Resilience, Trauma, and Coping

Ahron Friedberg and Dana Malefakis

Abstract: The study and use of resilience is of the utmost importance to psychodynamic psychiatry. It is deeply ingrained in ideas about well-being and the treatment and care of patients. However, its neurobiology is incompletely understood, its terminology and relation to trauma and coping not well defined, and its efficacy underutilized in clinical practice. This article reviews the scientific literature on resilience, especially as it relates to trauma and coping. It also attempts to point the way for its greater application in psychiatry and mental health by utilizing resilience in more informed and individualized approaches.

Keywords: resilience, trauma, coping, psychodynamic psychiatry, novel treatment

The subject of resilience, with particular reference to trauma and its treatment, is both complex and fascinating in terms of issues in mind-brain medicine and psychodynamic psychiatry. While some research has begun to delve into the relationship between a person's mental state and his or her ability to heal, much remains to be learned (Baker, Minchoff, & Dillon, 1985). Perhaps more than any other topic, resilience spans the range of translational medicine, from bench top to bedside and from individual to population health. In this article, we will review our current knowledge and understanding about resilience as it relates to clinical treatment and care, especially involving trauma.

The study of resilience is a rather new course in trauma research. The change in direction was spurred on by the realization that resilience is not a rare ability and can be harnessed therapeutically. Loss and suffering are a part of life, whether it be dealing with the loss of a loved one

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or a job, or surviving illness, abuse, or some other woe. Research has shown that healthy coping is usually possible, even feasible. So resilience requires a multidimensional discussion. A greater understanding of the various factors impacting resilience is necessary, such as genetic, epigenetic, developmental, psychosocial, psychological, neurochemical, and pharmacological components.

Scope of Subject

The scope of the interrelationship among resilience, trauma, and coping is tremendous. It encompasses acute and chronic stressors—the trials, tribulations, and travails of being human—as well as tragedies. The ordinary stuff of life can be devastating with the inevitable death of loved ones, disease, and divorce, not to mention exceptional circumstances such as natural disasters, poverty and homelessness, and war. The subject raises issues of great social significance, including immigration, child abuse, and bullying.

A multitude of research studies on trauma and resilience have been conducted, most notably on war-affected communities (Diab, Peltonen, Qouta, Palosaari, & Punamäki, 2015; Raffaelli & Iturbide, 2015; Vindevogel, Ager, Schiltz, Broekaert, & Derluyn, 2015; Winter, Brown, Goins, Mason, 2016) and veterans (Pietrzak & Southwick, 2011; Tsai, Harpaz-Rotem, Pietrzak, & Southwick, 2012), victims of terror attacks (Fredrickson, Tugade, Waugh, & Larkin, 2003), natural disasters, such as hurricanes (Pietrzak et al., 2012) and earthquakes (Ahmad et al., 2010; Feder, Ahmad et al., 2013), sexual abuse (Crete & Singh, 2015; Domhardt, Münzer, Fegert, & Goldbeck, 2015), at-risk communities with poor social support and health care (Alim et al., 2008; Heath, Donald, Theron, & Lyon, 2014; Southwick, Morgan, Vythilingam, & Charney, 2006), bullying (Sapouna & Wolke, 2013), immigrant populations (Bursztyn & Korn-Bursztyn, 2015; Georgiades, 2016; Paat, 2014), as well as refugees (Shakya et al., 2014) and indentured child laborers (Maercker, Hilpert, & Burri, 2016). High rates of posttraumatic stress disorder (PTSD) and depressive symptoms have been observed in the vulnerable victims of these traumas. All of these studies are evidence that resilience is a dynamic process with multiple determinants.

Resilience itself is a multidimensional subject that relates to an individual's ability to adapt positively in response to significant adversity. It is useful to recognize from the start that stress to a certain extent is good. It motivates you to meet your goals, gives you energy, acts as a warning system, and smaller amounts prepare you for future challeng-

es. However, many people, unfortunately, are exposed to potentially traumatic events and may become symptomatic and even debilitated by the stress of them. A person may develop PTSD or a related condition. Yet others show a significant, at times tremendous, ability, to bounce back. While much of the focus in the fields of psychology, neuroscience, and medicine has been on understanding stress and the conditions that result from high degrees of it, studying resilience and factors influencing it is an equally important endeavor. Enhancing resilience and building personal strengths should be more integrated into models of psychological treatment (Southwick, Bonanno, Masten, Panter-Brick, & Yehuda, 2014). Some of the main determinants of resilience include genetic, biological, developmental, social, and cultural factors.

