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YOUNG SURVIVORS OF DISASTER: A META-ANALYTIC REVIEW OF MENTAL HEALTH INTERVENTIONS FOR CHILDREN AND THEIR FAMILIES

Theressa L. LaBarrie

DePaul University, tlabarri@depaul.edu

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YOUNG SURVIVORS OF DISASTER:
A META-ANALYTIC REVIEW OF
MENTAL HEALTH INTERVENTIONS
FOR CHILDREN AND THEIR FAMILIES

A Dissertation
Presented in
Partial Fulfillment of the
Requirements for the Degree of
Doctor of Philosophy in Clinical Psychology

BY
THERESSA L. LABARRIE
2016

Department of Psychology
College of Health and Science
DePaul University
DISSEMINATION COMMITTEE

Kathryn E. Grant, Ph.D.
Chairperson

Jocelyn Carter, Ph.D.
Gerald P. Koocher, Ph.D.
Cecilia Martinez-Torteya, Ph.D.
Alexandra Novakovic, Ph.D.
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I am truly blessed to have such wonderful family and friends who have been there along the way. My grandparents played an instrumental role in sculpting who I am today. Their kindness and unyielding love will never be forgotten. One of my greatest successes in this life is having made my grandparents proud. May my work be in tribute to them:

LeRoy T. LaBarrie (1940-2012)
Eleanor M. Zappa (1937-2013)
Margaret L. Piskin (1925-2014)

We all need protective factors in this world. My grandfather, LeRoy T. LaBarrie, was exactly that for me. He was one of the most generous,
compassionate, and dignified individuals I have had the honor of holding dear. Those fortunate to have known him and our connection know well that we would (and did) go to the ends of the earth for each other. My success is largely due to his gentle and patient support and guidance, combined with my determination to achieve, bestow pride, and memorialize his name.

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VITA

Theressa L. LaBarrie was born in Freehold, New Jersey, September 1, 1983 to Patty Lee LaBarrie (1965-1985). Theressa graduated from the Academy of Allied Health and Science (Neptune, NJ) in 2002 and received her Bachelor of Arts degree from the College of Saint Elizabeth in 2006, with a double major in Psychology and Sociology with a Social Work Sequence (Morristown, NJ). Her graduate school career includes two Master of Arts degrees: Psychology and Education from Teachers College, Columbia University (New York, NY) in 2008 and Clinical Psychology, Child Track, from DePaul University (Chicago, IL) in 2013. Theressa completed her pre-doctoral internship at Boston Children’s Hospital, Harvard Medical School in 2016.
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ABSTRACT

Disasters, both natural and human-made, are on the rise. While disasters affect everyone, the most vulnerable populations are often hardest hit. Our nation’s youth are among the most vulnerable, suffering the most severe psychological repercussions. This is a population in need of empirically supported post-disaster mental health interventions. However, the research on mental health treatments for post-disaster trauma treatment among youth is still in its developmental stages. There is no known synthesis of treatment interventions for youth and their families, even though there is clear evidence that this population is among the most vulnerable to the effects of disaster exposure. Following multiple large-scale disasters, such as September 11, 2001 and Hurricane Katrina, there has been a growth in post-disaster intervention research. This new research may better inform the effectiveness of interventions with youth.

The current meta-analytic review is the first to investigate the effectiveness of mental health interventions for children, adolescents, and their families following disaster. This review found that psychological outcomes from 24 intervention studies indicate that children and adolescents receiving post-disaster mental health interventions fared significantly better than those in control or waitlist groups, with respect to anxiety, PTSD, and depression symptoms. Review findings also provide a reference that can inform key stakeholders and impact future research, practice, and policy.
INTRODUCTION

Disasters impact millions of children annually and can take on a plethora of forms, including natural disasters, such as hurricanes, tornadoes, tsunamis, and floods, along with human-made disasters of armed conflict, school shootings, and terrorism. Trend analyses reveal disasters are on the rise. The International Federation of the Red Cross and Red Crescent Societies (IFRC) has provided critical statistical evidence revealing the number of natural disasters reported over the last 40 years has increased nearly 400 percent (2012). Congruently, epidemiology research on disaster trends identified three times as many natural disasters between 2000 and 2009 in comparison to earlier time periods, with a vast majority (80 percent) of this growth due to climate-related events (Leaning & Guha-Sapir, 2013). The frequency of human-made disasters has also increased exponentially during the 20th century. This is partly due to industrial means and new technologies, along with increased advances in small arms technology and accessibility of lethal weapons (Coleman, 2006; Leaning & Guha-Sapir, 2013).

Disasters are defined as potentially traumatic, natural or human-made, events that have an acute onset, are collectively experienced, and sometimes result in catastrophic levels of destruction (McFarlane & Norris, 2006). They confront every society, can seriously overwhelm and disrupt the functioning of entire communities, and collectively impact as many as 160 million individuals worldwide annually (IFRC, 2012). It is predicted that natural disasters will become more frequent and severe because of climate change, while deadly attacks against civilian populations will also continue. These events affect the mortality,
morbidity, and well-being of all populations (Leaning & Guha-Sapir, 2013). While disasters are devastating for all who experience them, exposure to and the pervasive impact of disasters are often disproportionate among the most vulnerable; most significantly children.

Given the adverse impacts of disasters on youth, associations devoted to the needs of youth have developed task forces and guidelines (e.g., American Academy of Pediatrics, 1995; Levant, 2002; National Child Traumatic Stress Network, 2012; Vogel & Vernberg, 1993), placing the empirical understanding of children’s needs after disasters at the forefront of their agendas. As a result, governmental agencies and private foundations provide substantial resources for child services following disasters. To optimally inform the distribution of resources and target mental health intervention efforts, there is a need to synthesize current information on the effectiveness of post-disaster interventions with children and adolescents.

**Vulnerable Populations**

Vulnerability can be defined as a person’s “reduced capacity to anticipate, cope with, resist, and recover from the impact of a…hazard” (Blaikie, Cannon, Davis, & Wisner, 1994, p. 9). Research reveals that increased vulnerability is associated with factors such as age, gender, social class, and race/ethnicity (see for example Aptekar & Boore, 1990; Barnes, Treiber, & Ludwig, 2005; Peacock, Morrow, & Gladwin, 1997). The focus of the present review is on children and adolescents.
Children are the most vulnerable population in the event of a disaster, largely due to their ultimate dependence on others for livelihood, decision-making, and emotional support (Fendya, 2006; Hagan, 2005; Hoffman, 2009). Children require special attention and procedures during disasters, and they are often identified as a population that should be prioritized during relief efforts. The negative impact of disaster has also been found to linger much longer in children than adults (Hoven, Duarte, Turner, & Mandell, 2009). Epidemiological investigations provide strong evidence that disaster-related traumatic events experienced in childhood could pose significant adverse psychopathological consequences (Hoven et al., 2005; La Greca, Silverman, Vernberg, & Prinstein, 1996; Lonigan, Shannon, Finch, Daugherty, & Taylor, 1991). In light of this, it is of no surprise that previous research has connected such diverse phenomena as hurricanes, earthquakes, floods, tsunamis, brushfires, terrorist attacks, mass transportation disasters, and nuclear waste accidents to elevated rates of psychopathology and impairment in children and adolescents (e.g., Hoven et al., 2005; La Greca et al., 1996; La Greca, Silverman, Vernberg, & Roberts, 2002; March, Amaya-Jackson, Terry, & Costanzo, 1997; Pynoos et al., 1993).

Disasters can be considered indiscriminate acts that impact communities at random, acting as status levelers that impact people from all walks of life regardless of social status (Fritz, 1961). While disasters threaten everyone in their path, they do not affect all members of society equally. Specifically, individuals with low socioeconomic status (SES) are at a heightened risk for trauma exposure during disasters (Hawkins, Zinzow, Amstadter, Danielson, & Ruggiero, 2009),
suffering the greatest losses and having the most limited access to recovery supports (Fothergill, Maestas, & Darlington, 1999; Jones, Frary, Cunningham, Weddle, & Kaiser, 2001; Peacock et al., 1997; Perilla, Norris, & Lavizzo, 2002).

These populations are also more vulnerable to negative disaster-related mental health outcomes (Hawkins et al., 2009). Poverty and low SES have been associated with a higher risk for experiencing more distress post-disaster (e.g., Dew & Bromet, 1993; Ginexi, Weihs, Simmens, & Hoyt, 2000). A review by Norris and colleagues (2002) found that across 14 post-disaster studies reporting SES status, 13 revealed that low SES was consistently associated with greater post-disaster distress. Research conducted in the shadow of September 11th 2001 found New Yorkers with low SES were two and a half times more likely to develop PTSD (Galea et al., 2002). Among low-income, inner city high school students living 20 miles north of Ground Zero, PTSD rates remained prevalent eight months post-disaster; a rate five times more than those reporting no financial difficulties (Calderoni, Alderman, Silver, & Bauman, 2006).

SES and race/ethnicity are intimately intertwined. Research has shown that race and ethnicity often inform a person’s socioeconomic status (House & Williams, 2000).

Children of color are also more likely to live in segregated urban communities where there are few resources and high rates of unemployment, homelessness, and crime (U.S. Department of Health and Human Services, 2005). Impoverished populations experience a disproportionate amount of stressors, including systemic stressors, chronic stressors and daily hassles, and major
events, including disasters. Overall, marginalized populations are disproportionately affected by disaster and highly vulnerable to the negative consequences of disaster. As a result, marginalized youth and their families are at a heightened risk of mental health problems (Grant et al., 2003, 2004).

The Mental Health Impact of Disaster

A range of common reactions and emerging mental health concerns can be observed in children following the aftermath of a disaster (La Greca et al., 2002; Vogel & Vernberg, 1993). Disasters are related to many forms of psychopathology, with post-traumatic stress disorder (PTSD), depressive disorders, and anxiety disorders most commonly reported (Kilpatrick et al., 2003). Disorders seen in children and adolescents after large-scale traumatic events may also include behavioral problems and substance abuse (e.g., Copeland, Keeler, Angold, & Costello, 2007; Hoven et al., 2005; Kilpatrick et al., 2003).

Systematic reviews have found PTSD to be a primary focus of research to date (e.g., Norris et al., 2002). This is due to the fact that disasters have the potential to confront people with threats to life or bodily integrity and increase the likelihood of experiencing intense fear, horror, or helplessness (McFarlane & Norris, 2006). In turn, a consistent finding is that youth living in regions that have experienced a disaster, subsequently exhibit elevated rates of posttraumatic stress (PTS) symptoms. The symptoms include re-experiencing (e.g., nightmares, reenactments in play, etc.), avoidance/emotional numbing, and hyperarousal. PTS and PTSD can be associated with considerable impairment and difficulty, and when left untreated are associated with subsequent depression, anxiety, substance
abuse, conduct disorder, and/or overall impaired quality of life (e.g., Copeland et al., 2007; Giaconia et al., 1995).

Norris and colleagues (2002) note the prevalence of PTSD is most connected with heightened rates of other anxiety disorders and major depression. Anxiety disorders often co-occur with PTSD (Asarnow et al., 1999; Goenjian et al., 2001). The most common forms of anxiety disorders among children are agoraphobia, separation anxiety (Hoven et al., 2005), and specific phobias connected to the disaster (e.g., fear of water; Vogel & Vernberg, 1993). Youth showing symptoms of agoraphobia may demonstrate a fear of leaving the home, while symptoms of separation anxiety may include increased dependent or clingy behaviors, avoidance of sleeping alone, difficulty separating from family members or other caregivers, and reluctance to go to school (Hoven et al., 2005; Vogel & Vernberg, 1993). Youth may also exhibit increased general anxiety, including worries about the disaster reoccurring. Post-disaster, youth can develop both event-specific fears and/or an increase in developmentally appropriate or regressive fears (e.g., fear of the dark) not clearly associated with the disaster event. In addition, youth may evidence increased health related concerns for themselves, family members, or friends (Schonfeld & Gurwitch, 2009).

Disasters have also been linked to depressive symptoms (Norris et al., 2002). Children are very likely to display sadness, tearfulness, and/or irritability, especially if they experienced difficult losses as a result of the disaster. Youth may evidence a decline in school performance and a loss of pleasure in activities once enjoyed (Vogel & Vernberg, 1993). If close family members or friends died,
bereavement and grief may exacerbate reactions. Children may become withdrawn and resistant toward interactions, particularly with unfamiliar adults (Schonfeld & Gurwitch, 2009). Acute grief-associated depression, which can be connected to several forms of loss, may also be experienced. This includes bereavement due to the loss of loved ones and close friends, the loss of familiar locations and things due to relocation, or a drastically impacted property and surrounding community. Early disaster exposure has been reported to have long-term implications, with adverse childhood experiences of disaster exposure linked to a nearly three-fold increased risk of depressive illness in adulthood (Chapman et al., 2004).

Children and adolescents can also exhibit behavioral problems (Norris et al., 2002). In the face of heightened distress, younger children may temporarily lose recently acquired behavioral and social skills and resort to functioning as they did at an earlier age (Schonfeld & Gurwitch, 2009). Forms of regression include increased tantrums, thumb sucking, toileting accidents, and decreased distress tolerance. Additional behaviors may include traumatic play and reenactments, hyperactivity, increased vying for attention, and school avoidance. Older children and adolescents may reveal increased oppositionality and conduct difficulty (Norris et al., 2002). Such behaviors include declines in school performance, increased rebelliousness, delinquent behavior, risk-taking, and substance use/abuse as a means of coping with troubling emotions (U.S. Department of Health and Human Services, 2005).
The extent to which children evidence mental health symptoms in the wake of disasters varies greatly and is often contingent on a variety of factors, including their age and developmental and cognitive level, the nature and extent of their involvement, and their preexisting vulnerabilities and available coping skills (Madrid, Grant, Reilly, & Redlener, 2006).

**Factors that Influence Post-Disaster Functioning**

While children generally recover from traumatic experiences with time and support (Chemtob, Nakashima, & Hamada 2002; Norris et al. 2002), there are a range of risk factors that can increase both the extent to which children display symptoms of psychopathology following disasters and their vulnerability to long-term effects. Several areas of influence that impact children’s functioning after disasters have been broadly conceptualized based on guiding frameworks (Green et al., 1991; La Greca et al., 1996; La Greca & Silverman, 2006; Silverman & La Greca, 2002; Weems & Overstreet, 2008). These areas of influence include aspects of the disaster and disaster exposure (e.g., proximity to disaster, perceived threat of harm) (Furr, Comer, Edmunds, & Kendall, 2010), pre-existing aspects of the child (e.g., age, gender, prior trauma), and aspects of the post-disaster sequelae (e.g., social support, financial resources). While all of these factors can impact risk for youth, the most important risk factors in a large-scale review by Norris and colleagues (2002) were, in fact, family-based. Taken together, these factors can become compounded, heightening symptom severity among youth (Norris et al., 2002).

**Aspects of the Disaster**
Various aspects of the disaster can directly impact and exacerbate symptoms among children. The magnitude and severity of the disaster and proximity to the disaster are paramount, directly impacting experienced or perceived threat of death, harm, and helplessness. Additional factors include witnessing injuries or deaths, the nature of the injuries or deaths, number injured, death toll, and the death of caregivers or loved ones (Solomon, Gerrity, & Muff, 1992).

Several aspects of the child’s disaster experience and environment have been found to be associated with post-disaster functioning. Many studies have examined “dose effects” and found that the child’s physical proximity to the disaster is positively associated with subsequent symptoms. For instance, youth in closer physical proximity display greater distress (e.g., Schuster et al., 2001; Stuber et al., 2002). However, some studies have found limited support for a proximity effect (e.g., Evans & Oehler-Stinnett, 2006). For example, some youth exposed to disaster through media sources have been found to demonstrate high symptoms levels that are congruent to peers directly exposed to disaster (Wu et al., 2006; Pfefferbaum et al., 2000). For instance, astonishingly, children nowhere near Ground Zero after the September 11th attacks revealed nearly the same rates of posttraumatic stress as those that witnessed the attacks first hand (Duarte et al., 2006).

