

---

---

# Evaluation of Identified Stressors In Children and Adolescents After Super Storm Sandy

*Margaret Quinn, Diane Gillooly, Sarah Kelly, John Kolassa,  
Elizabeth Davis, and Stephane Jankowski*

**N**atural disasters can have widespread detrimental effects that go beyond the obvious physical damage. Children are one of the most vulnerable populations affected by natural disasters because their sense of normalcy is altered (Lazerous, Jimerson, & Brock, n.d.; Pederson, 2011). Youth lack the emotional and cognitive maturity to effectively cope with challenges in the aftermath of disaster (McDermott & Cobham, 2012). Prior studies have concluded that hurricane exposure in children often results in post-traumatic stress reactions, depression, anxiety, and behavioral problems (Pina et al., 2008; Schoenbaum et al., 2009), and when children experience disaster, the trauma may influence normal developmental issues they are working on during and after the disaster, thus compounding the psychological impact of the disaster (Orr, 2007). The onset of post-traumatic stress disorder (PTSD) in children during the post-natural disaster period has been found to occur nine to 21 months after the event (Pederson, 2011). The purpose of this study was to explore the psychological effects of Super Storm Sandy had on children residing in the affected counties of New Jersey 15 to 20 months after the storm. Specifically, the aims of the study were to 1) identify the most prevalent

Super Storm Sandy, one of the largest storms endured by the East Coast of the United States, devastated New Jersey and the eastern seaboard. Although natural disasters affect individuals of all ages, children are particularly vulnerable because their sense of normalcy is altered. The purpose of this study was to explore the effects that exposure to Super Storm Sandy had on children who resided in New Jersey. This was a non-experimental, quantitative, cross-sectional research study. Study participants were recruited via printed flyers at disaster resource sites and on a dedicated research team's Facebook site. Each participant completed the Hurricane Stressors Assessment Tool for Children and Adolescents as a web-based survey related to their experiences with the hurricane. One hundred and forty-one (141) children participated in this study. Age groups (preschool, child, and adolescent) had varied results based upon developmental level. Age was positively associated with finding it harder to concentrate and pay attention ( $r = 0.18, p = 0.04$ ); feeling sad, down, or depressed ( $r = 0.17, p < 0.05$ ); being quiet and withdrawn ( $r = 0.16, p = 0.05$ ); feeling irritable and grouchy ( $r = 0.26, p < 0.05$ ); and finding it harder to complete schoolwork ( $r = 0.32, p < 0.001$ ). Certain parental perceptions of their child's behavior were negatively associated with the age of the child. Children had varying degrees of experiences after Sandy. Adolescents were shown to be more aware and affected by the storm than younger children. Observations can be used for intervention initiatives in the post-natural disaster period, encouraging healthcare providers to acknowledge family and community healing to provide adequate mental health referrals in the post-disaster period.

stressors in children after a natural disaster, 2) assess the behavior of children affected by this natural disaster, and 3) provide strategic guidance for the development of future interventions in the post-natural disaster period.

## Super Storm Sandy

Super Storm Sandy started as a tropical storm and advanced to a hurricane when it made landfall in the

New Jersey/New York area on October 29, 2012. This was the largest and most damaging Atlantic Ocean storm, with 117 deaths in the United States, including 37 in New Jersey, 69 in Canada and the Caribbean, and resulting in over 65 billion dollars in damage (Hoops-Halpin, 2013; United States Geological Survey, 2014). Most of the devastation in New Jersey occurred in Ocean County, which has 40 miles of beach and tens of thousands of residents living in waterfront communities (Hoops-Halpin, 2013). The Department of Energy estimated that 2.6 million customers were without power for an average of two to 10 days. The impact on residents and families was grave, with over 325,000 housing units damaged and numerous auto losses and days lost of work totaling \$883 million in lost wages (Hoops-Halpin, 2013). Nine of the 21 New Jersey counties were declared federal disaster areas.

---

**Margaret Quinn, DNP, RN, CPNP**, is a Clinical Associate Professor, Rutgers University – School of Nursing, Newark, NJ.

**Diane Gillooly, DNP, RN-BC, APN**, is a Clinical Assistant Professor, Rutgers University – School of Nursing, Newark, NJ.

**Sarah Kelly PhD, RN**, is an Assistant Professor, Rutgers University – School of Nursing, Newark, NJ.

**John Kolassa, PhD**, is a Professor, Rutgers University – Department of Statistics and Biostatistics, Piscataway, NJ.

**Elizabeth Davis, BSN, RN** is a Registered Nurse, Rutgers University – School of Nursing, New Brunswick, NJ.

**Stephane Jankowski, BN, RN**, is a Research Assistant, National School for Statistics and Data Analysis [École Nationale de la Statistique et de l'Analyse de l'Information], Rennes, France.

