examples of natural disasters that took an unimaginable toll on children. In such disaster management contexts, family members as well as health care and school personnel are the first-line responders and are natural sources of continued social support as children recover. Although psychologists have increasingly sophisticated understandings of post-disaster reactions and strategies for helping children and adolescents cope with trauma, models for responding to mass catastrophes are limited, particularly in geographically remote communities and in regions in which mental health services are stigmatizing. With children's well-being subsequent to earthquakes inextricably linked to family and community, psychologists can make important contributions in 3 spheres: (a) coordinating and activating collaborations within children's existing social contexts to develop post-earthquake interventions; (b) designing prevention and preparedness programs focused on the emotional needs of children in earthquake-prone communities; and (c) conducting research on interventions and recovery with particular attention to developmental stage, sociocultural-economic contexts, and the similarities versus differences across various types of disasters.

*Keywords:* children, earthquakes, disasters, mass trauma, family and community interventions

What are the unique contributions that psychologists can make in responding to the needs of children and families following an earthquake? Two recent earthquakes took a massive toll on youth. The 2008 Sichuan Province earthquake in China resulted in over 69,200 deaths, 375,000 injured, and left 15 million people displaced (International Federation of Red Cross and Red Crescent Societies, 2009). Described as one of the greatest disasters for children in the past decade, the Sichuan earthquake caused the

deaths of more than 10,000 children due to the collapse of their schools and the devastating landslides that followed; approximately 4,700 children were orphaned, and millions lost their homes or were unable to attend school (Watts, 2008). The 2005 earthquake in Pakistan is estimated to have affected 3.5 million people, including 2.2 million children, and to have caused 86,000 fatalities (United Nations Office for the Coordination of Humanitarian Affairs, 2005). That earthquake also occurred during a school day and many children were buried under collapsed school buildings. In those two recent earthquakes, as well as the 1988 Armenian earthquake, many children who survived the initial impact most likely witnessed the agonizing deaths of their classmates. In addition, many were injured and trapped in rubble, and possibly faced excruciating dilemmas about assisting others versus prioritizing their own safety (Goenjian et al., 1995). Children who ultimately were reunited with their parents may have spent considerable time not knowing how to find their families or whether their family members survived. A substantial number of children who themselves survived the earthquake had to face the devastating realization that family members, friends, and neighbors had died.

As in other natural disasters, children are a particularly vulnerable population (Gurwitch et al., 2004; Johnston & Redlener, 2006; Norris, Friedman, & Watson, 2002; Williams, Alexander, Bolsover, & Bakke, 2008). However, as contrasted with natural disasters that have advance warning during which there is time for families to unite and evacuate, earthquakes can cause a particularly high number of injuries and deaths as well as destruction to community facilities and critical health infrastructure (La Greca & Prinstein, 2002; Mirhashemi, Ghanjal, Mohebbi, & Moharamzad, 2007). Unless the earthquake occurs during the night, family members may be separated at the time of the event. Moreover, adults and children may be evacuated to medical facilities else-

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where without other family members' knowledge. Parents' unavailability to offer immediate support and comfort to children can increase the distress associated with these frightening events. Children's reactions relate not only to the immediate terror of the event, but also the disruption of normal daily life, the distress and alarm exhibited by the adults who care for children, and the destruction of all that is familiar, including their home as well as physical and social structures in the communities.

### **Disruption to Families and Communities**

Earthquakes tend to have compounding effects through family systems with parents' adjustment along with the family's overall adaptability playing a significant role in children's adjustment (Endo, Shioiri, Someya, Akazawa, & Toyabe, 2007). Even under normal circumstances, parents' life stress and emotional problems can spill over into their parenting. Following natural disasters, adult earthquake disaster survivors exhibit a high prevalence of wide-ranging psychiatric symptoms and disorders, some of which do not remit even years later (Livanou et al., 2005; Önder, Tural, Aker, Kihc, & Erdogan, 2006). Children of distressed parents exhibit more distress themselves, most likely because children look to their parents for cues of how to respond to the disaster (Proctor et al., 2007). In light of children's need for the security of adult protection, children often exhibit heightened fear about being separated from their parents and concern about the safety of their parents. As a result, there are high demands on parents to be supportive and available to their children at the time they themselves are likely to be worried, sleep deprived, and struggling to cope with the challenges of day-to-day survival.