Although some children may react negatively even when not directly involved in a disaster, in general, proximity to trauma is a significant exacerbating variable. Thus, the child who is directly impacted by disaster is usually more
vulnerable than a child who witnesses the event or learns about it through a third party source. Similarly, direct victimization and witnessing usually have a greater impact than hearing about the trauma indirectly. Yet, the latter may at times lead to panic and contagion, with significantly negative consequences for some children (Hodas, 2006).

A number of studies have found personal loss (e.g., loss of a loved one, displacement) to be associated with post-disaster distress (e.g., Brown & Goodman, 2005; Lengua, Long, Smith, & Meltzoff, 2005; Pfefferbaum, Nixon, Krug, et al., 1999; Pfefferbaum, Nixon, Tucker, et al., 1999; Stuber et al., 2002; Thienkura et al., 2006). While few studies have considered disaster type to be an impacting factor, Norris and colleagues (2002) identified disasters caused by mass violence or malicious human intent to be more likely to result in severe impairment.

Aspects of the Child

Pre-existing characteristics of the child include their age, gender, SES, race/ethnicity, and the extent of their previous traumatic experiences (Furr et al., 2010; Norris et al., 2002). Across the child post-disaster literature, age and gender have been the most consistently studied. In contrast to earlier beliefs that early trauma had little impact on the child, it is now recognized that early trauma has a significant potential impact, by altering fundamental neurochemical processes, which in turn can affect the growth, structure, and functioning of the brain (Hodas, 2006; Schwartz & Perry, 1994). However, analyses of age effects have produced mixed findings with some studies finding no age differences (e.g.,
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Jeney-Gammon, Daugherty, Finch, Belter, & Foster, 1993; Schuster et al., 2001), and other studies finding older children to show greater PTS than younger children (e.g., Garrison et al., 1995; Saylor, Cowart, Lipovsky, Jackson, & Finch, 2003; Terr et al., 1997). The latter is likely due to older children’s increased cognitive capacity in understanding the lethality of disasters verses younger children’s limited ability to vocalize their trauma experience to clarify the depth of impact and a lack of research studying younger children. Differences in findings are likely tied to additional factors, such as prior trauma experience, social support, and disaster exposure and severity. Regardless of age, children tend to evidence signs of trauma that vary in kind along developmental lines, with separation and regression difficulties for younger children, and self-esteem, academic, aggression, and substance use difficulties for older youth (Norris et al., 2002).

A number of studies that have included an examination of gender effects find that females evidence more internalizing symptoms and are more likely to become passive, while males tend to externalize, turning to activity and aggression (e.g., Barnes et al., 2005; Foa, Johnson, Feeny, & Treadwell, 2001; Garrison et al., 1995; Lengua et al., 2005; Schwartz & Perry, 1994; Whalen, Henker, King, Jamner, & Levine, 2004). At the physiological level, females are found to use dissociation and a surrender response pattern as their primary defense, while males are found to use an active emergency response and become hyper-aroused (Hodas, 2006; Vernberg & Vogel, 1993). Nevertheless, there are exceptions to the above generalization. For example, young children, including
males, subjected to maltreatment may preferentially use dissociation, which may be adaptive given their relative powerlessness in the presence of an offending adult or situation. In addition, females may develop externalizing behaviors in addition to their internalizing symptoms (Hodas, 2006). Importantly, given that gender differences in internalizing symptoms have been found to emerge at puberty (e.g., Angold, Worthman, & Costello, 2003), there may exist a gender by age interaction, such that the effect of gender on PTS symptoms are stronger for older youth (Furr et al., 2010).

As previously discussed, SES and race/ethnicity represent additional factors of vulnerability; with children from lower SES families more likely to live in hazardous areas, maintain fewer financial resources, and experience more difficulty evacuating before a disaster hits. Racial and ethnic minority youth are disproportionately from lower SES families and often face additional stressors and compounding factors, such as discrimination and delayed emergency support (Hawkins et al., 2009).

Since the effects of trauma are understood as being cumulative, the children who have had chronic, concurrent, and/or prior trauma exposure are at an increased risk of developing symptoms and of having their normative developmental and psychological trajectories disrupted. As a result, repeated exposure to trauma may result in a situation-specific “state” becoming a more permanent “trait” (Hodas, 2006; Perry, Pollard, Blakeley, Baker, & Vigiliante, 1995). This is a critical factor, as youth, especially those from marginalized populations, are more likely to suffer previous, concurrent, or chronic traumas.
Additional factors that impact youth post-disaster symptomology, include a history of major mental illness (Solomon, Gerrity, & Muff, 1992) and peritraumatic distress or added non-disaster distress at the time of disaster (Garrison et al., 1995; Green et al., 1991; La Greca et al., 1996; Nader, Pynoos, Fairbanks, & Frederick, 1990; Thienkura et al., 2006; Vernberg, La Greca, Silverman, & Prinstein, 1996). Just as various characteristics of the child and their history can impact response to disaster, characteristics of the sustained disaster can also directly impact disaster survivors.

Aspects Post-Disaster

Factors may emerge post-disaster that act to maintain or further impact the distress experienced by youth and their families. These include reduced social support, loss of resources, family distress and caregiver reactions or psychopathology. Social support has been found to have a bidirectional influence on distress, with maintained or increased support acting as a buffer and reduced support leading to elevated distress levels (Kaniasty & Norris, 2008). Reduced support following a disaster can be caused by death, relocation, or displacement and disruption of previous sources of support. A loss of resources can include displacement from the home or community, financial distress due to job loss, and thwarted access to child support or schools due to destruction or repercussions from the disaster (Solomon et al., 1992).

Caregiver reactions following a disaster have been found to be a key factor directly impacting the level of distress experienced by the child (Endo, Shioiri, Someya, Toyabe, & Akazawa, 2007; Norris & Wind, 2009). Studies have
documented that children are highly sensitive to familial distress after a disaster (La Greca, Slivernan, & Wasserstein, 1998) and find that they tend to mirror their caregivers’ distress (Swenson et al., 1996). Caregivers may also be so impacted or preoccupied that they do not recognize their child’s distress or are unable to assist the child with coping (American Academy of Pediatrics, 1995; Hagan, 2005). The realization that they are not in a strong position to help their children might also contribute to increased stress in the caregiver (Hagan, 2005).

The caregiver’s stress reaction tends to directly impact their children's stress reactions (Norris et al., 2002). Living with a caregiver demonstrating significant posttraumatic stress reactions has been found to result in an increased risk for mental health problems among children (Hoven et al., 2005; Hoven, Duarte, & Mandell, 2003). For example, Hoven and colleagues (2005) found that children who saw their parents crying were three times more likely to have severe posttraumatic reactions, while children of parents with PTSD symptoms were four times more likely to have severe posttraumatic reactions. Young children under age five tend to show the greatest susceptibility and reactivity to the impact of the traumatic event on their primary caregiver rather than to the trauma, as the caregiver is the direct lens through which they come to understand and cope with their surrounding environment (Hodas, 2006). There are also several non-disaster-related family factors that can increase risk for decreased psychological functioning in youth. For instance, low levels of caregiver warmth, poor discipline practices, high caregiver-child, marital, or family conflict, caregivers’
psychopathology, caregivers’ substance abuse, and lack of caregiver supervision can all heighten the risk of difficulties in children (e.g., Ronan et al., 2008).

Further, marital stress, presence of domestic violence, and caregiver mental health problems has been found to increase after disasters (Schonfeld & Gurwitch, 2009). When these issues are present, it becomes harder for children to establish and maintain a sense of safety and feelings of connectedness to others (Norris, Friedman, Watson, 2005). Research by Scheeringa and Zeana (2008) found that mental health problems in preschool children, following Hurricane Katrina, were significantly correlated with new mental health problems in their caregivers and a similar relationship was found between maternal psychological distress and problems in their school-aged children (Spell et al., 2008). Thus, it has been hypothesized that overall caregiver distress and impairment in caregiver functioning can significantly contribute to the development of psychological problems in children (Scaramella, Sohr-Preston, Callahan, & Mirabile 2008).

These aspects highlight the importance of acknowledging the multi-level ecology of child development (Bronfenbrenner, 1979; Mohr, 2002), and the cascade of influences a disaster may have over a child’s personal factors, the family system, and the surrounding community. When disasters occur, many youth experience factors that may worsen their symptoms such as being in close proximity and vulnerable to directly witnessing massive destruction, seeing dead or injured people, being involved in a school evacuation, losing a loved one, viewing physical damage or ruins, and/or being forced to relocate. Children of low-SES populations are at a heightened risk for increased symptom severity
because they are more likely to be caught in the intersections of these aforementioned factors along with additional factors that are often disproportionately experienced as a result of their low-income and/or ethnic minority status.

**Overview of Post-Disaster Interventions**

Among primary first-step post-disaster interventions, ensuring basic physical needs is essential. When people experience loss or displacement, providing the basic needs of safety, shelter, food, water, clothing, and so forth is important for survival. Further, when people are physically safe and their basic needs met, this helps to increase a sense of emotional security and control (Ronan et al., 2008). The subsequent text reviews and contrasts two first-step post-disaster interventions, followed by a review of general post-disaster interventions.

Psychological Debriefing, formally known as Critical Incident Stress Debriefing (CISD; Mitchell, 1983), has been used as the principal intervention modality immediately following disasters because it provides clear guidelines of what to do in the wake of chaos. Its origins can be traced to efforts to reduce psychiatric impacts among soldiers after combat. Presently, it is seen more frequently that relief agencies seek to deliver psychological debriefing to the entire surviving population in certain trauma-affected communities. Debriefing typically involves promoting emotional processing or catharsis by encouraging recollection, ventilation and reworking of the traumatic event in a single session in the near aftermath of the trauma (World Health Organization, n.d.). Further, the
hallmarks of CISD include immediacy, proximity, expectancy, and brevity (Flannery & Everyly, 2000).

Growing studies show debriefing is neither appropriate nor effective as an early intervention after exposure to trauma (Raphael & Wilson, 2000; Rose, Bisson, & Wessely, 2002). The World Health Organization (n.d.) Department of Mental Health and Substance Abuse advises against the provision of single-session debriefing practices post-disaster reporting that it can be counterproductive to recovery. Adversely, debriefing continues to be used as a primary means today. It should be noted, however, that much of the critical evidence on debriefing is recent, which explains why many well-meaning professionals are still involved and may continue to be involved in psychological debriefing. As stated by Kaul and Welzant, “a strong desire to help, if not grounded in empirical and practical foundations, might lead to interventions that prove ineffective or potentially harmful despite good intentions” (2005, p. 203). A primary means of avoiding undue harm is through subjecting interventions to randomized control trials in order to ensure safety and utility as well as the development and growth of an evidence base.

Psychological First Aid (PFA), also initially developed as a military debriefing tool, has since been used by the National Child Traumatic Stress Network (NCTSN), American Psychological Association (APA), and the International Federation of the Red Cross and Red Crescent Societies (IFRC) as a primary method through which to provide psychological care after disasters and other traumatic events (Fox et al., 2012). PFA has been identified as a more
suitable generic approach, meeting the all-important standards of “first do no harm.” The process has been critically reviewed along with detailed guidelines developed by NCTSN (Parker, Everly, Barnett, & Links, 2006). PFA is practical assistance that includes offering emotional support, providing information and education, encouraging the practice of positive coping, and recognizing when more help is needed and helping individuals to get this extra help (American Red Cross, 2006). The goals of PFA include engagement, safety and orientation, stabilization and self-regulation, and connectedness. This model also may lead to triage, registration, follow-up, linkage to services and outreach, as needed (Parker et al., 2006). The success of PFA may be attributed to its flexibility and capability to prescribe a sequence of care based on the individualized needs of those being served. Further, it is an outreach method associated with practical support as needed at onset and then provides maintained availability over time for support, as those affected become ready to engage with services (Raphael, Dunsmore, & Wooding, 2004). PFA has been widely supported via objective observations of measurements of effectiveness and expert opinion and best fits the category of “evidence informed” (Fox et al., 2012). This contrast between CISD and PFA underscores the importance of efficacy research and the need for evidence-based treatments (EBTs).

The following text provides a review of general post-disaster interventions. According to sparse yet promising randomized control trial (RCT) research that has been done directly testing post-disaster mental health interventions to date, all of the interventions have incorporated or emphasized
aspects of cognitive-behavioral therapy and demonstrated effective symptom reduction. Levitt and colleagues (2009) reviewed three randomized controlled studies and one quasi-randomized control study which investigated treatments for children or adolescents exposed to disaster (Berger, Pat-Horenczyk, & Gelkopf, 2007; Chemtob, Nakashima, & Carlson, 2002; Chemtob, Nakashima, & Hamada, 2002; Field, Seligman, Scafidi, & Schanberg, 1996). Treatments varied in the method of intervention delivery (e.g., classrooms, individual, group) and type of intervention components administered (i.e., psychoeducation, skill training, art therapy, massage, Eye Movement Desensitization and Reprocessing Therapy). However, all treatments evaluated included one or more aspects of CBT, such as relaxation training, coping skills, and/or exposure to and reprocessing of traumatic memories. All of the studies were found to be effective in symptom reduction.

While there has been insufficient evidence to determine the effectiveness, treatments based on psychodynamic principles can allow the traumatized children to release unconscious thoughts and emotions and to integrate the traumatic event into their understanding of life and self-concept (Vernberg & Vogel, 1993; Wethington et al., 2008). This method consisting largely of nondirective and interpretive sessions that typically occurs over many months (Cohen, Berliner, & Mannarino, 2003). The therapeutic goals include helping children express frightening thoughts and feelings related to disaster events and developing self-enhancing coping skills (Terr, 1989). These goals can be achieved in both play and verbal form; while other indirect, metaphoric interpretations, such as acted
out scenarios or stories have also been described as effective therapeutic techniques for traumatized children (Terr, 1989).

Play therapy is a popular therapeutic modality with younger children, shifting on to more verbal-based therapies by early adolescents. A recent meta-analysis found that play therapy for an array of presenting problems far broader than exposure to traumatic events had desirable results on several outcome measures, including anxiety and internalizing and externalizing behaviors (Bratton, Ray, Rhine, & Jones, 2005). Further, it was found that the effects of play therapy were more positive for humanistic, non-directive treatments and that the use of parents in play therapy produced the largest effects (Bratton et al., 2005). It has also been proposed that drawing, like play, allows for visual and other perceptual experiences of the traumatic event to become represented and transformed by a child’s activity (Wethington et al., 2008). Case series studies have concluded that imagery-specific techniques, including art therapy, are effective in reducing PTSD symptomatology in adolescents (Appleton, 2001). Due to their flexible nature, play and art may also be incorporated in other types of psychotherapy, such as CBT, to facilitate communication, reduce resistance, and safely facilitate the recall of the traumatic event (Appleton, 2001; Cohen et al., 2003). While understudied, the utility of psychodynamic therapy in its various forms (e.g., play and art) to aid in the treatment of traumatized children throughout a range of developmental stages is admirable.