## The Effect of Disasters On Children's Mental Health

A search of the literature for articles related to children's stressors post-natural disaster – specifically hurricanes – was conducted using the search terms “natural disaster,” “children,” “post-disaster response,” and “hurricane” in the CINAHL, Pub Med, and the Cochrane Review databases. The output of the search revealed that many articles were outdated and clustered in the immediate timeframe after a specific natural disaster, but research relevant to long-term behaviors and ongoing stress responses in children is limited. Research after storms, such as hurricanes Andrew, Hugo, Floyd, and Katrina, highlight the significant association between personal loss and PTSD symptomatology in children. Children and adolescents who were affected by Hurricane Katrina had a greater risk of having PTSD due to their helplessness (Galea et al., 2007), and the top three predictors of PTSD were 1) storm exposure, 2) relocation time, and 3) loss of resources (Blaze, & Shwalb, 2009).

## Effects of Relocation/Property Loss

Individuals and families create bonds with their homes and neighborhood communities, and these attachments become a part of their identity and help provide stability (Brown & Perkins, 1992). Relocation of affected children and their families after a natural disaster may negatively impact the experiences of these children. Hansel, Osofsky, Osofsky, and Friedrich (2013) substantiated the idea that children ( $N = 795$  participants) who were relocated to Baton Rouge from their homes as a result of the disaster ( $A = 270$  or 34%), when compared to children who either moved to a different zip-code but stayed within Orleans Parish ( $B = 351$  or 44%), or were able to return to their original zip code after the storm ( $C = 174$  or 22%), reported more cases of post-traumatic stress ( $A: M = 21.88, SD = 7.51; B: M = 18.34, SD = 6.80; C: M = 19.20, SD = 6.83$ ), depression ( $A: M = 22.68, SD = 8.61; B: M = 20.25, SD = 7.69; C: M = 21.40, SD = 8.33$ ), and other trauma ( $A: M = 41.67, SD = 13.32; B: M = 36.90, SD = 12.35; C: M = 38.89, SD = 12.92$ ).

Another post-Katrina cross-sectional study of 636 high school students found that significantly higher levels of PTSD were present in students who were displaced from their homes due to the storm ( $M = 39.62, SD = 22.3; p < 0.001$ ) as compared to students who were not displaced ( $M = 11.53, SD = 15.6; p < 0.001$ ) after completing a multivariate analysis of variance (Blaze & Shwalb, 2009). LaGreca, Lai, Joorman, Auslander, and Short (2013) found that children who experienced loss and disruption after Hurricane Ike, particularly those with sustained loss eight months post-storm, reported higher incidence of PTSD symptoms. The authors further analyzed the effects of sex, environmental stressors, and social support on PTSD in those children, and found that females were more likely to experience PTSD ( $p \geq 0.05$ ) when there was a perceived life threat and immediate as well as ongoing loss/disruption (LaGreca et al., 2013). Additional findings indicated that environmental stressors had a significant effect with regard to perceived life threat ( $p \geq 0.05$ ), immediate loss/disruption ( $p \geq 0.001$ ), and ongoing loss/disruption ( $p \geq 0.01$ ) (LaGreca et al., 2013). They also noted that social support had a significant impact with regard to perceived life threat ( $p \geq 0.01$ ), immediate loss/disruption ( $p \geq 0.01$ ), and ongoing loss/disruption ( $p \geq 0.05$ ) (LaGreca et al., 2013).

Fourteen months following Hurricane Hugo, significant predictors of longer lasting behavioral and emotional problems in children post-disaster were property loss (accounting for 2% of the variance;  $p < 0.01$ ) or other life stressors, including a death in the family (accounting for 4% of the variance;  $p < 0.01$ ). From the one-year anniversary of the storm to the time of the questionnaire, mothers reported that 5% of children were still experiencing shock/upset, while an additional 6% were experiencing other emotional/behavioral problems (Swenson et al., 1996). After Hurricane Floyd, research confirmed that children whose homes were flooded were three times more likely to have symptoms of PTSD than children who did not have flooded homes (Russoniello et al., 2002)

Norris et al. (2002) reviewed 20 years of empirical research to determine what is known about the range, magnitude, and duration of mental health effects on a community to-

gether with the experiential, demographic, and psychosocial factors that influence who is adversely affected. Variations in responses were reviewed across all age groups, and problems specific to youth included clinginess, dependence, sleep disruptions, temper tantrums, aggressive behaviors, incontinence, hyperactivity, and separation issues. Adolescents showed disaster-related elevation in minor deviance and delinquency in the studies that were included in this review.

