

Evidence-Based Assessment in the Aftermath of Disasters: Towards a Best-Practice Model for Evaluating Hurricane-Exposed Youth

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*Julie B. Kaplow, PhD, ABPP
Christopher M. Layne, PhD
Benjamin Rolon-Arroyo, PhD*

In 2017 alone, multiple states and territories across the United States, including Texas, Puerto Rico, Florida, and the U.S. Virgin Islands, sustained direct hits from some of the strongest hurricanes on record, impacting millions of children and families. Unfortunately, these devastating events are all too commonplace. In recognition of the inevitability and frequency of natural disasters, the Institute of Medicine (2015) has proposed strategies for building healthy, resilient, and sustainable communities following disasters, including the implementation of community-level disaster impact assessments. Further awareness of the potentially traumatic nature of disasters, including their associated mental health consequences (e.g., posttraumatic stress reactions; Goenjian et al., 2005; Kronenberg et al., 2010; Lai, Lewis, Livings, La Greca, & Esnard, 2017; Pynoos et al., 1993), has led to calls to train health care providers in trauma-informed care, including trauma-informed risk screening and assessment (Courtois & Gold, 2009; Cook & Newman, 2014). Despite these calls to action, the child trauma field has yet to develop best practice models for efficient and effective risk screening and assessment of youth in the wake of natural disasters. The recent hurricanes and associated floods across the United States underscore the pressing need for guidelines that can assist providers and organizations who serve hurricane-exposed youth.

In this paper, we propose that *evidence-based assess-*

ment (EBA) principles and methods can serve as valuable tools for addressing this need, and offer suggestions for how to apply them to help disaster-exposed youth. EBA provides a rigorous yet practical way for clinicians to use assessment tools to guide such activities as risk screening, triage, case conceptualization, diagnosis, and treatment planning/monitoring. EBA carries promise for enhancing the efficiency, accuracy, and effectiveness of youth mental health services (Youngstrom, 2013), and researchers have recently applied EBA to traumatized and bereaved children and adolescents (Layne, Kaplow, & Youngstrom, 2017b). Although beyond the scope of this article, a number of researchers have described an evidence-based stepped-care model of post-disaster child and adolescent mental health services (e.g., Saltzman, Layne, Steinberg, Arslanagic, & Pynoos, 2003; for reviews, see Institute of Medicine, 2014; McDermott & Cobham, 2014).

Accordingly, the present paper has two primary aims. The first is to propose basic guidelines for applying EBA concepts, principles, and practices to the task of assessing youth in the aftermath of a hurricane. These guidelines draw upon multiple sources, including both empirical studies of hurricane exposure-related risk factors and consequences and our clinical experiences in conducting trauma-informed assessments and interventions with youth exposed to Hurricane Harvey, which struck Texas and Louisiana in August 2017. The second aim is to illustrate how EBA can improve both assessment efficiency (e.g., reserving in-depth assessment for decision-making points where it is most

useful and accurate) and effectiveness (using appropriately-designed tools to guide specific clinical decisions as they arise) when applied to settings that serve youth exposed to hurricanes and their aftermath (Layne et al., 2017b).

Using Evidence-Based Assessment Procedures in the Aftermath of a Hurricane

One of the greatest challenges associated with disasters is that planning for recovery must be conducted within a limited timeframe that is typically calculated in weeks and months. Making effective decisions in this tightly-compressed context requires coordinated, efficient information-gathering (Johnson & Olshansky, 2013) and the timely synthesis of findings in ways that are clearly comprehensible and clinically actionable. Professionals can use several types of information to support the incorporation of mental health considerations into the recovery process to improve outcomes after a disaster. Ideally, practitioners should identify valid and reliable sources and tools for each type of information in advance of a disaster as part of prior planning. EBA encourages the efficient selection of the best available assessment tools for the specific questions at hand, gathering the best available data using those tools, and judiciously applying assessment data to make informed decisions about individuals and their needs (Hunsley 2015; Hunsley & Mash, 2007).

In the next section, we present a four-stage model for utilizing EBA in post-disaster settings. Readers should view these stages as fluid (adaptable to individual settings) rather than strictly sequential, allowing practitioners and administrators to iterate the procedure as well as “backtrack” to prior steps as additional information becomes available (Layne et al., 2017b).