Evidence-based treatments for anxiety disorders and PTSD (e.g., Cohen, Mannarino, & Deblinger, 2006; Ronan et al., 2008) have also been used for post-
disaster populations. Efficacious intervention protocols developed for youth trauma, such as Trauma/grief-focused group CBT (Layne, Saltzman, Savjak, & Pynoos, 1999) and Trauma-Focused CBT (Cohen et al., 2006) have been used successfully in community and school settings and have strong utility as post-disaster interventions. Trauma/grief-focused group CBT (Layne et al., 1999) consists of 20 semi-structured sessions fostering group cohesion, coping skills, the processing of traumatic events, and the promotion of adaptive grieving (Layne et al., 1999). The efficacy of this intervention has been investigated in three studies with different populations of trauma-exposed adolescents (i.e., earthquake, war, community violence) with consistent outcomes that evidence decreases in PTSD, depression, and grief symptoms (Goenjian et al., 1997, 2005). Trauma-Focused CBT (TF-CBT; Cohen et al., 2006) has demonstrated efficacy among non-disaster trauma populations. This treatment consists of two phases. The first phase aims to support children in developing the stress management and relaxation skills necessary for the second phase of treatment, which is focused on gradual exposure via the creation of a trauma narrative (Cohen et al., 2006; Ronan et al., 2008). This model has been applied to children suffering a variety of traumatic experiences (i.e., physical abuse, terrorism, community/domestic violence) and has been found to be feasible for use in community settings to treat disaster exposed youth (CATS Consortium, 2007; Hoagwood et al., 2006; Hoagwood, Vogel, Levitt, D’Amico, & Paisner, 2007). TF-CBT includes the added benefit of parental involvement to promote improved communication with children, provide
education about personal safety, address parenting skills, and allow discussion of the narrative in a healthy manner (Cohen et al., 2006).

The Child and Adolescent Trauma Treatments and Services (CATS) Project, developed by Hoagwood and colleagues (2006; CATS Consortium, 2007), provided the two aforementioned trauma-specific CBTs to children and adolescents affected by the September 11th 2001 terrorist attacks. The CATS Project was channeled through nine provider organizations that spanned 45 clinical and school sites. TF-CBT was provided to children and the Trauma/Grief focused Group Psychotherapy Program was used with adolescents (Saltzman, Pynoos, Layne, Stienberg, & Aisenberg, 2001). Of 700 eligible participants, the majority of participants were from low-income families and/or minority backgrounds. Youth with the most severe symptoms were placed in the trauma specific CBT group versus treatment as usual resulting in a quasi-experimental design. The majority of youth across conditions experienced a decline in trauma symptoms over time, yet the rate of improvement was greater for youth in the trauma specific CBT group than the comparison group.Importantly, the CBT group had significantly higher baseline levels of severe trauma (along with multiple traumas and family stressors), yet, despite these disadvantages, experienced significant improvements (CATS Consortium, 2007; Hoagwood et al., 2006). Lessons and results gained from the CATS Project are quite valuable and underscore the next steps needed for future research in this area. This includes the ongoing evaluation of the effectiveness of promising treatment approaches in preparation for necessary efficacy research.
Most research to date has not placed an emphasis on the needs of children and families following disaster trauma. Unlike previous research, the current meta-analysis has identified and compiled interventions used among youth to determine which treatments have been found to be efficacious and promote positive outcomes for these youth and their families. This study is both necessary and timely given the risk that ever-increasing disasters pose.

**Moderators of Intervention Effectiveness**

While the primary focus of the current meta-analysis is to determine whether post-disaster mental health interventions targeting youth positively affect psychological outcomes, this study also examined moderating factors that may influence the effect of interventions on youth outcomes. Thus, identifying the circumstances in which interventions are beneficial is key in illuminating the most effective post-disaster interventions. Based on prior research, the following factors are important to consider (Furr et al., 2010; Hawkins et al., 2009, Norris et al., 2002): a) youth age, b) socio-economic status, c) disaster type, frequency, and the incidence of complex trauma, d) intervention setting and change agent, and e) intervention length.

**Youth Age**

Mental health interventions for youth span early childhood and late adolescence. The current study includes interventions that employed samples with a mean age below 19-years-of-age to broadly assess youth 18-years of age and younger at the time of the intervention. Extending upon the aforementioned child factors, disaster can have a significant impact during all ages; from early trauma’s
direct impact on child brain development to the role of increased cognitive capacity and understanding among older youth (Hodas, 2006; Saylor et al., 2003). However, some research has shown mixed findings between the existence of no age differences and older youth experiencing heightened psychological symptomology (Schuster et al., 2001; Terr et al., 1997).

**Socio-Economic Status (SES)**

As previously stated, social class and ethnicity is often confounded in the intervention literature given the disproportionate number of racial and ethnic minorities in the United States that are economically disadvantaged (House & Williams, 2000). Youth residing in poor and low-income communities experience increased levels of chronic poverty and disproportionate rates of stressors, including various dangerous conditions (e.g., unsound housing structure, ongoing violence within community). This is often driven by social inequality and systemic discrimination (Hawkins et al., 2009). Given these patterns, it is important to examine the effectiveness of mental health interventions within the context of SES.

**Disaster Characteristics**

While few studies have considered disaster type, the work by Norris and colleagues (2002) found that disaster frequency and type can exacerbate psychological outcomes. Human-made disasters caused by malicious intent, such as community violence and war, tend to be chronic in nature. Many natural disasters, including earthquakes and tsunamis, tend to be less frequent and more episodic in quality. While both can create high impact, large-scale devastation,
loss, and family disruption, the characteristics of high chronicity and human-caused destruction are believed to result in heightened psychological burden. Chronic disasters increase the likelihood of experiencing forms of complex trauma, such as assault, torture, kidnapping, and rape (Hodas, 2006; Perry et al., 1995). We also understand that complex trauma is experienced at an increased rate among low-SES populations. Taken together, the characteristics of disaster are a significant area of further examination.

**Intervention Setting and Change Agent**

Intervention settings and change agents have been increasingly of interest in the literature, which has shown great value in locations outside of standard outpatient settings of mental health care. These include school and community settings that are thought to increase population catchment and engagement. Chemtob, Nakashima, and Hamada (2002) notably suggested that interventions are most effective when implemented within the settings that the child interacts with the most. In fact, Ronan and colleagues (2008) explicitly stated that for children and adolescents, the school context should be a “central focus of intervention (p. 38).” Further, group intervention implementation at school, or even a community agency/setting, allows for increased feasibility and flexibility within the post-disaster setting (Chemtob, Nakashima, & Hamada, 2002; Goenjian et al., 1997; Ronan et al., 2008). Training teachers to provide interventions allows such change agents to assist children already familiar to their service, while mental health professionals, and community agencies provide additional key agents of change. Review of the impact of various settings and
change agents on the effectiveness of post-disaster interventions is an important consideration.

**Intervention Length**

Finally, intervention length is included as a moderator for analysis. Length represents the amount of sessions administered to participants. In previous research, efficacious interventions reportedly consist of a greater length than those that were less efficacious (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011). Evidence suggests that short-term, brief-interventions, which easier to administer, produced only time-limited benefits, if at all, particularly with groups demonstrating elevated symptomology. Even though length may be a particularly important moderator to consider, it may be confounded with intervention completion or follow-through. Programs that have increased intervention length are often more difficult for families to adhere to, given the greater time duration (Chemtob, Nakashima, & Hamada, 2002).

**A Conceptual Model**

A conceptual model based on the work of Wethington and colleagues (2008) aids the evaluation of intervention effectiveness in reducing psychological harm and negative outcomes (see Figure 1). It depicts the flow of influences, beginning with the disaster exposure, immediate responses, screening and measurement processes that may lead to receipt of the intervention, through moderating processes of the intervention, and to mental health outcomes of interest (e.g., reduced internalizing symptoms (anxiety, depression, PTSD) and externalizing symptoms (conduct, function). The present meta-analysis looks at
the impact of post-disaster interventions on improving mental health outcomes based on an additional three key areas of moderation, as it is anticipated that these areas will increase intervention effects and may achieve heightened and prolonged psychological benefits for youth following the wake of a disaster. Interventions incorporated the following three key areas of moderation: First, interventions that involve the child’s caregiver(s) may contribute to positive intervention outcomes by improving overall child psychological symptoms and parent–child relationship, an essential protective factor. Second, use of evidence-based practices (EBPs) have shown consistent, positive outcomes in previous research with various communities. Third, interventions are provided in a culturally sensitive manner with direct consideration of the cultural aspects of the child, family, and target community are believed to be beneficial to intervention outcomes.
Figure 1. Conceptual Model for Post-Disaster Mental Health Interventions
The present meta-analysis tested the aforementioned conceptual model with an emphasis placed on addressing and clarifying the various characteristics that may support positive intervention outcomes, including the key areas of caregiver involvement, evidence-based interventions, and cultural adaptation within interventions. Each of these areas will be further considered as moderators within the current review. They are discussed in additional detail in the following sections. Other moderators were also examined but only these three were hypothesized to be conceptually relevant.

**Caregiver Involvement**

The central protective role of caregivers in the treatment and care of children must not be overlooked in the aftermath of a disaster. Accordingly, there may be considerable need for interventions that include caregiver(s). According to a review by Norris and colleagues (2002), caregivers’ disaster-related distress was identified as one of the most prominent risk factors among children. Thus, to promote an effective intervention with traumatized youth, it is essential to assess and enhance the level of functioning of caregivers and to encourage caregivers in the process of both coping with stressful events and aiding their children (National Child Traumatic Stress Network, 2012). For example, while interventions can be very helpful, if a child then returns to an environment that does not support the strategies promoted through the intervention and/or one that demonstrates ongoing stress, fear, and avoidance, the effects of the intervention may be reduced and difficult to sustain (Ronan et al., 2008).
Therefore, when an intervention is carried out it may be beneficial to provide psychoeducational information to caregivers about how they can assist their child in the aftermath of a disaster or more directly include caregivers within the intervention. Broadly, caregiver involvement in youth interventions has been found to heighten treatment gains as shown through increased symptom reduction, skill generalization and maintenance, and improved treatment coordination and cooperation among youth (Norris et al., 2002). As emphasized earlier, multiple layers of ecology influence children and the most powerful influence comes from the family (Bronfenbrenner, 1979; Mohr, 2002).

Evidence-Based Practices

Systematic reviews by Wethington and colleagues (2008) and Brown (2005) both found use of EBPs, including cognitive-behavioral therapy (CBT) approaches, in the treatment of PTSD and other trauma-related symptoms to have been efficacious in children exposed to various traumatic events. Insufficient evidence of effectiveness existed for other therapies such as psychodynamic therapy (i.e., play and art therapy) and pharmacotherapy (Brown, 2005; Levitt, Hoagwood, Greene, Rodriguez, & Radigan, 2009; Wethington et al., 2008) mainly due to a small number of controlled studies.

Researchers working in the disaster and trauma areas have extended the use of EBP protocols initially developed for anxiety disorders and PTSD (e.g., Cohen et al., 2006; Ronan et al., 2008). The foci of these protocols include helping families manage arousal, decrease associated anxiety and trauma responses, and some programs aid in strengthening the parent-child bond. It is
believed that the use of evidence-based practices, which have been found to be efficacious in aiding symptom reduction, will result in increased positive outcomes for youth following the psychological influence of disasters.

**Cultural Adaptation**

The necessity of the appropriate provision of services to youth and their families who are most likely to experience the negative psychological repercussions of disaster has been thoroughly emphasized and highlighted. Thus, it is critical that the intersections of SES and race/ethnicity are simultaneously considered to ensure effective and considerate treatment provision to children, adolescents, and their families (e.g., Fothergill & Peek, 2004; Hawkins et al., 2009). For this reason, culturally adapted treatments may be best able to translate services within diverse and specific cultural contexts. Such treatments include the thoughtful use of intervention-based modifications and activities that are inclusive and relatable to youth based on both their community and cultural context.

Such considerations as caregiver involvement, EBP integration, and cultural adaptations may support intervention effectiveness and heighten positive outcomes and symptoms reduction. This meta-analytical proposal is the first to seek out and review interventions to determine how or if these key intersections impact intervention effectiveness.
Rationale for the Review

The rate and impact of disasters are increasing at an alarming rate, while the most vulnerable population continues to experience direct repercussions. Based on the post-disaster experiences of children and adolescents, a critical lens is necessary to identify and illuminate empirically supported mental health interventions for youth. Research in this area remains lacking with no known synthesis of treatment interventions.

While there has been a growth in post-disaster intervention research over the past decade there remains no known review of post-disaster mental health interventions implemented with youth. This is the case even though there is definitive evidence that children and adolescents are most vulnerable in the face of disaster exposure. In addition, there is a need to synthesize intervention research to date to understand the effectiveness of post-disaster mental health interventions with children and adolescents. The current meta-analysis is the first such review.

The objective of this review is not only to identify mental health interventions used with youth and their families after disaster but also to examine the effectiveness of these intervention programs in reducing symptoms along with understanding the impact of caregiver involvement, evidence-based practice usage, and incorporation of culturally adapted strategies, in addition to other factors that may increase or decrease intervention effectiveness. This meta-analytic review aims to further provide a critical reference for future research, practice, and policy to improve the efficiency of care to these communities.
Research Questions and Hypotheses

The overarching goals of the current review are to use meta-analytic procedures to examine post-disaster mental health interventions for youth in order to evaluate their ability to produce psychological benefits for youth. This meta-analysis also examined factors, or moderators, that influenced program effectiveness.

Meta-analysis was used to test the following hypotheses and research questions. Specifically, tests of pre-post effect sizes were evaluated through meta-analysis to address the overarching question of intervention benefits. Analyses then examined whether effect size variation was associated with differences in specific moderators (Cooper, 2010).

1. Overall effectiveness: How effective are these mental health interventions at targeting and reducing psychological symptoms. What is the overall effect size across outcomes?

2. Effectiveness for specific outcomes: How effective are these interventions at addressing broad internalizing and externalizing outcomes; along with more precise outcome areas such as anxiety, depression, PTS/PTSD, conduct, and functional impairment? What is the effect size for each outcome category?

3. Moderators of effect: Which intervention characteristics influence the effectiveness of these intervention programs? What factors appear to make some programs more advantageous than others?

   a. It is hypothesized that there are larger treatment effect sizes for interventions that incorporate the following areas of moderation: 1)
c. Caregiver involvement, 2) evidence-based practice utilization, and/or
3) cultural adaptations.

b. The following moderators were also examined: youth age,
socioeconomic status, presence of complex trauma, disaster source and
frequency, diagnostic cut-off, intervention setting (e.g., school,
community, outpatient), change agent (e.g., mental health professional,
teacher, community agency/members), and intervention length.
METHOD

Meta-analytic review is an accepted and respected quantitative approach to the synthesis of a body of empirical literature that is also well suited for measuring the efficacy of post-disaster mental health interventions across multiple studies (Rosenthal & Rosnow, 1991). By summarizing the magnitude of overall relationships found across studies, determining factors associated with variations in the magnitude of such relationships, and establishing relationships by aggregate analysis, meta-analytic procedures provide more systematic, exhaustive, objective, and representative conclusions than qualitative reviews (Rosenthal, 1984). To understand the effect of post-disaster mental health interventions on psychopathology symptoms in youth, as well as the factors associated with variations in this effect, meta-analysis is the preferred tool and is a respected reference to help inform funding decisions, service delivery, and public policy.

Conducting a meta-analysis includes the following steps: a) determining inclusion and exclusion criteria, b) carrying out a systematic and comprehensive search for eligible studies, c) coding study characteristics and using available statistical information to compute effect sizes, d) calculating an overall/average effect size comprised of findings from all studies as well as an estimate of the degree to which effect size varies across studies, and e) assuming there is significant variation in effect sizes, conducting moderator analyses to examine study characteristics that may be associated with, and thus account for, this variation (Cooper, 2010; Lipsey & Wilson, 2001). This section discusses the first three steps. The following section will address the remaining two. To the extent
available, information in this meta-analysis was presented in accordance with American Psychological Association’s Meta-Analysis Reporting Standards (APA, 2008).