After completing the data analysis of the 387 completed responses of students to the National Child Trauma Safety Network (NCTSN) Hurricane Assessment and Referral Tool for Children and Adolescents collected two and three years after Katrina, Kronenberg et al. (2010) found that 27.7% ( $n = 108$ ) of students classified as experiencing breakdown without recovery; 27.1% ( $n = 105$ ) were classified as normal response and recovery, and 45.2% ( $n = 175$ ) were classified as stress-resistant. Of the three trajectories, students that experienced post-hurricane breakdown without recovery had the highest reports of post-hurricane loss or trauma (43.5%;  $p < 0.01$ ) during this post-disaster period in addition to school problems (48.1%;  $p < 0.01$ ), financial problems/worries (20.4%;  $p < 0.01$ ), and more (Kronenberg et al., 2010).

Compared to adults, significantly less research has been done regarding PTSD in children affected by natural disasters. Children are often overlooked during the aftermath of a disaster even though they are affected by such tragedies in numerous ways (Silverman & LaGreca, 2002). Children manifest depression and signs and symptoms of PTSD, including problems concentrating, irritability, difficulty sleeping, and a limited range in affect (American Psychological Association [APA], 2014). Following a disaster, children who have difficulty regulating emotions or have a more fearful nature are at an increased risk of PTSD; of 152 sixth graders who completed this study's surveys, males had significantly less negative coping than females (Males:  $M = 1.52, SD = 0.60$ ; Females:  $M = 1.68, SD = 0.65$ ) and less PTSD symptoms 1.5 months after the storm (Males:  $M = 0.69, SD = 0.54$ ; Females:  $M = 0.87, SD = 0.55; p < 0.05$ ) (Terranova, Boxer, & Morris, 2009).

## School Behaviors

Changes in school behaviors are another common theme in post-disaster assessments. For children, disrupted social supports that occur for a year or less, such as missed school, lack of social activities, and increases in stress exposures, are some of the negative interferences experienced after disasters strike that can negatively impact functioning of the affected children (Silverman & LaGreca, 2002). Displaced students affected by Hurricane Katrina, several of whom had been performing below the academic level for their age already, further struggled with the subjects of math and reading during the recovery period after the storm (Casserly, 2006). After Katrina, long-term distress was significantly related to the surveyed students' worries and problems regarding school, among other issues (Kronenberg et al., 2010). The Gulf Coast Child and Family Health Study (GCAFH) (National Center for Disaster Preparedness, 2016) has studied the effects of Hurricane Katrina on child development and family dynamics from multiple perspectives. Results continue to be significant at the five-year anniversary, with 60% of children who were displaced continuing to have some form of emotional disorders and behavioral issues, and are still experiencing significant housing instability. Research is ongoing with this cohort of children and families, and GCAFH will promote key recommendations for support in the aftermath of that disaster.

## Method

### Design and Sample

This study used a non-experimental quantitative cross-sectional research design to explore children's experiences with Super Storm Sandy. A convenience sample was recruited through two main strategies. First, flyers were printed with information about the study, survey link, and information to contact the primary investigator. These flyers were distributed to disaster resource sites in all nine counties of New Jersey identified as disaster areas. Churches, schools, food pantries, resource centers, social service, and mental health support groups assisted with the dissemination of flyers. To support the participation of the communities, local

media and newspapers also reported on the research initiative and advertised the survey link. The second avenue for recruitment was through Facebook. The use of social media for recruitment is currently evolving and awaiting Federal Drug Administration (FDA) approval for clinical trial recruitment (Strickroth, 2012). The Institutional Review Board (IRB) at the investigators' institution approved the study as a whole, inclusive of a Facebook page for the purpose of allowing participants to review the goals of the research, meet the team involved in the recruitment and study, and provide the participant with a direct link to the survey. Via Facebook, recruitment notices were posted monthly to over 62 sites, including radio stations, media outlets, recovery groups, food pantries, schools, community pages, and resource sites. Visits to the page increased after reminder notices were posted on other Facebook sites. Families were able to privately contact the research team with any questions or comments. Community partners were able to follow the events of the research team. The page was developed and monitored by an undergraduate research assistant.

Participation for this study was voluntary by children's families accessing the survey directly or through the Facebook page. Younger participants required parental assistance to access the Internet and to read and answer required questions. Parental consent and participant assent was determined from an online question within the survey. The parent and participant had an option to choose "I agree," which required an answer. If the parent or participant did not click "I agree," the survey did not progress any further. If the parent or participant chose "I disagree," the survey ended at that point and did not allow any further information to be recorded.

