



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

A Public Health Framework for Preventing Mental Disorders in the Context of Pandemics

Brett T. Litz, *Massachusetts Veterans Epidemiological Research and Information Center, VA Boston Healthcare System, Boston University School of Medicine*
Mackenzie H. Cummings and Breanna Grunthal, *Massachusetts Veterans Epidemiological Research and Information Center, VA Boston Healthcare System*
Caitlin L. McLean, *VA San Diego Healthcare System, University of California San Diego*

The COVID-19 pandemic has universally threatened the building blocks of mental health, well-being, and quality of life, namely, expectations of safety, connectedness, hope, and individual and societal efficacy. Consequently, unprecedentedly large numbers of individuals are significantly stressed and many are at risk for relapse of mental health problems, exacerbations of existing mental and behavioral health problems, and new onset clinical problems. Because of the scope of the problem, a population-based public health perspective is needed, which in the context of disasters has well-established theories and prevention approaches. Public health approaches to disasters and pandemics focus on preventing subclinical problems from becoming clinical disorders, in comparison to clinical care approaches that focus on treating established disorders. Fortunately, specialty care clinicians who typically think about assessing and treating established disorders have the training and clinical competencies to deliver prevention-focused interventions. This paper is designed to help specialty care clinicians who use cognitive-behavioral strategies to understand the biopsychosocial impacts and resource deficits associated with COVID-19-related stressors and the public health perspective to address them. We also provide ways clinicians can help people who are suffering from significant stress and resource deficits bounce back and regain functioning. We describe psychological first aid, stress management, repeated ecological assessment, writing about stressors, problem-solving, and behavioral activation approaches to assist individuals at risk for enduring stress-linked problems.

THE U.S. Census conducts a weekly pulse household survey during COVID-19 of U.S. residents and, consistently, approximately 25% report demonstrable symptoms of anxiety and depression ([United States Census Bureau, 2020](#)). Yet, it is too early to know from an epidemiological standpoint the full psychosocial-spiritual impact of COVID-19-related stressors in the population and among unique risk groups (e.g., the elderly, people with preexisting physical and mental health problems, people of color, people of limited means and resources). Unlike other disasters, which typically have localized impacts (e.g., Hurricane Katrina), almost everyone is affected in some way by COVID-19-related changes in their lives and communities. Given our experience and knowledge of how people close to or around us have been impacted,

it is reasonable to make assumptions about the range of potential impacts and disruptions and to empathize with the plight of those severely affected.

Potential exposures to COVID-19-related stressors include, but are not limited to: illness and associated loss of functioning; loss of loved ones; severely disrupted bereavement; drained personal and social resources (e.g., constraints on social and physical contact, disconnection from social supports, inattention to wellness); job loss and financial concerns; role-conflicts (e.g., having to work from home and providing daytime childcare); frustration about unmet needs or constraints on freedom of movement and routines; and anxiety about the safety and future viability of oneself, loved ones, communities, and country ([Brooks et al., 2020](#); [Klaiber et al., 2020](#); [Nelson et al., 2020](#)). The impacts on healthcare workers are particularly profound, including high levels of anxiety about exposure to the virus and bearing witness to unprecedented numbers of severely ill and dying people ([Mosheva](#)

Keywords: COVID-19; public health; prevention

et al., 2020). Some first responders and essential workers have had to work without sufficient personal protective gear or adequate equipment (Krystal & McNeil, 2020). In these contexts, distress and disruption is normal; most people will experience stress. But some will experience severe and lasting distress, affecting their well-being and functioning.

Although COVID-19 is unprecedented, there is a wealth of knowledge about ways to address pandemic- and disaster-related stress. Field-based professional experiences from previous disasters can also be used to prevent and mitigate COVID-19-related stress in individuals and communities. In this paper, we provide an overview of the knowledge about disasters that is applicable to COVID-19. We introduce the *public health* perspective to prevention and care, which does not target people with established disorders but rather targets subclinical manifestations of stress to prevent mental and behavioral health disorders, based on the military example of stress mitigation and resilience training. Although most clinicians trained in cognitive-behavioral therapies provide specialty care, their understanding of brief, problem-focused interventions can be utilized to help mitigate pandemic-related stress (McLean et al., in press; Sorenson, 2002). We end with a description of prevention interventions that can be delivered within a preventative public health framework.

Stress and Disaster Research That Applies to Pandemics

Stress is a normal mental and physical response to physical and mental challenges, losses, threats, frustrations, and failures. Yet, exposure to acute and chronic disaster stressors poses a serious risk to individual physical, mental, behavioral, and spiritual health, affects the availability of material and social resources, and affects family members and family systems. Stress is tolerable when people have the personal and social resources to weather the storm; they bounce back. In the face of significant and taxing stressors, resilience is a dynamic process that initially entails a moderately impairing emotional, psychological, social, and biological stress response, but the person rebounds from the temporary distress (Bonanno et al., 2011; Litz et al., 2014). Stress can cause systemic biological damage, enduring emotional and behavioral health symptoms, and unhealthy lifestyle changes when people do not have the personal or support resources to bounce back (McEwen & Stellar, 1993).

Biological Impacts

The process of adapting to stressors and returning to homeostasis is called allostasis (McEwen & Stellar,

1993), which entails stress hormone secretion (e.g., cortisol, noradrenalin, epinephrine, DHEA) and activation of the autonomic nervous system. The cumulative changes in the body and brain that are produced by dysregulated and overused allostatic processes is termed allostatic load (McEwen & Seeman, 1999). An individual's body can experience allostatic overload from chronic uncontrolled stress, which is evident by diminished stress system flexibility and compromised recovery. Allostatic overload predisposes the individual to disease (McEwen & Wingfield, 2003) and can be damaging to mind, body, and spirit. Another term for allostatic overload is toxic stress. When stress is toxic, people lose a sense of control and agency, which can lead to demoralization, dysphoria, and helplessness (Rodriguez et al., 2018).

Disaster stressors are associated with various manifestations of allostatic overload (e.g., higher resting heart rate, serum cholesterol, and triglycerides; Trevisan et al., 1997). For example, 1 year after the nuclear accident at Three Mile Island, residents living near the disaster had significantly higher levels of catecholamines (indicating chronic sympathetic arousal) compared to individuals living near undamaged coal and nuclear plants (Baum et al., 1983). Exposure to the Oklahoma City bombing was associated with neurologic reactivity 6 to 7 years later (Tucker et al., 2007). Many years after the 9/11 attacks, proximity to the attacks was found to be associated with brain volume deficits (Ganzel et al., 2008).

Psychological and Behavioral Health Impacts

Pandemics and disasters affect mental and behavioral health because stress affects perceptions of safety, predictability, control, agency, and competence—the building blocks of well-being, positive mood, and the ability to connect with others (see Schneiderman et al., 2005). People who are stressed and alarmed, and whose bodies are engaged in a struggle to return to homeostasis, have reduced resources to devote to work performance, helping others, and attend to their own wellness, including receiving support (Dich et al., 2015; McEwen & McEwen, 2017; Wilkinson & Goodyer, 2011). Rather, their attention and executive resources are likely to be drawn to threats and internal discomfort and anxiety (Ursache et al., 2015). Not surprisingly, individuals with high magnitude (unprecedentedly severe or traumatic) stressor exposure or resource deficits following disasters endorse a myriad of difficulties, including posttraumatic stress disorder (PTSD), depression, anxiety, sleep problems, behavioral problems, suicidality, and decreased quality

of life (Bromet & Havenaar, 2007; Galea et al., 2005; Loganovsky et al., 2008; Wang et al., 2000). Similar problems are associated with exposure to COVID-19-related stressors (Xiong et al., 2020). Even if we develop efficacious treatments and vaccines for COVID-19 by the end of 2020, some people will still be affected; the biological, social, and psychological impacts of disasters can last years to decades (Norris et al., 2002).

Social Support Impacts

One of the signature outcomes of the COVID-19 pandemic is chronic social isolation (Brooks et al., 2020). Stay-at-home and social isolation orders affect the resources that people would otherwise use to cope and manage COVID-19-related threats, illness, and loss, such as livelihoods, educational and social services, and access to food and household items. Most of all, social isolation reduces the most precious healing and repairing resource: close connection and physical contact. Exposure to disaster stressors generally affects mental health through disruption of social networks (i.e., supports are unavailable or consumed by their own demands and suffering) and via a decline in perceptions of support availability (Norris & Kaniasty, 1996). In general, feelings of separateness, alienation, and disconnection are associated with mental and behavioral health problems and mortality (Cacioppo et al., 2015).