Overview

Drawing on prior work detailing the roles of situation analysis and needs assessment as complementary information-gathering procedures following war and disasters (Layne, Beck, Rimmasch, Southwick, Moreno, & Hobfoll, 2009), we propose that these types of information include:

1. Situation analysis, which focuses on collecting factual details of what occurred, including prevalence rates of exposure to specific risk types of factors (e.g., percentages of youth who were seriously injured, lost a pet, lost their home). Situation analysis also involves searching for and predicting “chain reaction” cascades of adversities resulting from the original exposure, which assume a life of their own as separate sources of stress (e.g., loss of home leading to forced displacement, change in school, loss of family income, financial strains) that extend beyond, exacerbate, and outlast the initial effects of disaster-related exposures per se.
2. Mental health needs assessment, which aims to address the causal consequences of exposure to risk factors (identified through situation analysis) with the aim of preventing and/or ameliorating longer-term distress and dysfunction. Mental health needs assessment focuses on gathering information regarding mental health problems (e.g., posttraumatic stress reactions, depression, grief reactions) theorized to arise from, or to have been exacerbated by, one’s specific exposure profile. Needs assessment can be conducted at the individual (e.g., through in-depth assessment, case formulation, and treatment planning) and/or group level (e.g., by identifying at-risk subgroups that share a common set of mental health needs based on their pattern of exposure/vulnerabilities), and can encompass a range of child caregiving systems (Masten & Obradovic, 2008).
3. In-depth ecological assessment of the recovery environment, including up-to-date information regarding potential vulnerability and protective factors, secondary adversities set in motion or exacerbated by initial risk factors, and trauma reminders (e.g., media coverage). Ecological assessment also includes surveillance, which can be viewed as an abbreviated, ongoing repetition and extension of the initial situation analysis. Surveillance involves a search for recurring or emerging causal risk factors and related threats to safety and well-being (e.g., supply shortages, disease outbreaks, unemployment, increases in domestic violence, scams, people moving back into condemned/unsafe housing) that can exacerbate, prolong, and extend beyond

the short-term effects of hurricane exposure alone.

4. Ongoing assessment of client well-being, including monitoring response over the course of intervention and assessing outcomes at follow-up.

Stage 1: Situation Analysis

Conducting a situation analysis in the aftermath of a hurricane requires a working knowledge of the various exposure-related risk factors that youth are likely to encounter, either during the storm or its aftermath. A number of studies have contributed to a growing evidence base regarding potent risk factors that may predispose youth to developing significant psychological distress, including posttraumatic stress symptoms (PTSS), after a hurricane (see Furr, Comer, Edmunds, & Kendall, 2010 for a meta-analytic review). Identified risk factors include:

- Experiencing the death of a loved one (including pets)
- Being injured or witnessing other people who are injured
- Extensive damage to home and/or belongings
- Being separated from a caregiver
- Being forced to evacuate with little time to prepare
- Requiring rescue by helicopter or boat
- Being trapped or having difficulty escaping
- Being displaced from home for a long period of time (e.g., living in a shelter)
- A history of other trauma(s) or losses
- Being forced to move to a new school
- Lack of social support
- Having a family member who served as a rescue worker
- Financial difficulties prior to or resulting from the storm
- Ongoing threats of recurring disasters

(Kronenberg et al., 2010; LaGreca, Silverman, Vernberg, & Prinstein, 1996; 2010; Martin, Felton, & Cole, 2016; McLaughlin et al., 2009; Overstreet & Mathews, 2011).

Although certain risk factors may be differentially more potent than others in their causal effects, pathways of influence, and the severity of their consequences (Layne et al., 2009), (for example, death of

a loved one is associated with the highest levels of distress; Breslau, Peterson, Poisson, Schultz, & Lucia, 2004), there is converging evidence across post-disaster studies of a general dose-response relation. In particular, as exposure to risk factors increases, emotional distress also tends to increase (Overstreet & Mathews, 2011). This finding underscores the value of risk screening (as part of initial situation analysis) for identifying youth who endorse a greater number of exposure-related risk factors and are consequently at greater risk for experiencing persisting mental health difficulties. Those youths with higher levels of exposure could be identified early on as potential recipients of a lower-tier intervention (e.g., a universal, skills-based intervention such as Skills for Psychological Recovery, Berkowitz et al., 2010; or the skills-building modules of multi-module interventions, Saltzman, Layne, Pynoos, Olafson, Kaplow, & Boat, 2018), implemented in schools or community centers as a means of preventing future posttraumatic stress or further exacerbation of symptoms.