### Measures

The NCTSN (2005) Hurricane Stressors Assessment Tool for Children and Adolescents consists of demographic questions and an assessment of hurricane-related experiences and inquiries about the children's feelings of well-being, and can assess mental health symptoms of post-traumatic stress. The survey was created for use after Hurricane Katrina in 2005 by the NCTSN, and although it

was specific for Hurricane Katrina experiences, the survey was revised for general use in 2009, and was used with permission for this research. There are 19 disaster-related experiences for the children/family to choose to categorize their personal experiences. In addition to disaster-related experiences, there are 20 items comprising a PTSD scale. The items are scored on a Likert scale with responses ranging from 0 "not at all" to 4 "very much." The higher the score, the higher the level of PTSD. There are two distinct subscales in this instrument, a 12-item depressive reactions, and an 8-item anxious reactions scale (Hansel, Osofsky, & Osofsky, 2015). Hansel et al., (2015) tested the psychometric properties of the instrument and found a strong internal consistency among scales. The PTSD scale (20 items) had a reliability score of 0.92, the depressive reactions subscale reliability was 0.89, and the anxious reactions subscale reliability was 0.83. The Cronbach's alpha for this study is 0.94.

### Procedure

This survey was inputted to an online platform for ease of dissemination, and the questions were not scored individually for a child's individual risk factor, but were compiled and analyzed for trends in aggregate data. There was no identifiable information gathered in the survey, and as the survey was electronically generated, there was no further link to the participant. The online survey link was accessible directly from the Internet or via the dedicated Facebook page.

### Data Analysis

Descriptive statistics were used to characterize participants' demographics and to summarize the study variables. In addition, bivariate correlational analyses were used to describe the relationship(s) among the variables. Results were aggregated from three age categories: preschool (0 to 5 years), child (6 to 11 years), and adolescents (12 to 17 years) as defined in the original NCTSN (2005) Hurricane Stressors Assessment Tool for Children and Adolescents. The Kruskal-Wallis Test was used to explore the differences among the three age groups represented in the study. The IBM Statistical Package for Social Sciences (SPSS) version 18 program was used for data analysis (New York, NY).

**Table 1.**  
Sample Characteristics

Characteristic	<i>n</i>	%
<b>Age</b>		
Preschool (0-5)	14	9
Child (6-11)	71	50
Adolescent (12-17)	56	39
<b>Sex</b>		
Female	86	61
Male	55	39
<b>Ethnicity</b>		
Caucasian	123	87
Black	5	3.5
Asian	4	2.8
Other	3	2.2
<b>County of Residence</b>		
Atlantic	1	0.7
Bergen	2	1.4
Cape May	1	0.7
Hudson	1.4	0.7
Monmouth	30	21.3
Ocean	101	71.6
Union	2	1.4
Other county in NJ	3	2.1

## Results

One hundred and forty-one ( $N = 141$ ) children participated in this study. The majority of the participants were girls ( $n = 86$ , 61%), Caucasian ( $n = 123$ , 87.2%), and between the ages of 6 and 11 ( $n = 70$ , 50%). The majority of respondents were from Ocean County, New Jersey, ( $n = 101$ , 71.6%), which was the hardest hit of all communities, and has mainland and barrier island residents (see Table 1) were used to determine if there was a significant relationship among the different study variables. Age was positively associated with finding it harder to concentrate and pay attention ( $r = 0.18$ ,  $p = 0.04$ ); feeling sad, down, or depressed ( $r = 0.17$ ,  $p < .05$ ); and being quiet and withdrawn ( $r = 0.16$ ,  $p = 0.05$ ); however, these correlations were relatively weak. Age also had a relatively weak to moderate statistically positive relationship with feeling irritable and grouchy ( $r = 0.26$ ,  $p < 0.05$ ), and finding it harder to complete schoolwork ( $r = 0.32$ ,  $p < 0.001$ ). Certain parental perceptions of their child's behavior

**Table 2.**  
Types of Experiences During and After Super Storm Sandy

Experience	<i>n</i>	%
Home damaged or destroyed	110	80
Evacuated with no time to prepare	32	23
Vehicle or major property loss	76	55
Other financial loss	74	53
Prolonged separation from family	22	16
Displaced from home at least one week	95	69

were negatively associated with the age of the child. Parents' views on whether their child was too clingy or worried about being separated ( $r = -0.22$ ,  $p < 0.01$ ) and having their child's play focused on the disaster ( $r = -0.27$ ,  $p < 0.01$ ) were negatively related to age.

A Kruskal-Wallis Test revealed a statistically significant difference in feeling irritable or grouchy across three different age groups (preschool, child, and adolescent) ( $[2, n = 141] = 11.9$ ,  $p < 0.01$ ). The adolescent group recorded a higher median score ( $Md = 79$ ) than the other two age groups. In addition, the adolescent group displayed a statistically significant difference in finding it harder to complete schoolwork when compared to the other two groups ( $[2, n = 141] = 13.2$ ,  $p < 0.001$ ). The adolescent group recorded a higher median score ( $Md = 80.4$ ).

