

SAMHSA

**Disaster Technical Assistance Center
Supplemental Research Bulletin**

**Behavioral Health Conditions
in Children and Youth Exposed to
Natural Disasters**

September 2018

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The focus of the *Supplemental Research Bulletin* is to provide an overview of the current literature on a specific topic and make it easy to understand for disaster behavioral health professionals who are not otherwise exposed to the research. The product aims to assist professionals and paraprofessionals involved in all-hazards planning, disaster behavioral health response and recovery, and/or Crisis Counseling Assistance and Training Program grant activities.

INTRODUCTION

This issue of the *Supplemental Research Bulletin* focuses on mental health and substance use (behavioral health) conditions in children and adolescents following exposure to natural disasters such as hurricanes, tornadoes, and earthquakes.

Each year, natural disasters affect an average of 224 million individuals worldwide, and about 85.2 million in North America. In the United States, the average number of natural disasters per year over the past decade was 21.5, making the United States one of the top five countries in the world in terms of how frequently it was hit by natural disasters (Guha-Sapir, Hoyois, Wallemacq, & Below, 2017). Winter storm Jonas alone (2016) affected about 85 million people (Guha-Sapir et al., 2017). Children under the age of 18 comprise nearly 25 percent of the United States' population, or 74 million Americans (National Commission on Children and Disasters, 2010). In a representative sample of children ages 2 to 17 years, 13.9 percent had been exposed to a disaster in their lifetime, while 4.1 percent of the sample reported experiencing a disaster in the past year (Becker-Blease, Turner, & Finkelhor, 2010). As these statistics reflect, many children are exposed to disasters, and they constitute a population with particular risks and needs during and after disasters (Becker-Blease, Turner, & Finkelhor, 2010; National Commission on Children and Disasters, 2010).

Researchers have found mental health problems and conditions including depression, anxiety, and general distress in disaster survivors of all ages (Norris et al., 2002). Children differ from adults physically, developmentally, and socially, which results in a need for disaster response services designed specifically for children of particular age groups. Disasters pose a higher risk for children because of young children's inability to escape danger, identify themselves, and make critical decisions as well as their dependency on adults for care, shelter, transportation, and protection. Additionally, children's active behavior and the heightened sensitivity of their skin and organs put them at higher risk for exposure to toxins or hazards (Bartenfeld, Peacock, & Griese, 2014; Dziuban, Peacock, & Frogel, 2017; National Commission on Children and Disasters, 2010). Children may not have yet developed the appropriate self-preservation skills, communication skills, or judgment to seek help when they need it in disaster situations, putting them at even higher risk of harm (Bartenfeld et al., 2014). All these factors contribute to the unique needs of children in disasters and emergencies and place them at the forefront of populations needing assistance in the event of a disaster (Disaster Preparedness Advisory Council, Committee on Pediatric Emergency Medicine, 2015; National Commission on Children and Disasters, 2010).

According to some researchers, children and youth move through five different developmental stages:

- Infancy and toddler years from birth to age 3
- Early childhood from ages 3 to 8
- Middle childhood from ages 8 to 12
- Early adolescence from ages 12 to 16
- Middle to late adolescence from ages 16 to 21

Within each childhood developmental stage, there are varying "domains of impairment" in which a child may be affected when he or she experiences trauma as part of a natural disaster or other incident. These domains include dissociation, cognition, attachment, biology, self-concept, behavioral control, and affect regulation, and they should be considered, along with developmental stage, in the aftermath of a disaster

(Aber, 2017). At different ages, children talk, think, and understand things differently, and they may or may not have the abilities and experience to cope effectively with situations they face. These skills develop alongside other crucial capabilities such as communication, cognition, and other social skills (Braun-Lewensohn, 2015).

Research has consistently shown that children experience severe reactions to stress following a natural disaster, including clinical needs and behavioral health issues such as posttraumatic stress disorder (PTSD), functional impairments, traumatic stress symptoms, and other mental disorders (Koplewicz & Cloitre, 2006). Following an event such as a hurricane, children may feel anxious, scared, and vulnerable. Meanwhile children who have lost their homes, belongings, or loved ones may go through lengthy periods of grief and pain (Koplewicz & Cloitre, 2006). After a disaster strikes, youth are at greater risk than adults of developing psychiatric disorders (Adams et al., 2015). Following a natural disaster, increases in depression and anxiety among children have been reported, with some symptoms persisting over time (Coombe et al., 2015).