Definition of Terms

Since issues involving resilience are varied and complex, it is useful to have good and clear working definitions of our main terms. They are as follows:

(1) Resilience is the ability of a system to cope with change. It can be applied to various disciplines in addition to psychology including engineering, ecology, and the social sciences. Psychological resilience refers to an individual's ability to adapt to stress and deal with adversity. Such challenges may come in many forms including family or relationship issues, health problems, work, and financial concerns to name a few. Resilience is found within each of us and can be developed. It is best considered a process rather than a trait—a progression of psychological and physiological adjustments that can be made to better enable us to cope with trauma (Atkinson, 2015; Masten, 2001).

A common misperception is that resilient people do not have negative thoughts and emotions or that they are always optimistic. A more accurate idea is that resilient individuals have developed coping techniques and strategies that allow them to deal more effectively with adversity and even crisis. To the extent it is present, their optimism helps effectively balance negative emotions, which may be based in reality (Ahmad et al., 2010; Bonanno, 2004; Chansky, 2008; Iacoviello & Charney, 2014; Vindevogel, Ager, Schiltz, Broekaert, & Derluyn, 2015).

(2) Trauma can be defined in physical or mental terms. In terms of physiology, trauma is a wound or shock resulting from a physically distressing experience. In terms of psychology, it is a disturbing emotional stress that leads to a mental impairment or dysfunction. Major stresses may include sexual assault, warfare, or other threats to a person's life.

Symptoms may include disturbing flashback, avoidance or numbing memories of the event, hyper-arousal, and continue for more than a month after the event.

The *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-V*; American Psychiatric Association, 2013a) defines posttraumatic stress disorder (PTSD) in terms of eight criteria. The first criterion is "a history of exposure to a traumatic event that meets specific stipulations and symptoms from each of four symptom clusters: intrusion, avoidance, negative alterations in cognitions and mood, and alterations in arousal and reactivity," comprising criteria 2–5 with the sixth criterion concerning "duration of symptoms"; the seventh "assesses functioning"; and, the eighth "clarifies symptoms as not attributable to a substance or co-occurring medical condition" (American Psychiatric Association, 2013b, p. 1). Of note, the *DSM-V* reclassified PTSD, making a new category for it as a "Trauma and Stressor-related Disorder" rather than in the category of Anxiety Disorders.

(3) Coping means to deal effectively with problems or difficulties. Clinicians often talk about treatments of psychiatric disorders, but we would like to speak more broadly about coping as a way of facing and overcoming significant trauma. Coping is when one struggles with but manages stress whatever it may be.

In terms of psychodynamic psychiatry, Anna Freud developed the idea of defense mechanisms in her landmark *The Ego and the Mechanism of Defense* (Freud, 1937). She observed that in order to maintain an emotional equilibrium, the ego uses unconscious psychological strategies (defense mechanisms) to cope with anxiety that arises from uncomfortable thoughts and feelings. These defenses are a normal part of personality, although they can lead to symptoms or pathology when one or more are used in ways that avoid dealing with reality.

RESILIENCE

History and Aspects of Term

Resilience is generally thought of as the ability to adapt and recover from a life-threatening, harmful, or overwhelming stress. Since scientific research on resilience is a fairly recent endeavor, it might be surprising to learn that methods for promoting resilience have been pursued since ancient times (Vernon, 2004). Ancient Greeks showed an insightful understanding of war and its darkening effects on the psyche (Southwick, Litz, Charney, & Friedman, 2011). It seems that their insights have only recently resurfaced to make the amelioration of post-deployment ram-

ifications of high intensity combat stress a priority (Southwick, Litz, Charney, & Friedman, 2011). Much of the evidence for our knowledge about resilience lies in the realm of the military and how the ancients developed programs to combat operational stress (Nash et al., 2011). Pre-induction training in the army to promote resilience is generally similar today to what it was in the past, preparing them for the rigorous and shocking conditions of war (Southwick, Litz, Charney, & Friedman, 2011).

One of the earliest to use the term *resilience* was the developmental psychologist Emmy Werner in the 1970s in an important, longitudinal, 32-year study (Werner & Smith, 2001). She traced the development of 700 infants born in 1955 in Kauai, Hawaii until they turned 40. One third of the children faced ordeals, including poverty, domestic conflict, and parental drug abuse. However, by the end of the study, only one in six suffered from substance abuse, mental health issues, or had criminal records (Werner & Smith, 2001). Werner found that some high-risk youths displayed resilience and bounced back from their unstable and difficult childhood circumstances (Werner, 1993, 2013). She discovered several protective factors that encouraged positive change, including "continuing education at community colleges; educational and vocational skill acquired during service in the armed forces; marriage to a stable partner; conversion to a religion that demanded active participation in a 'community of faith,' and recovery from a life-threatening illness or accident" (Werner & Smith [abstract], 2001).