Review of post-hurricane risk screening tools. To date, experts have developed few hurricane-specific measures designed to assess exposure-related risks. One of the most widely-used measures of hurricane-related risk exposure (e.g., Brown, Mellman, Alfano, Weems, 2011; Terranova, Boxer, & Morris, 2009; Weems et al., 2010) is the Hurricane-Related Traumatic Experiences Questionnaire (HURTE; Vernberg, La Greca, Silverman, & Prinstein, 1996). Clinical experience gained by interviewing children and adults following Hurricane Andrew in 1992, and inspection of a post-disaster supplement to the Diagnostic Interview Schedule, aided the development of this measure (Robins & Smith, 1993). The HURTE, which was recently updated with additional items and now referred to as the HURTE-II, is designed to be administered to school-age children and assesses exposure-related risk factors across four domains: Before the Hurricane (17 items), During the Hurricane (16 items), After the Hurricane (17 items), and Current Functioning (4 items). Research findings support the reliability and predictive validity of the original HURTE for assessing children's hurricane-related exposure and associated stressors (La Greca, Silverman, & Wasserstein, 1998; Weems et al., 2010; Yelland et al., 2010). Research regarding the HURTE-II's psychometric properties is currently underway (La

Greca, personal communication, January 8, 2018).

The National Child Traumatic Stress Network (NCTSN) Hurricane Assessment and Referral Tool for Children and Adolescents was created to assess both hurricane-related exposure and associated symptoms of PTSD and depression (Hansel, Osofsky, & Osofsky, 2015), thereby collecting information relevant to both situation analysis and mental health needs assessment. Caregivers and/or children/adolescents can complete this measure, although younger school-aged children may need assistance in completing the measure (Kronenberg et al., 2010). Regarding hurricane-related exposure, this measure assesses demographic information, 18 hurricane-related exposure items, as well as six items assessing for a history of psychological/psychiatric problems and treatment. Experts have not formally evaluated the hurricane-related exposure section of the measure. This measure also includes a section designed to assess a total of 22 symptoms of PTSD (derived from the UCLA PTSD Reaction Index; Steinberg, Brymer, Decker, & Pynoos, 2004) and depression, and seven additional parent-report symptoms for young children.

Researchers have created a number of adaptations to the NCTSN Disaster Assessment and Referral Tool for Children and Adolescents to meet the needs of different settings and populations. For example, an adaptation by Osofsky and colleagues (Kronenberg et al., 2010), simplified the language of the measure to make it easier for school-aged students ($Mage = 14.27$ years, $SD = 2.13$) to complete. The resulting measure, the Child/Youth Assessment & Referral Tool, is typically administered via interview format and assesses demographic information, 18 exposure risk categories, 15 symptoms of PTSD and depression, and five additional parent-report symptoms for young children.

The Louisiana State Health Sciences Center Katrina Inspired Disaster Screenings (LSUHSC-KIDS; Hansel et al., 2015) was developed for 9-18 year olds ($Mage = 14.14$, $SD = 2.41$). Designed to be administered to students in a group format, the measure assesses hurricane-related exposure via nine items based on several existing hurricane exposure measures (Kronenberg et al., 2010, NCTSN, 2005; La Greca, Vernberg, & Prinstein, 1996). This measure also assesses PTSS and

depressive symptoms. An exploratory factor analysis of the 22-symptom portion revealed a two-factor solution comprised of anxious and depressive reactions (Hansel et al., 2015).

Experts adapted the Hurricane Exposure Questionnaire for Caretakers and Youth (aged 11 to 17 years) from adult measures of hurricane-related exposure (Bravo, Rubio-Stipec, Canino, Woodbury, & Ribera, 1990; Norris & Kaniasty, 1992) as well as the HURTE (La Greca et al., 1996). Items assess the child and family's exposure to the hurricane, perceived safety, loss or damage to their home, life threat/loss (i.e., physical injury to the child or a significant other, loss of a family member or a person close to them), loss of material objects, and child's disruption of everyday life (i.e., separation from family, still living out of home at time of interview). Practitioners have used this measure in multiple studies to examine risk factors associated with hurricane-related exposure (Felix et al., 2011; Felix, Kaniasty, You, & Canino, 2016; Felix, You, Vernberg, & Canino, 2013; Rubens, Vernberg, Felix, & Canino, 2013); however, researchers have not yet conducted a formal psychometric study.