The purpose of this publication is to discuss the challenges faced by children and adolescents following natural disasters; shed light on behavioral health consequences (such as PTSD, depression, and acute stress disorder) of being exposed to traumatic events; and present various ways to reduce lasting impacts of such events.

It is important to note that young people may experience a wide range of outcomes following disasters of all types, including natural disasters, and only a small percentage of children and youth will develop mental and/or substance use disorders after disasters. Please refer to the table on the next page for common stress reactions to disasters in children and youth. This issue of the *Supplemental Research Bulletin* focuses on diagnosable disorders that appear in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)*. However, after experience of a natural disaster, children and youth may also develop symptoms that do not combine to lead to a full disorder (for example, fear or anxiety, negative behavior at school, decline in academic performance, increased clinginess, difficulty with behavioral control, withdrawal and isolation, and aggressive behavior) (Speier, 2000; Coombe et al., 2015; de Jong et al., 2015; McDermott & Cobham, 2014; Tian & Guan, 2015). They also may experience physical symptoms following a natural disaster (for example, stomach pain, trouble sleeping, back pain, indigestion, fast heartbeat, or fainting spells) (Speier, 2000; Zhang, Zhang, Zhu, Du, & Zhang, 2015). Additionally, they may develop symptoms of disorders that lessen fairly quickly on their own over time.

This *Supplemental Research Bulletin* zeroes in on a narrow slice of how children react to natural disasters and presents public health approaches to addressing the needs of all children and youth following disasters, including those emphasized in this issue who may be most in need of behavioral health support.

Common Stress Reactions in Children and Youth After a Disaster

Children often regress after a disaster, losing skills they acquired before the disaster or returning to behaviors they had outgrown. They also often have physiological, emotional, and behavioral reactions. Because of the developmental stages through which children progress, common reactions look slightly different for children of different ages. What follows is a sampling of common reactions, not an exhaustive list.

| Age Range (Years) | Common Regressive Reactions | Common Physiological Reactions | Common Emotional and Behavioral Reactions |
|-------------------|---|---|---|
| 1–5 | <ul style="list-style-type: none"> • Bedwetting in a child who before the disaster was toilet trained • Thumb-sucking • Greater fear (of darkness, animals, monsters, strangers) | <ul style="list-style-type: none"> • Loss of appetite • Overeating • Indigestion and other digestive problems | <ul style="list-style-type: none"> • Nervousness • Anxiety about being away from parents or other primary caregivers • Irritability and disobedience |
| 5–11 | <ul style="list-style-type: none"> • Clinginess with parents or other primary caregivers • Crying or whimpering • Requests to be fed or dressed | <ul style="list-style-type: none"> • Headaches • Complaints of visual or hearing problems • Sleep problems and nightmares | <ul style="list-style-type: none"> • School phobia • Social withdrawal • Irritability and disobedience |
| 11–14 | <ul style="list-style-type: none"> • Competing with younger siblings for attention from parents or other primary caregivers • Failure to perform chores and fulfill normal responsibilities | <ul style="list-style-type: none"> • Headaches • Complaints of vague aches and pains • Overeating or loss of appetite • Skin problems • Sleep problems | <ul style="list-style-type: none"> • Loss of interest in activities • Poorer school performance • Disruptive behavior • Resistance of authority |
| 14–18 | <ul style="list-style-type: none"> • Resumption of earlier behaviors and attitudes • Decline in previous responsible behavior | <ul style="list-style-type: none"> • Headaches • Sleep problems • Digestive problems • Vague physical complaints | <ul style="list-style-type: none"> • Increase or decrease in physical activity • Depression • Isolation • Antisocial behavior |

Source: Columbia University, Earth Institute, National Center for Disaster Preparedness

This issue of the *Supplemental Research Bulletin* is based on literature and scientific publications found through the National Center for Biotechnology Information and U.S. National Library of Medicine (PubMed). All research cited in this issue was published in English, and the majority was conducted in the United States (with a few exceptions where investigations in other countries proved useful to the topic). This issue addresses exposure to natural disasters (such as tornadoes, hurricanes, floods, earthquakes, forest fires, mudslides, tsunamis, and snowstorms). We did not include literature on trauma related to living in war zones, as the ongoing exposure and associated challenges are different. We also excluded literature on human-caused disasters (such as incidents of mass violence and technological disasters), which will be covered in the next issue of this newsletter.