Resilience became a major research topic in the 1980s (Masten, Best, & Garmezy, 1990). Researchers began to analyze responses to adversity when a 1989 study emerged involving children with a schizophrenic parent who may not have given an adequate amount of comfort as a caregiver, impacting a child's likelihood of following maladaptive paths through life (Masten, 1989). Other children, as Masten (1989) found with the "Project Competence" studies of stress resistance in Minnesota, however, were capable of overcoming adversity, and this led researchers to explore the "process" of resilience.

An individual's coping process and his or her "relational protective process" must both be considered in understanding how resilience in a person unfolds as they are reciprocals and intrinsically connected (Hauser & Allen, 2006). Each individually identified protective factor has an underlying component process, and these processes synchronize, synthesizing in an individual, enabling him or her to develop resilience (Hauser & Allen, 2006).

More recently, clinician-scientists have helped identify and study specific factors that are determinants of resilience. By conducting detailed analyses of interviews with resilient subjects, Southwick and Charney

identified ten "resilience factors" or coping mechanisms for dealing with trauma or severe stress. These include: an optimistic but realistic outlook, sought and accepted social support, sturdy role models as well as an inner, moral compass, religious or spiritual practices, and acceptance of what could not be changed. In addition, other features they found were attending to health and well-being such as physical fitness, mental sharpness, and emotional strength, actively solving problems while looking for meaning and opportunity, and even humor. Finally, resilient people tend to take responsibility for their emotional well-being and use the traumatic experience as a basis for personal growth (Southwick & Charney, 2012, p. 13).

NEUROBIOLOGY

Genetics and Epigenetics

In the last decade, researchers have looked beyond the psychological determinants of resilience toward the neurobiological, in order to discover new therapies for the treatment of stress-induced psychopathology (Feder, Haglund, Wu, Southwick, & Charney, 2013). Recent research has identified that genetic, epigenetic, neuroanatomical, and neurochemical mechanisms are associated with resilient responses to stress (Feder, Nestler, Westphal, & Charney, 2010, and Charney, 2004). Findings have shown that resilience is affected by adaptive changes in various neural circuits that involve several hormones, neuropeptides, and neurotransmitter and molecular pathways. Current understandings of the pathophysiology of PTSD consider that these changes mediate the functioning of the neural circuitry of fear, reward, emotion regulation, and social behavior (Feder, Nestler, & Charney, 2009). An individual's genes and their interaction with the environment shape the neurocircuitry and neurochemistry that are expressed in various psychological states and behaviors characteristic of resilience (Feder, Nestler, & Charney, 2009, p. 455).

One groundbreaking study discovered a basis for the development of novel therapeutic targets to enhance stress resilience (Dias et al., 2014). β-catenin, a multi-functional protein in the central nervous system, has been implicated in several neuropsychiatric disorders including depression. Dias and his team found that mice β-catenin mediates pro-resilient and anxiolytic effects in the nucleus accumbens, a key brain reward region, mediated by D2-type medium spiny neurons. Using genome-wide β-catenin enrichment, they showed that the gene Dicer1 plays an important role in small RNA (microRNA) biogenesis—as a β-

catenin target gene that mediates resilience. Their findings help establish β-catenin as a critical regulator in the development of behavioral resilience, activating a network that includes Dicer1 and downstream microRNAs (Dias et al., 2014). Clearly, like with depression, resilience has its own neurobiology (Russo, Murrough, Han, Charney, & Nestler, 2012), genetics (Feder, Nestler, & Charney, 2009), and epigenetics (Nestler, 2012, 2014). Certain genetic and epigenetic phenomena are conserved across species, while others may not be. Relevant research has not yet been carried out to determine the relevance of research with mice and animal models, but such initial findings seem promising.

Another significant study looked at mice and identified that exposure to subchronic variable stress (SCVS) induces depression type behaviors in female mice and not in males, which appear resilient. Thus, males and females undergo different patterns of transcriptional regulation in response to stress, and a DNA methyltransferase in NAc contributes to this sex difference in stress vulnerability (Hodes et al., 2015). Other researchers have discovered that infants carrying the short allele(s) of 5-HTTLRP show a high level of association between maternal anxiety and negative emotionality, whereas no association exists in infants carrying the long allele (Murrough & Charney, 2011). This finding and other similar ones may provide new therapeutic opportunities for aspects of negative emotion associated with risk and resilience.