As previously discussed, one of the greatest challenges in conducting a situation analysis in the aftermath of a disaster is the need for both rapid and efficient information-gathering. Post-disaster settings that provide the greatest access to youth, such as schools or hospitals, require developmentally- and culturally-informed self-report tools that children or adolescents can complete quickly and easily by themselves with minimal assistance from teachers or healthcare providers. In addition, a number of existing hurricane-related exposure tools include mental health variables (e.g., PTSS) that can lead to increases in "false positives" in the more immediate aftermath, given that most children demonstrate expectable short-term increases in psychological distress following natural disasters. For example, La Greca and colleagues (1996) found that 29% of youth exposed to Katrina ($n = 442$) exhibited "severe" or "very severe" PTSS within the first 3 months of the storm; in contrast, only 12% exhibited severe or very severe symptoms 10 months post-Katrina. Thus, although PTSD can be diagnosed as early as 1 month post-event, practitioners may need additional time to discriminate between individuals with

more protracted recovery trajectories versus youth at risk for severe persisting distress, functional impairment, and developmental disruption, who stand in need of specialized intervention (Layne et al., 2009).

To address these issues, our Harvey Resiliency and Recovery Program at Texas Children's Hospital created the Hurricane Exposure, Adversity and Recovery Tool (HEART), adapted from the NCTSN Assessment and Referral Tool for Children and Adolescents. The HEART was created explicitly for the purpose of conducting a post-hurricane situation analysis among Houston youth between the ages of 8 and 18 in both medical (including emergency departments, mobile units, outpatient pediatric practices, etc.) and school-based settings. The child self-report version of the HEART consists of 29 yes/no questions pertaining to potential exposure-related risk factors, accompanied by a question inquiring about their desire for mental health support. We also created a parent-report version (available in both English and Spanish). To date, the HEART has been administered to 50 hurricane-exposed children/adolescents and shows excellent acceptability (children report that they understand the questions) and feasibility (children and caregivers are able to complete the measure independently within 5 minutes or less). Studies regarding the HEART's psychometric properties and clinical utility are underway.

Stage 2: Mental Health Needs Assessment

In most post-hurricane situations, referral questions typically center not only on hurricane-related exposures among children and adolescents (an integral part of situation analysis), but also their range of distress reactions to those events (Layne et al., 2009) in the form of a mental health needs assessment. A mental health needs assessment focuses on the expected causal consequences of those exposures—in particular, on the range of youths' distress reactions, life disruptions, and associated mental health needs, including the specific interventions that may be indicated. These may include "Tier 1" general/supportive interventions, "Tier 2" locally-delivered therapeutic treatments for clinically significant problems (e.g., specialized school-based mental health services), "Tier 3" intensive psychiatric treatment, or some combination thereof. (See

Saltzman et al., 2018, for an example of a three-tiered school/community-based intervention).

Conducting an evidence-based mental health needs assessment in the aftermath of a hurricane requires that one first consider the most common referral questions and diagnostic issues that exposed youth are likely to manifest. Based on studies of youth exposed to Hurricane Katrina (e.g., Kronenberg et al., 2010), as well as a recent review of post-disaster symptom trajectories in youth (Lai et al., 2017), PTSS are commonly identified after a natural disaster, with some estimates of up to 70% among youth in the immediate aftermath (Küçüköğlü, Yıldırım, & Dursun, 2015). Besides PTSS, other commonly reported mental health issues among youth post-disaster (natural or man-made) include depressive symptoms and maladaptive grief reactions (Claycomb et al., 2016; Lai, La Greca, Auslanders, & Short, 2013; Layne et al., 2001; 2008). It is important to note that not all youth who demonstrate elevated PTSS, depression, or grief within the first 3 to 6 months of the disaster will go on to exhibit persistent symptoms over time. Consequently, stratifying children based on early symptom levels may lead to misclassification errors, such as the referral of "false positive" children (who will recover naturally) to costly intensive services they do not need (Lai et al., 2017). Thus, multiple competing concerns should guide the decision as to when to commence risk-screening. If resources permit, early (between 1 to 3 months post-disaster) brief screening may be useful in identifying youth at high risk for significant distress and functional impairment, for whom timely intervention might prevent developmental disruption (e.g., distress leading to academic problems, school drop-out) or risky behavior (substance use, affiliation with deviant peers). Given the potential risk, however, of over-selection and over-referral, such second-tier interventions could involve general supportive skill-building delivered in classroom settings (e.g., coping skills delivered by a trained counselor; Layne et al., 2008) that carries both low cost and low risk for iatrogenic effects.