BACKGROUND

Protecting the health of our youth is a vital part of maintaining the well-being of this country and its citizens. However, not all exposures to potentially harmful situations can be foreseen, leaving public health and health professionals to deal with ameliorating the aftereffects of these experiences. In the United States overall, in any year between 2003 and 2010, 7–9 percent of adolescents met criteria for an alcohol or illicit drug use disorder, according to the National Survey of Substance Abuse Treatment Services (N-SSATS) (Mericle et al., 2015). According to a report based on federal surveillance systems, approximately 8 percent of children ages 12–17 years had experienced 14 or more mentally unhealthy days in the past month (Perou et al., 2013). At a webpage on children’s mental health, the Centers for Disease Control and Prevention (CDC) notes that 1 out of 7 children ages 2 to 8 years has a diagnosed mental, behavioral, or developmental disorder (CDC, 2018).

It has been estimated that about 14 percent of American youth experience a disaster during their childhood (Self-Brown, Lai, Thompson, McGill, & Kelley, 2013). Exposure to disasters can be direct or indirect, both of which can leave children with lasting behavioral health issues.

Behavioral Health Conditions in Exposed Youth

Because children are developmentally distinct from adults, they may have different symptoms for diagnosable mental illnesses than adults do (Bath, 2008). This poses an additional difficulty for those attempting to screen and diagnose children in the aftermath of a natural disaster or traumatic event.

Exposure to natural disasters has lasting consequences for the behavioral and developmental health of children. For example, 36 months after exposure to the 2006 tsunami, one-third of schoolchildren continued to meet the diagnostic criteria for having a mental illness, and 18 to 27 months after Hurricane Katrina, 9.3 percent of children continued to experience serious emotional disturbance (Ularntinon et al., 2008; McLaughlin et al.; as cited in McDermott & Cobham, 2014).

STRESS AND POSTTRAUMATIC STRESS DISORDER/SYMPTOMS

Posttraumatic stress manifestations in children following disaster exposure have been studied extensively in recent years. PTSD or posttraumatic stress (PTS) symptoms were the most commonly reported outcomes related to mental and/or substance use disorders in studies reviewed for this bulletin.

PTS symptoms, which can contribute to problems in development and interfere with normal childhood functioning, have been reported in a significant percentage of children exposed to a variety of different natural disasters. Studies have found that as few as 6 percent and as many as 57 percent of samples of children exposed to a 2004 tsunami, 4.5 percent of children exposed to earthquakes, and 35 percent of children exposed to hurricanes experienced significant PTS symptoms (Thienkrua et al., 2006; Wickrama & Kaspar, 2007; Eksi & Braun, 2009; Roussos et al., 2005; La Greca, Silverman, Lai, & Jaccard, 2010; as cited in McDermott & Cobham, 2014). The variety in the percentages could be attributed to study sample age and gender differences as well as to disaster experience and loss, including the type and severity of the natural disaster and the associated loss experienced by youth, whether loss of loved ones, home, or school (Terasaka et al., 2015). One article reported that prevalence of moderate to severe PTS symptoms ranged from 20 percent in the 18 months following a cyclone, to 29 percent 21 months following a hurricane (McDermott, Cobham, Berry, & Kim, 2014; Shaw, Applegate, & Schorr, 1996; as

cited in McDermott & Cobham, 2014). In one study, it was reported that about 6 percent of natural-disaster-exposed youth met criteria for a diagnosis of PTSD (Danielson et al., 2017). Another study found that about 20 percent of children affected by Hurricane Katrina had only PTS symptoms (as opposed to also experiencing symptoms of anxiety and depression) following the disaster, while chronicity of these symptoms rarely exceeded 30 percent of the sampled population (Lai, Kelley, Harrison, Thompson, & Self-Brown, 2015). Research conducted in schools following bushfires in Australia found that students had elevated levels of PTSD, similar to those of global rates among children who had experienced natural disasters worldwide (Coombe et al., 2015). In a sample of adolescents who lived through the 2011 tornado outbreak in Alabama and Missouri, about 6.7 percent met the diagnostic criteria for PTSD following the disaster (Adams et al., 2014). In a sample of 905 youth ages 11–17 exposed to Hurricane Georges (1998), 1.1 percent reported PTSD (Rubens et al., 2013). Children diagnosed with post-disaster PTSD often experience a decrease in quality of life, which may correlate with negative behaviors in school, including difficulty concentrating, disruptive behavior, and poorer grades (Coombe et al., 2015).