**Selection Criteria**

Studies were included in the meta-analysis if all of the following criteria were met:

A. They were published prior to January 1, 2015 and within the period of 2000–2014, given research in the field of post-disaster mental health increased most significantly over this span of time.

B. Studies involved the evaluation of a mental health intervention intended to promote positive psychological gains among children and adolescents.

C. Children and adolescents were identified as the primary beneficiaries of intervention; operationalized as individuals 18-years old and younger at the time of the intervention. Therefore, only samples with a mean age below 19 years were included.

D. All studies included a control group. A key concern of intervention effectiveness research is the potential for changes in outcomes over time to be a corollary of normative development or maturation, that are not actual effects of the intervention. Such changes may be positive (e.g., increased distress tolerance) or negative (e.g., increased defiance of adults). Without comparison to a control group of youth not receiving the intervention, positive changes would lead to an apparent inflation in intervention effectiveness or minimization of negative changes.
E. Studies used standardized outcome measures assessed at baseline and post-intervention. Three designs were considered acceptable: a) randomized designs; b) quasi-experimental designs; and c) multiple baseline designs using sample cohorts as controls.

F. Studies were conducted with either a United States or international-based sample to allow the investigation of a breath of intervention types and inform future utilization across contexts.

G. Studies examined youth mental health interventions provided after a distinct and identifiable disaster, as defined by Task Force on Psychological Responses of Children to Natural and Human-made Disasters (Vogel & Vernberg, 1993). This definition characterizes disasters as “events that are relatively sudden, highly disruptive, and time-limited (even though the effects may be longer lasting), and public (affecting children from more than one family)” (Vogel & Vernberg, 1993, p. 465). Accordingly, studies examining the effects of family were not included.

   a. Investigations about chronic exposure to specific mass traumatic events (e.g., community violence, terrorist attack, and war) were included, but studies reporting on adults, even if the exposure occurred during childhood, were not.

   b. Studies about reactions to personal traumatic experiences (e.g., child abuse) were excluded.
H. Study sample sizes included were deemed large enough to afford statistical analyses, thus case studies, case series, or studies with n<10 were excluded.

I. Studies had sufficient data that provided specific statistical information, including: means, standard deviations, correlation coefficients, $p$-values, sample size, standard error, variance, odd ratios, chi-squares, or enough data for the author to obtain additional data to calculate the effect sizes needed for meta-analytic procedures. See below for detailed information on computing effect sizes.

J. Data are from independent samples. Specifically, studies that used data from the same sample were included to the extent that they differ in outcomes and/or moderators analyzed. Multiple studies that report data from the same sample were not included more than once in the analysis of an overall effect size, with initial published work selected for inclusion.

K. Studies came from either published peer-reviewed journals or dissertations to aid in capturing representative data and reduce publication bias (publishing only positive findings).

L. All studies had to be written in English.

**Literature Search Procedures**

Studies were deemed eligible for inclusion in this review using the selection criteria listed above. A number of strategies were used to identify studies satisfying these criteria. First, computerized searches were conducted in ERIC, PsycINFO, and Social Science Citation Index using the following
keywords: disaster(s), fire(s), earthquake(s), flood(s), hurricane(s), manmade disaster(s), natural disaster(s), school shooting(s), terrorism, tornado, trauma, tsunami(s) or war. These terms were searched in conjunction with a) general terms such as behavior(al), disorder, emotional, mental health, mental illness, pathology, psychiatric, and psychological; b) specific diagnoses and symptoms such as anxiety, bipolar, conduct disorder, depression, externalizing, internalizing, oppositional defiant disorder, phobia, psychosis, PTSD, and substance (use/abuse); c) services such as intervention, program, therapy, or treatment; and d) age-specifier terms such as adolescent(s), child, schoolchildren, and youth.

Second, the reference sections of each of the articles found via computerized searches were reviewed to find additional studies.

Third, eligible studies were sought by examining the reference sections of published reviews and meta-analyses that included studies with psychological intervention samples of youth (Bobich, 2011; Pfefferbaum, Newman, & Nelson, 2014). Fourth, tables of contents in journals that typically include studies on youth, trauma, and child psychopathology were also reviewed to identify other potential studies not included in the previous types of searches (i.e., American Journal of Psychiatry, Clinical Child Psychology and Psychiatry, Clinical Child and Adolescent Psychology, Journal of the American Academy of Child and Adolescent Psychiatry, Journal of Child Psychology and Psychiatry, Journal of Clinical Child and Adolescent Psychology, Journal of Consulting and Clinical Psychology, Journal of Traumatic Stress, Pediatrics).
Coding Procedure

Coding is a process that involves “interviewing” (p. 73) eligible studies in order to answer specific questions of interest to the meta-analyst (Lipsey & Wilson, 2001). As described by Lipsey and Wilson (2001), coding encompasses two major categories of information: details about study characteristics, or study descriptors, and details about empirical findings of the study, or effect sizes. These two categories generally can be thought of as encoding information relevant to independent (study descriptors) and dependent (effect sizes) variables. Relevant study level and outcome level information were extracted from each article or manuscript using a detailed coding guide.

Study descriptors that were coded for in each study included source information (e.g., publication form and year), disaster type (e.g., natural or human-made, chronicity), methods (e.g., sample demographics, methodological design), measurement quality and assessment period (e.g., established psychometrics; one year or more than one year post-disaster), intervention characteristics (e.g., setting, mode of delivery, length), change agent (e.g., teacher, psychologist, researcher), other independent variables relevant for moderation analyses (e.g., caregiver involvement, evidence-based practice (EBP), culturally-based adaptation(s)), statistical data (e.g., appropriate means, standard deviations), and related outcome variable information. Appendix A includes the descriptive coding guide.

Coding for EBP validity and documented scientific evidence was based on endorsement by one of the following organizations: Substance Abuse and Mental
Health Service Administration’s National Registry of Evidence-based Programs and Practices (SAMHSA’s NREPP, 2016), the World Health Organization (WHO, 2004), or the Washington State Institute for Public Policy and the University of Washington Evidence-Based Practice Institute Inventory of Evidence-Based, Research-Based, and Promising Practices (WSIPP & UW, 2012). Interventions were also coded to indicate the inclusion of evidence-informed practices in which methods were guided by best available research and methods, including cognitive-behavioral therapy (CBT) approaches.

All studies were coded by both a doctoral candidate (the author) and an undergraduate-level researcher. After studies were coded independently, coders held a consensus meeting to make final determinations and resolve discrepancies from independent coding by consensus. When insufficient information was available to compute an effect size and/or when essential study information was missing, study authors were contacted to obtain such information.
DATA ANALYSIS

Computing Effect Size

Effect sizes were computed as standardized mean differences, also known as Cohen’s $d$ or estimated $d$ (Cooper, Hedges, & Valentine, 2009). This involves taking the raw difference between treatment and control group means on the outcome measure at post-treatment and then dividing this difference by the pooled (weighted average) standard deviation of the measure for the two groups (see Cooper, 2010, formula 5.11). A meaningful measure of effect size is based on the following key: small equates to 0.2 to 0.4, medium is 0.5 to 0.7, and large is 0.8 and higher (Cohen, 1988). Effect size formulas provide a value of the magnitude of an effect, independent of sample size. Because statistics derived from smaller samples are inherently less reliable than those derived from larger samples, effect sizes computed from smaller samples are less reliable than those from larger samples. Therefore, when effect sizes are combined to calculate an average/overall effect, problems may arise because effect size statistics contribute equally to this average value, regardless of the reliability of the information that each effect size carries (Lipsey & Wilson, 2001). To address this potential problem, an adjustment developed by Hedges (1981) was also incorporated. Pretest means were subtracted from post-treatment means to adjust for potential differences between program and comparison groups at baseline to convert Cohen’s $d$ into a statistic referred to as Hedge’s $g$ (Hedges, 1981; Hedges & Olkin, 1985) and thus enhance precision in effect size estimation (Lipsey & Wilson, 2001). Effect sizes were computed from means and standard deviations.
on outcome measures included in the study report. When these are not available, effect sizes were estimated from relevant test statistics or their reported significance levels (Rosenthal, 1994). Effect sizes were computed so that positive values indicate differences in directions consistent with a favorable effect of the intervention group on youth outcomes (e.g., higher self-esteem, fewer symptoms of depression). See Appendix A for the effect size coding guide.

**Analysis of Overall Program Effectiveness**

When conducting a meta-analysis, it is necessary to 1) determine the unit of analysis and 2) determine the statistical model (i.e., either fixed or random effects, see below) (Cooper et al., 2009). The current meta-analysis uses the independent sample as the primary unit of analysis. In the studies in which effect size information (or information used to obtain effect size) is reported for the overall sample, each study contributes one sample to the analysis. In the studies in which findings are reported separately for distinct subgroups only (e.g., male and female), each subgroup was treated as an independent sample (Cooper et al., 2009). Additionally, effect sizes were computed for each outcome category (e.g., internalizing or externalizing symptoms). Similar to the overall effect size, for those samples with multiple outcomes within an outcome category, an average effect size was computed and then used to compute the effect size for that outcome category.

Effect sizes more than three interquartile ranges above the 75th percentile or below the 25th percentile, which qualify as statistical outliers according to Tukey’s definition (Tukey, 1977), were Winsorized by setting their values to the
highest or lowest effect size, respectively, that will not qualify as an outlier. Doing so provides a safeguard against extreme effect sizes having undue influence on the study findings. In addition, each effect size has been weighted by the inverse of its variance to provide more efficient estimation of true population effects (Hedges & Olkin, 1985). This procedure gives greater weight to larger samples and is the generally preferred approach (Cooper, 2010).

In terms of the statistical model, a random effects model was used for all analyses (Hedges & Vevea, 1998). A random effects model, as opposed to a fixed effects model, should be used in meta-analysis when there is significant study-level variability (measured as variance) in effect sizes, in addition to the assumed sampling, or random, error. This model is more conservative in its estimate because it accounts for the additional variance component and is more conceptually accurate for this and most meta-analyses due to the common practice of studies combined in meta-analyses to vary in sample characteristics, research design, outcomes of interest, and measurement tools used (Cooper et al., 2009; Lipsey & Wilson, 2001).

The appropriateness of a random-effects model for the current analysis is indicated by a) substantial variability in the characteristics and participants of youth in the included interventions and the potential for such differences to constitute significant sources of random error even after taking into account variance associated with specified moderating variables and b) interest in drawing generalized inferences about all interventions, not just those that are included in the present review (Hedges & Vevea, 1998).
To test whether there is variability in sample-level effect sizes greater than that which would be expected by sampling error around a single population value, a homogeneity analysis was conducted using procedures described by Cooper (2010). Results of this analysis are used as well to calculate $I^2$, a descriptive measure of the amount of the observed variability in effect sizes across studies that is attributable to study differences rather than sampling error (Higgins & Thompson, 2002).

Additional analyses were run to reduce any potential for publication bias. Studies with significant findings are more likely to be submitted and accepted for publication. The “file drawer effect” is the probability that unpublished null findings would eliminate the obtained results (Rosenthal, 1991). Often times, these manuscripts are those in which findings were not significant, methodology quality was lacking, or the author decided to not publish the findings due to a lack in magnitude of the findings (Lipsey & Wilson, 2001; Rosenthal, 1979). If the studies that do not find differences are not accurately represented in the sample of studies included, publication bias may result. To account for the “file-drawer problem,” an Orwin “fail-safe N” (FSN; Orwin, 1983) was calculated for significant results, which corresponds to the number of null results that would be needed to overturn a significant result (the number of studies that would make $p > .05$). If the FSN is greater than or equal to five times the number of studies in the analysis plus 10 (i.e., $FSN > 5k + 10$), the results are considered to be robust against the file-drawer effect (Rosenthal, 1991).
Moderator Analyses

Following analysis of the overall effect of post-disaster mental health interventions for youth across outcomes and within outcome categories, moderators were analyzed to uncover factors that may increase (or decrease) effect sizes, with implications for intervention effectiveness. Moderators (listed above), drawn from theory, empirical research, and prior meta-analyses of youth trauma interventions were coded and tested.

Moderators were analyzed if they are characteristic of a large enough number of samples and if there is significant unexplained variability in effect sizes (Lipsey & Wilson, 2001). In a random effects model, the study-level variance component of mean effect sizes is computed and is subject to a significance test. This test assumes the variance of effect sizes is zero, and therefore, rejecting this null hypothesis indicates that the variance of effect sizes is significantly greater than zero. This test statistic is called $Q$, and a statistically significant $Q$ suggests that there is enough variability in effect sizes to conduct further (i.e., moderator) analyses to attempt to explain the sources of this variability. Categorical moderators were given categorical codes and differences between groups of moderators were examined.
RESULTS

Search Outcome

Using the abovementioned search methods, over 1,700 articles were identified. An examination of article abstracts limited the search results to 144 studies. The author examined each of the 144 studies in detail to determine whether the studies fit all eligibility criteria. Of the 144 studies, 24 fit all eligibility criteria and were included in this meta-analysis. Studies were excluded due to the following reasons: 1) the study design did not meet criteria (e.g., lack of control group), 2) disaster experienced was vague in nature (e.g., lumping together various personal and community trauma events), 3) included individuals with individually experienced trauma (e.g., bike/ motor vehicle accident, human trafficking), 4) study solely focused on long-lapse longitudinal follow-up data (e.g., 3 year, 5 year.), 5) used dosing of treatment without control, 6) the study was a qualitative analysis, and/or 7) introduced a new mental health intervention that was not empirically tested. Table 1 presents key characteristics of included studies.
Table 1. Descriptive Characteristics of 24 Post-disaster Interventions

<table>
<thead>
<tr>
<th>Participant Characteristics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in Years: M (SD) = 11.45 (2.60)</td>
<td>Range = 5–25</td>
</tr>
<tr>
<td>Treatment n: M (SD) = 86.92 (64.79)</td>
<td>Range = 13–242</td>
</tr>
<tr>
<td>Control n: M (SD) = 76.13 (63.43)</td>
<td>Range = 11–240</td>
</tr>
</tbody>
</table>

| Low-SES | 79.17% |

<table>
<thead>
<tr>
<th>Contextual Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>International</td>
</tr>
<tr>
<td>United States</td>
</tr>
<tr>
<td>Urban Area</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disaster Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural</td>
</tr>
<tr>
<td>Earthquake</td>
</tr>
<tr>
<td>Hurricane</td>
</tr>
<tr>
<td>Tsunami</td>
</tr>
<tr>
<td>Human-made</td>
</tr>
<tr>
<td>Community Violence</td>
</tr>
<tr>
<td>Terrorist Attack</td>
</tr>
<tr>
<td>War</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intervention Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manuscript Year</td>
</tr>
<tr>
<td>2000-2003</td>
</tr>
<tr>
<td>2004-2007</td>
</tr>
<tr>
<td>2008-2011</td>
</tr>
<tr>
<td>2012-2014</td>
</tr>
<tr>
<td>Setting</td>
</tr>
<tr>
<td>School</td>
</tr>
<tr>
<td>Within Community</td>
</tr>
<tr>
<td>Clinical Outpatient</td>
</tr>
<tr>
<td>Community Mental Health Center</td>
</tr>
<tr>
<td>Intervention Format*</td>
</tr>
<tr>
<td>Individual</td>
</tr>
<tr>
<td>Small Group (2-5)</td>
</tr>
<tr>
<td>Large Group (6 or more)</td>
</tr>
<tr>
<td>Whole Classroom</td>
</tr>
<tr>
<td>Change Agent</td>
</tr>
<tr>
<td>Mental Health Professional</td>
</tr>
<tr>
<td>Teacher</td>
</tr>
<tr>
<td>Other (e.g., Community Agency/Community Members)</td>
</tr>
</tbody>
</table>

*One study excluded due to unclear description of intervention format.
Overall Intervention Effectiveness on Psychological Well-being

A power analysis was conducted to estimate the likelihood of 24 studies to yield a statistically significant result (Borenstein, Hedges, Higgins, & Rothstein, 2009). Assuming a random effects model, a moderate degree of between-study heterogeneity, and an alpha of .05, along with known data (24 studies with approximately 150 participants in each study), statistical power comes to .8293. This value indicates a high level of power to find a statistically significant result.