Earthquakes may render entire communities uninhabitable or, alternatively, can differentially affect buildings depending on engineering, building codes and construction, and specific soil conditions that amplify seismic waves. An important question is whether a community can sustain its citizens by working collectively to rebuild their infrastructure, or is the destruction so great that survivors disperse to a variety of new locations and thus become isolated from fellow earthquake survivors. Even though relocation limits being confronted with repeated visual reminders of the disaster, those who relocate tend to show equally high rates of posttraumatic stress disorder (PTSD) and depression as those who remain (Najarian, Goenjian, Pelcovitz, Mandel, & Najarian, 1996). When earthquake survivors do not relocate, the commonality of experience and collective sense of loss can sometimes be healing; however, communal loss in combination with personal loss also can exact a particularly high toll on survivors (Norris et al., 2002).

### **Children's Responses to Earthquakes**

Child survivors of earthquakes exhibit an array of problems with posttraumatic stress symptoms commonly noted but typically comorbid with depression, anxiety, and conduct disorders, and with particularly strong effects for young children (Giannopoulou, Dikaiakou, & Yule, 2006; Goenjian et al., 1995; Şahin, Batıgün, & Yılmaz, 2007). Dose-response effects have been related to factors such as severity of personal life threat, personal injury, injury or death of a family member or friend, directly observing the injury and death of others, feeling trapped or unable to escape, separation

from parent, and damage to or destruction of one's home (Gurwitch et al., 2004; Proctor et al., 2007). Perceptions of life threat predict to posttrauma symptoms, even in low casualty disasters (La Greca, Silverman, Vernberg, & Prinstein, 1996). Predisaster psychopathology, particularly anxiety, appears to predict the development and continuation of post-disaster symptoms (Asarnow et al., 1999). Family stress and conflict also are associated with the maintenance of post-disaster problems (Jones, 2008).

Post-earthquake reactions in children raise several key considerations for post-disaster responding—the extent to which the symptoms are normal responses to abnormal circumstances, are understandable within a developmental context, and are disruptive to the children's developmental trajectories. The disaster literature highlights the importance of avoiding pathologizing anticipated “normal” reactions to terrifying events while still identifying those children suffering severe mental disorders (Gurwitch et al., 2004; Jones, 2008). Experts on disaster management and mental health debate whether a focus on clinical symptoms and psychiatric categories detracts attention from the needs of the society-at-large (Belfer, 2006; Williams et al., 2008). Particularly in low resource countries, attention focused primarily on psychological trauma interventions may come at a cost to other, more general psychosocial intervention and prevention programs (Jones, 2008). Nuanced ways of understanding the range of psychological reactions, thresholds for defining children's reactions as problematic, and attention to culturally based symptoms of distress (e.g., greater focus on somatic complaints) are complex issues that warrant additional attention.

Regardless of whether children's reactions are indicative of diagnosable conditions, a relevant question is whether post-earthquake symptoms reflect functional impairments that disrupt normal developmental trajectories. Difficulty concentrating, a common post-earthquake symptom, can lead to secondary problems including academic failure, dropping out of school, and loss of friends that, in turn, lead to loneliness, lack of future focus, anxiety, and self-blame. Indeed, following the 1999 earthquake in Turkey, negative school performance was the variable most predictive of severe symptoms and compounding problems (Şahin et al., 2007).

Earthquake reactions also need to be understood from a developmental perspective. Children, compared to adults, are more vulnerable physiologically to earthquakes, for example, they are more likely to sustain head and multisystem organ injuries (Allen, Parrillo, Will, & Mohr, 2007), and they may also show developmentally related cognitive and emotional reactions. Children often have significant misperceptions about the causes of earthquakes, for example, some child survivors of the 1988 Armenian earthquake attributed the disaster to President Gorbachev because of the explosions of underground missiles that were stored by the Soviet army along the Turkish border (Najarian, 2004). Moreover, guilt related to the injuries and deaths of others was a particularly severe symptom for children following the Armenian earthquake—far exceeding the guilt reported by comparably exposed adults (Goenjian et al., 1995). This symptom makes sense from the developmental perspective that children often mistakenly assume accountability for situations over which they have no control, and then blame themselves for not acting differently.