Prior research on the aftermath of pandemic-related quarantine and isolation has found negative psychological effects, including symptoms of posttraumatic stress, confusion, and anger (Brooks et al., 2020). Individuals who were quarantined because of the Severe Acute Respiratory Syndrome (SARS) outbreak in 2003 reported being most affected by the inability to have social and physical contact (Bonanno et al., 2008; Hawryluck et al., 2004). SARS-related quarantine time in Canada was also associated with posttraumatic stress symptoms, avoidance behavior, anger problems, anxiety about illness and infecting others, and frustration and boredom (Bai et al., 2004; Hull, 2005; Reynolds et al., 2008). People who reported difficulties getting food and other resources were particularly anxious and stressed (Hawryluck et al., 2004).

Couple and Family Impacts

Dyadic and family relationships can be salutogenic in periods of acute exposure to stressors. Families are far more able to be resilient when stressors and traumas occur outside the home and affect an individual within a family system, which allows partners or other

family members to overfunction to help the affected individual repair, heal, and regain homeostasis. Because disasters and pandemics affect everyone in a family system (or close relationship), individuals typically do not have the luxury to underfunction and get respite time, even though everyone needs it. Moreover, disaster and pandemic stressors can derail the functioning of a family system, creating ripple effects for all members. The varied manifestations of disaster or pandemic stress, including negative mood, job performance problems, substance abuse, anxiety, reduced coping and self-management resources (used up by managing allostasis), can reduce an individual's and family's comfort communicating and connecting with others and motivation to engage supports (Norris & Kaniasty, 1996). In disasters, declines in comfortable and caring intimacy and support, communication, fun/leisure/shared wellness activities, can be especially impactful and stressful in formerly effective dyads and families (Walsh, 2007).

These systemic deficits and stressors are compounded in families with dependent children. In disasters and pandemics, children and their parents are challenged by shifts in the expectations of comfort, protection, and hope that otherwise is necessary for development and family functioning (e.g., Putnam, 2006). Single-parent families and low-income populations may be especially susceptible due to lack of adequate insurance and high-quality health care, financial constraints on stockpiling resources, unstable employment, and less robust social support networks (Bouye et al., 2009). Compared to prepandemic functioning, preexisting financial concerns and COVID-19-related stressors were associated with greater problems with parent emotion dysregulation, parenting irritability, and couple conflict (Westrupp et al., 2020).

As such, it is unsurprising that family violence, including child abuse and intimate partner violence, has increased worldwide since the start of COVID-19-related social isolation and quarantining measures (Usher, Bhullar, Durkin, Gyamfi, & Jackson, 2020). In pandemics, parents are physically present but are at risk for being less capable to meet the emotional and instrumental needs of their children.

A Model for Conceptualizing Resource Deficits and Losses

It is important for clinicians to appreciate that bouncing back from disasters such as COVID-19 can be thwarted, assisted, and sustained by varying and dynamic levels of personal, social, and community resources. Abramson et al. (2015) posited the following mosaic of necessary resources to adapt to disaster stressors: (1) human capital (e.g., access to medical care,

food); (2) economic capital (e.g., income, savings); (3) social capital (e.g., social networks, cohesion); and (4) political capital (e.g., fair distribution and availability of resources, good governance). In disasters, these varied resource losses are extensive, and availability and access can be severely compromised. Acute stressors result in rapid resource loss; chronic stressors ebb away at resources, tapping resource reservoirs. People who lack resources are more vulnerable to resource loss and cascading losses in times of crisis and disaster (Hobfoll, 2012). Consequently, due to the extraordinary and enduring stressors associated with COVID-19, clinicians need to be mindful that various signs of stress and problem functioning require interventions designed to help a person be agentic with respect to garnering or regaining lost resources.

Resilience in the Aftermath of Disasters

For some, COVID-19 is a perfect storm, causing allostatic overload, mental and behavioral health problems, and despair, if the stressors do not abate and personal and social resources dwindle. Yet, most people do not need help weathering the storm and resilience is modal. There are several axioms about resilience that apply to pandemics. First, although the majority of people exposed to trauma and disasters do not develop mental and behavioral health problems (Bonanno et al., 2006), no one is immune to stress and everyone has a line that can be crossed that leads to incapacitation and stress injury (allostatic overload). The line of demarcation pertains to the synergistic influences of the magnitude, chronicity, and type of stressor exposure and deficits in personal and social resources that would otherwise be used to manage and recover from serious stressors (Litz et al., 2014). Second, adaptation to emerging viral diseases is an unfolding dynamic. Any cross-sectional assessment of stress, impact, and needs is inadequate to plan, implement, and evaluate public health programs to prevent psychological and behavioral health problems (Nash et al., 2015). The challenge is to conduct ongoing surveillance at the local level to identify and help those who need resources to bounce back (Nash et al., 2012). Third, COVID-19 stressors have acute and chronic components. Chronic disaster stressors, such as displacement, social isolation, unemployment, financial strain, food insecurity, health problems, poor health-care, providing care to children or parents with disabilities, and so on, create greater risk for physical, mental, and behavioral health problems in individuals and families (Norris et al., 2009). For these stressors not to be overwhelming, personal, familial, and community resources need to be commensurately strong (Schetter & Dolbier, 2011). Fourth, it is important to

appreciate that resilience is a multilevel phenomenon, especially in the context of disasters. Resilience requires the capacity for individuals, families, and communities to bounce back from shared stressors (Johnson & Galea, 2012).

The most basic way to characterize disaster-related resilience is the assumption that most people who are stressed possess the right combination of resources to bounce back (regain homeostasis). People with preexisting mental disorders are at risk for exacerbations of symptoms and some will develop new onset mental disorders and need specialty care, if they decide to get treatment (Sullivan et al., 2013). The best predictors of at least subclinical levels of mental and behavioral health problems from disaster stressor exposure are: (a) the degree of exposure, especially personal suffering or witnessing others suffering or dying, or suffering loss (Litz, 2014; May & Wisco, 2016); and (b) the degree of resource deficits or losses (e.g., financial, work, social support; Bolton et al., 2015; Hobfoll et al., 2006; Hobfoll et al., 2007; Norris et al., 2008). Even the most robust and well-resourced person whose only challenge is to follow social distancing guidelines can be devastated by the loss of a loved one to COVID-19; people who have preexisting mental, physical health, or economic problems are more likely to be affected by various stressors.

Who Needs Help?

The answer to who should get help is dependent upon the resources available to provide help and the intervention model. Because COVID-19 stressors affect the population, stress and resource deficits in the population are by definition *public health challenges*. A public health perspective requires population-based health programs (e.g., in primary care) and Internet-based strategies that promote health and well-being and prevents disorder and other adverse health, social, and functional outcomes (Benedek & Fullerton, 2007; Nash et al., 2011). Within the public health approach, individual face-to-face interventions need to focus on preventing mental and behavioral health problems or addressing exacerbations of preexisting mental health problems.

Prevention Interventions

The state-of-the-art framework for prevention comes from the Institute of Medicine (IOM) Intervention Spectrum Model (Institute of Medicine, 2009), depicted in Fig. 1. This framework places interventions for health promotion and prevention on a continuum with interventions to treat or rehabilitate diagnosed mental or physical disorders. On the left side of the

protractor lie two categories of interventions intended to develop and protect health and well-being: Health Promotion and Prevention. On the right side lie two categories of interventions intended to restore health once a diagnosable health condition has been identified: Treatment and Maintenance. Within the Prevention category, interventions in the IOM model are defined solely in terms of the nature of the target of those interventions. Universal prevention targets entire populations (e.g., all citizens in a city, all children under the age of 18); selective prevention targets subgroups within a population deemed to be elevated levels of risk (e.g., every healthcare worker working with COVID-19 patients, regardless of responsibilities, roles, and exposure); and indicated prevention targets individuals identified as already burdened by at least subclinical levels of symptoms (e.g., stress and psychological symptoms).

Research, which has predominately occurred in the context of military stressors, has shown that universal prevention (e.g., the *comprehensive soldier fitness* program) and selective prevention efforts have questionable impact and efficacy to prevent allostatic overload, mental disorders, and severe disruptions in functional capacities in the context of trauma (Adler et al., 2008; Steenkamp et al., 2013). Universal didactics on stress, coping, and relationships must be designed to apply equally and generically to all individuals. Further, they should address resource losses and help people prepare for unprecedented roles and high-magnitude stressor and trauma exposure. Selective prevention is problematic because it is predicated on the assumption that all members of a shared culture or region have equal exposure to stressors and equal risk for stress. For example, an evaluation of posttraumatic stress symptoms in response to exposure to the 1999 floods in Mexico and the 9/11 attacks demon-

strated that the majority of individuals were recovered over time (Norris et al., 2009). Epidemiological studies of military service members over the deployment cycle have shown that even in the context of high combat exposure, most service members are resilient (e.g., Nash et al., 2015). Yet, in the selective prevention framework, people who are suffering (such as healthcare workers) are mandated to attend typically a one-time program with coworkers, some of whom have bounced back, and may resent attendance. Arguably, this stigmatizes those who are suffering. The best available evidence supports the effectiveness of *indicated prevention*, which targets individuals with impairing distress (Bryant, 2014; Litz et al., 2002; Litz & Maguen, 2007; Litz, 2015). Indicated prevention identifies individuals who have impairing levels of stress, psychological, and behavioral health problems. The aim is to bolster resources, to help people regain homeostasis and recover the body, mind, and spirit from allostatic overload, and to prevent mental disorders. Services should be accessible, and interventions should be the least restrictive for individuals in each culture and context. People should be offered the least restrictive, flexible agency-enhancing self-management regimens to promote self- and family-efficacy.