Various studies have demonstrated that noradrenergic and hypothalamic-pituitary-adrenal axis markers, oxytocin pathways, and serotonin transporter and brain-derived neurotrophic factor gene polymorphisms are important determinants of resilience (Ozbay, Fitterling, Charney, & Southwick, 2008). Most of the molecular mechanisms underlying stress-induced neuronal adaptations are incompletely understood (Vialou et al., 2010). Some researchers identified serum response factor (SRF), an activity-dependent transcription factor, as a novel upstream mediator of stress-induced ΔFosB. They found that SRF is downregulated in the NAc of both depressed human patients and in mice chronically exposed to social defeat stress. This downregulation of SRF is absent in resilient animals. Through the use of inducible mutagenesis, Vialou and his group showed that stress-mediated induction of ΔFosB, which occurs predominantly in resilient mice, is dependent on SRF expression in this brain region (Vialou et al., 2010).

So at both genetic and epigenetic levels, significant progress is being made in understanding the neurobiology of resilience. This development is true for studies with animal models and human populations. Although, as a caveat, many important determinants at a basic science level need to be better understood for relevant translational research to contribute to clinical care.

Brain and Neuroimaging

Neuroimaging can be an excellent tool for assessing the structural and functional processes of the brain as an individual responds to stressful and potentially traumatic events. The systems of the brain and their interactions with each other inform us of what processes are occurring to trigger mental health problems. For example, several studies suggest regions of the limbic system are likely to play significant roles in determining resilience (Elliott, Sahakian, & Charney, 2010). Many studies testing theories about neuroanatomical issues show that there are specific brain processes involved in generating resilience, which include the hypothalamus, medial prefrontal cortex, anterior cingulate cortex, the hippocampal-pituitary-adrenal axis, and the amygdala (Atkinson, 2015).

More specifically, studies have typically revealed lower levels of hippocampal *N*-acetylaspartate (NAA) in PTSD participants, an abnormality in hippocampal biochemistry in PTSD participants relative to controls (Villarreal, Petropoulos et al., 2002). In a study of 12 subjects with PTSD and 10 control subjects who underwent brain MRIs, researchers found, consistent with other replications, reduced hippocampal volume and total white matter volume in PTSD patients (Villarreal, Hamilton et al., 2002). Another functional magnetic resonance imaging (fMRI) study found that non-traumatized healthy control subjects were more successful than the trauma-exposed group (PTSD or non-PTSD) in downregulating responses to negative pictures. This finding suggests that the ability to upregulate emotional responses to negative stimuli may be a protective factor to trauma exposure and associated with resilience (New et al., 2009). An additional neuroimaging study found that PTSD patients experience difficulty in synthesizing the traumatic experience in a comprehensive narrative (Peres, Moreira-Almeida, Nasello, & Koenig, 2007).

However, it is worth keeping in mind that resilience is a complex topic to comprehend fully from structural and functional images of the brain. Researchers expect that neuroimaging research will benefit from functional and structural connectivity approaches and the use of novel imaging task paradigms (Werff, Pannekoek, Stein, & Wee, 2013).

Neuroendocrine

Although the importance of stress resilience has been recognized, the underlying neural mediators and their roles have not yet been fully recognized and understood. Neurochemical factors are of critical importance in resilience, and researchers are keyed into at least some of the most relevant neurotransmitters and hormones that play a role in resilience factors. These include neuropeptide Y and dehydroepiandrosterone (Elliott, Sahakian, & Charney, 2010). Neuropeptide Y (NPY) is a peptide known for its anti-anxiety-like effects mediated via the amygdala (Sajdyk et al., 2008). Antagonizing the activity of calcineurin, a protein phosphatase involved in neuronal remodeling and present in NPY receptor containing neurons within the basolateral amygdala (BLA), blocked the development of long-term social interaction responses induced by NPY administration. This suggests that the NPY-induced long-term behavioral resilience to restraint stress may occur via mechanisms involving neuronal plasticity. These studies suggest one physiologic mechanism underlying stress resilience and could identify novel targets for development of therapies augmenting the ability to cope with stress (Sajdyk et al., 2008).

Other studies investigating neuroendocrine matters focused on the role of norepinephrine in traumatic stress, since norepinephrine has a role in exaggerated arousal, selective attention, vigilance, and memory (Southwick et al., 1999). Neurochemical mechanisms are essential to examine in the promotion of effective treatments of PTSD and other related stress-induced conditions. Unfortunately, few pharmacotherapies have indicated efficacy in the treatment of PTSD. In one study, researchers tested the efficacy and safety of a single, intravenous sub-anesthetic dose of ketamine for the treatment of PTSD and associated depressive symptoms in patients with chronic PTSD. They found the first evidence for rapid reduction in symptom severity following ketamine infusion in patients with chronic PTSD (Feder et al., 2014).

Clearly, the neuroendocrine system plays an important role in resilience. When it does not function adequately, symptoms of PTSD, major depression, and anxiety disorders may develop. One well-established finding of patients with PTSD is of enhanced suppression of cortisol following dexamethasone administration (Yehuda & Charney, 1993). More research is needed to understand mechanisms in coping with and mastering life's traumas and other challenges.