More generally, children's manifestations of symptoms following a disaster vary across different developmental stages (Gur-

witch et al., 2004; Murray, 2006; Vogel & Vernberg, 1993). For very young children who cannot verbally describe their internal states, posttrauma stress might best be recognized through trauma themes in their play, loss of developmental skills, and disturbances in sleeping and eating. To a certain extent, these types of reactions are quite normal and play may be the mechanism for confronting and dealing with fears. School-age children tend to exhibit difficulty falling asleep, oppositional acting-out behaviors, and obsession with trauma details. Adolescents tend to demonstrate responses more similar to those of adults (e.g., intrusive recollections, numbing and withdrawal, and symptoms of increased arousal) but in addition may engage in substance abuse, antisocial behavior, and risk-taking behaviors, and report physical symptoms and academic problems.

### **Role of Mental Health Specialists in Earthquake Intervention and Prevention**

Psychologists bring unique perspectives to the understanding and treatment of children's and adolescents' reactions to traumatic events such as an earthquake. There is a rapidly expanding knowledge base about children's and adolescents' reactions following natural disasters. In addition to comprehensive reviews of evidence-based interventions for children and adolescents exposed to traumatic events more generally (American Academy of Child & Adolescent Psychiatry, 1998; La Greca & Silverman, 2009; Silverman et al., 2008; Vickerman & Margolin, 2007), several reviews focus on interventions specifically for children and adolescents following natural disasters (La Greca & Prinstein, 2002; Şalcioglu & Başoğlu, 2008) as distinct from interpersonal or violence-related traumas.

A number of resources also are available through fact sheets, pamphlets, websites, and manuals (Brymer et al., 2006; La Greca, Sevin, & Sevin, 2008; La Greca, Vernberg, Silverman, Vogel, & Prinstein, 1994; National Child Traumatic Stress Network, n.d.; National Institute of Mental Health, 2008; Schreiber & Gurwitch, 2006), all in English but some also in Japanese, Chinese, and Spanish. These materials address how families and community members can promote recovery in the aftermath of natural disasters. Those recommended by the National Child Traumatic Stress Network (e.g., Pynoos et al., 2008) are evidence informed. Although still needing to be tested as interventions, they are based on known correlates and risk factors for deleterious outcomes, and for children's reactions to natural and human-made disasters. Empirically guided recommendations for children following disasters typically point to enhancing children's social support networks, decreasing stress, and promoting effective coping with ongoing stressors.

Interventions used for child victims of earthquakes are derived primarily from cognitive-behavior therapy (CBT) and trauma-focused psychotherapies or a combination of the two. Generally speaking, post-disaster CBT interventions focus on interrupting trauma-related thoughts with more adaptive ways of thinking, education about posttraumatic stress reactions, relaxation to reduce anxiety, and the promotion of active coping strategies and problem solving, all designed to improve mood and motivate involvement in daily activities (La Greca & Prinstein, 2002; Ruzek et al., 2008). Promising results have been reported for trauma-related symptoms through: (a) a school-based grief-and-trauma focused intervention

combining group and individual sessions 1.5 years following the Armenian earthquake, ( $n = 35$  treated and 29 nontreated early adolescents; treatment reduced PTSD symptoms and prevented worsening of depression; Goenjian, Karayan, Pynoos & Minasian, 1997); (b) a six-session group-administered treatment delivered 20 months following the Turkey earthquake to enhance school-age children's sense of control over traumatic stressors through exposure to feared situations ( $n = 23$ , treatment led to reduction in PTSD symptoms and earthquake fears, a second study produced similar results through an earthquake simulation treatment; Şalcioglu & Başoğlu, 2008), and (c) a clinic-based short-term CBT group intervention 2 to 4 months following the 1999 Athens earthquake ( $n = 20$ , treatment reduced PTSD and depression and improved psychosocial functioning; Giannopoulou et al., 2006).

Multi-session interventions reported in the literature have been administered months or years following the earthquake, whereas more immediate interventions may occur through psychological first aid. Psychological first aid has been used to provide immediate care in field settings such as community shelters, field hospitals, and other disaster assistance service centers (Brymer et al., 2006; Gray, Maguen, & Litz, 2004; Vernberg et al., 2008). The goals of these interventions include enhancing the survivors' safety and physical and emotional comfort, stabilizing those who are emotionally overwhelmed and having difficulty orienting to the environment, gathering information about immediate as well as long range concerns, providing practical support, establishing links to social support and available services, and offering information about coping. The feasibility of these interventions depends on coordination with other disaster rescue efforts and access to the survivors. The high psychological distress experienced immediately following a disaster suggests the importance of these procedures but little is known about their impact (Gray et al., 2004; La Greca & Silverman, 2009; McNally, Bryant, & Ehlers, 2003). To our knowledge, published reports on psychological first aid have not yet addressed the effectiveness of these strategies with child earthquake survivors.