## Discussion

The purpose of this study was to provide an initial analysis of stressors experienced and how they were manifested in affected children in New Jersey post-Super Storm Sandy. This inquiry used an online survey to gather data, and currently is the only assessment using the NCTSN (2005) Hurricane Stressors Assessment Tool for Children and Adolescents at this time.

### Hurricane-Related Experiences

The children in this study reported varied experiences after Super Storm Sandy, and results suggest that they were adversely affected by the natural disaster. Analysis indicates that children and adolescents were irritable, grouchy, sad, and depressed in the post-storm period, and reported difficulty completing schoolwork. Parents noted increased worrying and clinginess in their children and that their play was related to the disaster. Recovery in New Jersey has been slow

in some communities. This can have a negative impact on family structure and healing. This study was performed 15 to 20 months after the storm; 82.5% stated their home was damaged or destroyed, and at the time of assessment, 42% of participants still had homes that were under construction or torn down (see Table 2). Loss of one's home and school, where routines are typically established and provide a source of comfort to children, can have negative effects and contribute to maladaptive coping (Fothergill & Peek, 2006). Prolonged rebuilding efforts, and thus, prolonged return to previous routines can lead to a slower healing process.

### Age and Sex Differences

Infants, children, and adolescents have unique physiological and psychosocial needs during and after disasters (Veenema, 2012). Emerging cognitive development can be a factor in the preschooler's behaviors, as well as understanding and healing after a natural disaster. Parental observations about changes in preschoolers' behaviors were considerable; 35% ( $n = 7$ ) of parents reported complaints of children being more clingy or worried about separation in the months after the storm. Preschool children are extremely dependent on routine and can react to any disruption in their daily experiences (Berger, 2014; Veenema, 2012). These behaviors may not be as evident in older children, as was suggested in this study. Preschoolers can also manifest with an increased fear of storms, concern for others, and other signs of disaster experience in their play for up to one year after a hurricane (Saylor, Swenson, & Powell, 1992). Play is essential for healthy development, and during stressful events, play can be a vehicle for younger children to express their thoughts and feelings. This observation was significant in this current

study; parents acknowledged a change in play behaviors relative to this disaster ( $n = 5$ , 35%). One parent shared the experience about her preschooler, stating:

*We just returned home. Although the home is not finished, it is livable. My daughter is hypersensitive, depressed, and won't go into any room without myself or my husband. She goes hysterical if we leave her alone (i.e., just going to the bathroom).*

Adolescents were found to have the highest number of responses indicating stress-related alterations in control of emotions. During adolescence, the rate of clinical depression increases due to the combination of biological and psychosocial stressors during this mental and physical growth period (Zahn-Waxler, Shirtcliff, & Marceau, 2008). Results of this study indicate that adolescents experienced increased feelings of depression in the aftermath of the disaster, which was associated with feelings of sadness, anhedonia (inability to experience pleasure from activities), and anxiety, which is also reported more frequently in adolescents in this study.

Kar and Bastia (2006) identified differences in symptomatology after a natural disaster based upon each adolescent's sex. In their study, girls were noted to report guilt, and boys were more likely to have increased worry, anhedonia, and concentration and academic problems. Although not statistically significant, these sex differences were noted in this present study, in which adolescent males reported a higher level of feeling sad or depressed, as well as reporting increases in psychosomatic complaints, such as aches and pains 2.5 times more than females. Overall, a higher percentage of girls reported being upset, afraid, or sad when something makes them think about the disaster. Results were almost equal for teenagers worrying about something else bad happening to them or their family. Adolescents were shown to be more affected by the storm than the other two age cohorts, reporting the most symptoms or disruptions to their lives. This suggests that adolescents may be more cognizant of their experiences and those younger than 12 may not comprehend the gravity of the situation. Some adolescents reported they helped with the rescue

and recovery efforts within their neighborhood ( $n = 22$ , 30%). According to Veenema (2012), "adolescents may feel a strong need to make a contribution to the recovery effort and find meaningful ways to make a difference" (p. 69). As noted by significant community response by the adolescents in the immediate post-storm period, their direct involvement may have caused a more intense post-disaster stress reaction.