Defining who needs indicated prevention is not an exact science. The military has created a heuristic model, which clinicians can use to conceptualize individuals exposed to high magnitude pandemic-related stressors. The model, depicted in Fig. 2, can help care-providers identify the states of mind and body that require indicated prevention (Nash et al., 2012; Watson et al., 2011). This model distinguishes normal stress (yellow zone), defined as transient distress and impairment, from potentially toxic, persistent, and impairing distress (orange zone), defined as persistently impairing distress. Yellow zone stress is called a *stress reaction*, whereas orange zone stress is called a *stress injury* (i.e., allostatic overload) and is typically assessed as subclinical depression, anxiety, and PTSD. If unaddressed, allostatic overload and subclinical PTSD increases risk for comorbid disorders, delayed-onset PTSD, and poor occupational outcomes like PTSD in veterans (Marshall et al., 2001). The prevalence rates of subclinical PTSD range from 4.6% to 16.4% (Brancu et al., 2016; McLaughlin et al., 2015). Subclinical PTSD is associated with substantial distress and impairment, comorbid psychiatric conditions, increased suicidality and hopelessness (Brancu et al., 2016; McLaughlin et al., 2015), and problems with social and occupational functioning (Breslau et al., 2004; Zlotnick et al., 2002). Moreover, rates of subclinical PTSD and related problems in functioning can extend far past the conclusion of a disaster. Twelve

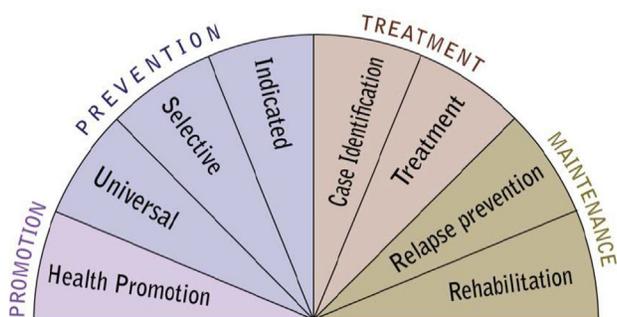


Fig. 1. The Intervention Spectrum Model. *Note.* From Institute of Medicine. (2009). Preventing mental, emotional, and behavioral disorders among young people: Progress and possibilities. M. E. O'Connell, T. F. Boat, & K. E. Warner (Eds.). National Academies Press

READY	REACTING	INJURED	ILL
<p>DEFINITION</p> <ul style="list-style-type: none"> • Adaptive coping • Effective functioning • Well-being <p>FEATURES</p> <ul style="list-style-type: none"> • In control • Calm and steady • Getting the job done • Playing • Sense of humor • Sleeping enough • Ethical and moral behavior 	<p>DEFINITION</p> <ul style="list-style-type: none"> • Mild and transient distress or loss of function <p>FEATURES</p> <ul style="list-style-type: none"> • Anxious • Irritable, angry • Worrying • Cutting corners • Poor sleep • Poor mental focus • Social isolation • Too loud and hyperactive 	<p>DEFINITION</p> <ul style="list-style-type: none"> • More severe and persistent distress or loss of function <p>TYPES</p> <ul style="list-style-type: none"> • Trauma • Fatigue • Grief • Moral injury <p>FEATURES</p> <ul style="list-style-type: none"> • Loss of control • Can't sleep • Panic or rage • Apathy • Shame or guilt 	<p>DEFINITION</p> <ul style="list-style-type: none"> • Clinical mental disorders • Unhealed stress injuries <p>TYPES</p> <ul style="list-style-type: none"> • PTSD • Depression • Anxiety • Substance abuse <p>FEATURES</p> <ul style="list-style-type: none"> • Symptoms persist > 60 days after return from deployment

Fig. 2. The Stress Continuum Model Sponsored by the Marine Corps. Note. From Nash, W., Steenkamp, M., Conoscenti, L., & Litz, B. T. (2012). The stress continuum model: A military organizational approach to resilience and recovery. In S. Southwick, B. T. Litz, M. Friedman, & D. Charney (Eds.), *Resilience and mental health: Challenges across the lifespan* (pp. 238–252). Cambridge University Press

years after the 9/11 attacks, 17.5–24.1% of responders demonstrated subthreshold PTSD symptoms, which were associated with higher psychiatric comorbidities, functional impairment, and reduced quality of life (Chen et al., 2020).

Key Components of Prevention Approaches

A consensus panel of disaster mental and behavioral health prevention experts offered evidence- and field experience-based cognitive-behavioral principles to enhance the efficacy and impact of preventative interventions that are applicable to pandemics (Hobfoll et al., 2007). They stated that disaster interventions need to promote: (1) *a sense of safety* (e.g., redressing rumors and fake news; addressing immediate threats to safety, promoting a balanced view of threat, predictability, control, and agency); (2) *calming* (e.g., easy to learn and apply calming and emotion regulation techniques; stressor attenuation via problem-solving); (3) *a sense of self- and community efficacy* (e.g., building confidence that leaders and the community can help, that people care, promoting agentic change via self-management, using professional support only when wanted); (4) *connectedness* (e.g., receiving information and recommendations that are packaged specifically for people who share the same culture and context; promoting positive and useful connections, helping others feel supported); and (5) *hope* (e.g., change is possible, good things can happen to offset the bad, lifestyles of comfort and leisure can be reclaimed). There are numerous ways to promote these five essential

reparative elements. For clinicians, the key is to generate a suite of strategies designed that promote self-monitoring, stress mitigation, and resilience that can be tailored to the needs of specific individuals, paying particular attention to bolstering confidence and competence with respect to addressing economic and social resource deficits associated with pandemics.

Hobfoll (2012) argued that organizational and community leaders and care-providers need to reduce the risk for resource loss and facilitate resource gains for vulnerable individuals in the context of disasters. A typical cognitive-behavioral approach to treating mental disorders focuses nearly exclusively on shoring up personal characteristics, but it is no less important to redress human, economic, and social capital-related deficits. During the COVID-19 pandemic, clinicians need to assess resource losses and support the individual in regaining those resources. This should entail conducting a functional analysis to determine if there are modifiable intervention targets that if addressed would likely facilitate resource gains (e.g., assertiveness).

Models of resource loss also underscore how bound these resource dynamics are to region, context, and culture. Although there are universally applicable *types* of resources (e.g., objects, conditions), the specific resources, resource needs, and vehicles to access resources are *highly context- and culture-specific* (Perilla et al., 2002; Wyche et al., 2011). The COVID-19 virus does not care about culture and context, yet prevention, mitigation, and psycho-social-spiritual intervention for those affected is highly culture- and context-

bound. If care-providers are asked to help people *from outside their own culture or context* who are suffering from pandemic stressors, the providers need to find ways of learning about the culture/context and the unique resource needs and losses associated within a given context.

Evidence-Based Psychological and Behavioral Strategies

A wealth of evidence supports the use of a core set of intuitive, easy-to-learn and apply cognitive-behavioral strategies to reduce stress/arousal and anxiety, and to promote resilience. These strategies include, but are not limited to, helping others problem-solve, expressing negative affect, and finding meaning through a narrative about stressful circumstances, building agency and regaining predictability and control, and regulating emotional reactions to life stressors (Bryant, 2014; Bryant & Litz, 2009; Litz & Gray, 2004). Most of the evidence comes from studies of face-to-face psychotherapy. However, investigators have created and tested web-based self-management versions of these interventions (Heber et al., 2017; Kuhn & Owen, 2020; Moberg et al., 2019). In addition, many investigators have developed and tested web-based tools to address mental and behavioral health problems following war and disaster (e.g., Ruzek et al., 2016). Each of the interventions reviewed below serves to enhance beliefs about safety and create calm, which in turn enhance self-efficacy, which facilitates taking advantage of resources, garnering social supports, and improving family roles (e.g., parenting, the ability to provide support for others).