### **What Other Roles Can Psychologists Play Related to the Preparation and Recovery of Child Earthquake Victims?**

Humanitarian concerns coupled with expertise in alleviating human suffering motivate psychologists to action following disasters such as earthquakes. However, the post-earthquake role of the psychologist can be somewhat ambiguous due to the enormity of the basic needs for safety, shelter, and emergency medical care. In addition, psychologists could play a greater role in response to disasters through specific training in trauma-based therapies, in particular, psychological first aid, recognizing the emotional toll on all health care providers, and better integration with interdisciplinary disaster response teams. The goal here is to highlight the role of psychologists in three spheres: (a) coordinating, activating, and informing the natural social contexts for children; (b) developing prevention programs; and (c) obtaining much needed knowledge through empirical research.

### **Coordinating, Activating, and Informing Natural Social Contexts for Children and Adolescents**

The disaster literature strongly advocates for intervention models based on collaboration between families, schools, pediatric healthcare professionals, and the community (Murray, 2006; Wieling & Mittal, 2008; Williams et al., 2008). These approaches emerge from models of resilience rather than psychopathology, and build on natural support systems (Harper & Çetin, 2008; McNally et al., 2003) as well as community models for pyramidal expansion of intervention effects (Jones, 2008; Omigbodun, 2008). That is, persons already identified as providers of care, for example, parents, teachers, doctors and nurses, and religious leaders, are coached in strategies for responding to the post-disaster needs of children. These individuals communicate knowledge and promote steps toward recovery to other potential change agents, for example, mothers who seek knowledge and who, in turn, can offer assistance to others in their own spheres of influence (Landau, Mittal, & Wieling, 2008). Moreover, involving professionally trained and lay persons indigenous to the community means that they can translate the information to be culturally acceptable in their own communities.

There are a number of reasons why it is important to impart information and interventions to families and communities, even if that is not done through face-to-face contact. Parents, teachers, and other community members are the first responders to children's physical and psychological needs following an earthquake. After attending to issues of safety and security and providing for basic needs (food, water, shelter, and sanitation), these adults need strategies for reassuring children and dealing with children's grief and fears. As noted in the disaster management literature (e.g., Madrid et al., 2008), even with outside relief efforts, access to mental health resources may be limited or unavailable in the aftermath of a widespread disaster and, over time, the needs for disaster-related mental health services will continue to far outstrip available resources. When outside relief workers enter a disaster area and offer short-term interventions, resources for continued care may not be in place (McNally et al., 2003). Moreover, due to stigma and distrust of mental health services, disaster victims often rely on family and community supports rather than seek available professional mental health services (Madrid et al., 2008; Ruzek et al., 2008).

### **Interventions Through Family Systems**

Family support is essential to recovery in childhood trauma, and certainly in natural disasters (Vernberg & Vogel, 1993). Parents, in particular, are the cornerstone of intervention efforts with children as well as the link between other community resources and children. Interventions that focus at the contextual level of families and communities reflect the fundamental assumption that recovery emerges from the restorative nature of interpersonal relationships (Wieling & Mittal, 2008). Resilience displayed by individuals often is fueled by the care and encouragement they receive from others along with their own motivation and sense of purpose to ease the burden of others.

Following a natural disaster, when children rely on parents' guidance for how to react to the catastrophic event, the stress of that event can strain family relationships and compromise family

functioning. A study that happened to be ongoing at the time of the 1994 Northridge, California earthquake showed that post-earthquake responses in 4- and 5-year-old children were influenced by their relationships to parents both before and after the earthquake (Proctor et al., 2007). The number of post-earthquake symptoms exhibited by the child related to parents' behavioral distress symptoms.

Thus, there are a number of factors underlying the rationale for intervening with the family: (a) post-earthquake families overall are stressed and multiple-family members may exhibit symptoms of trauma; (b) high-family stress sometimes exacerbates conflict and violence among family members; (c) high-parental conflict is associated with increased post-disaster symptoms in children; (d) parents may need guidance in recognizing and understanding their children's earthquake responses; (e) parents typically have a high level of contact with their children and thus can best administer and monitor child-focused interventions; (f) parents establish the rhythm of children's daily routines; and (g) parents may have fears about being physically separate from their children, resulting in an overprotectiveness that can impede children's progress in reestablishing normal routines.