Those youth who do exhibit chronically elevated PTSS have often been exposed to a combination of both hurricane-related risk factors and pre-existing environmental and relational risk factors (which exacerbate the adverse effects of hurricane exposure; Kronenberg

et al., 2010; Lai et al., 2017). For example, the majority of youth treated for PTSD in the longer-term aftermath of Katrina had experienced other traumas and losses prior to the hurricane (Jaycox et al., 2010). The most common potentially traumatic event reported was “death or serious injury of a loved one” prior to the hurricane, as endorsed by 70% of the sample. This finding underscores the need for assessment tools that encompass a range of potentially traumatic life events endemic to the affected region (e.g., bereavement), as well as common psychological responses to those events (e.g., PTSS, grief reactions; Layne, Kaplow, Oosterhoff, Hill, & Pynoos, 2017a). Elevated prevalence rates of trauma and bereavement reported by underserved populations (who are often hardest hit by hurricane-related adversities) call for the systematic assessment of both trauma exposure/PTSS and bereavement/maladaptive grief (e.g., Layne, Kaplow, & Pynoos, 2014) as common consequences (Breslau et al., 2004; Courtois & Gold, 2009; Kaplow, Saunders, Angold, & Costello, 2010).

A related evidence-based practice involves reviewing assessment tools and protocols to ensure that candidate tools are valid and useful for assessing the most prevalent and common diagnostic conditions in the targeted setting (see Layne et al., 2017b for a review of commonly used measures for Acute Stress Disorder, PTSD, and PCBD in youth). One strategy for locating specialized measures for traumatized or bereaved youth is to review the [Measures Review Database compiled by the National Child Traumatic Stress Network](#). This no-cost service describes measures of potentially traumatic events (including bereavement), PTSS, grief, and associated reactions; summarizes test reliability and validity data; and includes details for obtaining each measure.

When conducting an evidence-based needs assessment, it is also helpful to consider common differential diagnoses or potential comorbid diagnoses. Keeping a list of the most common conditions and comorbidities can help to prevent clinicians from missing diagnoses or underestimating co-occurring psychological problems (Jensen-Doss, Youngstrom, Youngstrom, Feeny, & Findling, 2014; Rettew, Lynch, Achenbach, Dumenci, & Ivanova, 2009). Studies of youth post-disaster have found high comorbidity of PTSS and depressive

symptoms (Fan, Zhang, Yang, Mo, & Liu, 2011; Lai et al., 2013). However, PTSS can often be masked by other co-occurring psychological or behavioral difficulties (Layne et al., 2017b). For example, although PTSS can appear as a comorbid condition with ADHD (Cuffe, McCullough, & Pumariega, 1994; Weinstein, Staffelbach, & Biaggio, 2000), and PTSS and dissociative symptoms both predict future attention problems in children (Kaplow, Hall, Koenen, Dodge, & Amarya-Jackson, 2008), PTSS can often be misdiagnosed as ADHD. This diagnostic conflation between ADHD and PTSS may arise from the inherent difficulty in distinguishing between behavioral manifestations of (a) hyperactivity versus hyperarousal, (b) inattention versus avoidance or dissociation, and (c) fidgetiness versus reexperiencing symptoms. The close overlap between these dual sets of symptoms underscores the need to carefully assess whether the onset of possible ADHD symptoms temporally corresponds with the occurrence of the hurricane and/or other potentially traumatic events as precipitating causal risk factors. In such cases, practitioners should evaluate the hypotheses that (1) ADHD is comorbid with and potentially masking underlying PTSD, or, alternatively, (2) ADHD-like symptoms reflect the presence of PTSD and are not actually ADHD, as alternative explanations compared to an ADHD diagnosis alone (Layne et al., 2017b).