Psychological First Aid

Psychological first aid (PFA) is a set of evidence-informed and field-tested strategies care-providers can use to help people who are in a pandemic-related crisis or are experiencing the acute aftermath of a high magnitude pandemic stressor, such as the death of a loved one (National Child Traumatic Stress Network [NCTSN] & National Center for PTSD [NCPTSD], 2006). In these contexts, people are in an orange zone state, which may entail agitation, mental status compromises, and intense arousal. When people are in a crisis, care-providers need to be compassionate, caring, patient, and calm. PFA also requires good listening and reflecting skills. The aims of PFA are to: (1) establish a human connection; (2) ensure safety (e.g., conduct a suicide risk assessment and take action when needed); (3) calm and promote executive control of functioning (e.g., using deep slow diaphragmatic breathing and mindfulness strategies); (4) assess

intermediate needs beyond the crisis situation; (5) provide practical assistance to meet intermediate needs; (6) connect the person to social and community resources, if need be; (7) support existing coping resources after the encounter is over; (8) provide information about additional strategies to augment coping capacities; and, (9) if need be, link the individual to formal mental and behavioral health resources. Public domain manuals are available to learn PFA (e.g., NCTSN & NCPTSD, 2006). A recent randomized controlled trial found that PFA delivered by paraprofessionals helped crime victims in the immediate aftermath of trauma to function more effectively than the usual services provided (McCart et al., 2020).

Repeated Ecological Assessments of Mood

Individuals who are exposed to COVID-19-related stressors will benefit from repeated systematic assessments of mood and context to help them identify specific situations associated with relative calm versus that that trigger intense distress, and to learn that stress ebbs and flows. The process of real-time monitoring of stress and mood can also promote mood regulation and problem-solving (Ebner-Priemer & Trull, 2009). Momentary daily ratings eliminate retrospective report bias (Ebner-Priemer & Trull, 2009) and help people learn the connection between context and stress/-mood (aan het Rot et al., 2012).

Stress Management

Stress mitigation and resilience-building via stress management has chiefly been promoted using mindfulness meditation and slow diaphragmatic breathing (Macedo et al., 2014). Mindfulness meditation focuses on the observation and acceptance of current thoughts, emotions, and physiological states *as they are*, as opposed to trying to actively engage with and/or change these experiences. Mindfulness is “a mental state characterized by nonjudgmental awareness of the present moment experience, including one’s sensations, thoughts, bodily states, consciousness, and the environment, while encouraging openness, curiosity, and acceptance” (Hofmann et al., 2010, p. 170). Mindfulness has been shown to be effective in helping depression, pain conditions, smoking, and addictive disorders (see Goldberg et al., 2018). Mindfulness practice has gained traction in the culture as a wellness and stress reduction strategy (Khoury et al., 2015) and is used standardly in trauma-related treatment (e.g., Litz & Carney, 2018). Mindfulness interventions are associated with medium to large effect size changes in PTSD (Boyd, Lanius, & McKinnon, 2018). A system-

atic review including only randomized controlled trials also revealed a moderate to large effect size for mindfulness over comparison treatments (Niles et al., 2018).

In a trial of U.S. Marines, mindfulness meditation to build resilience led to greater capacity to recover from stress, as indexed by enhanced cardiac recovery and lower plasma neuropeptide Y (a biomarker of stress), after exposure to training stressors (Johnson et al., 2014). In a meta-analysis, mindfulness meditation was determined to mediate physiological markers of stress, including reduced cortisol, systolic blood pressure, and heart rate (Pascoe et al., 2017).

A review of mindfulness as a prevention intervention for nurses and nursing students identified that overall mindfulness had a positive impact on decreasing stress, burnout, anxiety, depression, and empathy (van der Riet et al., 2018). While these studies were limited by small sample size, mindfulness may be a helpful intervention for health care workers in the midst of the pandemic. Another trial compared different types of mindfulness training to slow breathing and sitting quietly and found that veterans with PTSD in the mindfulness groups endorsed greater decreases in PTSD and depression symptom severity and increases in mindfulness (Colgan et al., 2016). Finally, mindfulness meditation interventions have been successfully delivered via the Internet with a small but significant impact on stress and well-being (Jayawardene et al., 2017; Spijkerman et al., 2016).

Deep, slow, diaphragmatic breathing is the most consistently used stress- and arousal-reducing strategy in mental and behavioral health (Gerritsen & Band, 2018; Hazlett-Stevens & Craske, 2009). This type of breathing exercise reduces stress and arousal in part because it stimulates the vagus nerve, a cranial nerve complex with widespread connections to the parasympathetic nervous system. It is well-suited for relaying relaxation from the central nervous system to the body and checking the arousal and homeostatic state of the viscera. Vagus nerve activity is modulated by respiration; it is suppressed during inhalation and facilitated during exhalation and slow respiration cycles. The other benefits of deep breathing are that it helps a person slow down and focus on their breathing, which may reduce rumination and enhance predictability and control.

Writing About Stressors

Expressive writing is a brief intervention in which individuals write about significant thoughts and emotions regarding life stressors or traumatic events for 15 minutes a day on consecutive days (e.g., 3–4 days; Pennebaker, n.d.). A meta-analysis of empirical studies

found that expressive writing was associated with reduced distress, depression, anxiety, and anger, compared to factual writing, in samples coping with stressors, major life transitions, and PTSD symptoms (Frattaroli, 2006). Another meta-analysis found a small mean differential effect size in change in PTSD symptoms in writing as opposed to comparison groups (Pavlicic et al., 2019). A large randomized controlled trial of post-9/11 veterans compared expressive writing to both factual writing and no writing (Sayer et al., 2015). At a 6-month follow-up, veterans who did expressive writing reported greater reductions in distress, anger, and physical complaints compared to veterans in both other groups. Veterans who did expressive writing also demonstrated greater reductions in PTSD symptoms and greater improvements in social support compared to those who did not write at all (Sayer et al., 2015). This study is noteworthy because it suggests that when symptoms of stress and psychological problems abate people are in a better place to garner social support resources, which is a key resource deficit in pandemics.

Problem-Solving

Problem-solving trains individuals to identify problems in operational terms, brainstorm about feasible solutions, choose an option they think is most likely to help, implement the plan, and assess its impact. Problem-solving enhances coping skills to mitigate adverse effects of stressful life experiences. Problem-solving therapy is a well-established therapy for depression (Nezu et al., 2012); a meta-analysis of randomized controlled trials found large effect size change associated with problem-solving, relative to control groups (Cuijpers et al., 2018).

A pilot study of problem-solving was associated with improvements in service members' distress, resilience, and social problem-solving (Cooper & Bates, 2019). A computer-guided problem-solving intervention with military veterans was associated with reductions in symptoms of depression, PTSD, and insomnia compared to a minimal contact control group (Bedford et al., 2018). Another computer-guided intervention specifically for teachers found that teachers in the intervention group reported greater reductions in depressive symptoms, perceived stress, worries, burnout symptoms, compared to those in a waitlist control group (Ebert et al., 2014).

Behavioral Activation

Behavioral activation involves training individuals to decrease avoidance and isolation by identifying and

engaging in activities that are hedonically reinforcing and consistent with the individual's values and goals (Cuijpers et al., 2020). While behavioral activation was originally developed for depression and has well-established empirical support (Simmonds-Buckley et al., 2019; Stein et al., 2020), including successful delivery via the Internet (Huguet et al., 2018), more recently, behavioral activation has been studied as an intervention for PTSD. A meta-analysis of behavioral activation for PTSD symptoms found significant reductions in PTSD symptoms with an average symptom reduction of 25.8% (Flint et al., 2020). Another small meta-analysis of three studies found large effect size improvements in PTSD symptoms compared to wait-list controls (Etherton & Farley, 2020). A randomized trial of veterans that compared behavioral activation to treatment as usual found that at posttreatment and 3-month follow-up, behavioral activation was associated with greater improvement on self-rated PTSD and depression symptoms (Wagner et al., 2019).

Summary

Emerging viral diseases cause illness and care-provider strain, restrict social supports, disrupt bereavement, drain resources, create role-conflicts, and limit autonomy. These stressors can be tolerated when people have the personal and social resources to bounce back; they are resilient. Yet, stressors, impacts, and resources change over time and if the stressors do not abate and personal and social resources dwindle, pandemic-related stressors create a perfect environment for enduring stress injury and allostatic overload (wear and tear on the body from chronic heightened neuroendocrine stress responses), and mental and behavioral health problems. If left unaddressed, these stress-related problems can become mental disorders that require scarce specialty care resources. In this paper, we reviewed the impacts of disasters and pandemics and provided a framework to guide indicated prevention interventions for individuals with subclinical but impairing distress.