TRAUMA

Definition and History of Term

A common definition of trauma is a wounding or a serious physical injury. In terms of a psychological definition, a useful working definition of a trauma is an overwhelming stimulus, stressor, or event that is so excessive in its psychological disruption that the person loses his or her normal mediating capacity. The disruption and its long-lasting effects significantly impair psychological functioning (Laplanche & Pontalis, 1973). The term comes from the Greek word τραῦμα meaning "wound," which derives from τιτροσχω meaning "to pierce" (Laplanche & Pontalis, 1973).

Some clinicians distinguish "shock trauma," the experience of trauma after a single experience, from "stress trauma" or "strain trauma," in which the experience of trauma emerges after a period of protracted, more mild disturbing experience, resulting in psychological strain over time (Kris, 1956). Other psychoanalysts consider "cumulative trauma," which results from the mother's failure to act as a kind of protective shield or stimulus barrier in relation to traumatizing experiences during childhood development (Khan, 1963). Freud had several theories about trauma as it related to the ego, notably "the original traumatic state" he called "birth trauma." In one characterization, he defined trauma as "an experience which within a short period of time presents the mind with an increase of stimulus too powerful to be dealt with or worked off in the normal way, and this must result in permanent disturbances of the manner in which the energy operates" (Freud, 1916–17, p. 275).

Theorists have tried to integrate the psychoanalytic point of view with evidence from developmental psychology and cognitive neuroscience (Schore, 2002). In non-psychoanalytic terms, trauma frequently triggers several symptoms referred to collectively as PTSD. Data from the National Comorbidity Survey Replication indicates lifetime PTSD prevalence rates are 3.6% and 9.7% respectively among American men and women. Rates of PTSD are considerably higher in post-conflict settings (Friedman, 2016). Some findings correlate physical abuse as a child with increased susceptibility to developing PTSD as an adult (Yehuda & Charney, 1993).

However much trauma and traumatic experience have been part of the human condition from the beginning of our evolution, psychiatry as a field was slow to identify the condition as a disorder (Friedman,

2016). The term "Posttraumatic Stress Disorder" was not coined until late in the 1970s, although the 1952 edition of the *DSM-I* included a diagnosis of "gross stress reaction" (Andreasen, 2010). PTSD was added to the *DSM-III* in 1980 when conflicts during the Vietnam War gave rise to "soldier's heart," "shell shock," and "war neurosis" (Crocq & Crocq, 2000). Diagnosis has continued to develop over time. It has also taken time to come to a consensus on effectively studying the condition (Charney, Davidson, Friedman, & Judge, 1998).

The use of these terms continued until World War I when vast numbers of soldiers were hospitalized, presenting extreme mental disturbances, and their emotional shock was referred to as "shell shock" (Crocq & Crocq, 2000). WWI is deemed the first of modern warfare, and its modernity applied to a more scientific approach to psychology as well. Psychiatrists began to witness soldiers showing, at a staggeringly increasing rate, neurological symptoms including muteness, deafness, general tremor, inability to walk or even stand, episodic loss of consciousness, and other symptoms as reported by the German psychiatrist Robert Gaupp (Crocq & Crocq, 2000). Soldiers who were suffering from "shock" reportedly exhibited almost all the same symptoms of "hysteria." It was not clear if these symptoms were caused by subtle lesions to the brain or had a psychological etiology. To some extent that controversy continues even until today.

World War II was a "total war," targeting civilian populations, enhancing the need of combat psychiatry for more than just soldiers. In their classic *Men Under Stress*, American psychiatrists Grinker and Spiegel (1945) offer detailed descriptions of 65 clinical cases and treatment by "narcosynthesis" using barbiturates. They distinguish acute from delayed reactions to combat. The latter include war neuroses, designated by the euphemism "operational fatigue" syndrome in the Air Force. Other chronic consequences of combat include psychosomatic states, guilt and depression, aggressive and hostile reactions, and psychotic-like states (Crocq & Crocq, 2000). The suffering endured by Holocaust and concentration camp survivors is unquestionably traumatic (Eitinger, 1961). During the Vietnam War, numerous Vietnam veterans needed some form of psychological help, either immediate or delayed.

Posttraumatic stress pathology has gained prevalence in modern-day life with the predominance of terror attacks and torture (Auchincloss & Samberg, 2012). Modern psychiatry recognizes the differences between acute stress disorders and chronic posttraumatic stress and revised the diagnostic criteria accordingly. It has been well established that the disorder has distinct neural circuits (Lopresto, Schipper, & Homberg, 2016) and psychobiological mechanisms (Charney, Deutch, Krystal, Southwick, & Davis, 1993).