Empirically informed manuals written for parents offer specific information and activities for how to support and guide children following natural disasters (e.g., Brymer et al., 2006; La Greca et al., 2008; Schreiber & Gurwitsch, 2006). Parents often need information about the nature of children's post-disaster emotional reactions, which tend to be more varied, severe, and rapidly fluctuating than under normal circumstances. Additional patience may be required if children's responses include regressive behaviors (e.g., not wanting to sleep alone), aggressive and acting out behaviors, irritability, and even a seeming disinterest in what has happened (Madrid et al., 2008). Some parents may need encouragement to talk with their children about earthquake reactions, particularly if they believe that discussion will increase the children's distress. Other parents may need to refrain from forcing discussion and learn to recognize the signs when children are ready to talk about the earthquake and their fears (Vickerman & Margolin, 2007). Parents can be responsive simply by listening. They also can help children to develop an emotional vocabulary and to discover strategies that decrease anxiety and distress related to the earthquake, for example, physical exercise, relaxing activities, restructuring and distracting unhealthy thoughts through positive imagery, and self-talk strategies (La Greca et al., 2008). Parents also play a key role in recreating normal routines and activities, which are essential for recovery (Prinstein, La Greca, Vernberg, & Silverman, 1996; Vernberg & Vogel, 1993). Establishing routines can be particularly challenging if the family's access to their home, possessions, places of work and school is limited; however, even temporary routines and structure can be helpful in relieving children's anxiety.

### **Interventions Through School Systems**

The following factors make schools an ideal setting for post-earthquake intervention programs: (a) In addition to the family, schools are a natural source of social support; (b) school interventions can reach large numbers of children and can avoid scheduling difficulties and compliance issues when integrated into the curriculum and implemented in the classroom (Whitman, Aldinger,

Zhang, & Magner, 2008); (c) school-wide interventions eliminate the stigma associated with seeking help from mental health professionals; (d) teachers and school personnel already have a relationship with the children and are trusted to promote children's well-being; and (e) schools may be the only institutions running and attempting to establish normalcy (Dean et al., 2008; La Greca et al., 1994; Wolmer, Laor, & Yazgan, 2003). Moreover, the familiar routine of the school day is an important component in children's recovery by reinforcing expectations that customary patterns of life will return, that children are to resume their roles as students, and that they can be future oriented (Prinstein et al., 1996; Vernberg & Vogel, 1993).

Some school interventions bring mental health professionals into the school setting and provide direct services to the most symptomatic youth in either small groups or individual sessions (Goenjian et al., 1997; Najarian, 2004). One such example, the Cognitive Behavioral Intervention for Trauma in Schools (CBITS; Stein et al., 2003), is an empirically supported trauma-based intervention, originally developed for youth exposed to interpersonal traumas and more recently implemented in Louisiana following Hurricane Katrina (Dean et al., 2008). This evidence-based school-based trauma intervention is designed for students who report high levels of traumatic stress symptoms, is administered through a combination of 10 group meetings and one to three individual sessions, and includes intervention modules on psycho-education, relaxation, development of trauma narratives, and social problem solving.

A second model of school-based treatment, more integrated with the overall classroom curriculum, involves training teachers to provide preventive interventions to all students (La Greca et al., 1994; Wolmer et al., 2003). An early example of one such school program occurred following the 1980 earthquake in central Italy in which children in isolated villages witnessed many horrors in the days before relief sources arrived; 7-monthly sessions to promote discussion and coping resulted in reduced symptoms (Galante & Foa, 1986). Wolmer and colleagues (2003) developed a teacher-mediated intervention following the 1999 earthquake in Turkey for the 320 families displaced from the village of Adapazari and relocated to prefabricated housing. First, the trained team worked with teachers and principals to: (a) process and emotionally restructure the earthquake impact, and (b) redefine and enhance their roles as educators and leaders so that they could accept the idea of spending classroom time on issues beyond the standard curriculum. Following those steps, and 4 to 5 months post-earthquake, the training team provided ongoing supervision while the teachers implemented eight 2-hr meetings over 4 weeks to help the children recover through

restructuring traumatic experiences, dealing with intrusive thoughts, establishing a safe place, learning about the earthquake and preparing for future earthquakes, mourning the ruined city, controlling body sensations, confronting posttraumatic dreams, understanding reactions in the family, coping with loss, guilt, and death, dealing with anger, extracting life lessons, and planning for the future. (Wolmer et al., 2003, p. 373)

The training team also offered a meeting with parents to introduce the intervention and to help them understand children's earthquake reactions. The group of 202 children receiving this intervention showed significant decreases in trauma and dissocia-

tive symptoms but increases in grief. A 3-year follow-up (Wolmer, Laor, Dedeoglu, Siev, & Yazgan, 2005) showed that emotional symptoms continued to abate but did not differentiate treated youth from a comparably exposed but nontreated group; however, treated youth showed greater functional adaptation, for example, academic performance, social behavior, and general conduct.