In our experience with treating youth in the aftermath of Hurricane Harvey, it is clear that PTSS and grief reactions often co-occur. Symptom presentations may emanate from temporally- and causally-disconnected events, such as PTSS (e.g., hyperarousal) evoked by hurricane exposure that co-occurs with grief reactions (e.g., yearning for the deceased) to a prior death. Alternatively, PTSS and grief reactions may co-occur because they each emanate from the same event (traumatic bereavement; e.g., being killed by natural disaster, murder, suicide) (Layne et al., 2017a). The ensuing interplay between PTSS and grief reactions can powerfully influence the nature and course of children’s adjustment (Kaplow, Layne, Pynoos, Cohen, & Lieberman, 2012; Kaplow, Layne, Saltzman, Cozza, & Pynoos, 2013; Layne et al., 2001, 2008; Pynoos, 1992). Although in its early stages, the current literature points to the importance of distinguishing between PTSS and grief reactions, given that the two constructs

may have different configurations of causal risk factors, vulnerability factors, protective factors, and sequelae (Layne et al., 2017a; 2017b). Further, evidence that PTS reactions and grief reactions exhibit different treatment response trajectories (e.g., PTS reactions recede significantly more during trauma-focused work than grief reactions) suggests the need for different treatment components (Grassetti et al., 2015). Clinicians' ability to formulate effective treatment plans for traumatized and bereaved youth may thus depend on their ability to accurately assess and discriminate between PTSS versus grief reactions.

Stage 3: In-Depth Ecological Assessment

After evaluating exposure to hurricane-related risk factors and other potentially traumatic events (e.g., bereavement), and commonly observed reactions to these events, clinicians can move toward a systematic in-depth ecological assessment for clinical impairment. By definition, trauma- and stressor-related disorders such as PTSD and Persistent Complex Bereavement Disorder (PCBD) have their primary causal origins located outside the individual (i.e., trauma exposure is the primary causal risk factor for PTSD; bereavement is the primary causal risk factor for PCBD)—within their surrounding ecologies. This basic distinction regarding the primary locus of causation sets these disorders apart from heavily biologically-determined psychiatric disorders such as bipolar disorder and schizophrenia (Layne et al., 2017b) and underscores the need for a thorough ecological assessment that searches for contextual factors theorized to play influential roles in causing, maintaining, worsening, or alleviating clinically significant distress, functional impairment, and risky behavior (Layne et al., 2006; Layne, Steinberg, & Steinberg, 2014). These contextual factors include:

- (a) Direct-effect causal contributors to adjustment, including harmful causal risk factors (e.g., life threat, physical injury, bereavement, loss of home); and beneficial promotive factors (e.g., healthy attachment relationships, positive family connectedness; well-resourced schools).
- (b) Interactive-effect moderator variables, including vulnerability factors and protective factors:

- Vulnerability factors interact with the causal risk factor to exacerbate its harmful effects on a negative outcome. For example, poor social support (vulnerability factor) after witnessing the injury of a loved one (causal risk factor) can lead to a worsening in PTSS (a negative or undesirable outcome).
- Vulnerability factors can also interact with the causal risk factor to intensify its negative effects on a positive outcome. For example, being forced to enroll in a new school where a child has no friends and feels alienated (a vulnerability factor) can exacerbate the effects of extensive damage to one's home (a risk factor), leading to a diminishment in a child's self-esteem (a positive or desirable outcome).
- In contrast, protective factors interact with the causal risk factor to buffer or mitigate its effects on a negative outcome. For example, a child's use of effective coping strategies such as emotional expression and seeking social support (both protective factors) can mitigate the harmful effects of being trapped in her home during a flood (a causal risk factor) in ways that diminish PTSS (a negative outcome).
- Protective factors can also interact with the causal risk factor to diminish its harmful effects on a positive outcome—for example, positive parent-child communication (a protective factor) regarding the death of a loved one (a causal risk factor) can preserve a child's ability to grieve in comforting, adaptive ways (a positive outcome).

