

The Mental Health Impacts of Successive Disasters: Examining the Roles of Individual and Community Resilience Following a Tornado and COVID-19

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Introduction

On the early hours of March 3rd, 2020, the U.S. city of Nashville, Tennessee was hit by an EF-3 nocturnal tornado that killed 25 individuals and injured over 300 (Stanglin et al., 2020). The physical and economic damage from the March 2020 tornado is estimated to be between \$1.5 and \$2 billion and was one of the deadliest to affect the Middle Tennessee area (Roach, 2020). Eight days later on March 11, 2020 the World Health Organization declared the coronavirus disease outbreak (COVID-19) a global pandemic. As of May 2021, Tennessee has experienced more than 12,000 COVID-related deaths along with large-scale disruption to its infrastructure, healthcare, employment, education,

economies, transportation, and social services (Tennessee Department of Health, 2021).

Decades of research on collective trauma indicates that each of these events in Nashville may independently have adverse mental health impacts for exposed individuals (for a review see Neria et al., 2008). Studies investigating the relationship between disaster exposure and mental health outcomes have reported a dose–response effect, in which post-traumatic stress disorder (PTSD) and depression symptoms are found to increase with greater levels of exposure to a disaster (Brewin et al., 2000; Lowe et al., 2019; Neria et al., 2008; Norris et al., 2002). For example, following a major tornado in Joplin, Missouri, Houston et al. (2015) found having more tornado-related exposure (e.g., property damage, losing a loved one, being displaced, injuries) was related to a greater likelihood of PTSD and depression for participants at both 6 months and 2.5 years following the tornado. Like-

related to higher rates of adverse mental health (Du et al., 2020; First et al., 2021; Kira et al., 2020; Wu et al., 2020). In addition, facing exposure to both the March 2020 tornado and to the COVID-19 pandemic is likely to be associated with an even greater risk for adverse mental health than to exposure to only one of these disasters. Prior research has examined exposure to multiple disasters via a “cumulative model” wherein exposure to multiple disasters has been found to enhance risk for adverse mental health outcomes (Harville et al., 2017; Jacobs & Harville, 2015; Lowe et al., 2019). For instance, Lowe et al. (2019) examined the impact of exposure to Hurricane Katrina and the Deepwater Horizon oil spill and found that having exposure to both disasters increased risk for PTSD and depression.

While prior research has examined the negative psychological effects of disasters (i.e. both single and cumulative exposure), limited attention has been given to examining how different system levels of resilience (e.g., individual, family, community, regional) facilitate positive adaptation following cumulative exposure to disaster events. The purpose of the current study is therefore to examine the mental health impact of cumulative exposure to successive disasters, and to explore how individual- and community-level resilience protect against post-disaster PTS and depression symptoms. To begin we review the construct of resilience and consider resilience in terms of individual and community levels.

Individual Disaster Resilience

A variety of definitions and theoretical perspectives of resilience exist (for a review see Southwick et al., 2014); however, in general human resilience is defined as the capacity of individuals or systems to adapt positively to challenges that threaten their survival or functioning (Masten, 2001). To examine the human process of adaption, resilience research considers risk exposure, protective factors, and outcomes. For example, when an individual encounters a disaster event, resilience can be understood to be the combination of risk factors (e.g., things that exacerbate or worsen outcomes) and various protective factors (e.g., things that ameliorate negative outcomes) that emanate from human systems (e.g., individual, family, community). These protective factors foster the adaptation processes and influence positive outcomes (e.g., mental health, wellness, development) in the midst of risk (Bonanno et al., 2004; Masten, 2001; Ungar, 2013).

In the context of disaster, multiple studies have found individual-level resilience to have an inverse relationship with adverse mental health outcomes (Ahmad et al., 2010; Bistricky et al., 2019; Bonanno et al., 2006; Fereirre et al., 2019; Long et al., 2020; Ying et al., 2014). For instance, Osofsky et al. (2011) found that internal traits of resilience (i.e., self-efficacy) were associated with less depression and

anxiety in a sample exposed to Hurricane Katrina and the Deepwater Horizon oil spill. At the individual level, both internal and external protective factors have been found to facilitate resilience following disaster events. Examples of internal factors include adaptive coping strategies such as distress regulation, problem solving, and optimism (Luther et al., 2000; Masten, 2001). Internal factors often help individuals regulate emotions, work toward goals, and maintain healthy connections. In addition to internal factors, individuals draw from the external resources in their environment that further support their successful adaptation and well-being. For example, external resources may include having access to material goods (e.g., finances, housing, transportation), interpersonal relationships (e.g., family, friends), and community supports (e.g., social services) that assist individuals in positive adaption following disaster adversity (Houston et al., 2017; Norris et al., 2008).

Individual disaster resilience is thus the combination of internal and external resources that help an individual adapt following a challenging event like a disaster. Overall, many of the resources that foster individual resilience come from social and community systems (Ungar et al., 2013). For example, supportive interpersonal relationships that promote resilience in disaster situations (e.g., emotional support, child care, information) are often accessed via an individual’s social network (Aldrich & Meyer, 2015). Additionally, even many of the internal resources that foster resilience in individuals have origins in social and community systems (Abramson, et al., 2015; Masten & Obradovic, 2008). For instance, self-efficacy, a previously described internal factor that fosters resilience post-disaster (Osofsky et al., 2011), is an internal capacity of an individual, but is likely dependent upon an individual having resources like a supportive family structure or helpful educational opportunities. Thus, while conceptualized as an individual-level construct, individual disaster resilience is highly dependent on accessing resources and supports outside of the individual (First et al., 2021).