References

- aan het Rot, M., Hogenelst, K., & Schoevers, R. A. (2012). Mood disorders in everyday life: A systematic review of experience sampling and ecological momentary assessment studies. *Clinical Psychology Review, 32*, 510–523. <https://doi.org/10.1016/j.cpr.2012.05.007>.
- Abramson, D. M., Grattan, L. M., Mayer, B., Colten, C. E., Arosemena, F. A., Bedimo-Rung, A., & Lichtveld, M. (2015). The resilience activation framework: A conceptual model of how access to social resources promotes adaptation and rapid recovery in post-disaster settings. *The Journal of Behavioral Health Services & Research, 42*, 42–57. <https://doi.org/10.1007/s11414-014-9410-2>.
- Adler, A. B., Litz, B. T., Castro, C. A., Suvak, M., Thomas, J. L., Burrell, L., McGurk, D., Wright, K. M., & Bliese, P. D. (2008). A group randomized trial of critical incident stress debriefing provided to US peacekeepers. *Journal of Traumatic Stress, 21*, 253–263. <https://doi.org/10.1002/jts.20342>.
- Bai, Y., Lin, C. C., Lin, C. Y., Chen, J. Y., Chue, C. M., & Chou, P. (2004). Survey of stress reactions among health care workers involved with the SARS outbreak. *Psychiatric Services, 55*, 1055–1057. <https://doi.org/10.1176/appi.ps.55.9.1055>.
- Baum, A., Gatchel, R. J., & Schaeffer, M. A. (1983). Emotional, behavioral, and physiological effects of chronic stress at Three Mile Island. *Journal of Consulting and Clinical Psychology, 51*, 565–572. <https://doi.org/10.1037/0022-006X.51.4.565>.
- Bedford, L. A., Dietch, J. R., Taylor, D. J., Boals, A., & Zayfert, C. (2018). Computer-guided problem-solving treatment for depression, PTSD, and insomnia symptoms in student veterans: A pilot randomized controlled trial. *Behavior Therapy, 49*, 756–767. <https://doi.org/10.1016/j.beth.2017.11.010>.
- Benedek, D. M., & Fullerton, C. S. (2007). Translating five essential elements into programs and practice. *Psychiatry: Interpersonal and Biological Processes, 70*, 345–349. <https://doi.org/10.1521/psyc.2007.70.4.345>.
- Bolton, E. E., Tankersley, A. P., Eisen, E. M., & Litz, B. T. (2015). Adaptation to traumatic stress: Resilient traits, resources, and trajectories of outcomes. *Current Psychiatry Reviews, 11*, 150–159. <https://doi.org/10.2174/1573400511666150629104748>.
- Bonanno, G. A., Galea, S., Bucchiarelli, A., & Vlahov, D. (2006). Psychological resilience after disaster: New York City in the aftermath of the September 11th terrorist attack. *Psychological Science, 17*, 181–186. <https://doi.org/10.1111/j.1467-9280.2006.01682.x>.
- Bonanno, G. A., Ho, S. M., Chan, J. C., Kwong, R. S., Cheung, C. K., Wong, C. P., & Wong, V. C. (2008). Psychological resilience and dysfunction among hospitalized survivors of the SARS epidemic in Hong Kong: A latent class approach. *Health Psychology, 27*, 659–667. <https://doi.org/10.1037/0278-6133.27.5.659>.
- Bonanno, G. A., Westphal, M., & Mancini, A. D. (2011). Resilience to loss and potential trauma. *Annual Review of Clinical Psychology, 7*, 511–535. <https://doi.org/10.1146/annurev-clinpsy-032210-104526>.
- Bouye, K., Truman, B. I., Hutchins, S., Richard, R., Brown, C., Guillory, J. A., & Rashid, J. (2009). Pandemic influenza preparedness and response among public-housing residents, single-parent families, and low-income populations. *American Journal of Public Health, 99*, S287–S293. <https://doi.org/10.2105/AJPH.2009.165134>.
- Boyd, J. E., Lanius, R. A., & McKinnon, M. C. (2018). Mindfulness-based treatments for posttraumatic stress disorder: A review of the treatment literature and neurobiological evidence. *Journal of Psychiatry and Neuroscience, 7*–25. <https://doi.org/10.1503/jpn.170021>.
- Brancu, M., Mann-Wrobel, M., Beckham, J. C., Wagner, H. R., Elliott, A., Robbins, A. T., Wong, M., Berchuck, A. E., & Runnals, J. J. (2016). Subthreshold posttraumatic stress disorder: A meta-analytic review of DSM-IV prevalence and a proposed DSM-5 approach to measurement. *Psychological Trauma: Theory, Research, Practice, and Policy, 8*, 222–232. <https://doi.org/10.1037/tra0000078>.
- Breslau, N., Lucia, V. C., & Davis, G. C. (2004). Partial PTSD versus full PTSD: An empirical examination of associated impairment. *Psychological Medicine, 34*, 1205–1214. <https://doi.org/10.1017/S0033291704002594>.
- Bromet, E. J., & Havenaar, J. M. (2007). Psychological and perceived health effects of the Chernobyl disaster: A 20-year review. *Health Physics, 93*, 516–521. <https://doi.org/10.1097/01.HP.0000279635.14108.02>.

- Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. *The Lancet*, *395*, 912–920. [https://doi.org/10.1016/S0140-6736\(20\)30460-8](https://doi.org/10.1016/S0140-6736(20)30460-8).
- Bryant, R. (2014). Early intervention for trauma. In M. Friedman, T. Keane, & P. Resick (Eds.), *PTSD: Science and practice: A comprehensive handbook* (2nd ed., pp. 406–418). Guilford Press.
- Bryant, R., & Litz, B. T. (2009). Early mental health interventions. In Y. Neria, S. Galea, & F. Norris (Eds.), *Mental health consequences of disaster* (pp. 321–335). Cambridge University Press.
- Cacioppo, S., Grippo, A. J., London, S., Goossens, L., & Cacioppo, J. T. (2015). Loneliness: Clinical import and interventions. *Perspectives on Psychological Science*, *10*, 238–249. <https://doi.org/10.1177/1745691615570616>.
- Chen, C., Salim, R., Rodriguez, J., Singh, R., Schechter, C., Dasaro, C. R., Todd, A. C., Crane, M., Moline, J. M., Udasin, I. G., Harrison, D. J., Luft, B. J., Southwick, S. M., Pietrzak, R. H., & Feder, A. (2020). The burden of subthreshold posttraumatic stress disorder in World Trade Center responders in the second decade after 9/11. *The Journal of Clinical Psychiatry*, *81*, 19m12881. <https://doi.org/10.4088/JCP.19m12881>.
- Colgan, D. D., Christopher, M., Michael, P., & Wahbeh, H. (2016). The body scan and mindful breathing among veterans with PTSD: Type of intervention moderates the relationship between changes in mindfulness and post-treatment depression. *Mindfulness*, *7*, 372–383. <https://doi.org/10.1007/s12671-015-0453-0>.
- Cooper, D. C., & Bates, M. J. (2019). Military health provider training and evaluation of a problem-solving intervention to reduce distress and enhance readiness among service members. *Military Medicine*, *184*, e303–e311. <https://doi.org/10.1093/milmed/usy229>.
- Cuijpers, P., de Wit, L., Kleiboer, A., Karyotaki, E., & Ebert, D. D. (2018). Problem-solving therapy for adult depression: An updated meta-analysis. *European Psychiatry*, *48*, 27–37. <https://doi.org/10.1016/j.eurpsy.2017.11.006>.
- Cuijpers, P., Karyotaki, E., de Wit, L., & Ebert, D. D. (2020). The effects of fifteen evidence-supported therapies for adult depression: A meta-analytic review. *Psychotherapy Research*, *30*, 279–293. <https://doi.org/10.1080/10503307.2019.1649732>.
- Dich, N., Lange, T., Head, J., & Rod, N. H. (2015). Work stress, caregiving and allostatic load: Prospective results from Whitehall II cohort study. *Psychosomatic Medicine*, *77*, 539–547. <https://doi.org/10.1097/PSY.0000000000000191>.
- Ebert, D. D., Lehr, D., Boß, L., Riper, H., Cuijpers, P., Andersson, G., Thiart, H., Heber, E., & Berking, M. (2014). Efficacy of an internet-based problem-solving training for teachers: Results of a randomized controlled trial. *Scandinavian Journal of Work, Environment & Health*, *40*, 582–596. <https://doi.org/10.5271/sjweh.3449>.
- Ebner-Priemer, U. W., & Trull, T. J. (2009). Ecological momentary assessment of mood disorders and mood dysregulation. *Psychological Assessment*, *21*, 463–745. <https://doi.org/10.1037/a0017075>.
- Etherton, J. L., & Farley, R. (2020). Behavioral activation for PTSD: A meta-analysis. *Psychological Trauma: Theory, Research, Practice, and Policy*. Advance online publication. <https://dx.doi.org/10.1037/tra0000566>.
- Flint, D. D., Ferrell, E. L., & Engelman, J. (2020). Clinical research on behavioral activation as treatment for post-traumatic stress disorder: A brief review and meta-analysis. *Behavioral Interventions*, *35*, 325–335. <https://doi.org/10.1002/bin.1712>.
- Frattaroli, J. (2006). Experimental disclosure and its moderators: A meta-analysis. *Psychological Bulletin*, *132*, 823–865. <https://doi.org/10.1037/033-2909.132.6.823>.
- Galea, S., Nandi, A., & Vlahov, D. (2005). The epidemiology of post-traumatic stress disorder after disasters. *Epidemiologic Reviews*, *27*, 78–91. <https://doi.org/10.1093/epirev/mxi003>.
- Ganzel, B. L., Kim, P., Glover, G. H., & Temple, E. (2008). Resilience after 9/11: Multimodal neuroimaging evidence for stress-related change in the healthy adult brain. *Neuroimage*, *40*, 788–795. <https://doi.org/10.1016/j.neuroimage.2007.12.010>.
- Gerritsen, R. J., & Band, G. P. (2018). Breath of life: The respiratory vagal stimulation model of contemplative activity. *Frontiers in Human Neuroscience*, *12*, 397. <https://doi.org/10.3389/fnhum.2018.00397>.
- Goldberg, S. B., Tucker, R. P., Greene, P. A., Davidson, R. J., Wampold, B. E., Kearney, D. J., & Simpson, T. L. (2018). Mindfulness-based interventions for psychiatric disorders: A systematic review and meta-analysis. *Clinical Psychology Review*, *50–60*. <https://doi.org/10.1016/j.cpr.2017.10.011>.
- Hawryluck, L., Gold, W. L., Robinson, S., Pogorski, S., Galea, S., & Styra, R. (2004). SARS control and psychological effects of quarantine, Toronto, Canada. *Emerging Infectious Diseases*, *10*, 1206–1212. <https://doi.org/10.3201/eid1007.030703>.
- Hazlett-Stevens, H., & Craske, M. G. (2009). Breathing retraining and diaphragmatic breathing techniques. In W. T. O'Donohue, J. E. Fisher, & S. C. Hayes (Eds.), *General principles and empirically supported techniques of cognitive behavior therapy* (pp. 166–172). John Wiley & Sons.
- Heber, E., Ebert, D. D., Lehr, D., Cuijpers, P., Berking, M., Nobis, S., & Riper, H. (2017). The benefit of web- and computer-based interventions for stress: A systematic review and meta-analysis. *Journal of Medical Internet Research*, *19*. <https://doi.org/10.2196/jmir.5774> e32.
- Hobfoll, S. E. (2012). Conservation of resources and disaster in cultural context: The caravans and passageways for resources. *Psychiatry: Interpersonal & Biological Processes*, *75*, 227–232. <https://doi.org/10.1521/psyc.2012.75.3.227>.
- Hobfoll, S. E., Tracy, M., & Galea, S. (2006). The impact of resource loss and traumatic growth on probable PTSD and depression following terrorist attacks. *Journal of Traumatic Stress*, *19*, 867–878. <https://doi.org/10.1002/jts.20166>.
- Hobfoll, S. E., Watson, P., Bell, C. C., Bryant, R. A., Brymer, M. J., Friedman, M. J., Friedman, M., Gersons, B. P. R., de Jong, J. T. V. M., Layne, C. M., Maguen, S., Neria, Y., Norwood, A. E., Pynoos, R. S., Reissman, D., Ruzek, J. I., Shalev, A. Y., Solomon, Z., Steinberg, A. M., & Ursano, R. J. (2007). Five essential elements of immediate and mid-term mass trauma intervention: Empirical evidence. *Psychiatry: Interpersonal and Biological Processes*, *70*, 283–315. <https://doi.org/10.1521/psyc.2007.70.4.283>.
- Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology*, *78*, 169–183. <https://doi.org/10.1037/a0018555>.
- Huguet, A., Miller, A., Kisely, S., Rao, S., Saadat, N., & McGrath, P. J. (2018). A systematic review and meta-analysis on the efficacy of Internet-delivered behavioral activation. *Journal of Affective Disorders*, *235*, 27–38. <https://doi.org/10.1016/j.jad.2018.02.073>.
- Hull, H. F. (2005). SARS control and psychological effects of quarantine, Toronto, Canada. *Emerging Infectious Diseases*, *11*, 354–355. <https://doi.org/10.3201/eid1102.04076>.
- Institute of Medicine. (2009). Preventing mental, emotional, and behavioral disorders among young people: Progress and possibilities. In: M. E. O'Connell, T. F. Boat, & K. E. Warner (Eds.). National Academies Press.
- Jayawardene, W. P., Lohrmann, D. K., Erbe, R. G., & Torabi, M. R. (2017). Effects of preventive online mindfulness interventions on stress and mindfulness: A meta-analysis of randomized