(c) Mediator variables (including trauma reminders, loss reminders, and secondary adversities) are intervening links in causal chains that transmit the prior effects of causal factors (e.g., trauma, bereavement) to subsequent outcomes (e.g., PTSD, PCBD). For example, the loss of one's home during a hurricane can lead to "chain reaction" cascades of subsequent adversities, such as displacement → starting a new school → drop in school grades. Mediators can thus maintain, prolong, and even worsen distress over time (Kaplow et al., 2012; Kaplow & Layne, 2014). Mediator variables can also be conceptualized in the form of pernicious developmental cascades (Masten & Cichetti, 2010). For example, trauma exposure in an earlier developmental period (e.g., physical abuse in childhood) can lead to

proximal distress (e.g., PTS reactions) and problems in functioning (e.g., behavior problems at school) within that same developmental period. These childhood school-related problems can act as mediators by cascading forward into subsequent developmental periods (e.g., affiliation with deviant peers in middle adolescence) that carry their own risks (e.g., school dropout, risky behavior such as drug and alcohol use). In turn, these accumulating problems increase one's vulnerability to the effects of subsequent stressors (e.g., hurricane exposure), exacerbating their harmful effects and setting the stage for further developmental disruption (e.g., school dropout, criminal activity in older adolescence) (Layne et al., 2017a). These findings underscore the need to assess for both current and prior trauma exposure, as well as co-occurring psychological and behavioral problems, to create opportunities for early intervention (Layne et al., 2014a).

Evidence of differential relations between theorized causal risk factors and their consequences further illustrates the need for conceptual clarity and measurement precision when assessing the ecologies that surround traumatized and bereaved youth. For example, studies of youth post-disaster have found that unlike the dose-response pattern that consistently emerges for PTSS, neither level of disaster exposure nor proximity to the disaster are consistently associated with depressive symptoms (Kronenberg et al., 2010). Such findings point to the conclusion that disaster-related causal risk factors and their primary consequences (e.g., PTSD, PCBD, depression) are not functionally interchangeable. More specifically, simple summative scoring (i.e., creating a sum of different types of exposure-related risk factors, where a higher total score denotes greater risk), although potentially helpful in initial risk screening, loses theoretically informative and clinically actionable information when applied to needs assessment—that is, in identifying the causal consequences of such exposures and associated needs and targets for intervention. Summative scoring across exposure types during needs assessment can thus impede efforts to identify who is at risk for what, through what causal pathways, and to identify targets for early intervention to prevent cascading effects (Layne et al., 2014c). Summative scoring can thus lead to the erroneous and inefficient conclusion that everyone is at risk for every problematic outcome, and thus every-

one requires every mental health service (i.e., indiscriminately prescribing all treatment components) to prevent or reduce those outcomes (Layne et al., 2009).

Compared to Stage 2 assessment, Stage 3 ecological assessment uses more rigorous and comprehensive tools, including semi-structured or structured diagnostic interviews that focus not only on PTSS and related psychological and behavioral conditions, but also environmental vulnerability and protective factors (Sheehan et al., 1998). The reliability of these methods is substantially higher than unstructured interviews (Garb, 1998), increasing the accuracy of diagnosis, case conceptualization, and treatment planning. Semi-structured interviews carry the added value of offering the clinician greater flexibility in addressing pre-existing developmental (Kaplow et al., 2012; Kaplow & Layne, 2014) and cultural factors (Contractor et al., 2015) that can influence the specific ways in which post-disaster posttraumatic stress or grief reactions manifest in children and adolescents (Nader & Layne, 2009). In this stage of evaluation, diagnostic interviews and self-report checklists (utilized in Stage 2) complement one another in guiding and informing clinical diagnosis and treatment planning.

Throughout the process of treatment planning, EBA also calls for the integration of idiographic (client-centered or client-nominated) information, such as asking clients to identify their highest priority or “top” problems, with nomothetic (norm-referenced) information as gathered using standardized tests (Layne et al., 2017b). This integrative approach captures the complementary strengths of both methods, including client engagement and making treatment outcomes transparent and relevant to children and adolescents (Weisz et al., 2011). Being sensitive to clients' values is especially relevant to the assessment of traumatized and/or bereaved youth for whom developmental factors, culture, and personal life experiences may markedly influence how they exhibit distress, impairment, and/or adaptation (Kaplow et al., 2012). Clients' beliefs about the causes of their distress reactions, as well as how to best address them, also vary widely, can change over time, and can influence their willingness to engage in assessment and treatment. For example, in the more immediate aftermath of disaster, children may be focused primarily on the acquisition of basic