Community Disaster Resilience

In addition to individual resilience, community resilience is important in fostering human adaptation following a disaster. Community resilience is a process linking a set of adaptive capacities to a positive trajectory of community functioning and adaptation after a disturbance (i.e., natural and human-caused disasters, public health emergencies; Norris et al., 2008). A resilient community is more than simply a collection of resilient individuals, but is instead a community that can work collectively to ensure the people across the community are able to adapt following a disaster (Houston et al., 2015). Community disaster resilience has been conceptualized as a

multidimensional construct representing the abilities of local community to operate as a complex system (e.g., critical infrastructures, agencies, natural and built environments, and citizens) and adapt to collective adversity (Norris et al., 2008). Pfefferbaum et al (2013) proposed four core components of adaptive capacity for communities in the face of disasters and public health hazards: connection and caring, resources, transformative potential, and disaster management. Following disasters, community resilience has been linked to better individual mental health outcomes. For instance, Fullerton et al. (2015) found that community-level factors of collective efficacy mitigated the impact of hurricanes in Florida on depression symptoms. Likewise, following a major flood in England, Wind and Komproe (2012) found higher social capital and collective efficacy was related to less posttraumatic stress symptoms.

Taken together, a consistent finding across the literature is that human resilience is a process of harnessing multiple protective mechanisms in an individual's environment (e.g., individual, community, nation) to foster healthy adaptation despite adversity. While prior studies have supported the protective effects of individual and community resilience in disaster contexts, much of the research has examined these two systems in isolation, with limited focus of their additive contributions and mechanisms linked to better mental health outcomes. To address this gap, our study objectives included examining (a) how cumulative exposure to the Nashville tornado and COVID-19 pandemic impact mental health outcomes (e.g., PTS and depression symptoms), and (b) how the relationships between community and individual resilience impact mental health outcomes. We used structural equation modeling (SEM) to develop and test hypothesized pathways between cumulative disaster exposure, individual and community resilience, and PTS and depression symptoms. Based on the evidence reviewed above, we propose the following hypotheses to guide this study:

H1 More cumulative exposure to the tornado and COVID-19 will be associated with higher levels of PTS and depressive symptoms.

H2 Individual resilience will be inversely related with PTS and depression symptoms.

H3 Community resilience will be inversely related with PTS and depression symptoms.

H4 Individual resilience will mediate the relationship between community resilience and PTS and depression symptoms.

Method

In order to test our proposed hypotheses, we conducted an online survey with 412 adults (18 years or older) living in Nashville, Tennessee. Data were collected in February 2021, approximately one year following the March 3, 2020 EF-3 tornado and one year into the COVID-19 pandemic.

Participants and Procedures

Data collection procedures were approved by the [identity removed for review] Institutional Review Board (IRB). Participants were recruited through a partnership with a local volunteer organization who managed the volunteer recovery efforts following both the tornado and COVID-19 pandemic. Potential respondents were invited to complete the survey via social media posts and email. Interested participants used a secure URL to review the study's purpose and access the survey. An electronic informed consent indicated that participation was voluntary and responses would be anonymous. After consenting to the study, participants began the online survey. Participants were eligible to enter a prize drawing to receive one of four \$50 gift cards as an incentive. At the end of the survey, participants were provided with a list of local community resources for tornado and COVID-19 relief.

Of the 412 participants, 313 were female (75.9%) and 95 were male (23.1%). A majority of participants identified as White/Caucasian ($n = 301$, 73.0%), followed by Black ($n = 45$, 10.9%), Native American ($n = 24$, 5.8%), Asian ($n = 20$, 4.9%), Hispanic/Latino ($n = 16$, 3.9%), Native Hawaiian/Pacific Islander ($n = 3$, 0.7%), and multi-racial ($n = 2$, 0.5%). The age of participants ranged from 18 to 75 years and older, with 18 – 24 years old at 8.0% ($n = 33$), 25–34 years old at 46.6% ($n = 192$), 35–44 years old at 21.6% ($n = 89$), 45–54 years old at 9.2% ($n = 38$), 55–64 years old at 9.2% ($n = 38$), 65–74 years old at 4.1% ($n = 17$), and 75 years or older at 1.0% ($n = 4$).

Posttraumatic Stress

Posttraumatic stress symptoms ($M=40.62$, $SD=16.05$) were measured with the Posttraumatic Stress Disorder Checklist for Civilians (PCL-C; Blevins, Weather, Davis, Witte, Domino, 2015), a 17-item self-report questionnaire that assesses for probable PTSD diagnosis in individuals exposed to a traumatic event. The PCL-C has four subscales, including re-experiencing symptoms, avoidance symptoms, negative alterations in cognition and mood and arousal symptoms. Each item is scored on a five-point Likert scale ranging from *not at all* (1) to *extremely* (5). Respondents were asked to indicate how often they were bothered by each of the symptoms during the past month. In the present sample, the Cronbach's alpha value was 0.95.

Depression

Symptoms of depression ($M=9.80$, $SD=6.58$) were assessed with the Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001). The PHQ measures the degree to which an individual has experienced depressed mood and anhedonia over the past 2 weeks in order to screen participants for depression. Respondents were asked to indicate how often they were bothered by each symptom using four response options ranging from *not at all* (0) to *nearly every day* (3), and whether the symptoms endorsed occurred within the same two-week period. In the present sample, the Cronbach's alpha value was 0.91.

Analysis

Data analysis was conducted using R statistical software and

of our hypotheses. See Table 2 and Fig. 1 for a diagram of the structural results.

Our first hypothesis (H1) predicted that cumulative disaster exposure would have a significant positive relationship with PTS and depression symptoms. H1 was supported, as we found cumulative disaster exposure had a

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