School interventions can impart content-based information as well as provide a format for supportive group discussion. Grade-appropriate science curricula that include lessons incorporating geology, geophysics, and energy can be complemented by social science curricula examining the impact of earthquakes on the social structure of communities as well as historical perspectives on how communities recovered. In a parallel fashion, age-appropriate information can be presented about the connection between frightening experiences and certain physiological and emotional reactions. The classroom also can be an ideal setting for teacher-mediated discussions of earthquake-related reactions, acquiring reassurance that others have had similar experiences and emotional reactions, and learning new coping skills from peers. Teachers can facilitate disaster-related emotional coping by encouraging drawing and play for younger children, and journal writing and poetry for older children and adolescents (Vernberg & Vogel, 1993). With older youth, schools also can offer volunteer opportunities in the community to help others affected by the earthquake, as long as such activities do not lead to further traumatization (Comer & Kendall, 2007).

Schools also have an important role to play in earthquake preparedness to help youth gain some sense of planning and control for aftershocks or future earthquakes. Earthquake drills that teach children to "drop, cover, and hold on" also can include lessons about what to expect after an earthquake—what they can do if they are trapped and need assistance or see others who need assistance. With knowledge about earthquakes, students can motivate their parents to better prepare their homes for earthquakes. Moreover, instructing older youth in basic first aid would benefit the community overall as there would be a large segment of citizens competent to respond to minor injuries in future earthquakes.

### Preventive Partnerships at the Local Level

Psychologists, particularly those with expertise in child trauma, child development, health communications, education, or family psychology, can make important contributions in earthquake responding and preparedness by partnering with schools, churches and synagogues, medical care facilities, businesses, or other community agencies. From a primary preventive perspective, an important role for psychologists is to participate in preparedness planning to mitigate the effects of future earthquakes (Allen et al., 2007). Preparedness planning for earthquakes typically involves many dimensions (food, water, medical supplies, triage capacities, and communications networks) but frequently there is inadequate attention to the social and emotional needs of children. Psychologists, even if not experts in disaster preparedness, can contribute to community and school planning by drawing attention to the social-emotional components of earthquake responses. Ongoing school partnerships can lead to planning for children's psychological needs along with their safety needs. Psychologists' knowledge of child and family reactions and of social, emotional, and biological

components of trauma also could offer essential input to community groups such as Citizen Corps ([www.citizen corps.gov](http://www.citizen corps.gov)), which exists in over 2,000 U.S. communities to coordinate disaster preparedness and responses by bringing together local government, emergency managers, voluntary organizations, and first responders in public and private sectors.

For secondary prevention, it is important for wide-ranging segments of the community to have developmentally informed knowledge about normal and abnormal earthquake reactions in children and adolescents, particularly because parents are likely to disclose concerns about a child's problems to a variety of people other than a mental health specialist, e.g., a pediatrician, teacher, other family members, friends, religious leaders, or coworkers (Ruzek et al., 2008). The greater the number of adults who anticipate, understand, and respond sensitively to children's symptoms and fears, the greater the likelihood of preventing the emergence of more long-lasting or serious symptoms. Information can be communicated through meetings at schools and other community organizations, newsletters, and establishing consultative hot lines.

### Health Risk Communications

Effective health risk communications are increasingly seen as a mechanism to promote disaster preparedness and post-disaster coping (Hyer & Covello, 2005). Combined entertainment and educational programs specifically for children and their parents are a recent innovation. For example, the Department of Homeland Security "Ready" campaign ([www.ready.gov](http://www.ready.gov)) includes a family-friendly tool to help parents and teachers educate children about emergencies, including natural disasters. A UNICEF-sponsored popular cartoon (<http://www.unicef.org/meena/>) that is widely viewed throughout South Asia features Meena, an 8-year-old girl living with her family in a small village. One story line designed in response to the Pakistan earthquake shows Meena meeting Neela, who is sad because she was separated from her family during an earthquake but then is cared for by Meena's family and eventually is reunited with her own family. The popularity of this cartoon is attributed to embedding an important educational message in a program that is 90% entertainment (Li, 2006). In general, the newly emerging field of health promotion and education through the popular media (e.g. Bandura, 2004) is grounded in behavior change and social-cognitive theories, with psychologists' expertise in health risk communications integral to the future development of such tools.