It is important to note that rates of PTSD in children after disasters may vary with the time that has passed since the disaster occurred, research methodology used, and specific definitions of outcomes or symptoms measured. PTS symptoms seem to be more prevalent in the first few months after disaster occurrence, with a decline in prevalence over the first year or more. For example, one article reports that elevated PTS symptoms are common in the first few months following a high-impact disaster, but chronic symptom elevations rarely exceed 30 percent of the youth sampled (Pfefferbaum, Jacobs, Griffin, & Houston, 2015).

DEPRESSION

Reviews concerning children affected by natural disasters report that depression prevalence rates range from 7.5 to 44.8 percent across studies (Tang, Liu, Liu, Xue, & Zhang, 2014; Pfefferbaum et al., 2015). Among a sample of adolescents who lived through the 2011 tornado outbreak in Alabama and Missouri, 7.5 percent met the diagnostic criteria for major depressive episodes following the disaster (Adams et al., 2014). In a study conducted after a major hurricane, about 4 percent of children met the symptom criteria for major depression (Rubens, Vernberg, Felix, & Canino, 2013). Six months after an earthquake in China, 24.5 percent of adolescents reported clinically significant depressive symptoms; a similar rate of depressive symptoms was observed after a wildfire in Greece, and a somewhat lower rate of 17.6 percent was reported after a cyclone in India (Papadatou et al., 2012; Kar & Bastia, 2006; as cited in McDermott & Cobham, 2014). Exposure to Hurricane Georges was associated with meeting diagnostic criteria for several different depressive disorders, with 4.1 percent of youth ages 11 to 17 reporting major depression and 1.1 percent reporting dysthymic disorder, which is characterized by mood disturbance over a duration of more than 1 year in children as well as transient periods of normal mood (Rubens et al., 2013).¹

1 This study was conducted when the current version of the *Diagnostic and Statistical Manual of Mental Disorders (DSM)* was the *DSM-IV-Text Revision (TR)*. In the DSM-5, dysthymic disorder is combined with chronic major depressive disorder in a condition called persistent depressive disorder (dysthymia). The 1-year criterion for children and adolescents remains in effect; children and adolescents must experience symptoms of the disorder for 1 year or longer to merit a diagnosis of persistent depressive disorder. Also, depressive mood and symptoms may have been absent at times, but not for a period longer than 2 months (American Psychiatric Association, 2013).

SUBSTANCE USE

Elevated rates of substance use have been reported in adolescents after disasters. These could include increased rates of alcohol use, smoking, and use of illicit drugs (de Jong et al., 2015; McDermott & Cobham, 2014). After exposure to a tornado, about 3 percent of adolescents reported subsequent substance use, with history of prior traumatic events, older age, and a higher degree of loss as risk factors for increased use (Danielson et al., 2017).

ANXIETY DISORDERS

Exposure to disasters may lead to the development of anxiety disorders such as separation anxiety, panic disorder, and specific phobias (de Jong et al., 2015; Pfefferbaum et al., 2015; Pfefferbaum et al., 2014). In a study conducted after a major hurricane (Hurricane Georges), about 6 percent of adolescents ages 11–17 met the symptom criteria for separation anxiety, 3.2 percent for social phobia, 1.1 percent for panic disorder, and nearly 2 percent for generalized anxiety disorder (Rubens et al., 2013). Six months after an earthquake in China, 40.5 percent of adolescents had reported clinically significant anxiety symptoms; a similar rate of anxiety symptoms was observed after a wildfire in Greece, and somewhat lower rates of anxiety symptoms of 12 percent were reported after a cyclone in India (Papadatou et al., 2012; and Kar & Bastia, 2006; as cited in McDermott & Cobham, 2014).

OTHER MENTAL DISORDERS

After exposure to natural disasters, some children may develop behavioral problems, including aggression and inability to control anger, while others may struggle with lack of control or hopelessness (Speier, 2000; de Jong et al., 2015; McDermott & Cobham, 2014). Students displaced by Hurricane Katrina were 7.3 percent more likely than other students to commit a discipline infraction, as well as more likely to commit status offenses (for example, willful disobedience, use of profane or obscene language), offenses against another person or property, and serious crimes (for example, discharge or use of weapons prohibited by federal law, assault, burglary) (Tian & Guan, 2015).