### **Anxiety**

Internalization of problems causes one to be fearful or withdrawn, and turning their distress inward. Emotions can be internalized with stomachaches or headaches (Berger, 2014), and can manifest with mood and anxiety disorders. Anxiety is a common theme noted after natural disasters and post-traumatic growth processes, and has been researched and confirmed extensively. Additional anecdotal comments from parents reflect that school-age children are more afraid of weather reports, rain, and anticipated flooding. Comments included: "Weather reports make our children feel uneasy" and "My son had nightmares and would always look up to the sky and wonder when the next storm was coming." Some parents indicated their children were receiving counseling, but there was a common theme of anxiety relative to the weather, flooding, and returning to neighborhoods in which there was mass devastation. Although not statistically significant, parents reported changes in their child's behavior or development (i.e., bedwetting, baby talk, fighting, or risk-taking behaviors). One mother of an adolescent stated: "My son went into a very bad depression after the storm. He developed migraines and also grades in school started to fall. He became very anxious and started cutting himself. He had to quit the wrestling team."

### **School Behaviors**

Classroom behaviors are noted to change when a child is experiencing post-traumatic stress reactions. Decline in academic achievement and concentration, and the ability to get schoolwork done are reported observations in prior research relative to other natural disasters. Similar to a past study by Shannon, Lonigan, Finch, and Taylor (1994), the reported incidence of having difficulty concentrating in school was also significant.

Disruption in routine and displacement from the family home can affect attentiveness in school as well as attendance (Dogana-Ates, 2010). Additionally, children who are displaced from their own school and relocated to others due to structural damages at the school are at risk for declining school performance. Disturbance of the students' normal school routine as well as altered instruction due to an influx of students in the schools that remained intact can have a negative impact on school accomplishments (Lamb, Gross, & Lewis, 2013). Over 69% ( $n = 95$ ) of our respondents acknowledged they were displaced from their home for one week or more, and 12% ( $n = 16$ ) stated the children had to change schools since the disaster.

### **Study Limitations**

There are several limitations to the study due to the limited number of respondents and underrepresentation in affected communities throughout New Jersey. A significant cohort of respondents was eliminated from data collection because they did not answer any of the standardized questions for children or parents. Survey responses could have been required for progression in the survey to assure survey completion, which is difficult in an uncontrolled online format. The focus of the survey was to poll the children in the nine disaster-declared counties in New Jersey, but results were obtained from other New Jersey counties and other eastern states, and the data were excluded.

Sampling occurred via an online survey, and exclusions occurred for respondents who did not have Internet access. The generalization of results was difficult because the demographics and events may be different from waterfront counties, which are over-represented in the study. There is the possibility of method bias because parents reported on behalf of younger children, while older children were able to complete the survey independently. This was an anonymous survey; thus, there can be no correlation to future studies and assessment of progression through the recovery process, and determination of post-traumatic stress growth. This study was focused on children, and therefore, we did not gather information about the parents' distress or coping abilities, which may have impacted their child's behavior.

## Implications for Future

Natural disasters can occur anywhere in the country, and families and communities are often ill prepared for the immediate and long-term effects on the family as a central unit. As healthcare providers, we must be aware of how the community is healing, and support both children and families through the recovery efforts. If children are doing well, it is likely their social support systems are intact, and if they are not doing well, it may be a sign that many systems are failing them (Abramson & Redlener, 2012). The stress associated with natural disasters can affect family relationships. Parental resources have been identified as being the most important to children and adolescents, and when parents' coping skills are diminished, the ability to support their children can also be reduced (McDermott & Cobham, 2012). Healthcare providers need to recognize and treat parental stress and assist them in finding healthy coping strategies so they, in turn, will be able to provide the stability needed by their children. School-related behaviors and research partnerships with schools need to be established as communities continue to recover.

The American Academy of Pediatrics (AAP) is one of the few professional organizations that acknowledges the need for children's concerns in disaster planning and advocacy, and has developed several initiatives to address systems related to disaster preparedness and educational resources for providers (AAP, n.d.; Peck, 2008). As families view their pediatric care provider as a trusted professional, it is imperative that pediatric care providers answer questions and concerns, provide guidance, and participate in pre- and post-disaster planning to ensure their clients' needs are being met with appropriate resources and referrals as needed (Committee on Pediatric Emergency Medicine, Committee on Medical Liability, & The Task Force on Terrorism, 2006).