One of the major revisions to *DSM-V* was to no longer categorize PTSD as an anxiety disorder (Friedman, 2016). PTSD is now included in the Trauma- and Stressor-Related Disorders section, which includes disorders "in which exposure to a traumatic or stressful event is listed explicitly as a diagnostic criterion," such as reactive attachment disorder, disinhibited social engagement disorder, acute stress disorder, and adjustment disorders (American Psychiatric Association, 2013c, p. 265). Other evidence-based revisions consist mostly of changes in language stipulating response and behavioral symptoms. For example, the *DSM-V* [Fact Sheet] proposes four (rather than three) diagnostic clusters: re-experiencing, avoidance, negative cognitions and mood, and arousal (American Psychiatric Association, 2013b). Another significant alteration is the addition of two subtypes: PTSD in children younger than 6 years and PTSD with prominent dissociative symptoms (American Psychiatric Association, 2013b).

The current criteria for PTSD in the *DSM-V* (pp. 271–272) are summarized as follows:

- Exposure to actual or threatened death, serious injury, or sexual violence in a number of ways, such as: directly experiencing the traumatic event(s); witnessing, in person, the event(s) as it occurred to others; learning that the traumatic event(s) occurred to a close family member or friend; or experiencing repeated or extreme exposure to aversive details of the traumatic event(s).
- Presence of one or more intrusion symptoms, such as: recurrent, involuntary, and intrusive distressing memories of the traumatic event(s); recurrent distressing dreams in which content and/or affect of the dream are related to the traumatic event(s); dissociative reactions (e.g., flashbacks) in which the individual feels or acts as if the traumatic event(s) were recurring; intense or prolonged psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event(s); and/or marked physiological reactions to such cues.
- Persistent avoidance of stimuli associated with the traumatic event(s) as evidenced by one or both of the following: avoidance of or efforts to avoid distressing memories, thoughts, or feelings about or closely associated with the traumatic event(s); avoidance of or efforts to avoid external reminders that arouse such associated distressing memories, thoughts, or feelings.
- Negative alterations in cognitions and mood associated with the traumatic event(s), as evidenced by: an inability to remember an

important aspect of the traumatic event(s); persistent and exaggerated negative beliefs or expectations about oneself, others, or the world; persistent, distorted cognitions about the cause or consequences of the traumatic event(s) that lead the individual to blame himself/herself or others; persistent negative emotional state; markedly diminished interest or participation in significant activities; feelings of detachment or estrangement from others; and/or persistent inability to experience positive emotions.

- Marked alterations in arousal and reactivity associated with the traumatic event(s), as evidenced by two (or more) of the following: irritable behavior and angry outbursts; reckless or self-destructive behavior; hypervigilance; exaggerated startle response; problems with concentration; and/or sleep disturbance.

Duration of the above listed disturbances is more than 1 month. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning. The disturbance is not attributable to the physiological effects of a substance or another medical condition. Diagnosis can be further specified as to whether there are dissociative symptoms, such as depersonalization or derealization, and if diagnostic criteria are not met until at least 6 months after the event. (For a more complete description, please see full criteria as detailed by the American Psychiatric Association, 2013a, [*DSM-V* 309.81]).

An even more contemporary line of thinking brings diagnosis in psychiatry in conjunction with brain-based processes. Research Diagnostic-oriented Criteria (RDoC) is a contemporary research framework to better study and analyze mental disorders (The National Institute of Mental Health, 2016). As developed by Thomas Insel, former Director of the NIMH, this RDoC approach may eventually allow us to better understand and integrate basic dimensions of functioning underlying mental illness such as with PTSD and other disorders. The symptom-oriented drug therapy treatments for PTSD might become less emphasized, as no specific drug or type of therapy has effectively, as of yet, targeted the core symptoms of PTSD. Researchers note endophenotypes that stand between genetics and disease can be applied to PTSD. Relevant to our greater understanding are specific brain regions, neuronal networks, stress-related systems (e.g., the hypothalamic–pituitary–adrenal axis), and their underlying genetic and neurogenetic bases (Young, 2014).

COPING: BOLSTERING RESILIENCE AND TREATING PTSD

As with any psychiatric condition, PTSD presents certain difficulties in its treatment and care. Usually, coping is discussed as the solution. Instead, we begin by considering that it is best to prevent symptoms from developing in the first place. This approach has made its way into popular psychology and literature. Studies have shown that preventive measures that make soldiers, for example, more prepared to handle the stress of a traumatic experience coincide with a lower likelihood of their developing PTSD (Rothschild, 2000). Training programs for police and firemen as general approaches to stress management are beginning to incorporate relevant practical cognitive and behavioral techniques.