needs (e.g., finding a new permanent home), but may later be concerned with reducing distress in response to trauma reminders (e.g., experiencing panic when faced with stormy weather). When patient beliefs align with clinicians' line of questioning and use of assessment tools, the chances of rapport building, treatment adherence, and treatment success markedly improve (Yeh et al., 2005). This information, gathered through Stage 3 Ecological Assessment, can be shared (with permission) with other providers and those working closely with the children (e.g., school counselors, case managers), thereby streamlining the acquisition and use of information while avoiding repetition.

Stage 4: Surveillance and Treatment Monitoring

If Stage 3 in-depth ecological assessment identifies the need for treatment, then the goal of assessment shifts to measuring and monitoring therapeutic process and progress (Youngstrom & Frazier, 2013). Process measures can include tracking whether the patient completes homework assignments, such as keeping track of trauma reminders, associated reactions, and consequences. Technology, such as text-messaging, now makes it easier to automatically schedule client reminders for activities and to track completion rates. A variety of brief progress measures are also available that are sensitive to change, allowing clinicians to monitor therapeutic progress (e.g., Wells, Burlingame, Lambert, Hoag, & Hope, 1996; see Beidas et al., 2015, for a review of no-cost measures). Session-by-session progress measures, even though brief, can significantly improve outcomes and provide a valuable cue to revisit treatment planning if the client is not making expected gains. Once clients have reached their goals, termination planning can incorporate monitoring strategies that can trigger a booster session or return to treatment (Lambert, 2010). Identifying disaster-related anniversaries, bereavement anniversaries, developmental milestones, or other reminder-laden situations ahead

of time, and developing proactive plans for how to manage them, improves the prospect for maintaining treatment gains (Saltzman et al., 2018).

Conclusions

Unfortunately, experts expect natural disasters, including hurricanes, to increase in intensity and frequency in the foreseeable future (U.S. Global Change Research Program, 2016), and these events can adversely impact significant numbers of children and adolescents worldwide (UNISDR, 2015). A growing body of research is shedding light on how youth typically respond to hurricanes and on factors that can exacerbate or mitigate their effects. EBA principles have the capacity to inform all stages of evaluation necessary in the aftermath of disaster, including risk screening/situation analysis, mental health needs assessment, in-depth ecological assessment, and treatment planning/monitoring (Layne et al., 2009; Youngstrom, 2013). EBA also provides rigorous yet practical strategies to guide the assessment of hurricane-exposed youth in ways that can improve the effectiveness (maximizing the likelihood of successful outcomes), efficiency (matching individuals to the types of services they need), and coherence (adding clarity to assessment tool selection, case formulation, and intervention planning) of mental health intervention efforts. EBA can also assist with the coordination of other services across the post-disaster recovery landscape by providing necessary information (e.g., situation analysis, mental health needs assessment) to other providers, school personnel, and case managers working with hurricane-affected youth. It is our hope that the use of EBA in the aftermath of Hurricane Harvey, and the lessons we continue to learn from its implementation, will help to lay the foundation for future recovery efforts in the years to come.

About the Authors

Julie Kaplow, PhD, ABPP, is Associate Professor, Department of Pediatrics, Baylor College of Medicine; Director of the Trauma and Grief Center; and Director of the Harvey Resiliency and Recovery Program, Texas Children's Hospital. She oversees assessment, treatment, and research with traumatized and bereaved youth and disseminates trauma- and grief-informed best practices.

Christopher M. Layne, PhD, is Director of Education in Evidence-Based Practice at the UCLA/Duke University National Center for Child Traumatic Stress, and Research Psychologist in the Department of Psychiatry and Biobehavioral Sciences at UCLA. His interests include applying principles of evidence-based assessment and developmental psychopathology to trauma-exposed and bereaved youth.

Benjamin Rolon-Arroyo, PhD, is a second-year Postdoctoral Fellow at the Trauma and Grief Center at Baylor College of Medicine/Texas Children's Hospital. He received his doctorate in Clinical Psychology from the University of Massachusetts—Amherst. His research interests focus on the development of disruptive behavior disorders and the impact of traumatic stress.

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