### Preventive Partnerships at the Global Level

Earthquakes clearly are a global problem and international collaborations lead to the much needed sharing of resources. One such example is the translation of the "Helping Children Cope with Natural Disasters" manual by La Greca and colleagues (1994) into Japanese following the 1995 Kobe earthquake. Another example is the long-term collaborative international educational exchange for local psychologists and psychiatrists subsequent to the Armenian earthquake. Since 1989, U.S. psychiatrists have continued to rotate to Armenia for 10 days each year to supervise clinical work, consult on wide-ranging issues regarding medication, administrative issues, equipment and supplies, and also provide moral sup-

port to local professionals and the population (Najarian, 2004). As Najarian (2004) described,

Everything that followed was atypical in the annals of disaster interventions. Usually, the team arrives, provides help, possibly trains the local professionals in psychotherapeutic methods and leaves. In Armenia, the helpers in the mental health program from the United States were of Armenian nationality who spoke the Armenian language and had a deeper incentive to help . . . The helpers stayed, and continued to participate in the evolution of a society. (p. 85)

Beyond face-to-face disaster relief assistance, with more options for global communication, there also are ways of expanding networks of service providers. When language barriers can be overcome, models such as the post-Katrina surveillance and education infectious disease hotline (Cavey et al., 2009) can be adapted for post-earthquake consultation regarding mental health. Once telephone or Internet contact is reestablished, trained psychologists who are not geographically onsite could be available 24-hr a day for ongoing consultation and education. Global collaborations are fostered through international organizations, such as the World Association for Disaster and Emergency Medicine (<http://wadem.medicine.wisc.edu/>), which offers cutting-edge interdisciplinary knowledge about disaster management for psychologists, as well as physicians, nurses, paramedics, emergency managers, disaster planners, hospital administrators, and sociologists.

### Directions for Future Research

*What is the natural course of recovery for children in an earthquake and does recovery vary by developmental stage? Relatedly, what are the long-term impacts following a disaster?* More information about the natural course of recovery can inform our interventions. Distress symptoms are to be anticipated following an earthquake, and yet most youth ultimately recover. The literature thus far has focused primarily on how to reduce trauma-related symptoms, with less attention to age salient patterns of recovery or on optimizing children's post-earthquake functioning in developmentally appropriate activities.

Although there is a general association between current functioning and future functioning (La Greca et al., 1996), that association does not characterize the trajectories of all children. Severe symptoms will lessen for some but will worsen for others, particularly those confronted with another serious life challenge (Comer & Kendall, 2007). Some children who initially appear to be functioning well may experience delayed adverse reactions as they become more aware of their losses and uncertain future. In general, there are important gaps in our information about which actions by parents, other adults, and youth themselves facilitate recovery, and what prolongs or interferes with recovery. Systematic large-scale follow-up data collection that continues long beyond the initial crisis is needed to identify contextual variables that buffer youth from short-term and long-term negative impacts of disasters and that promote recovery.

*What is the role of sociocultural-economic context in children's reactions to and recovery from disasters?* Increasing consideration is being given to whether the practices and services in providing post-disaster humanitarian relief efforts are compatible with the culture and beliefs of persons in the stricken region (Birnbaum, 2008). Cultural sensitivity is particularly important with respect to

post-disaster mental health assistance, and has led to reflection about extent of similarity in children's post-disaster reactions and on the appropriateness of Western mental health concepts across cultures (Belfer, 2006; Comer & Kendall, 2007; Landau et al., 2008). Cultural background tends to influence earthquake survivors' interpretations of the devastating event, their preferred coping strategies, and their attitudes toward accepting help from outsiders versus assuming that community members will care for one another (Rahardjo, Wiroatmodjo & Koeshartono, 2008). Whereas western cultures turn to scientific and chance explanations and generally tend to have a strong focus on individually oriented problem solving, the collectivist values of eastern cultures tend to understand negative life events from spiritual perspectives, attribute natural disasters to a divine being, and favor coping methods that are relational, particularly involving family, and that focus on harmony with natural realities (Field, Shaffer, Motipara, Battar, & Lalani, 2003). Cultural beliefs influence preferences for obtaining assistance—through mental health services, medical interventions, or the counsel of family, friends, or religious leaders. For these reasons, assessing the specific problems and requests in the population directly affected by an earthquake is a high priority. Such information will provide valuable knowledge about the relevance and portability of interventions across cultures.