PHYSICAL CONSEQUENCES

As a result of ongoing anxiety, some children may experience physical symptoms (Koplewicz & Cloitre, 2006). Child and adolescent earthquake survivors with PTSD had higher prevalence rates of various physical symptoms than those unaffected, with most commonly reported symptoms being trouble sleeping (83.2 percent), feeling tired or low energy (74.4 percent), having stomach pain (63.2 percent), feeling dizzy (58.1 percent), and headaches (57.7 percent) (Zhang, Zhang, Zhu, Du, & Zhang, 2015). More direct exposure to the event, such as loss of a family member or witnessing serious injury or death, were predictors of physical symptoms in earthquake survivors.

COMORBIDITIES

Youth affected by disaster may present with multiple comorbid psychiatric conditions such as depression and anxiety (La Greca et al., 2013). Eight months after Hurricane Ike, about 10 percent of children reported comorbid PTSD symptoms and depression, while at 21 months after the hurricane, 7 percent of children reported the same comorbidities (Lai, La Greca, Auslander, & Short, 2013). Those with comorbidity of PTSD symptoms and depression showed increased severity in symptoms and poorer

recovery, and they reported greater recovery stressors. An investigation after Hurricane Katrina revealed that about 12 percent of children reported “mixed internalizing” symptoms consisting of depression, anxiety, and moderate PTSD symptoms (Lai et al., 2015). Among adolescents affected by the spring 2011 tornadoes in Alabama and Missouri, prevalence of comorbid PTSD and major depressive episode was 3.7 percent; comorbid PTSD and substance use disorder was 1.1 percent; comorbid major depressive episode and substance use disorder was 1.0 percent; and comorbid PTSD, substance use disorder, and major depressive episode was 0.7 percent (Adams et al., 2015).

RISK AND PROTECTIVE FACTORS FOR MENTAL AND BEHAVIORAL HEALTH IN YOUTH

Many studies have assessed the risk and protective factors for disaster-related behavioral health issues among children and adolescents.

Non-modifiable Risk and Protective Factors

A child’s gender appears to be one of the most important non-modifiable risk or protective factors when it comes to disaster reactions and recovery following exposure. Girls are significantly more likely than boys to have major depressive episode or be affected by depression in general (Adams et al., 2014; Lai et al., 2014). Adolescent girls have also been found after a disaster to be significantly more likely than boys of the same age range to experience comorbidities and meet diagnoses for both PTSD and a major depressive episode, as well as both major depressive episode and substance use disorder (Adams et al., 2015).

Age at exposure may also serve as a risk factor in consequences following a disaster. For example, older adolescents who were exposed to tornadoes were more likely than younger adolescents to report major depressive episode (Adams et al., 2014). Older age was also found to be a risk factor for tobacco, alcohol, and substance use following tornado exposure, as were prior traumatic events (Danielson et al., 2017).

Children who are from an ethnic minority may be at higher risk for adjustment issues after disaster exposure, but this may be modified by a host of factors such as socioeconomic status and family or other social influences (Lai et al., 2018; Pfefferbaum et al., 2015). In a study in New Orleans following Hurricane Katrina, lower income groups were more vulnerable to the disaster, struggled in the immediate response phase, and had more difficulty in coping with the aftermath (Masozera et al., 2007). According to Dodgen et al., individuals living with few socioeconomic resources have less capacity to adapt to the challenges brought by climate change and experience the most negative impacts and mental distress caused by natural disasters due to reduced mobility, reduced access to health care, and economic limitations that reduce the ability to buy goods and services that could mitigate the effects of disasters (2016).

Youth with preexisting disabilities may also be disproportionately affected by natural disasters. Children with disabilities may need additional assistance to evacuate and to take shelter. Additionally, some cognitive or emotional disabilities may make children more vulnerable to disaster; for example, children with attention-deficit/hyperactivity disorder may be unable to pay attention to instructions during evacuations, while children with autism may have difficulties when encountering unusual and unexpected situations. Other medical conditions that require specialized diets or the use adaptive equipment can complicate evacuation and treatment in emergency situations (Stough, Ducey, & Kang, 2017).