Using a random effects model, the overall effect size (reported in Hedge’s $g$) calculated across coded intervention outcomes, yielded an effect size of .4802, with a 95% confidence interval (CI) of .384 to .576. To clarify, all individual effect sizes were coded as positive when the outcome favored the intervention group. Borenstein and colleagues (2009) recommend that outcomes should only be meta-analyzed when a sufficient proportion of the data are reported to represent the effect. The effect size of .4802 was significantly different from zero ($p < .001$). Thus, the null hypothesis was rejected suggesting that mental health interventions have a significant, small, approaching medium, positive effect on psychological outcomes for youth who receive post-disaster mental health interventions compared to youth who do not receive post-disaster mental health interventions. A summary of each study’s characteristics and intervention outcomes measured within this meta-analysis is presented in Table 2. For the 24 included studies, sample sizes ranged from 26 to 495 (mean = 170, median = 167).
Table 2. Post-disaster Mental Health Interventions for Youth with Effect Size Calculations

<table>
<thead>
<tr>
<th>First Author &amp; Year</th>
<th>Disaster Type (Country)</th>
<th>Intervention [EBP/CBT/Eclectic]</th>
<th>Target symptoms/problem</th>
<th>Total N (Treatment Group n)</th>
<th>Age Range (Mean)</th>
<th>Setting Type (Change Agent)</th>
<th>Study Design</th>
<th>Average Effect Size (g) by Outcome Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baum (2013)</td>
<td>War (Israel)</td>
<td>Building Resilience Intervention (BRI) [Teacher Training]</td>
<td>PTSD, anxiety</td>
<td>287 (136)</td>
<td>9.5-11.5 (10.80)</td>
<td>School (Teacher)</td>
<td>Randomized, pre-post with waitlist control</td>
<td>Anxiety (.70) PTSD (.54)</td>
</tr>
<tr>
<td>Berger (2009)</td>
<td>Tsunami (Sri Lanka)</td>
<td>Enhancing Resiliency among Students Experiencing (ERASE) – Stress Sri Lanka (ES-SL) [EBP/CBT]</td>
<td>Stress, PTS, depression, functional impairment, somatic complaints, hope</td>
<td>166 (84)</td>
<td>9-15 (Not reported)</td>
<td>School (Teacher)</td>
<td>Randomized, pre-post with waitlist control</td>
<td>Depression (.58) PTSD (.96) Functional Impairment (.74)</td>
</tr>
<tr>
<td>Berger (2007)</td>
<td>Terrorist attack (Israel)</td>
<td>Overshadowing the Threat of Terrorism (OTT) [Eclectic/CBT]</td>
<td>PTSS, anxiety, functional problems, somatic concerns</td>
<td>142 (70)</td>
<td>7.5-11.5 (9.50)</td>
<td>School (Teacher)</td>
<td>Randomized, pre-post with waitlist control</td>
<td>Anxiety (.99) PTSD (.123) Functional Impairment (.92)</td>
</tr>
<tr>
<td>Bolton (2007)</td>
<td>War (Uganda)</td>
<td>Interpersonal Psychotherapy Group (IPT-G) [EBP]</td>
<td>Depression, anxiety, conduct</td>
<td>179 (90)</td>
<td>14-17 (15.00)</td>
<td>Other Community Setting (Community Agency)</td>
<td>Randomized, pre-post with waitlist control</td>
<td>Depression (-.61)</td>
</tr>
<tr>
<td>Chermotb (2002)</td>
<td>Hurricane (USA)</td>
<td>Eye Movement Desensitization and Reprocessing (EMDR) [EBP]</td>
<td>PTSD, anxiety, depression</td>
<td>32 (17)</td>
<td>6-12 (8.40)</td>
<td>School (MH Professional)</td>
<td>Randomized, pre-post with waitlist control, longitudinal 3mo follow-up</td>
<td>Anxiety (-.26) Depression (.08) PTSD (.18)</td>
</tr>
<tr>
<td>Study</td>
<td>Location</td>
<td>Intervention</td>
<td>Evaluation Target</td>
<td>Study Type</td>
<td>Control Group</td>
<td>Effect Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------</td>
<td>-------------------------------------------------------------------------------</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cooley-Strickland</td>
<td>Community violence (USA)</td>
<td>FRIENDS modified [EBP/CBT]</td>
<td>Anxiety</td>
<td>Randomized, pre-post with waitlist control</td>
<td>Anxiety (.02)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ertl (2011)</td>
<td>War (Uganda)</td>
<td>KidNET (Narrative Exposure Therapy) [EBP/CBT]</td>
<td>PTSD, depression, functional impairment</td>
<td>Randomized, pre-post with waitlist control</td>
<td>Depression (.69) PTSD (1.07) Functional Impairment (.56)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Karam (2008)</td>
<td>War (Lebanon)</td>
<td>CBT and Stress Inoculation [Eclectic/CBT]</td>
<td>Major depressive disorder (MDD), separation anxiety disorder (SAD), PTSD</td>
<td>Non-randomized, pre-post with waitlist control</td>
<td>Depression (.33) PTSD (.37)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kataoka (2003)</td>
<td>Community violence (USA)</td>
<td>Adapted Cognitive Behavioral Intervention for Trauma in Schools (CBITS) [EBP/CBT]</td>
<td>PTSD, depression, anxiety</td>
<td>Randomized, pre-post with no treatment control</td>
<td>PTS: Reexpereince =.77 Hyperarousal =.61 Avoidance =.59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesmana (2009)</td>
<td>Terrorist attack (Indonesia)</td>
<td>Spiritual-Hypnosis Assisted Treatment (SHAT) [Eclectic]</td>
<td>PTSD</td>
<td>Randomized, pre-post with no treatment control</td>
<td>PTS; Reexpereince =.77 Hyperarousal =.61 Avoidance =.59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loughry (2006)</td>
<td>War (Palestine, West Bank)</td>
<td>Recreational &amp; connectivity activities [Eclectic]</td>
<td>Internalizing, externalizing, hope, parental support</td>
<td>250 (200)</td>
<td>6-17 (11.31)</td>
<td>Other Community Setting (Community members)</td>
<td>Randomized, pre-post with control</td>
<td>Internalizing (.19) Externalizing (.33)</td>
</tr>
<tr>
<td>Peltonen (2012)</td>
<td>War (Palestine)</td>
<td>School Mediation Intervention (SMI) [Eclectic]</td>
<td>Depression, PTSD, prosocial behavior, aggression, psychological distress</td>
<td>225 (141)</td>
<td>10-14 (11.37)</td>
<td>School (Teacher)</td>
<td>Randomized, pre-post with a no treatment control</td>
<td>Depression (.40) PTSD (-.45) Conduct (.88)</td>
</tr>
<tr>
<td>Punamäki (2014)</td>
<td>War (Palestine)</td>
<td>Teaching Recovery Techniques (TRT) [Eclectic/CBT]</td>
<td>Emotional regulation</td>
<td>482 (242)</td>
<td>10-13 (11.29)</td>
<td>School (MH Professional)</td>
<td>Non-randomized, pre-post with waitlist control, longitudinal 9mo follow-up</td>
<td>Emotional Regulation (.00)</td>
</tr>
<tr>
<td>Ruf (2010)</td>
<td>War (Germany for Asylum)</td>
<td>KidNET (Narrative Exposure Therapy) [EBP/CBT]</td>
<td>PTSD</td>
<td>26 (13)</td>
<td>7-16 (11.40)</td>
<td>Clinical Outpatient (MH Professional)</td>
<td>Randomized, pre-post with waitlist control</td>
<td>PTSD (1.35)</td>
</tr>
<tr>
<td>Shen (2002)</td>
<td>Earthquake (Taiwan)</td>
<td>Short-term child-focused group play therapy [Eclectic]</td>
<td>Anxiety, depression</td>
<td>30 (15)</td>
<td>8-12 (9.7)</td>
<td>School (MH Professional)</td>
<td>Randomized, pre-post with a no treatment control</td>
<td>Anxiety (.51) Depression (.03) Functional Impairment (.19)</td>
</tr>
<tr>
<td>Stein (2003)</td>
<td>Community violence (USA)</td>
<td>Cognitive Behavioral Intervention for Trauma in Schools (CBITS) [EBP]</td>
<td>PTSS &amp; depression</td>
<td>126 (54)</td>
<td>10-11 (10.95)</td>
<td>School (MH Professional)</td>
<td>Randomized, pre-post with waitlist control, longitudinal 6mo follow-up</td>
<td>PTSD (.82) Conduct per Teacher (.28)</td>
</tr>
<tr>
<td>Study (Year)</td>
<td>Event Type</td>
<td>Treatment</td>
<td>Primary Outcomes</td>
<td>Sample Size</td>
<td>Age</td>
<td>Setting</td>
<td>Design</td>
<td>Additional Details</td>
</tr>
<tr>
<td>-------------</td>
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</tr>
<tr>
<td>Zhu (2014)</td>
<td>Earthquake (China)</td>
<td>Calligraphy Training [Eclectic]</td>
<td>PTSD</td>
<td>210 (129)</td>
<td>9-11 (10.51)</td>
<td>School (Teacher)</td>
<td>Randomized, pre-post with a no treatment control</td>
<td>PTSD; Intrusion = .52 Arousal = .33 Avoidance = .19</td>
</tr>
</tbody>
</table>
Analysis of Psychological Outcome Categories

Effect sizes were computed for psychological outcome categories as well. Outcome category formation was guided by the outcome categories examined in Furr and colleagues (2010) and Bobich (2011) research syntheses of mental health programs with psychological outcomes and by available data from included studies. Seven outcome categories were subsequently generated that spanned broad and specific psychological symptoms. These included broad internalizing symptoms with specific symptoms, such as anxiety, depressive, and post-traumatic stress disorder (PTSD), and externalizing symptoms (directly synonymous with conduct), and other symptoms that were measured consistently across studies (e.g., functional impairment). A majority of the outcome category effect sizes were significantly different from zero. The following categories did not reach significance: functional impairment (p = .077) and externalizing/conduct (p = .089). Outcome categories did not significantly differ from one another. Outcome category effect sizes, corresponding 95% confidence intervals, and p-values are listed in Table 3.

Table 3. Effect Sizes for Broad and Specific Outcome Categories

<table>
<thead>
<tr>
<th>Outcome Category</th>
<th>N of Studies</th>
<th>Effect Size (Hedge’s g)</th>
<th>95% Confidence Interval</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internalizing Symptoms</td>
<td>23</td>
<td>0.467</td>
<td>.263 to .671</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Anxiety</td>
<td>12</td>
<td>0.470</td>
<td>.183 to .758</td>
<td>0.001</td>
</tr>
<tr>
<td>Depression</td>
<td>14</td>
<td>0.329</td>
<td>.083 to .575</td>
<td>0.009</td>
</tr>
<tr>
<td>PTSD</td>
<td>17</td>
<td>0.458</td>
<td>.221 to .695</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Externalizing Symptoms</td>
<td>5</td>
<td>0.372</td>
<td>-.056 to .799</td>
<td>0.089</td>
</tr>
<tr>
<td>Conduct</td>
<td>5</td>
<td>0.372</td>
<td>-.056 to .799</td>
<td>0.089</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functional Impairment</td>
<td>6</td>
<td>0.352</td>
<td>-.038 to .742</td>
<td>0.077</td>
</tr>
</tbody>
</table>

Note: “N of studies” represents the number of independent study samples per category.
Moderators of Intervention Effectiveness

Moderator analyses were conducted to determine factors that influence intervention effectiveness. First, a power analysis of heterogeneity was conducted to estimate the likelihood of a statistically significant result (Borenstein et al., 2009). Again, assuming a random effects model, moderate heterogeneity, and an alpha of .05, statistical power equated to .6553. Because the present power is medium in level, conclusions drawn from the following moderator analyses should be made with caution (Borenstein et al., 2009).

Next, to determine whether moderator analysis is permissible, heterogeneity among samples must exist and this is examined through obtaining a Q-statistic and corresponding p-value. The Q-statistic is a test of the null hypothesis that all variance among samples is due to random error and is not due to real differences in sample effects (Borenstein et al., 2009). A significant Q-statistic indicates that the studies are not from a common population, while a non-significant Q value indicates the opposite (Higgins, Thompson, Deeks, & Altman, 2003). In the current meta-analysis, the aggregate effect size across all twenty-four samples was not internally homogenous, \( Q(85) = 524.151, p < .001 \); thus, the null hypothesis is rejected, and it is concluded that at least some of the dispersion across samples is due to real differences in sample effects. Therefore, moderator analyses may be conducted.

As a complement to the Q-statistic, the \( I^2 \) statistic indicates the percent of heterogeneity among a set of studies and the percent of variance that is due to real sample effects (Borenstein et al., 2009). The \( I^2 \) values range from 0% to 100%. 
According to Higgins and colleagues (2003), values around 15% reflect a mild degree of heterogeneity, between 25% and 50% a moderate degree, and values greater than or equal to 75% a high degree of heterogeneity. The $I^2$ index measures the extent of true heterogeneity, dividing the difference between the result of the $Q$ test and its degrees of freedom ($k - 1$) by the $Q$ value itself and multiplying by 100 (Higgins et al., 2003). The $I^2$ among the twenty-four samples included in this meta-analysis is 83.783, indicating that approximately 83.8% of the variance is due to real sample effects (not random error), and therefore, moderator analysis could explain up to 83.8% of sample dispersion. Based on the significant $Q$-statistic and high $I^2$ value, moderator analyses were justified. Borenstein and colleagues (2009) note that power to detect the relationship between subgroup membership and effect size or between covariate values and effect size is commonly low.

**Moderation with Categorical Variables**

Moderator analyses with categorical moderator variables were conducted to compare effect sizes between groups of studies. More specifically, a mixed effects analysis was used. In a mixed effects analysis, a random effects model is used to combine samples within each group, and a fixed effect model is used to combine groups and yield the overall effect. The sample-to-sample variance (tau-squared) is assumed to be the same for both/all groups; this value is computed within groups and then pooled across groups (i.e., obtaining a pooled variance) (Borenstein et al., 2009). In the mixed effects analysis, differences between groups of samples (i.e., moderation) were examined by computing a $Q$-statistic.
and the corresponding p-value. In this case, the Q-statistic is a test of the null hypothesis that there is no difference between groups.

Two moderator analyses were conducted to compare Evidence-Based Practice (EBP) utilization among the studies reviewed. The first analysis compared studies in which the sample was exposed to an EBP intervention, an evidence-informed practice (EIP; based on cognitive-behavioral therapy approaches), or to non-EBP/EIP methods. Nine samples exposed to EBP interventions, six samples exposed to EIP interventions, and nine samples exposed to non-EBP/EIP interventions were included in this analysis. Using a mixed effects estimate, the nine samples presented with EBP interventions resulted in a Hedge’s $g$ and a corresponding 95% confidence interval of .374 (.046 to .702), the six samples presented with EIP interventions resulted in a Hedge’s $g$ of .593 (.205 to .981), and the nine samples presented with non-EBP/EIP interventions resulted in a Hedge’s $g$ of .463 (.144 to .781). Moderator analysis yielded, $Q (1) = 0.713$, $p = .700$, indicating that there was no significant difference between intervention sample outcome based on EBP utilization.