*Which types and to what extent do interventions benefit youth following a disaster?* The evidence base for immediate as well as long-term interventions is limited (La Greca & Silverman, 2009). To a large extent the available trauma-related interventions are empirically informed; however, it cannot be assumed that the empirical treatment literature on PTSD for individual traumas (e.g., sexual assault, car accidents) generalizes to conditions of mass trauma related to the destruction of the community infrastructure. Family-based interventions suggested here similarly are empirically informed but not evaluated. Nonetheless, it is very difficult to develop an empirical literature on this topic because of the post-disaster challenges associated with conducting clinical trials comparing different intervention strategies or comparing an intervention to no intervention. Particularly with “trickle-down” interventions through a number of community agents, it is difficult even to know what “dose” of intervention was provided and received. Ruzek and colleagues (2008) described the gap between the rigorous standards for evaluating mental health interventions typically ascribed to and the “types of data that can be obtained reasonably” (p. 406). They concluded that “The situation of a disaster mandates that treatment researchers become more innovative in re-conceptualizing how to learn from disaster. The mandate is to systematically evaluate interventions that can be implemented on a large scale in community settings” (p. 406).

Although beyond the scope here, important dialogues also are emerging about how to collect ethically and methodologically sound research following disasters (e.g., Collogan, Tuma, Dolan-Sewell, Borja, & Fleischman, 2004; Norris, Galea, Friedman & Watson, 2006).

*To what extent are there similarities versus differences in the mental health needs and impacts following an earthquake versus other types of mass disasters?* There is considerable debate about whether generalizations can be made across different types of natural disasters, for example, those that can be predicted and thus lead to mass evacuations in advance of the event versus those that are not predictable, as well as across natural and man-made disas-

ters such as terrorist events. To date, little data actually address whether there are common mechanisms underlying children's reactions (Kazdin, 2007). Identifying the specific needs of children and families following any new disaster relates to the nature of the disaster and the cultural-social-political context. Balance is needed between general best practices and optimizing creativity and flexibility when responding to the exigencies of any one event.

### Summary

The global problem of earthquakes and the accompanying human costs, particularly with respect to children, has posed serious challenges and will continue to do so. Better warning systems may reduce rates of injury and death due to other types of disasters, but the lack of warning for earthquakes makes them an ever-present threat. The potential for devastation is particularly dire in low-resource countries where, due to lax building codes, structural collapse and injury are more likely. Moreover, as reported in the *United Nations Chronicle*, many of the mega-cities in developing countries are situated along major earthquake faults (Chandrapanya, 2000). Sustaining and empowering natural care-giving systems in the family, school, and community are essential for earthquake preparedness and restoring these systems is indispensable to reducing post-earthquake effects in children. Psychologists can play active and important roles, as part of interdisciplinary teams, to build self-reliant and self-sustaining systems of care capacities within local communities, and to coordinate these local integrated systems with external humanitarian relief efforts when needed.

### Addendum

After this manuscript was accepted, one of the most lethal, socially disruptive and structurally devastating earthquakes ever recorded impacted the country of Haiti. As a nation of approximately nine million with its capitol city straddling a major earthquake fault, many of the risk factors involved in unfavorable earthquake outcomes were in place prior to the January 12, 2010 magnitude 7.0 earthquake. According to the PanAmerican Health Organization ([http://www.paho.org/english/dd/ais/cp\\_332.htm](http://www.paho.org/english/dd/ais/cp_332.htm)), roughly two-thirds of the population lives in poverty, with nearly half of households comprising seven persons; 46% of families live in a single room. As a reflection of baseline sanitation, immunization, and medical infrastructure, the Haitian Ministry of Public Health and Population reported that 37.5% of all deaths prior to the earthquake were due to communicable diseases. The earthquake resulted in large-scale destruction of the water and sanitary infrastructure, which previously provided for less than half of the country's population. The mass numbers of fatalities, fracturing of family and social networks, an unprecedented level of exposure to death and dismemberment, and loss of resources to support basic subsistence needs portends serious adverse consequences for children who survive. The restoration of basic health and security systems will be a protracted effort, and attention to children's physical and psychological needs should be a priority throughout the long-term recovery from this catastrophe.

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