According to a study in which investigators interviewed 2,000 adolescent-parent dyads living within a 5-mile radius of an area of northern Alabama and Joplin, Missouri, affected by tornadoes in spring 2011, there was evidence that a higher degree of loss due to the disaster was associated with increased mental and behavioral health consequences (Danielson et al., 2017). Following the Great East Japan Earthquake, specific trauma experience, including loss of distant relatives or friends, was associated with internalizing problems in exposed children (Fujiwara et al., 2014).

Modifiable Risk and Protective Factors

Overall, a child's pre-disaster emotional status, previous trauma history, and post-disaster family and life course influence disaster response and recovery. Family stress has been found to be associated with poor post-disaster adjustment in children (Pfefferbaum et al., 2012). Youth with depression or a history of trauma or family conflict were two to three times more likely to also have PTSD following tornado exposure (Danielson et al., 2017). Previous exposure to hurricanes and violence proved to increase risk for a more serious PTSD trajectory in youth affected by Hurricane Katrina (Self-Brown et al., 2013). A meta-analysis of natural disasters found that in children, significant predictors of depression included prior trauma; experiencing fear, injury, or grief during the disaster; witnessing injury or death; being trapped during the disaster; and having poor social support (Tang et al., 2014). Peer social support was also identified as a protective factor against PTSD severity among youth affected by Hurricane Katrina (Self-Brown et al., 2013).

Impact of Indirect Exposure to Natural Disaster

Indirect exposure to disasters can happen through exposure to the media (such as television, radio, or social media) or to parents' discussions. Youth who view media coverage may show symptoms of being afraid, worried, or anxious; they also may experience sleep disturbances because of these reactions or their inability to stop thinking about what they have seen or heard. Some of these reactions could be prompted by the fear that they, or their families, will experience what they are seeing in the media. These symptoms are proportional to the amount of time these children are exposed to coverage (Houston et al., 2011). Children exposed to media coverage of disasters could be at risk of re-traumatization (Koplewicz & Cloitre, 2006). Another source of indirect exposure to disaster is prenatal exposure. In a study investigating school performance following

Children's Reactions to News About Disasters by Age Group

PRESCHOOL-AGE CHILDREN

Can be easily overwhelmed by news about disasters.

May confuse reality and facts with their fantasies.

Do not have the ability to keep events in perspective.

May be unable to block out troubling thoughts.

May personalize the news they hear, relating it to events or issues in their lives.

Are concerned about separation from parents.

ELEMENTARY SCHOOL-AGE CHILDREN

Understand the difference between fantasy and reality; however, they may have trouble keeping them separate at certain times.

May equate a scene from a scary movie with news footage.

May have difficulty recognizing that the disaster is not close to home.

May personalize the news they hear, relating it to events or issues in their lives.

Are concerned about separation from parents or other primary caregivers.

MIDDLE AND HIGH SCHOOL-AGE ADOLESCENTS

May be interested and intrigued by the politics of a situation and feel a need to take a stand or action.

May show a desire to be involved in political or charitable activities related to the disaster.

Source: Koplewicz & Cloitre, 2006

prenatal exposure to hurricanes, the prenatally exposed children achieved lower scores on third grade standardized tests in math and reading (Fuller, 2014).

INTERVENTIONS TO IMPROVE POST-DISASTER BEHAVIORAL HEALTH IN CHILDREN AND YOUTH

In this section, we cover general principles of intervention with children and youth after disasters to help them with coping. We also discuss some methodologies in use to help children and youth after disasters.

General Intervention Strategy

When developing a post-disaster intervention strategy, several factors should be taken into consideration. These factors include the developmental stage of the child or adolescent, the type of event, the cultural context, and the disaster type (Braun-Lewensohn, 2015). In a review of several studies, researchers found that any of a wide range of psychological interventions was better than no intervention when it came to improvement of PTSD symptoms in children and adolescents (Newman et al., 2014). The interventions in studies the researchers reviewed included various forms of cognitive behavioral therapy, as well as relaxation, Psychological First Aid, exposure, and blends of different types of approaches and interventions.