- controlled trials. *Preventive Medicine Reports*, 5, 150–159. <https://doi.org/10.1016/j.pmedr.2016.11.013>.
- Johnson, D. C., Thom, N. J., Stanley, E. A., Haase, L., Simmons, A. N., Shih, P. B., Thompson, W. K., Potterat, E. G., Minor, T. R., & Paulus, M. P. (2014). Modifying resilience mechanisms in at-risk individuals: A controlled study of mindfulness training in Marines preparing for deployment. *American Journal of Psychiatry*, 171, 844–853. <https://doi.org/10.1176/appi.ajp.2014.13040502>.
- Johnson, J. & Galea, S. (2012). Reorienting resilience: Adapting resilience for post-disaster research. In S. Southwick, B. T. Litz, M. Friedman, & D. Charney (Eds.), *Resilience and mental health: Challenges across the lifespan* (pp. 200–217). Cambridge University Press.
- Khoury, B., Sharma, M., Rush, S. E., & Fournier, C. (2015). Mindfulness-based stress reduction for healthy individuals: A meta-analysis. *Journal of Psychosomatic Research*, 78, 519–528. <https://doi.org/10.1016/j.jpsychores.2015.03.009>.
- Klaiber, P., Wen, J. H., DeLongis, A., & Sin, N. L. (2020). The ups and downs of daily life during COVID-19: Age differences in affect, stress, and positive events. *The Journals of Gerontology: Series B*, gbaa096. <https://doi.org/10.1093/geronb/gbaa096>.
- Krystal, J. H., & McNeil, R. L. (2020). Responding to the hidden pandemic for healthcare workers: Stress 639-639. *Nature Medicine*, 26. <https://doi.org/10.1038/s41591-020-0878-4>.
- Kuhn, E., & Owen, J. E. (2020). Advances in PTSD treatment delivery: The role of digital technology in PTSD treatment. *Current Treatment Options Psychiatry*, 7, 88–102. <https://doi.org/10.1007/s40501-020-00207-x>.
- Litz, B. T. (2014). Resilience in the aftermath of war trauma: A critical review and commentary. *Interface Focus*, 4, 20140008. <https://doi.org/10.1098/rsfs.2014.0008>.
- Litz, B. T. (2015). Early intervention for trauma and loss: Overview and working care model. *European Journal of Psychotraumatology*, 6, 28543. <https://doi.org/10.3402/ejpt.v6.28543>.
- Litz, B., & Carney, J. R. (2018). Employing loving-kindness meditation to promote self-and other-compassion among war veterans with posttraumatic stress disorder. *Spirituality in Clinical Practice*, 5, 201. <https://doi.org/10.1037/scp0000174>.
- Litz, B. T., & Gray, M. J. (2004). Early intervention for trauma in adults. In B. Litz (Ed.), *Early intervention for trauma and traumatic loss* (pp. 87–111). Guilford Publications.
- Litz, B. T. & Maguen, S. (2007). Early intervention for trauma in adults and children. In M. Friedman, T. Keane, & P. Resick (Eds.), *PTSD: Science and practice: A comprehensive handbook* (pp. 306–329). Guilford Press.
- Litz, B. T., Gray, M. J., Bryant, R. A., & Adler, A. B. (2002). Early intervention for trauma: Current status and future directions. *Clinical Psychology: Science and Practice*, 9, 112–134. <https://doi.org/10.1093/clipsy.9.2.112>.
- Litz, B. T., Steenkamp, M. M., & Nash, W. P. (2014). Resilience and recovery in the military. In L. Zoellner & N. Feeney (Eds.), *Facilitating resilience and recovery following traumatic events* (pp. 113–133). Guilford Publications.
- Loganovsky, K., Havenaar, J. M., Tintle, N. L., Guey, L. T., Kotov, R., & Bromet, E. J. (2008). The mental health of clean-up workers 18 years after the Chernobyl accident. *Psychological Medicine*, 38, 481–488. <https://doi.org/10.1017/S0033291707002371>.
- Macedo, T., Wilhelm, L., Gonçalves, R., Coutinho, E. S. F., Vilete, L., Figueira, I., & Ventura, P. (2014). Building resilience for future adversity: A systematic review of interventions in non-clinical samples of adults. *BMC Psychiatry*, 14, 227. <https://doi.org/10.1186/s12888-014-0227-6>.
- Marshall, R. D., Olfson, M., Hellman, F., Blanco, C., Guardino, M., & Struening, E. L. (2001). Comorbidity, impairment, and suicidality in subthreshold PTSD. *American Journal of Psychiatry*, 158, 1467–1473. <https://doi.org/10.1176/appi.ajp.158.9.1467>.
- May, C. L., & Wisco, B. E. (2016). Defining trauma: How level of exposure and proximity affect risk for posttraumatic stress disorder. *Psychological Trauma: Theory, Research, Practice, and Policy*, 8, 233–240. <https://doi.org/10.1037/tra0000077>.
- McCart, M. R., Chapman, J. E., Zajac, K., & Rheingold, A. A. (2020). Community-based randomized controlled trial of psychological first aid with crime victims. *Journal of Consulting and Clinical Psychology*, 88, 681–695. <https://doi.org/10.1037/ccp0000588>.
- McEwen, B. S., & Seeman, T. (1999). Protective and damaging effects of mediators of stress: Elaborating and testing the concepts of allostasis and allostatic load. *Annals of the New York Academy of Sciences*, 896, 30–47. <https://doi.org/10.1111/j.1749-6632.1999.tb08103.x>.
- McEwen, B. S., & Stellar, E. (1993). Stress and the individual: Mechanisms leading to disease. *Archives of Internal Medicine*, 153, 2093–2101. <https://doi.org/10.1001/archinte.1993.00410180039004>.
- McEwen, B. S., & Wingfield, J. C. (2003). The concept of allostasis in biology and biomedicine. *Hormones and Behavior*, 43, 2–15. [https://doi.org/10.1016/S0018-506X\(02\)00024-7](https://doi.org/10.1016/S0018-506X(02)00024-7).
- McEwen, C. A., & McEwen, B. S. (2017). Social structure, adversity, toxic stress, and intergenerational poverty: An early childhood model. *Annual Review of Sociology*, 43, 445–472. <https://doi.org/10.1146/annurev-soc-060116-053252>.
- McLaughlin, K. A., Koenen, K. C., Friedman, M. J., Ruscio, A. M., Karam, E. G., Shahly, V., Stein, D. J., Hill, E. D., Petukhova, M., Alonso, J., Andrade, L. H., Angermeyer, M. C., Borges, G., de Girolamo, G., de Graaf, R., Demyttenaere, K., Florescu, S. E., Mladenova, M., Posada-Villa, J., Scott, K. M., ... Kessler, R. C. (2015). Subthreshold posttraumatic stress disorder in the World Health Organization world mental health surveys. *Biological Psychiatry*, 77, 375–384. <https://doi.org/10.1016/j.biopsych.2014.03.028>.
- McLean, C. L., Cummings, M. H., & Litz, B. T. (In press). Individual approaches to prevention and early intervention. In J. G. Beck & D. M. Sloan (Eds.), *Oxford handbook of traumatic stress disorders* (2nd ed.). Oxford University Press.
- Moberg, C., Niles, A., & Beermann, D. (2019). Guided self-help works: Randomized waitlist controlled trial of Pacifica, a mobile app integrating cognitive behavioral therapy and mindfulness for stress, anxiety, and depression. *Journal of Medical Internet Research*, 21. <https://doi.org/10.2196/12556> e12556.
- Mosheva, M., Hertz-Palmor, N., Dorman Ilan, S., Matalon, N., Pessach, I. M., Afek, A., Ziv, A., Kreiss, Y., Gross, R., & Gothelf, D. (2020). Anxiety, pandemic-related stress and resilience among physicians during the COVID-19 pandemic. *Depression and Anxiety*, 37, 965–971. <https://doi.org/10.1002/da.23085>.
- Nash, W. P., Boasso, A. M., Steenkamp, M. M., Larson, J. L., Lubin, R. E., & Litz, B. T. (2015). Posttraumatic stress in deployed Marines: Prospective trajectories of early adaptation. *Journal of Abnormal Psychology*, 124, 155–171. <https://doi.org/10.1037/abn0000020>.
- Nash, W. P., Krantz L., Stein N., Westphal R. J., & Litz B. (2011). Two approaches to meeting the challenges of mental health prevention in the military: Army battlemind and the Navy-Marine Corps stress continuum. In J. I. Ruzek, P. P. Schnurr, J. J. Vasterling, & M. J. Friedman (Eds.), *Caring for veterans with deployment-related stress disorders: Iraq, Afghanistan, and beyond* (pp. 193–214). American Psychological Association Press.
- Nash, W., Steenkamp, M., Conoscenti, L., & Litz, B. T. (2012). The stress continuum model: A military organizational approach to resilience and recovery. In S. Southwick, B. T. Litz, M. Friedman,