A useful, initial approach for treating PTSD includes considerations of primary, secondary, and tertiary prevention. As described by Haim Knobler regarding Israeli soldiers, primary prevention incorporates pre-enlistment screening and developing competence and trust among soldiers in units. Secondary prevention includes debriefing techniques and educating traumatized soldiers about PTSD. Tertiary prevention centers on treatment immediately after symptoms appear (Schechter, 2010). Families and other support systems can also be utilized as part of treatment and care. Psychodynamic approaches to treatment can also help to deal with traumatic experience by understanding it in the context of developmental and family history (Schechter, 2010).

Steven Southwick and Dennis Charney, leaders in the field of resilience, have written extensively about bolstering resilience and the protective factors involved. In their book *Resilience: The Science of Mastering Life's Greatest Challenges*, they interviewed soldiers and other resilient individuals who had endured a wide range of severe psychological traumas and identified "resilience factors" (Southwick & Charney, 2012). Drawing on their work with trauma survivors, they find that realistic optimism and a belief in a brighter future are important factors for resilience. One possible mechanism may be that negative emotions activate the sympathetic nervous system and limit our visual focus to danger, trapping us in the nightmare of the traumatic event or stress. The adaptive ability to face fear and treat it as a guide rather than an adversary is crucial. They noticed that resilient individuals had a desire for altruism and evolved a keen sense of right and wrong—led by a strong moral compass and ethics. For example, their cohort used altruism and a sense of moral mission as motivational agents. Prisoners of war, without exception, turned to religion and/or developed a resolute

spiritual life, as the feeling of God's presence worked as an aid to bolster feelings of control, self-efficacy, and inner strength.

Furthermore, social support and interdependence can also provide a foundation for resilience since positive support from others reduces stress levels and, therefore, depression and PTSD. Role models have been found to inspire people, to emulate their model's perseverance and other positive attributes. Observational learning is an innate behavior, and so interestingly, in imitating role models, we discover the road map to our best selves. Physical fitness enhances general health and improves the autonomic nervous system, lessening symptoms of depression and anxiety. In strength training, we acclimatize to physical stressors, enabling us to become more resilient. Brain fitness is also essential, given that challenging our mind enhances our mental sharpness and equips us to face emotional challenges. Even simply thinking can lead to cortical reorganization. Along similar lines, Southwick and Charney explain how cognitive and emotional flexibility is imperative because they enable you to tolerate a highly stressful situation and reassess it. Assigning meaning and purpose to life can dramatically strengthen one's resilience in the way that having a sense of purpose fosters strength and may help prevent the worsening of PTSD symptoms. Finally, persistence and commitment to practicing and building resilience is necessary to consistently maintain a positive outlook and not shy away from adversity.

The American Psychological Association sums up the considerations nicely by suggesting "10 Ways to Build Resilience": (1) Make connections with people and build strong relationships with family and friends. (2) Avoid seeing crises as insurmountable problems. (3) Accept that change is a part of living, and there are circumstances you cannot alter. (4) Move toward your goals but make them realistic. (5) Take decisive actions, and act on adverse situations as much as you can rather than being passive. (6) Look for opportunities to discover more about yourself and gain an increased sense of self-worth. (7) Nurture a confident, positive view of yourself. (8) Keep events in perspective, and do not blow them out of proportion. (9) Maintain a hopeful outlook, and visualize what you want. (10) Take care of yourself by paying attention to your emotional and physical needs. In addition, meditation and spiritual practices can restore hope and build strength (American Psychological Association, 2016, p. 1). All of these factors are of course salient. As the APA recommends, the key is to find a personalized approach that works best for an individual.

To be clear, like with other psychiatric conditions, bolstering resilience to PTSD starts at the beginning of life. If we are to help people

be more resilient, we must raise children to be so from the start. A synthesis of major findings on protective factors gathered by a review of developments in the resilience field has shown that children who are nurtured and have positive relationships with their parents do better in the face of high-risk contexts (Luthar, 2006). The importance of parenting styles on a child's emerging self-development and ability to cope with distress cannot be underestimated, as evidenced by interview research of parenting styles and its effects on a diverse sample of 1,143 high school students, some with depressive symptoms (Liem, Cavell, & Lustig, 2010). Neglectful parenting is detrimental, but even "helicopter parenting" is problematic to the bolstering of resilience, as one must protect not overprotect, so that the child may strengthen and sustain him or herself (Southwick & Charney, 2012).

Therefore, since good parenting and community support are necessary in the prevention of and successful coping with stress-induced disorders, some researchers have expanded upon the current pool of resilience research by studying "parental resilience," a capacity of parents to deliver quality care to children despite the presence of risk factors (Gavidia-Payne, Denny, Davis, Francis, & Jackson, 2015). They proposed a conceptual model in which several parameters of a parent's ability to deliver high-level care, such as psychological well-being and self-efficacy, family functioning, and social connectedness, are considered.