The second EBP analysis compared studies in which the sample was exposed to either an EBP intervention or an EIP intervention (with a CBT component), versus samples exposed only to non-EBP/EIP methods. The analysis included 15 samples exposed to EBP/EIP interventions and nine samples exposed to non-EBP/EIP interventions. Using a mixed effects estimate, the 15 samples presenting with EBP/EIP interventions resulted in a Hedge’s $g$ and a corresponding 95% confidence interval of .466 (.212 to .719) and the nine
samples presented with non-EBP/EIP interventions resulted in a Hedge’s $g$ of .463 (.139 to .786). Moderator analysis yielded, $Q (1) = 0.0002, p = .987$, indicating no significant difference between intervention sample outcome based on EBP or EIP utilization. Table 4 presents findings for all moderator analyses, all following the above methodology. These results are later discussed in the Discussion section.
Table 4. Results of Moderator Analyses with Categorical Moderators

<table>
<thead>
<tr>
<th>Moderator</th>
<th>Category</th>
<th>N of Studies</th>
<th>Effect Size (g)</th>
<th>95% CI</th>
<th>Q, p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Disaster Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>Natural</td>
<td>6</td>
<td>.657</td>
<td>.265 to 1.049</td>
<td>1.239, p=.266</td>
</tr>
<tr>
<td></td>
<td>Human-Made</td>
<td>18</td>
<td>.402</td>
<td>.181 to .622</td>
<td></td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic</td>
<td></td>
<td>17</td>
<td>.385</td>
<td>.159 to .610</td>
<td>1.603, p=.205</td>
</tr>
<tr>
<td>Episodic</td>
<td></td>
<td>7</td>
<td>.657</td>
<td>.301 to 1.014</td>
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<td><strong>Population Characteristics</strong></td>
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<tr>
<td>Average Age</td>
<td>5-9</td>
<td>6</td>
<td>.445</td>
<td>.039 to .851</td>
<td>0.717, p=.388</td>
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<tr>
<td>10-12</td>
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<td>11</td>
<td>.434</td>
<td>.133 to .736</td>
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<tr>
<td>13-18</td>
<td></td>
<td>5</td>
<td>.509</td>
<td>.068 to .949</td>
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<td>Low SES</td>
<td>Yes</td>
<td>19</td>
<td>.523</td>
<td>.302 to .743</td>
<td>1.269, p=.260</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>5</td>
<td>.249</td>
<td>-.172 to .671</td>
<td></td>
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<td>Complex Trauma Reported</td>
<td>Yes</td>
<td>11</td>
<td>.457</td>
<td>.163 to .751</td>
<td>1.007, p=.604</td>
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<tr>
<td></td>
<td>No</td>
<td>6</td>
<td>.622</td>
<td>.226 to 1.018</td>
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<td></td>
<td>Unclear</td>
<td>7</td>
<td>.355</td>
<td>.013 to .696</td>
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<td><strong>Intervention Characteristics</strong></td>
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<td>Diagnostic Cut-off</td>
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<td>.457</td>
<td>.149 to .765</td>
<td>0.004, p=.952</td>
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<td></td>
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<td>13</td>
<td>.469</td>
<td>.208 to .732</td>
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<td>.391</td>
<td>.153 to .629</td>
<td>1.133, p=.287</td>
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<td>Other (e.g., Clinical Outpatient, CMHC, Community)</td>
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<td>.622</td>
<td>.271 to .973</td>
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<td>Change Agent</td>
<td>MH Professional</td>
<td>13</td>
<td>.530</td>
<td>.263 to .798</td>
<td>2.851, p=.240</td>
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<td>Teacher</td>
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<td>.552</td>
<td>.219 to .884</td>
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<td>Other (e.g., Community Agency/ Members)</td>
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<td>.119</td>
<td>-.323 to .560</td>
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<td>Intervention Length (# of Sessions)</td>
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<td>6</td>
<td>.739</td>
<td>.306 to 1.171</td>
<td>2.588, p=.274</td>
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<td></td>
<td>7 to 11</td>
<td>7</td>
<td>.495</td>
<td>.105 to .884</td>
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<tr>
<td></td>
<td>12 or more</td>
<td>7</td>
<td>.275</td>
<td>-.090 to .641</td>
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<td>Evidence-Based Practice (EBP)</td>
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<td>0.713, p=.700</td>
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<td>Analysis 1</td>
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<td>.205 to .981</td>
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<tr>
<td></td>
<td>No</td>
<td>9</td>
<td>.463</td>
<td>.144 to .781</td>
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<td>EBP</td>
<td>EBP/ EIP</td>
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<td>.466</td>
<td>.212 to .719</td>
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<tr>
<td>Analysis 2</td>
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<td>.463</td>
<td>.139 to .786</td>
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<td>Caregiver Involvement</td>
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<td>.483</td>
<td>.123 to .843</td>
<td>0.014, p=.905</td>
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<td></td>
<td>No</td>
<td>17</td>
<td>.457</td>
<td>.217 to .696</td>
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<td>Cultural Adaptation</td>
<td>Yes</td>
<td>9</td>
<td>.458</td>
<td>.134 to .782</td>
<td>0.002, p=.959</td>
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<tr>
<td></td>
<td>No/Cannot Tell</td>
<td>15</td>
<td>.469</td>
<td>.215 to .722</td>
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</tr>
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</table>

“N of studies” represents the number of independent study samples per category. “95% CI” refers to the 95% confidence interval. “Q, p” is the Q-statistic and corresponding p-value.

CMHC = community mental health
Publication Bias

Publication bias refers to a phenomenon common in meta-analyses that occurs when research findings in the published literature are systematically unrepresentative of the total population of completed studies (Borenstein et al., 2009). When publication bias exists, conclusions drawn from the published literature may be inaccurate; specifically, an overestimate of the true effect. One hypothesized reason for publication bias is the “File Drawer Effect” (Rosenthal, 1979). This theory states that statistically significant results are more likely to be published than null findings, thus biasing the literature base and, consequently, meta-analyses. Another potential reason for publication bias is the tendency for smaller studies to be conducted more rigorously and/or with better interventions (Borenstein et al., 2009). In the current meta-analysis, the 24 included samples were tested for whether they represent a biased sample of all studies. The following statistical procedures were conducted to analyze the potential for publication bias: forest plot, funnel plot, rank correlation, regression, fail-safe N, and the trim and fill method.

Forest Plot

The forest plot presents a visual representation of the relative weights associated with each independent sample (Borenstein, 2009). The plot presents samples with the lowest weight contribution (i.e., smallest sample sizes and largest standard errors) at the top. As seen in Figure 2, there is some evidence to suggest that studies with smaller samples sizes, thus smaller weights, have greater effect sizes than the studies with larger weights and larger sample sizes, which
may be indicative of publication bias.
Figure 2. Effect Size Forest Plot Across 24 Post-disaster Interventions
Funnel Plot

The funnel plot is a plot of the measure of sample standard error on the vertical axis as a function of Hedge’s $g$ on the horizontal axis. When samples are distributed symmetrically about the combined effect size, publication bias is absent. When the bottom of the plot shows a higher concentration of samples on one side of the mean than on the other, publication bias is present (Borenstein, 2006). In the current meta-analysis, a sample at the bottom right-hand side of the graph, suggests the possibility of mild publication bias, as seen in Figure 3.

Figure 3. Funnel Plot of Standard Error by Standard Difference in Means

Begg and Mazumdar Rank Correlation Test

To quantify the bias captured by the funnel plot, Begg and Mazumdar (1994) suggested that the inverse correlation between standard error (sample size) and effect size can be computed and serve as a test of publication bias.
Specifically, a rank order correlation (Kendall’s tau b) between the treatment effect and the standard error is computed. A significant correlation suggests the existence of bias. In the current analysis, Kendall’s tau b = -0.039, Z = 0.273, p (1-tailed) = .392, p (2-tailed) = .785; therefore, the rank correlation test does not indicate significant publication bias.

**Egger’s Regression Test**

Similarly, Egger’s linear regression method (Egger, Davey Smith, Schneider, & Minder, 1997) is also intended to quantify the bias captured by the funnel plot. Egger, however, suggests using the actual values of the effect sizes and their precision, rather than ranks, by regressing the standardized effect on the inverse of the standard error. In the resulting regression equation, the slope represents the treatment effect, and the intercept is a measure of bias. A significant intercept suggests the existence of bias. In the current analysis, Intercept = -0.032, SE = 1.489, CI95 = -3.121 to 3.057, t (22) = .021, p (1-tailed) = .491, p (2-tailed) = .983. These p-values suggest no significant publication bias.

**Fail-Safe N**

If publication bias is present, it is hypothesized that some non-significant studies are missing from our analysis, and including these missing studies would nullify the observed effect. Therefore, the number of studies that would be required to nullify the effect – the Fail-safe N (FSN) – is computed. As reported in the above results, this meta-analysis incorporates data from 24 studies, which yield a z-value of 14.137 and corresponding p-value less than 0.001. The FSN is 1225, which means that 1225 null studies (mean Hedge’s g = 0) would need to be
located and included in order for the combined p-value to exceed 0.05. More conservatively estimated, when the alpha level was set to 0.01 (instead of 0.05), analysis yielded a FSN of 699.

Rosenthal (1979) suggested that the FSN be equal to or larger than five times the number of retrieved studies (or, in this case, independent samples) plus 10. Both FSN estimates in this meta-analysis exceed Rosenthal’s recommended resistance number, $24 \times 5 + 10 = 130$, thus indicating no significant bias.

**Duval and Tweedie’s Trim and Fill**

Based on the four methods above, there is some possibility of publication bias. Next, it is important to ask how the intervention effect or overall effect size would shift if bias were to be removed. In reference to the funnel plot, because at least one sample (with a large effect size) falls toward the right of the mean, there is concern that studies such as this may actually exist and are missing from the analysis. Duval and Tweedie (2000) developed a method that allows for the imputation of these studies, called Trim and Fill. That is, the theoretical locations of these missing studies are determined, the studies are added to the analysis, and then the combined effect is recomputed.

In the current analysis, assuming a random effects model of imputation, the Trim and Fill method suggested that one study is missing. Under a random effects model, Hedge’s $g$ and 95% confidence interval for the combined studies is $0.497 \ (0.345 \text{ to } 0.649)$. Using Trim and Fill, the imputed Hedge’s $g$ estimate is $0.459 \ (0.313 \text{ to } 0.605)$. 
In summary, upon examining the forest and funnel plots, there appears to be a potential for publication bias. The rank correlation and intercept tests, however, indicate the absence of significant bias. The fail-safe N suggests that 699 studies with null findings would need to be found in order to bring the overall effect size to a non-significant level. Illustrated proportionally, for every one of the twenty-four observed samples in this meta-analysis there would need to be 29 missing null samples for the overall effect to be nullified. The trim and fill method indicates that, to remove even small bias in this meta-analysis, one sample would need to be added. The overall effect, compared to the original (.344 versus .313) remains positive and significantly greater than zero. Taken together, findings in this meta-analysis appear to be robust.
DISCUSSION

Increases in disaster rates over time and the growing availability of randomized controlled trials (RCTs) of post-disaster mental health interventions call for a systematic review of overall intervention effects. The aims of the current meta-analytic review were to evaluate the effectiveness of post-disaster mental health interventions published in a 15-year-period, between 2000 and 2014, targeting psychological outcomes among children and adolescents, and to examine participant, disaster, and intervention features moderating intervention effects. No meta-analysis to date has comprehensively examined program effects or moderators of intervention effectiveness specific to post-disaster mental health outcomes.

An examination of key study characteristics revealed that most interventions were provided in large group-settings, often within the school, and administered by either a mental health professional or a schoolteacher. In combination, eighty-seven percent of the evidence-based practice (EBP) and evidence-informed practice (EIP) interventions reviewed in the present study were based on or informed by cognitive-behavioral therapy (CBT) approaches. Notably, international samples impacted by chronic, human-made disasters were most common in the present study. Further, post-disaster RCTs were largely utilized among youth of low socio-economic status (79.2%) and in war contexts (45.8%).

In general, results of the current investigation demonstrated that post-disaster interventions produced small to moderate effect sizes in comparison to
control groups (waitlist or treatment at usual), supporting effectiveness of post-disaster interventions for youth. The current review used a random-effects model, which assumes that the true effects vary from study to study, but are normally distributed, allowing the generalization to a broader range of intervention scenarios. Results across 24 independent samples of mental health interventions yielded a significant, approaching a medium, effect size (Hedge’s $g = .4802$), providing evidence that mental health interventions for children and adolescents following various forms of disaster can yield benefits for psychological outcomes. Overall, these results suggest that post-disaster interventions can provide benefits for youth following various disaster circumstances.

Further, results indicated that post-disaster interventions have different effects on individual outcomes. Specifically, participants in the analyzed interventions showed the largest effects on anxiety, post-traumatic stress disorder (PTSD), and depression symptoms and non-significant effects on conduct and functional impairment symptoms. These psychological outcomes of impact are consistent with those mental health symptoms most commonly reported following a disaster (Kilpatrick et al., 2003; Norris et al., 2002). Therefore, this result may be driven by the fact that the majority of interventions supporting symptom reduction emphasized both the measurement and treatment of anxiety, PTSD/PTSD, and depression, in contrast to conduct and functional symptoms. In concordance, many interventions directly targeted symptom amelioration in these areas, with an emphasis placed on exposure, behavioral activation, and/or trauma narrative techniques (e.g., Ruf et al., 2010; Stein et al., 2003; Zhu et al., 2014).
Given the understanding that, typically, post-disaster interventions can be beneficial for youth, it is important for us to understand the factors that could moderate (i.e., increase or decrease) an intervention’s effect size. If moderators can be identified, perhaps post-disaster interventions can be improved by utilizing intervention practices that have been shown to demonstrate positive results for youth. This meta-analysis examined the following moderators: a) youth characteristics (i.e., age, socio-economic status (SES), experience of complex trauma), b) disaster characteristics (i.e., source, frequency), c) intervention characteristics (i.e., diagnostic cut-off, setting, change agent, length), and d) components of the conceptual model (i.e., evidence-based practice, caregiver involvement, cultural adaptations). Conclusions gathered from the moderation analyses should be considered with caution due to the reduced moderator power in the present analysis.

Youth Characteristics

No significant relationship was found between intervention effectiveness and youth characteristics, including age, SES level, or reported experience of complex trauma. This findings suggests that the interventions were just as beneficial to improving outcomes among youth of varying ages, which is consistent within the previous, yet mixed, youth profile findings that both children and adolescents may exhibit an ability to engage in and benefit from therapeutic activities (Saylor, Cowart, Lipovsky, Jackson, & Finch, 2003; Hodas, 2006; Schuster et al., 2001; Terr et al., 1997). Overall, the effectiveness of mental health
interventions for youth with mental health and general problems does not differ based on age; however, age may be a moderator for specific outcomes or sub-groups. For example, treatment intervention types are found to be most effective when age appropriate with increased consideration of active, play-based approaches for young children and more cognitive-based strategies for older youth (e.g., Terr, 1989; Vernberg & Vogel, 1993). This remains an area for further study.

While interventions may also be helpful across SES level, the following factors are important to note. First, findings for SES may be skewed by the fact that low-SES youth represented the majority of the samples used in the interventions that were reviewed within the current meta-analysis. Second, because the scope of the present meta-analysis includes both national and international post-disaster interventions, the method in which SES is accounted for among international studies is based on the author’s report of low-income status and/or limited access to key resources (i.e., food, stable housing) among study participants. As a result, the definition of low-SES and low-income may be contextually based and subject to differences across author reports (National Center for Education Statistics, 2012).