Community re-development will encourage children and families moving through the processes of post-traumatic growth. Similar to past natural disasters of this scale, we are aware that after effects of the storm can linger for years. Identification of community, family, and individual stressors needs to incorporate a multidisciplinary approach, with identified community

resources and services for survivors. As stated by a parent of an adolescent:

*I think teenagers are now more empathetic, thinking of ways to help those affected by any disaster. [They are] more aware they can organize and accomplish more good deeds by joining with groups rather than just working on their own.*

Disaster research seems to occur in time correlates following the disaster, and several months to years after. There is limited longitudinal research in this domain to follow children through their developmental stages and into adulthood coping patterns. Vulnerability to natural environmental disasters is evident, and short-term preparation for long-term recovery and research is paramount. Further research into long-term sequelae of natural disasters is critical in understanding the magnitude of this type of catastrophe on children and their families. With ongoing research post-Hurricane Katrina and now with emerging research after Super Storm Sandy, behavioral differences and similarities across geographic regions must be evaluated together with identification of long-term recovery needs to plan interventions to assist those affected in the healing process. ■

## References

- Abramson, D., & Redlener, I. (2012). Children as bellwethers of recovery. In T.G. Veenema (Ed.), *Disaster nursing and emergency preparedness for chemical, biological, and radiological terrorism and other hazards* (3rd ed., pp. 580-582). New York, NY: Springer.
- American Academy of Pediatrics (AAP). (n.d.). *Children and disasters*. Retrieved from <http://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/Children-and-Disasters/Pages/About.aspx>
- American Psychological Association (APA). (2014). *Children and trauma*. Retrieved from <http://www.apa.org/pi/families/resources/children-trauma-update.aspx>
- Berger, K.S. (2014). *The developing person through the lifespan* (9th ed.). New York, NY: Worth.
- Blaze, J.T., & Shwalm, D.W. (2009). Resource loss and relocation: A follow-up study of adolescents two years after Hurricane Katrina. *Psychological Trauma: Theory, Research, Practice, and Policy*, 1, 312-322.
- Brown, B.B., & Perkins, D. (1992). Disruptions in place attachment. In I. Altman, & S. Low (Eds.), *Place attachment* (pp. 279-304). New York, NY: Plenum Press.
- Cassery, M., (2006) Double jeopardy: Public education in New Orleans. Before and after the storm. In C. Hartman & G.D. Squires (Eds.), *There's no such thing as a natural disaster: Race, class and Hurricane Katrina* (pp.197-214). New York, NY: Routledge.
- Committee on Pediatric Emergency Medicine, Committee on Medical Liability, & The Task Force on Terrorism. (2006). The pediatrician and disaster preparedness. *Pediatrics*, 117(2), 560-565.
- Dogan-Ates, A. (2010). Developmental differences in children's and adolescents' post-disaster reactions. *Issues in Mental Health Nursing*, 31, 470-476.
- Fothergill, A., & Peek, L. (2006). Surviving catastrophe: A study of children in Hurricane Katrina. In Natural Hazards Center (Ed.), *Learning from catastrophe: Quick response research in the wake of Hurricane Katrina* (pp.97-129). Boulder, CO: Institute of Behavioral Science, University of Colorado at Boulder.
- Galea, S., Brewin, C., Gruber, M., Jones, R., King, D., Ling, L., ... Kessler, R. (2007). Exposure to hurricane related stressors and mental illness after Hurricane Katrina. *Archives of General Psychology*, 64(12), 1427-1434.
- Hansel, T., Osofsky, I., & Osofsky, H. (2015). Louisiana State University Health Science Center Katrina-Inspired Disaster Screenings (KIDS): Psychometric testing of the National Child Traumatic Stress Network Hurricane Assessment and Referral Tool. *Child Youth Care Forum*, 44, 567-582.
- Hansel, T., Osofsky, J., Osofsky, H., & Friedrich, P. (2013). The effect of long term relocation on child and adolescent survivors of Hurricane Katrina. *Journal of Traumatic Stress*, 26(5), 613-620.
- Hoops-Halpin, S. (2013). *The impact of Super Storm Sandy on New Jersey towns and households*. Rutgers School of Public Affairs and Administration. Retrieved from <http://njdatabank.newark.rutgers.edu/special-sandy>
- Kar, N., & Bastia B.K. (2006). Post-traumatic stress disorder, depression and generalized anxiety disorder in adolescents after a natural disaster: A study of comorbidity. *Clinical Practice and Epidemiology in Mental Health*, 2(1), 17. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1563462/>
- Kronenberg, M., Hansel, T., Brennan, A., Osofsky, H., Osofsky, J., & Lawrason, B., (2010). Children of Katrina: Lessons learned about postdisaster symptoms and recovery patterns. *Child Development*, 81(4), 1241-1259.
- Lamb, J., Gross, S., & Lewis, M. (2013). The hurricane Katrina effect on mathematics achievement in Mississippi. *School Science and Mathematics*, 113(2), 80-93.
- LaGreca, A.M., Lai, B.S., Joormann, J., Auslander, B.B., & Short, M.A. (2013). Children's risk and resilience following a natural disaster: Genetic vulnerability, posttraumatic stress, and depression. *Journal of Affective Disorders*, 151(3), 860-867.
- Lazarus, P., Jimerson, S., & Brock, S. (n.d.). *Responding to natural disasters: Helping children and families: Information for*