- & D. Charney (Eds.), *Resilience and mental health: Challenges across the lifespan* (pp. 238–252). Cambridge University Press.
- National Child Traumatic Stress Network (NCTSN) & National Center for PTSD (NCPTSD). (2006). *Psychological first aid: Field operations guide* (2nd ed.). NCTSN & NCPTSD. https://www.nctsn.org/sites/default/files/resources/pfa_field_operations_guide.pdf.
- Nelson, L. M., Simard, J. F., Oluyomi, A., Nava, V., Rosas, L. G., Bondy, M., & Linos, E. (2020). US public concerns about the COVID-19 pandemic from results of a survey given via social media. *JAMA Internal Medicine*, *180*, 1020–1022. <https://doi.org/10.1001/jamainternmed.2020.1369>.
- Nezu, A. M., Nezu, C. M., & D’Zurilla, T. (2012). *Problem-solving therapy: A treatment manual*. Springer Publishing Company.
- Niles, B. L., Mori, D. L., Polizzi, C., Pless Kaiser, A., Weinstein, E. S., Gershkovich, M., & Wang, C. (2018). A systematic review of randomized trials of mind-body interventions for PTSD. *Journal of Clinical Psychology*, *74*, 1485–1508. <https://doi.org/10.1002/jclp.22634>.
- Norris, F. H., Friedman, M. J., Watson, P. J., Byrne, C. M., Diaz, E., & Kaniasty, K. (2002). 60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981–2001. *Psychiatry: Interpersonal and Biological Processes*, *65*, 207–239. <https://doi.org/10.1521/psyc.65.3.207.20173>.
- Norris, F. H., & Kaniasty, K. (1996). Received and perceived social support in times of stress: A test of the social support deterioration deterrence model. *Journal of Personality and Social Psychology*, *71*, 498–511. <https://doi.org/10.1037/0022-3514.71.3.498>.
- Norris, F. H., Stevens, S. P., Pfefferbaum, B., Wyche, K. F., & Pfefferbaum, R. L. (2008). Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness. *American Journal of Community Psychology*, *41*, 127–150. <https://doi.org/10.1007/s10464-007-9156-6>.
- Norris, F. H., Tracy, M., & Galea, S. (2009). Looking for resilience: Understanding the longitudinal trajectories of responses to stress. *Social Science & Medicine*, *68*, 2190–2198. <https://doi.org/10.1016/j.socscimed.2009.03.043>.
- Pascoe, M. C., Thompson, D. R., Jenkins, Z. M., & Ski, C. F. (2017). Mindfulness mediates the physiological markers of stress: Systematic review and meta-analysis. *Journal of Psychiatric Research*, *95*, 156–178. <https://doi.org/10.1016/j.jpsychires.2017.08.004>.
- Pavlicic, J. M., Buchanan, E. M., Maxwell, N. P., Hopke, T. G., & Schulenberg, S. E. (2019). A meta-analysis of expressive writing on posttraumatic stress, posttraumatic growth, and quality of life. *Review of General Psychology*, *23*, 230–250. <https://doi.org/10.1177/1089268019831645>.
- Pennebaker J. W. (n.d.). Writing and health: Some practical advice. University of Texas at Austin. Retrieved from <https://liberalarts.utexas.edu/psychology/faculty/pennebaker#writing-health>.
- Perilla, J. L., Norris, F. H., & Lavizzo, E. A. (2002). Ethnicity, culture, and disaster response: Identifying and explaining ethnic differences in PTSD six months after Hurricane Andrew. *Journal of Social and Clinical Psychology*, *21*, 20–45. <https://doi.org/10.1521/jscp.21.1.20.22404>.
- Putnam, F. W. (2006). The impact of trauma on child development. *Juvenile and Family Court Journal*, *57*, 1–11. <https://doi.org/10.1111/j.1755-6988.2006.tb00110.x>.
- Reynolds, D. L., Garay, J. R., Deamond, S. L., Moran, M. K., Gold, W., & Styra, R. (2008). Understanding, compliance and psychological impact of the SARS quarantine experience. *Epidemiology & Infection*, *136*, 997–1007. <https://doi.org/10.1017/S0950268807009156>.
- Rodriguez, E. J., Livaudais-Toman, J., Gregorich, S. E., Jackson, J. S., Nápoles, A. M., & Pérez-Stable, E. J. (2018). Relationships between allostatic load, unhealthy behaviors, and depressive disorder in US adults, 2005–2012 NHANES. *Preventive Medicine*, *110*, 9–15. <https://doi.org/10.1016/j.ypmed.2018.02.002>.
- Ruzek, J. I., Kuhn, E., Jaworski, B. K., Owen, J. E., & Ramsey, K. M. (2016). Mobile mental health interventions following war and disaster. *mHealth*, *2*, 37.
- Sayer, N. A., Noorbaloochi, S., Frazier, P. A., Pennebaker, J. W., Orazem, R. J., Schnurr, P. P., Murdoch, M., Carlson, K. F., Gravely, A., & Litz, B. T. (2015). Randomized controlled trial of online expressive writing to address readjustment difficulties among US Afghanistan and Iraq war veterans. *Journal of Traumatic Stress*, *28*, 381–390. <https://doi.org/10.1002/jts.22047>.
- Schetter, C. D., & Dolbier, C. (2011). Resilience in the context of chronic stress and health in adults. *Social and Personality Psychology Compass*, *5*, 634–652. <https://doi.org/10.1111/j.1751-9004.2011.00379.x>.
- Schneiderman, N., Ironson, G., & Siegel, S. D. (2005). Stress and health: Psychological, behavioral, and biological determinants. *Annual Review of Clinical Psychology*, *1*, 607–628. <https://doi.org/10.1146/annurev.clinpsy.1.102803.144141>.
- Simmonds-Buckley, M., Kellett, S., & Waller, G. (2019). Acceptability and efficacy of group behavioral activation for depression among adults: A meta-analysis. *Behavior Therapy*, *50*, 864–885. <https://doi.org/10.1016/j.beth.2019.01.003>.
- Sorenson, S. B. (2002). Preventing traumatic stress: Public health approaches. *Journal of Traumatic Stress*, *15*, 3–7. <https://doi.org/10.1023/A:1014381925423>.
- Spijkerman, M. P. J., Pots, W. T. M., & Bohlmeijer, E. T. (2016). Effectiveness of online mindfulness-based interventions in improving mental health: A review and meta-analysis of randomised controlled trials. *Clinical Psychology Review*, *45*, 102–114. <https://doi.org/10.1016/j.cpr.2016.03.009>.
- Steenkamp, M. M., Nash, W. P., & Litz, B. T. (2013). Post-traumatic stress disorder: Review of the Comprehensive Soldier Fitness program. *American Journal of Preventive Medicine*, *44*, 507–512. <https://doi.org/10.1016/j.amepre.2013.01.013>.
- Stein, A. T., Carl, E., Cuijpers, P., Karyotaki, E., & Smits, J. A. J. (2020). Looking beyond depression: A meta-analysis of the effect of behavioral activation on depression, anxiety, and activation. *Psychological Medicine*. Advance online publication. <https://doi.org/10.1017/S0033291720000239>.
- Sullivan, G., Vasterling, J. J., Han, X., Tharp, A. T., Davis, T., Deitch, E. A., & Constans, J. I. (2013). Preexisting mental illness and risk for developing a new disorder after hurricane Katrina. *The Journal of Nervous and Mental Disease*, *201*, 161–166. <https://doi.org/10.1097/NMD.0b013e31827f636d>.
- Trevisan, M., O’Leary, E., Farinero, E., Jossa, F., Galasso, R., Celentano, E., Scottoni, A., Fusco, G., & Panico, S. (1997). Short- and long-term association between uric acid and a natural disaster. *Psychosomatic Medicine*, *59*, 109–113. <https://doi.org/10.1097/00006842-199703000-00001>.
- Tucker, P. M., Pfefferbaum, B., North, C. S., Kent, A., Burgin, C. E., Parker, D. E., Hossain, A., Jeon-Slaughter, H., & Trautman, R. P. (2007). Physiologic reactivity despite emotional resilience several years after direct exposure to terrorism. *American Journal of Psychiatry*, *164*, 230–235. <https://doi.org/10.1176/ajp.2007.164.2.230>.
- United States Census Bureau (2020, November 9). Measuring household experiences during the Coronavirus (COVID-19) pandemic. Retrieved from <https://www.census.gov/householdpulsedata>.
- Ursache, A., Noble, K. G., & Blair, C. (2015). Socioeconomic status, subjective social status, and perceived stress: Associations with stress physiology and executive functioning. *Behavioral Medicine*, *41*, 145–154. <https://doi.org/10.1080/08964289.2015.1024604>.

- Usher, K., Bhullar, N., Durkin, J., Gyamfi, N., & Jackson, D. (2020). Family violence and COVID-19: Increased vulnerability and reduced options for support. *International Journal of Mental Health Nursing, 29*(4), 549–552. <https://doi.org/10.1111/inm.12735>.
- van der Riet, P., Levett-Jones, T., & Aquino-Russell, C. (2018). The effectiveness of mindfulness meditation for nurses and nursing students: An integrated literature review. *Nurse Education Today, 65*, 201–211. <https://doi.org/10.1016/j.nedt.2018.03.018>.
- Wagner, A. W., Jakupcak, M., Kowalski, H. M., Bittinger, J. N., & Golshan, S. (2019). Behavioral activation as a treatment for posttraumatic stress disorder among returning veterans: A randomized trial. *Psychiatric Services, 70*, 867–873. <https://doi.org/10.1176/appi.ps.201800572>.
- Walsh, F. (2007). Traumatic loss and major disasters: Strengthening family and community resilience. *Family Process, 46*, 207–227. <https://doi.org/10.1111/j.1545-5300.2007.00205.x>.
- Wang, X., Gao, L., Zhang, H., Zhao, C., Shen, Y., & Shinfuku, N. (2000). Post-earthquake quality of life and psychological well-being: Longitudinal evaluation in a rural community sample in northern China. *Psychiatry and Clinical Neurosciences, 54*, 427–433. <https://doi.org/10.1046/j.1440-1819.2000.00732.x>.
- Watson, P. A., Litz, B., Southwick, S. T., & Ritchie, E. C. (2011). Preparation for deployment: Improving resilience. In M. K. Lenhart (Ed.), *Textbooks of military medicine: Combat and operational behavioral health* (pp. 43–48). Department of the Army, Office of Surgeon General, Borden Institute.
- Westrupp, E., Bennett, C., Berkowitz, T. S., Youssef, G. J., Toumbourou, J., Tucker, R., Andrews, F., Evans, S., Teague, S., Karantzas, G., Melvin G., Olsson, C., Macdonald, J., Greenwood, C., Mikocka-Walus, A., Hutchinson, D., Fuller-Tyszkiewicz, M., Stokes, M., Olive, L., . . . Sciberras, E. (2020, September 30). Child, parent, and family mental health and functioning in Australia during COVID-19: Comparison to pre-pandemic data. <https://doi.org/10.31234/osf.io/ydrm9>.
- Wilkinson, P. O., & Goodyer, I. M. (2011). Childhood adversity and allostatic overload of the hypothalamic–pituitary–adrenal axis: A vulnerability model for depressive disorders. *Development and psychopathology, 23*, 1017–1037. <https://doi.org/10.1017/S0954579411000472>.
- Wyche, K. F., Pfefferbaum, R. L., Pfefferbaum, B., Norris, F. H., Wisniewski, D., & Younger, H. (2011). Exploring community resilience in workforce communities of first responders serving Katrina survivors. *American Journal of Orthopsychiatry, 81*, 18–30. <https://doi.org/10.1111/j.1939-0025.2010.01068.x>.
- Xiong, J., Lipsitz, O., Nasri, F., Lui, L., Gill, H., Phan, L., Chen-Li, D., Jacobucci, M., Ho, R., Majeed, A., & McIntyre, R. S. (2020). Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *Journal of Affective Disorders, 277*, 55–64. <https://doi.org/10.1016/j.jad.2020.08.001>.
- Zlotnick, C., Franklin, C. L., & Zimmerman, M. (2002). Does “subthreshold” posttraumatic stress disorder have any clinical relevance?. *Comprehensive Psychiatry, 43*, 413–419. <https://doi.org/10.1053/comp.2002.35900>.

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. The authors declare no conflicts of interest.

Address correspondence to Brett Litz, VA Boston Healthcare System 150 S Huntington Ave., Boston, MA 02130. e-mail: litzb@bu.edu.

Received: August 27, 2020

Accepted: November 21, 2020

Available online 20 January 2021