Youth who reported past experiences of complex trauma, beyond and in addition to previous disaster experiences (e.g., assault, exposure to a range of violence, witnessing severe domestic violence, military trauma/war, etc.), compared to those who did not report complex trauma revealed no significant difference on intervention effectiveness. It is notable that the experience of
complex trauma was not consistently assessed across studies and this may have impacted outcomes. A preferred assessment of complex trauma would include consistent measurement, detailed experiential information, and would consider the rate and magnitude of the accrued trauma(s) (e.g., one added trauma experience verses several, witnessing violence versus direct assault).

**Disaster Characteristics**

Disaster source includes natural and human-made forms of disaster, while disaster frequency distinguishes between single-event, episodic occurrences and chronic events with increased rates of reoccurrence. These disaster characteristics were proposed as moderators, however, no significant differences were found among them. The lack of significant effects is counter to previous research findings that human-made forms of disaster have an increased mental health impact due to the malicious origin and intent of the disaster, fostering a heightened level of fear and mistrust in others, compared to natural disasters that are reported to drive community support and collaborative efforts (Hodas, 2006; Perry et al., 1995).

It was found that disaster source and frequency were highly concordant, such that all but one of eighteen human-made disasters were found to be chronic in frequency and all natural disasters were reported to be episodic. The exception was one study presenting a single occurrence terrorist attack in Bali, Indonesia (Lesmana et al., 2009). A majority (70.8%) of the interventions within the present review consisted of chronic, human-made types of disaster (i.e., war, ongoing terrorism, and community violence). Chronic, human-made disasters undoubtedly
warrant a considerably different formulation for intervention success in comparison to natural disasters, as the youth must endure varying rates of ongoing, active disaster exposure requiring differing coping strategies to drive effectiveness.

Due to the few post-disaster intervention studies conducted within the context of natural disasters (n = 6), the results related to the moderation of disaster source should be considered with extreme caution. The reduced number of RCTs implemented following natural disasters is likely reflective of the unpredictability of natural disasters as well as the convenience associated with chronic, human-made disasters that tend to have an increased predictability of continuation. These analyses should be replicated with a larger sample size to determine whether differences in effects would be statistically significant with the inclusion of more mental health interventions provided in the wake of natural disasters.

**Intervention Characteristics**

No significant differences were found between interventions on the basis of diagnostic cut-off, setting type, change agent, or intervention length. These findings suggest that the post-disaster interventions were just as beneficial to improving psychological outcomes for youth with or without implementation of a diagnostic cut-off as inclusion criteria to receive services. In this vein, use of a diagnostic cut-off may be best reserved when personnel and resource allocations are low, such as shortly after disaster aftermath. However, with the availability of adequate resources, interventions should be provided more generally to all youth to improve widespread psychological outcomes post-disaster.
While no significant differences were found between intervention settings, suggesting that the receipt of interventions may be beneficial regardless of the setting in which it is received, a majority of the interventions were conducted within school-based settings. This is largely due to a movement towards school-based group mental health intervention efforts because of the convenience and accessibility of a captive youth population within a context eliciting and supporting youth functioning (Chemtob et al., 2002).

In regard to change agents, the quantity and quality of training they received prior to intervention start and fidelity checks during the intervention was not consistently reported across intervention studies. Increased assessment and control of training and fidelity methods are of importance as they may be valuable moderators to intervention effectiveness (Mowbray, Holter, Teague, & Bybee, 2003).

The lack of significant effects for intervention length (or number of sessions) is in line with previous meta-analyses of mental health interventions that also found non-significant findings for intervention length (e.g., Farahmand et al., 2012). Further, in the larger context of interventions targeting youth with emotional and behavioral problems, short- and long-term interventions have shown efficacy (see SAMHSA’s NREPP http://www.nrepp.samhsa.gov/). Post-disaster interventions may be similar. What may be more vital to an effective intervention is the ability to build rapport to support intervention buy-in among youth, accomplish treatment goals, and conclude the intervention with a compilation of helpful coping skills. This is an area for further study.
Past studies have noted the importance of measuring intervention dosage rather than length of the intervention (Nation et al., 2003). Dosage refers to an actual measurement of how much participants were exposed to the intervention. An intervention may last 4 months but participants only receive the intervention once a week for 1 hour per week resulting in a total dosage of 16 hours. While another intervention may last 4 weeks total but be a 2-hour sessions two times per week, resulting in a total dosage equal to a intervention that lasts four times as long. Unfortunately, due to the infrequency and unreliability of studies reporting dosage, dosage was not used in this study and length was used instead. The lack of consistent and reliable measurement of intervention dosage across participants in studies highlights an area in need of improvement in the post-disaster intervention literature.

The Conceptual Model

The conceptual model, based on three key areas of moderation (i.e., caregiver involvement, evidence-based practice (EBP) use, cultural adaptation) hypothesized to support improved psychological outcomes in post-disaster interventions, was not supported in the present meta-analysis. A contributing factor may be that the majority of the interventions included in the present analysis did not incorporate caregiver involvement (71%) and/or cultural adaptation (62%), in turn limiting outcomes and making it difficult to draw generalized conclusions. Moderation based on EBP use was also found to be non-significant. These three areas of moderation are discussed in further detail in the following sections.
**Caregiver Involvement.** Interventions in which caregiver involvement was incorporated showed no difference in effect size when compared to those interventions that did not include caregiver involvement. This may be because among interventions attempting to involve caregivers, the level of actual involvement was minimal and often less than what was initially sought (i.e., desire to hold several caregiver psychoeducation sessions to support youth skill utilization was limited to one or two sessions). In this investigation, programs that included caregivers generally sought to provide psychoeducation and enhance promotion of youth skills outlined within the intervention. There was only one study that consisted of ongoing caregiver involvement as the intervention aimed to improve caregiver psychological outcomes to directly support improvements in the psychological outcomes of young children (Dybdahl et al., 2001). This intervention produced decreases in maternal PTS resulting in subsequent increases in functioning and healthy height and weight gains among youth. It is possible that caregivers experienced difficulty in attendance and availability due to other priorities following the occurrence of a disaster. This is an area warranting further study.

Active caregiver involvement in youth mental health interventions could yield improved outcomes among youth given the importance of caregiver involvement on youth psychological outcomes, which have been noted throughout mental health literatures (e.g., Fan & Chen, 2001; Norris et al., 2002; Patterson, Dishion, & Bank, 1984). This is especially true given the utility of such involvement in heightening treatment gains via increased symptom reduction,
skill generalization and maintenance, and improved treatment cooperation among youth (Norris et al., 2002). Despite the potential benefit of involving caregivers in interventions, many educators and mental health professionals encounter challenges in successfully engaging caregivers in intervention efforts. Added strategy development to aid in heightened efficiency of caregiver engagement within a highly stressed population is essential and may underscore a need for added funding to provide attendees with a meeting location of convenience, nourishment, transportation/parking waiver, and/or monetary incentive.

Evidence-based practice (EBP). In the current meta-analysis, no significant differences in effect size emerged across interventions that utilized EBP interventions, evidence-informed practice (EIP) interventions containing cognitive behavioral therapy (CBT) approaches, or interventions that were not EBP nor evidence-informed. These findings are inconsistent with the qualitative reviews by Wethington and colleagues (2008) and Brown (2005) that both found CBT approaches to the treatment of PTSD and other trauma-related symptoms to be superior and most efficacious in children exposed to various traumatic events. Due to the significant amount of heterogeneity found throughout the post-disaster interventions, the results related to the moderation of EBP use should be considered with caution.

Nevertheless, the present findings may highlight the utility of RCTs in identifying additional beneficial treatment approaches, beyond the current library of EBPs, which could prove valuable under the basis of replicated intervention results and effect size research. While there has been insufficient evidence to date
to determine effectiveness, psychodynamic-based and eclectic treatments, through
the use of active play, drawing, and other creative forms of self-expression, can
allow traumatized children to communicate their thoughts and emotions and to
integrate the traumatic event into their understanding of life and self-concept
(Vernberg & Vogel, 1993; Wethington et al., 2008). The therapeutic goals include
helping children express frightening thoughts and feelings related to disaster
events and developing self-enhancing coping skills (Terr, 1989). Due to its
flexible nature, play can be incorporated in other types of psychotherapy and
EBPs to facilitate communication and reduce resistance (Cohen et al., 2003).

*Cultural Adaptation.* No significant difference in effect size emerged for
cultural adaptations. The culturally adapted interventions that were identified
included integration of native customs, such as traditional Palestinian dance
(Loughry et al., 2006) or Balinese trance (Lesmana et al., 2009), into the broader
intervention, or based the intervention on a cultural tradition or experience, such
as Chinese calligraphy training (Zhu et al., 2014) and exploring community gun
violence with Edutainment (Allen, 2012). It must be underscored that the
interventions in the current meta-analysis were predominately conducted in
international contexts (79%). Many of the international studies yielded a high
level of cultural and ethnic homogeneity (e.g., Israel, Turkey, Sri Lanka, Bosnia)
compared to the small number interventions based in the United States or in
countries providing asylum to youth from diverse racial/ethnic backgrounds. As a
result, cultural adaptations may be so inherent to these interventions, reports of
such adaptations or traditions for various cultural populations might not be
perceived as noteworthy. However, it must also be considered that because the study samples were highly international and homogeneous in nature, the present set of studies may not be well suited to look at issues of ethnic/cultural differences and the use of adaptations.

Although no significant differences were found between interventions that incorporated caregiver support, cultural adaptations, and EBP use, there remains value to the continued use and study of these moderators within future post-disaster intervention research.

**Limitations**

The current meta-analysis is not without limitations. First and foremost, this study was conducted with a small sample of 24 studies. While main effect power analysis indicated that 24 studies of their size are adequate to detect even small effects, reduced moderation power underscores the need for caution when interpreting the results of moderator analyses. Partly accounting for this issue, there is difficulty in performing post-disaster research, let alone RCTs, given logistical issues in the wake of unforeseen and chaotic disaster situations. Disaster mental health is a challenging field in which to conduct research as no one disaster is exactly the same as the next, with innumerable factors affecting survivor’s reactions and long-term outcomes. Thus, many obstacles face researchers attempting to formulate and consistently implement interventions (Shalev, 2006).

Second, a constraint that impacts all reviews and may contribute to a Type 1 error (eliciting bias toward a significant finding) is that study authors might not
have reported all of the outcomes they examined, with a preference often given toward reporting positive, significant findings (Reed, 2009). This limitation suggests that the reported effect size estimates for these interventions may be inaccurately high. While the findings from the publication bias analyses conducted within this meta-analysis appeared robust, the potential for publication bias persists.

Third, in the intervention literature very few studies reported longitudinal follow-up outcomes. Lack of follow-up assessment makes it difficult to determine the lasting effects of the interventions on psychological outcomes. More research is needed to understand how to impact youth beyond the duration of the intervention. Within the realm of post-disaster interventions, it would be helpful to measure the maintenance of treatment effects over time in order to firmly establish whether these programs can provide lasting mental health benefits when implemented a single time, or if added or ongoing supports might be useful.

Fourth, this study was limited by the perspective and inconsistency of the data collected and reported. As a key example, only a few of the studies included in this meta-analysis reported the length of time between the identified disaster and the assessment start period, therefore, the potential moderating effect of speed of intervention implementation could not be examined. Further, studies should consistently report information regarding program implementation fidelity (i.e., change agent training, supervision, and years of experience) and the various intervention strategies and practices used within the intervention. As a result these areas of moderation were unable to be reviewed in the present analysis. The
availability of information impacting fidelity was typically not available and data on intervention practices utilized ranged from very broad to very detailed, lacking the overall specificity required for a thorough analysis.

**Implications for Research, Practice, and Policy**

Results of the current meta-analysis suggest that delivery of post-disaster interventions for youth may improve youth psychological outcomes in anxiety, PTS, and depression. Because no significant effects were found among the moderators it may well be that the interventions remain beneficial in their psychological outcomes across the variability and presence of the following moderators: youth age, SES, complex trauma experience; disaster source and frequency; intervention diagnostic cut-off, setting, change agent, and length; and caregiver involvement, EBP use, and cultural adaptation as described in the conceptual model. Clinicians can refer to Table 2 for a list of interventions that reported 1) larger effect sizes, 2) positive effects for some specific outcomes, and 3) interventions to avoid because of potential for negative effects.

The issue of being able to ethically use RCT designs in the midst of post-disaster chaos may continue to be a hurdle. The implementation of waitlist controls helps circumvent this issue. However, a delay in starting the intervention and resulting psychological worsening among youth in the waitlist control is a concern. The RCTs included within the current review were provided following a span of time between the disaster and start of intervention administration (e.g., 6 months, 1 year).
It is important to utilize the treatment effectiveness data that has been gained from the current investigation to directly impact what we know can best support this population and further guide the methods utilized by associations devoted to the needs of child and adolescent in addition to related task forces and guidelines (e.g., American Academy of Pediatrics, 1995; National Child Traumatic Stress Network, 2012). This can aid in optimal targeting of intervention efforts and distribution of resources. While there were no significant effects reported across areas of moderation, as a whole, post-disaster treatment outcome results from 24 intervention studies indicate that children and adolescents receiving mental health interventions fared significantly better than those in control or waitlist groups with respect to anxiety, PTSD, and depression symptoms.

School-based groups in which teachers are the primary change agents may continue to be useful in intervention dissemination, as these moderators are not found to have any reduction in their benefit. Rather, school settings are indeed thought to increase child and adolescent catchment and engagement, with teachers as change agents further allowing for increased intervention feasibility and flexibility within the post-disaster setting (Chemtob et al., 2002; Goenjian et al., 1997; Ronan et al., 2008). These factors may significantly heighten successful implementation, dissemination, and transportability of post-disaster interventions (Chambless & Hollon, 1998); and as such warrant consideration by policy stakeholders and task forces that guide the distribution of monetary resources to aid in intervention packaging, and extending the reach and implementation of
effective mental health intervention practices among children, adolescents, and their families following disaster.