- school crisis teams. Retrieved from [http://rems.ed.gov/docs/NASP\\_Natural Disaster\\_HelpChildrenFamilies.pdf](http://rems.ed.gov/docs/NASP_Natural_Disaster_HelpChildrenFamilies.pdf)
- McDermott, B.M., & Cobham, B.E. (2012). Family functioning in the aftermath of a natural disaster. *BMC Psychiatry, 12*(1), 55-61. doi:10.1186/1471-244X-12-55
- National Center for Disaster Preparedness. (2016). *Gulf Coast child and family health study*. Retrieved from <http://ncdp.columbia.edu/microsite-page/g-cafh/home>
- Norris, F.H., Friedman, M.J., Watson, P.J., Byrne, C.M., Diaz, E., & Kaniasty, K. (2002). 60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981-2001. *Psychiatry, 65*(3), 207-239.
- Orr, P. (2007). Art therapy with children after a disaster: A content analysis. *The Arts in Psychotherapy, 34*, 350-361.
- Pedersen, T. (2011). Children still show PTSD signs nearly 2 years after natural disaster. *PsychCentral*. Retrieved from <http://psychcentral.com/news/2011/01/17/children-still-show-ptsd-signs-nearly-2-years-after-natural-disaster/22704.html>
- Peck, G.Q. (2008). Disaster preparedness and pediatrics: What's next? *Pediatrics in Review, 29*(11), 371-373.
- Pina, A., Villalta, I., Ortiz, C., Gottschall, A., Costa, N., & Weems, C. (2008). Social support, discrimination, and coping as predictors of posttraumatic stress reactions in youth survivors of Hurricane Katrina. *Journal of Clinical Child & Adolescent Psychology, 37*(3), 564-574.
- Russoniello, C.V., Skalko, T.K., O'Brien, K., McGhee, S.A., Bingham-Alexander, D., & Beatley, J. (2002). Childhood posttraumatic stress disorder and efforts to cope after Hurricane Floyd. *Behavioral Medicine, 28*, 61-71.
- Saylor, C.F., Swenson, C.C., & Powell, P. (1992). Hurricane Hugo blows down the broccoli: Preschoolers' post-disaster play and adjustment. *Child Psychiatry & Human Development, 22*, 139-149.
- Schoenbaum, M., Butler, B., Kataoka, S., Norquist, G., Springgate, B., Sullivan, G., ... Wells, K. (2009). Promoting mental health recovery after hurricanes Katrina and Rita. *Archives in General Psychiatry, 66*(8), 906-914.
- Shannon, M., Lonigan, C., Finch, A., & Taylor, C. (1994). Children exposed to disaster: 1. Epidemiology of post-traumatic symptoms and symptom profiles. *Journal of the American Academy of Child and Adolescent Psychiatry, 33*, 80-93
- Silverman, W.K., & LaGreca, A.M., (2002). Children experiencing disasters: Definitions, reactions and predictors of outcomes. In A.M. LaGreca, W.K. Silverman, E.M. Vermberg, & M.C. Roberts (Eds.), *Helping children cope with disasters and terrorism* (pp. 11-34). Washington DC: American Psychological Association.
- Strickroth, T., (2012). *Oh that Facebook... Can social media be used for clinical trial recruitment?* BioMed 2.0. Retrieved from <http://biomed20.ucsf.edu/2012/05/22/oh-that-facebook-can-social-media-be-used-for-clinical-trial-recruitment>
- Swenson, C., Saylor, C., Powell, M., Stokes, S., Foster, K., & Belter, R. (1996). Impact of a natural disaster on preschool children: Adjustment 14 months after a hurricane. *American Journal of Orthopsychiatry, 66*(1), 122-130.
- Terranova, A., Boxer, P., & Morris, A.S., (2009). Factors influencing the course of posttraumatic stress following a natural disaster: Children's reactions to Hurricane Katrina. *Journal of Applied Developmental Psychology, 30*(3), 344-355.
- United States Geological Survey. (2014). *Coastal change hazards: Hurricanes and extreme storms – Hurricane Sandy*. Retrieved from <http://coastal.er.usgs.gov/hurricanes/sandy/index.php>
- Veenma, T. (2012). *Disaster nursing and emergency preparedness for chemical, biological, and radiological terrorism and other hazards*. New York, NY: Springer.
- Zahn-Waxler, C., Shirtcliff, E., & Marceau, K. (2008) Disorders of childhood and adolescence: Gender and psychopathology. *Annual Review of Clinical Psychology, 4*, 275-303.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.