In general, a three-tiered, stepped-care public health approach can offer multiple intervention strategies at different post-disaster time points and thus ensure that survivors receive services based upon their disaster experience and current needs (Institute of Medicine [IOM], 2015). Universal preventive interventions, or tier 1, are used for general populations of children whose disaster exposure and experiences may vary greatly. These interventions may help all children by normalizing their disaster reactions and helping them process their experiences. These interventions are usually administered in groups and rely heavily on various cognitive behavioral techniques (IOM, 2015; Pfefferbaum et al., 2014). Targeted short-term interventions represent the second tier, and they can be used with individuals or groups and delivered in various settings (for example, Cognitive Behavioral Intervention for Trauma in Schools, or CBITS). The third tier includes longer-term and more intensive interventions that can be delivered primarily to individuals experiencing severe and/or long-lasting symptoms. These interventions may involve more intensive treatment such as psychopharmacology (IOM, 2015).

Screening

In the aftermath of a disaster, it is imperative to identify children and youth who are most in need of assistance. Following the stepped-care approach described in the previous section, children after a disaster should be screened to identify potential risks. A more comprehensive, in-depth screening approach is needed when the symptoms last for a longer duration, to uncover morbidities and comorbidities. Those with comorbid psychological issues such as PTSD, anxiety, and depression should take priority in early intervention efforts (La Greca et al., 2013; Lai et al., 2013). When screening for mental health issues, staff should consider the risk factors mentioned earlier, including gender, impact of the disaster on the family of the child or adolescent, and the child's prior history of trauma (Adams et al., 2015)

Important Considerations

- *Setting*—Healing after a disaster can begin to take place in nonclinical settings. Schools play a major role in disaster recovery and are often the backbone of relief operations. Through the implementation of effective school-based, teacher-mediated interventions following disasters, children can regain a sense of normalcy in their lives and receive psychological support while doing so. Additionally, services can be delivered in schools without the stigma commonly associated with mental health interventions, and parents and families know and generally trust school personnel and processes (Coombe et al., 2015; Pfefferbaum et al., 2014). Clinical settings may be effective as well, although they may be less accessible than schools to children and their families. Clinical facilities are more likely to possess the resources needed to conduct comprehensive assessments and provide interventions. They also offer more privacy for children and families who may not want others to know they are seeking services (Pfefferbaum et al., 2014; Pfefferbaum et al., 2015).
- *Individual vs. Group Intervention*—A team of researchers found in a meta-analysis that children who had received individual therapies had greater improvement than those in group interventions, possibly due to the customization of intervention to disorder trajectory (Newman et al., 2014). However, group interventions can reach more disaster-affected children and youth at lower cost than individual interventions, and as such they may be a good choice after a disaster when resources may be more limited than usual. Additionally, many children exposed to disasters will experience only low or moderate levels of distress and will not require individual interventions.
- *Social Support*—Social support is immensely important in helping with coping after a disaster, acting to improve well-being and mental health, and setting the trajectory after a disaster for a pattern of recovery as opposed to one of chronic distress (Braun-Lewensohn, 2015; La Greca et al., 2013). Evidence shows that the lack of adequate social support following disaster can lead to the development of PTSD and other disorders, while high levels of social support are key in improving resiliency in situations such as the aftermath of the 2010 Haiti earthquake (Derivois, 2014). In children specifically, social support from parents, classmates, or friends served as a protective factor against negative symptoms following Hurricane Katrina (Lai et al., 2015). It is therefore important to choose interventions that foster social support network building and accessing of social support in children and youth to assist them in coping after a disaster.
- *Strategic Partnerships*—Awareness and collaboration between and among clinicians and mental health support staff, including school and community personnel, is necessary to surround the child with supportive mentors (Disaster Preparedness Advisory Council Committee on Pediatric Emergency Medicine, 2015). Ideally these partnerships are formed before a disaster occurs, eliminating protracted response times.
- *Technology*—Technology-based solutions for alleviating post-disaster burden can be very valuable if properly applied. The lack of mental health resources following a disaster can be ameliorated with remotely delivered interventions, increasing the reach and decreasing the time required for mental health services to be delivered (Yuen et al., 2016).