The current meta-analytic review offers empirical support for the success of post-disaster interventions in achieving their goals to provide youth with skills and competencies to enhance their mental health and reduce the risk of psychological problems during childhood and adolescence. Given that this is the first review of youth-focused post-disaster interventions, these findings should not be regarded as conclusive. Yet, these findings should stimulate added interest in investigating and understanding how mental health interventions affect youth, and how future research can enhance their effectiveness, especially in the identification of specific treatment methods and practices that may influence outcome gains for children and adolescents impacted by disaster.
REFERENCES

* Indicates study was included in this meta-analysis


Meta-analysis of Post-Disaster Mental Health Interventions for Children


Kilpatrick, D. G., Ruggiero, K. J., Acierno, R., Saunders, B. E., Resnick, H. S., &


Meta-analysis of Post-Disaster Mental Health Interventions for Children


*Peltonen, K., Qouta, S., El Sarraj, E., & Punamäki, R. (2012). Effectiveness of school-based intervention in enhancing mental health and social


APPENDIX A

DESCRIPTIVE CODING GUIDE

Post-Disaster Psychological Youth Interventions: Descriptive Meta Analysis Coding Form

Study ID#: ______________________

Coder(s): ______________________

Date: ______________________

Title of Article: ______________________

Author(s) of Article: ______________________

Contact Details: ______________________

Year of Publication: ________________

Journal: ______________________

Type of Publication [please check]

___ 1. Journal Article
___ 2. Dissertation
___ 3. Other: ______________________

Study Purpose/Hypotheses:

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
Applicability [please check]

__ 1. Coded, applicable
__ 2. Coded, not applicable
__ 3. Coded, needs data
__ 4. Not coded, not applicable

If not applicable for meta-analysis, explain:

General/Disaster Characteristics

Continent [please check]

__ 1. US
__ 2. Europe
__ 3. New Zealand
__ 4. UK
__ 5. Asia
__ 6. Pacific Island Region
__ 7. Africa
__ 8. Multi-country, Specify: _______________________________________
__ 9. Other, Specify: ________________________________________________

Population Density [please check]

__ 1. Rural
__ 2. Suburban
__ 3. Urban
__ 4. Cannot tell (does not specify, couldn’t figure it out based on information provided)

Disasters Specified and Measured [please check]

__ 1. Natural
    __ a. Earthquake
    __ b. Fire
    __ c. Flood
    __ d. Hurricane
    __ e. Motor Vehicle
    __ e. Tornado
    __ f. Tsunami
__ 2. Human-made
    __ a. Community Violence
    __ b. School Shooting
    __ c. Terrorist Act
    __ d. War

Frequency [select]

__ 1. Chronic
__ 2. Episodic
Disaster Reference Name,  
Specify: ______________________________________________________

Death Toll [fill in] ____________

Assessment Period/Study Duration [fill in] ________________________

  Month & Year of Disaster ______
  Month & Year(s) Data Collected ______
  Time Period of Data Collection(s): 
    1. _______ years    2. _______ months
    3. _______ weeks    4. _______ days
    5. __ Cannot tell (does not specify, couldn’t figure it out based on information provided)

Sample Characteristics

Sample Size [fill in]: ________________

Race and/or ethnicity [please check]
__   1. Primarily African American/Black (over 75% of sample)
__   2. Primarily Hispanic or Latino/a (over 75% of sample)
__   3. Primarily Caucasian/White (over 75% of sample)
__   4. Primarily Asian (over 75% of sample)
__   5. Primarily Other (over 75% of sample)
__   6. Mix (no group over 75%)
__   7. Cannot tell (does not specify, couldn’t figure it out based on information provided)

What is the exact percentage of each racial/ethnic group? [fill in]
__   1. African American/Black  What nationalities are represented in the sample? [please list]
__   2. Hispanic or Latino/a  _______________________________
__   3. Caucasian/White  _______________________________
__   4. Asian  _______________________________
__   5. Multiracial  _______________________________
__   6. Other  _______________________________
__   7. Cannot tell (does not specify, couldn’t figure it out based on information provided)

Socio-economic Status of Sample [please check]
__   1. Low
__   2. Middle
__   3. High
__   4. Mixed
__   5. Cannot tell (does not specify, couldn’t figure it out based on information provided)
### Average Age of Participants [fill in]

<table>
<thead>
<tr>
<th>Age Range: __________</th>
<th>Grade</th>
<th>Age</th>
<th>Grade</th>
<th>Age</th>
<th>Grade</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. age in years: __________</td>
<td>K</td>
<td>5.5</td>
<td>5</td>
<td>10.5</td>
<td>10</td>
<td>15.5</td>
</tr>
<tr>
<td>Check here if estimated from table:</td>
<td>1</td>
<td>6.5</td>
<td>6</td>
<td>11.5</td>
<td>11</td>
<td>16.5</td>
</tr>
<tr>
<td>__</td>
<td>2</td>
<td>7.5</td>
<td>7</td>
<td>12.5</td>
<td>12</td>
<td>17.5</td>
</tr>
<tr>
<td>__</td>
<td>3</td>
<td>8.5</td>
<td>8</td>
<td>13.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>__</td>
<td>4</td>
<td>9.5</td>
<td>9</td>
<td>14.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Information not provided

### Sex of Participants [fill in]

- % male / Total No. _______
- % female / Total No. _______
- Information not provided

### Caregiver Information [fill in if applicable]

- Age Range: __________
- Years of Education: __________

### Type of Setting [please check]

- 1. Clinical setting
  - Inpatient Hospital
  - Outpatient Hospital
  - Community mental health center
- 2. Community setting
  - School
  - Community, Specify: __________
- 3. Cannot tell (does not specify, couldn’t figure it out based on information provided)

### Study Characteristics

### Number of Comparative Interventions [fill-in]

1. ____________________________________________________________
2. ____________________________________________________________

### Design 1 [please check]

- 1. Cross-sectional
- 2. Longitudinal
- 3. Retrospective
- 4. Cannot tell (does not specify, couldn’t figure it out based on information provided)
Longitudinal Data Points Provided [please check/fill in]

___ 1. Yes If yes, what are the time point(s)?
___ 2. No

Design 2 [please check]

___ 1. Pre-Post Only
___ 2. Pre-Post with Control
___ 3. Other (such as post-only): ____________
___ 4. Cannot tell (does not specify, couldn’t figure it out based on information provided)

Type of Assignment [please check]

___ 1. Randomized
___ 2. Non-Randomized
___ 3. Not Applicable (no control group)
___ 4. Cannot tell (does not specify, couldn’t figure it out based on information provided)

Unit of Assignment [please check]

___ 1. Individual level
___ 2. Group (e.g., classroom, sports team)
___ 3. Institution (e.g., school, community organization)
___ 4. Geographic (e.g., school district, state, region)
___ 5. Other (does not fit in category 1-4)
___ 6. Cannot tell (does not specify, couldn’t figure it out based on information provided)

Nature of Control [please check]

___ 1. Waitlist (on waitlist for intervention)
___ 2. Alternative Treatment (control group uses a different intervention that is designed to bring about the same change as the experimental group intervention)
___ 3. Limited Treatment (control group is given some of the same treatment as experimental group, but not all of what they got)
___ 4. Placebo (other type of contact not intended to bring about same change as experimental group – ex: sugar pill; regular academic counseling at school versus academic intervention put in place)
___ 5. No Treatment (no treatment was given or promised—no waitlist or alternative or anything)
___ 6. Combination of above – Specify: ____________
___ 7. Cannot tell (does not specify, couldn’t figure it out based on information provided)
Bias Control [please check]
__ 1. Concealment
__ 2. Blinding
__ 3. Sequencing
__ 4. Other (specify): _______________________
__ 5. Cannot tell (does not specify, couldn’t figure it out based on information provided)

**Intervention General Descriptive Information** [fill in]

Name of Intervention (if applicable): ______________________________

Intervention Author (if applicable): ______________________________

Focus of Intervention (e.g., depression, aggression, academics): __________

Theoretical orientation/framework (e.g., cognitive-behavioral; systems; afrocentric, eclectic/various techniques): ______________________________

Evidence-Based Practice [check] __Yes/ Endorsed by Organization (SAMHSA, WHO, WSIPP)
__No __No with CBT component

Length of Intervention (e.g., weeks): ______________________

- # of Sessions ______
- Duration of Sessions [in minutes] ______

Frequency of Session [please check]
__ 1. Daily
__ 2. Multiple per week
__ 3. 1x per week
__ 4.Biweekly
__ 5. Monthly
__ 6. Varies
__ 7. Cannot tell

Intervention Format (e.g., individual, group, mixed): ______________________________

Structure of Intervention [please check]
__ 1. One-to-one
__ 2. One to Small group (2 to 5)
__ 3. One to Large group (6 or more)
__ 4. One to classroom
__ 5. Multiple Change Agents
__ 6. Unspecified
Caregiver Involvement [please check]
  __ 1. Change Agent
  __ 2. Recipient of Intervention
  __ 3. Recipient to Reinforce Learning
  __ 4. Not specified/Participation
  __ 5. Not involved

Eligibility/Level of Intervention [fill in]
  __ 1. All youth
  __ 2. Youth meeting diagnostic cutoff
  __ 3. Cannot tell (does not specify, couldn’t figure it out based on information provided)

Description of Intervention [please check]
  __ 1. Not reported
  __ 2. Very broad, few details
  __ 3. Major procedures specified
  __ 4. Program manual available
  __ 5. Cannot tell (does not specify, couldn’t figure it out based on information provided)

Change Agents [please check]
  __ 1. Mental health professionals
  __ 2. Graduate students
  __ 3. Teachers
  __ 4. Caregivers
  __ 5. Undergraduate students
  __ 6. Community Members
  __ 7. Community Agency
  __ 8. Other: ________________
  __ 9. Combination of above: ______________________________
  __ 10. Cannot tell (does not specify, couldn’t figure it out based on information provided)

Change Agent Years of experience {fill in # or range} ______________________

Training Details [fill in] ________________________________

Supervision Details [fill in] ________________________________

Cultural Considerations       __ Yes       __No       __Cannot Tell
Other Mental Health Services outside Int [select/fill in]  __ Yes  __No
  __Cannot Tell

General Results/Key Conclusions (briefly describe the general results of the intervention below and any other information that would be interesting)

__________________________________________________________________

Environmental/Contextual Risk factors [check/fill in]
Complex trauma experience  __ Yes  __No  __Cannot Tell

__________________________________________________________________

Outcomes Specified and Measured [please check]
  __ 1. Internalizing (anxiety, depression)
  __ 2. Externalizing (conduct disorder, oppositional defiant disorder)
  __ 3. Mix of symptoms
  __ 4. Substance use/abuse
  __ 5. Other
EFFECT SIZE CODING GUIDE

Meta-Analysis Coding Form
Effect Size Coding (1 sheet per outcome measure)

Study ID#: ___________

Measure Name: ________________________________________________________________

Measure Author: ______________________________________________________________

Standardized Instrument:
__ 1. Yes
__ 2. No
__ 3. Cannot tell (does not specify, couldn’t figure it out based on information provided)

Source of Measure [please check]
__ 1. Self-report
__ 2. Teacher-report
__ 3. Parent/guardian-report
__ 4. Observation
__ 5. Performance measure (standardized tests, grades, etc.)

Outcome [please check]
__ 1. General Internalizing
   __  a. Depressive symptoms
   __  b. Anxiety symptoms
   __  c. Mixed anxiety/depression
   __  d. Suicidal ideation
   __  e. Suicidal attempts/completion
   __  f. Psychological/emotional distress
   __  g. Psychological/emotional well-being
   __  h. Global/General self-esteem/Self-concept
   __  i. Global/general perceived self-efficacy/sense of mastery
   __  j. Personality general
   __  k. Post traumatic stress symptoms
   __  l. Somatic symptoms
   __  m. General internalizing symptoms
   __  n. Other (specify: ______________________)

__ 2. General Externalizing
   __  a. School discipline referrals (office visits)
   __  b. School suspensions
   __  c. School dropout
   __  d. School expulsion
Meta-analysis of Post-Disaster Mental Health Interventions for Children

__

3. DSM IV Diagnosis
__

a. Major Depressive Disorder/Depressive Disorder
__
b. Mood Disorder NOS
__
c. General Anxiety Disorder/Anxiety Disorder NOS
__
d. Post-Traumatic Stress Disorder
__
e. Oppositional Defiant Disorder
__
f. Attention Deficit/ Hyperactivity Disorder
__
g. Anorexia/Bulimia
__
h. Adjustment Disorder
__
i. Elimination Disorder
__
j. Other (specify:________________)
__

4. Other
__
a. Mix of symptoms
__
b. Social-Emotional Competence / Social Skills / Identity Formation
__
c. Life skills / Adaptive Functioning (employment, school attendance)
__
d. Post-Traumatic Stress Disorder
__
e. Academics (grades, standardized tests – non behavioral outcomes) / Cognitive / Language Development
__
f. Hope
__
j. Caregiver Support
__
k. Stress
__
l. Other (specify:________________)
__

What data are being used to measure outcome? [please check]

__

1. Pre-Post with Control
__

2. Other (such as post-only with control): ______________
__

3. Follow-up data (specify time period: ______________)
__

4. Cannot tell (does not specify, couldn’t figure it out based on information provided)
__

Raw difference favors (i.e., shows more success for) which group [please check]

__

1. Intervention group
__

2. Neither group (exactly equal)
__

3. Control group
__

4. Cannot tell or statistically insignificant report only
__
Direction of scale: an INCREASE in raw scores on this measure means change is…

_  1. Positive
_  2. Negative
_  3. Cannot tell
**Outcome Data: MEANS AND STANDARD DEVIATIONS**

- **Treatment/Intervention Study**
  - **Intervention group**…
    - Sample size (post-treatment): ______
    - **PRE-TREATMENT outcome** mean: _____ sd: ______
    - **POST-TREATMENT outcome** mean: _____ sd: ______
    - Sample size: ______
    - **FOLLOW_UP outcome** mean: _____ sd: ______
    - Sample size: ______
    - **FOLLOW_UP outcome** mean: _____ sd: ______

  - **Control group**…
    - Sample size (post-treatment): ______
    - **PRE-TREATMENT outcome** mean: _____ sd: ______
    - **POST-TREATMENT outcome** mean: _____ sd: ______
    - Sample size: ______
    - **FOLLOW_UP outcome** mean: _____ sd: ______
    - Sample size: ______
    - **FOLLOW_UP outcome** mean: _____ sd: ______

- **Single Group Treatment/Intervention Study**
  - Sample size (post-treatment): ______
  - **PRE-TREATMENT outcome** mean: _____ sd: ______
  - **POST-TREATMENT outcome** mean: _____ sd: ______
  - Sample size: ______
  - **FOLLOW_UP outcome** mean: _____ sd: ______
  - Sample size: ______
  - **FOLLOW_UP outcome** mean: _____ sd: ______

- **Non-treatment/Intervention Sample**
  - Sample size: ______
  - **Outcome** mean: _____ sd: ______
  - Sample size: ______
  - **FOLLOW_UP outcome** mean: _____ sd: ______
FREQUENCIES AND PROPORTIONS

- **Treatment/Intervention Study**
  
  **Dichotomous Frequency or Proportions**
  
  n of intervention group with a successful outcome: _______
  
  n of control group with a successful outcome: _______
  
  n of intervention group: _______
  
  n of control group: _______
  
  OR
  
  Proportion of intervention group with a successful outcome: _______
  
  Proportion of control group with a successful outcome: _______

- **Single Group Treatment/Intervention Study**
  
  **Dichotomous Frequency or Proportions**
  
  n of group with a successful outcome: _______
  
  n of total group: _______
  
  OR
  
  Proportion of group with a successful outcome: _______

- **Non-treatment/Intervention Sample**
  
  **Dichotomous Frequency or Proportions**
  
  n of group with a successful outcome: _______
  
  n of total group: _______
  
  OR
  
  Proportion of group with a successful outcome: _______

T-TEST

- **Means T-Test, Posttest Info**
  
  Mean of Treatment Group _______
  
  Mean of Control Group _______
  
  n of Treatment Group _______
  
  n of Control Group _______
  
  t-value _______

- **Independent T-Test, P-Only**
  
  p-value of t-test _______
  
  df _______

- **Independent T-Test, No Means**
  
  n of Treatment Group _______
  
  n of Control Group _______
  
  t-value _______

- **Pretest-Posttest T-Test, No Control**
  
  n(pairs) _______
  
  r for paired values _______
  
  t-value _______
CHI-SQUARE TEST

- Chi-Square Value
  - Total N
  - Chi-square value

- Chi-Square, P-Only
  - Total N
  - p-value of Chi-square

ANOVA

- One-way ANOVA, Two Groups
  - n of Treatment Group
  - n of Control Group
  - F-value

**Calculated Effect Size (d)** (report two decimal places with an algebraic sign in front: positive if difference favors treatment, negative if difference favors control [e.g., +1.31]):

\[
\text{Effect Size} = \rule{4cm}{0.1em}
\]

Confidence rating in effect size computation [please check]

- 1. Highly estimated (have N and crude p-value only)
- 2. Moderate estimation (lack descriptives, have complex, but relatively complete statistics, such as multifactor ANOVA, as basis for estimation)
- 3. Some estimation (has unconventional statistics and must convert to t-values or has conventional statistics, but incomplete, such as exact p-value only)
- 4. Slight estimation (must use significance-testing statistics rather than descriptive statistics, but have complete statistics of conventional sort)
- 5. No estimation (have descriptive statistics such as means, standard deviations, frequencies, proportions, etc. and can calculate effect size directly)