Guidance in Selecting Interventions

Many interventions exist for helping children and youth to cope with their reactions to disasters, and these interventions may be delivered in person in offices, schools, or homes; through workbooks; and by telephone, online, or via mobile app. Because there are often constraints such as cost and availability of practitioners, researchers have also come up with ways of evaluating interventions for goodness of fit with a given post-disaster situation. For example, Scheeringa, Cobham, and McDermott identify 10 factors to consider when selecting a treatment modality (office-based, school-based, home visitation, Internet, etc.):

- Reach (providing access to the greatest number of child and adolescent disaster survivors)
- Retention of patients
- Privacy
- Parental involvement
- Familiarity of the modality to clinicians
- Appropriateness of intensity (intervention type matches symptom acuity and impairment of patient)
- Burden to the clinician (in terms of time, travel, and inconvenience)
- Cost
- Technology needs
- Effect size (Scheeringa, Cobham, & McDermott, 2014)

Methodologies for Supporting Children After Natural Disasters

Many interventions exist for supporting children and adolescents after disaster exposure. A few of the more prominent ones are described in the following section.

SELECT POST-DISASTER INTERVENTIONS FOR CHILDREN

Cognitive Behavioral Therapy (CBT) or Skills-Building Frameworks

Interventions incorporating CBT should include the following components:

- Psychoeducation
- Relaxation skills
- Affect modulation
- Coping skill enhancement
- Exposure
- Trauma narrative
- Techniques to enhance future safety and/or development
- Garnering of social support
- Parent involvement (Pfefferbaum, Sweeton et al., 2014)

Psychological First Aid for Schools (PFA-S)

Developed by the National Child Traumatic Stress Network (NCTSN) and the National Center for PTSD, PFA-S is “an evidence-informed intervention model to assist students, families, school personnel, and school partners in the immediate aftermath of an emergency” (NCTSN & National Center for PTSD, 2009). PFA-S is an adaptation of Psychological First Aid (PFA), a modular approach for assisting survivors in the immediate aftermath of natural and human-caused disasters. PFA-S can be delivered by school personnel with or without mental health training as well as by mental health professionals. The model comprises eight core actions, including contact and engagement, safety and comfort, and connection with social supports.

Healing After Trauma Skills (HATS)

Developed after the bombing of the Alfred Murrah Building in Oklahoma City in 1995 and refined after subsequent disasters, this approach encompasses a series of classroom or small-group activities for children from kindergarten through early middle school ages who have experienced a trauma or disaster (Gurwitch & Messenbaugh, 2005). Each activity corresponds to a coping skill for children to learn. Activities can be led by a teacher, counselor, or parent. HATS can be useful for children who have experienced either natural or human-caused disasters (Gurwitch & Messenbaugh, 2005).

Support for Students Exposed to Trauma (SSET)

SSET is a group intervention designed to be provided in schools for children with symptoms of PTSD. It is an adaptation of CBITS into a format ideal for delivery by teachers and counselors. It may work well with children and youth from late primary through early high school years (NCTSN, SSET).

Child and Family Traumatic Stress Intervention (CFTSI)

Aimed at preventing PTSD, CFTSI focuses on two key risk factors: poor social or familial support, and poor coping skills in the aftermath of traumatic events. It seeks to reduce these risks by increasing communication between the affected child and his or her caregivers about feelings, symptoms, and behaviors, and by teaching specific behavioral skills to the caregiver and child to enhance their ability to cope with traumatic stress reactions (NCTSN, CFTSI).

Skills for Psychological Recovery (SPR)

Whereas PFA is designed to support survivors in the period immediately following a disaster, SPR is intended to be used after PFA, in the weeks and months after a disaster. SPR is intended to help survivors identify their most pressing current needs and concerns and teach and support them as they develop skills to address those needs. Each SPR skill can be covered in one contact session and reinforced in continuing contact sessions. Although each contact can stand alone, ideally the survivor will participate in multiple contacts and continue to learn and practice the skills with support from the SPR provider. The actions all include task assignments to practice the skills learned (NCTSN, SPR).

CONCLUSION

Children and adolescents are the future of this nation, and therefore it is imperative to preserve their health and well-being, especially in the face of disaster. Youth differ from adults based on varied physiological, cognitive, and emotional developmental factors, making them more vulnerable to the damaging effects of natural disasters. In the aftermath of a natural disaster or traumatic event, children may be affected by behavioral health conditions such as PTSD, depression, substance use, and anxiety disorders, among others. With a better understanding of risk and protective factors, we can begin to strategize more effectively to come up with a plan for recovery for children and youth after a disaster. When planning interventions for disaster-affected communities, it is crucial to consider the unique sensitivities of children and youth, as well as their tendency toward resilience, in tailoring post-disaster response interventions to promote successful recovery and healing for the community and its young survivors.

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