Other clinician-scientists also have studied family-based interventions to address trauma. In *The Theory of the Parent–Infant Relationship* (1960), the notable pediatrician and psychoanalyst Donald Winnicott studied the early parent–infant relationship and developed the concept of the "holding environment." More contemporary researchers, however, focused on the positive holding environment that is necessary not just in early infancy but throughout the course of children's development, especially in times of crisis (Ziegler & Weidner, 2004). Ziegler and Weidner proposed essential components of the parental holding environment: safety and security, with care, warmth, and self-control; empathy, being receptive to the child's feelings, seeing the child as separate and different from themselves, appreciating the child's developmental level, emotional availability, and controlled attunement to the child; and facilitation, and the identification of resources to support and continue the child's growth, and commitment to provide these opportunities (Ziegler & Weidner, 2004, p. 188).

Interestingly, there is a window during which it may be possible to stop trauma from setting in. The time period immediately after a possibly traumatic event occurs is perhaps the most decisive moment in the prevention or development of PTSD. For instance, if a child falls

off a bike, should he or she be encouraged to get back on immediately or wait a week to get back on? Early risk-targeted intervention seems to be an integral preventative measure (Glass & Jones, 2005). A study aimed at developing an accepted intervention to be delivered in the immediate aftermath of trauma assessed posttraumatic stress reactions at 4 and 12 weeks post-injury and depression at baseline and at week 4. The 137 patients were randomly assigned to sessions of differing levels of early intervention, and compared to a control group. Patients with the greatest intervention, consisting of prolonged exposure to the trauma memory, processing of traumatic material, and imaginal exposure homework showed a significantly lower rate of posttraumatic stress reactions (Rothbaum et al., 2012). This behavioral intervention was successful at reducing the reaction and depression symptoms one and three months after the trauma exposure, and thus early intervention may even prevent the development of PTSD by modifying the trauma memory prior to consolidation.

Since PTSD is marked by recurring, intrusive memories, dealing with that disturbance is an important consideration in treatment. Early intervention after exposure may change how the memory is consolidated and recalled. Studying the subject is complicated since memory undergoes many molecular, anatomical, and other changes (Alberini, 2011). Furthermore, no animal model has been able to replicate PTSD in full, but behavioral paradigms have been applied (Alberini, 2011).

However, despite the difficulty, researchers have suggested a model of PTSD's pathogenesis based on a model of classical conditioning. A traumatic event (unconditioned stimulus) overstimulates endogenous stress hormones (unconditioned response). These overstimulated hormones mediate an overconsolidation of the memory trace of the event, and the recall of the event as spurred by reminders (conditioned stimulus) releases further stress hormones (conditioned response), thus provoking further overconsolidation to produce PTSD symptoms (Pitman & Delahanty, 2005). It is also hypothesized that noradrenergic hyperactivity in the basolateral amygdala mediates memory (Pitman & Delahanty, 2005) and that pre- or peritraumatic stress hormone levels facilitate the encoding and consolidation of the traumatic memory and strengthen its trace (Alberini, 2011; Yehuda, 2006). Memory reconsolidation is a process in which a retrieved or reactivated memory re-stabilizes over time. Some researchers wonder if we could target the reconsolidation process, either in the post-retrieval phase or post-reactivation phase, to weaken memories that persist in PTSD (Alberini, 2011). Others disagree believing that it seems unlikely that reconsolidation affects long-term emotional memories that disturb patients (Tuch, 2015).

Pharmacological interventions have been suggested as treatments to be applied when recalling and reconsolidating traumatic memories in order to short-circuit the emotional valence they hold. Beta-blockers are a promising therapy. They block receptor sites for epinephrine and norepinephrine on adrenergic beta-receptors, and weaken the physiological symptoms of the fight-or-flight response. So this potential enables individuals to be less anxious about the trauma or stressor they are experiencing (Frishman, Cheng-Lai, & Nawarskas, 2005). Still, many clinicians recommend using beta-block therapy in combat-wounded individuals (Cohen, Plunkett, & Galvagno, 2012).

Some compounds have been found to disrupt reconsolidation and aid extinction, such as antagonists of β-adrenergic or glucocorticoid receptors. For example propranolol, a beta-blocker, has been administered during the retrieval of a feared or traumatic event in animals and humans (Alberini, 2011). The effects of propranolol have been examined in three phases of memory—acquisition and encoding, emotional response and consolidation, and retrieval and reconsolidation. Early research focused on acquisition and consolidation has yielded inconsistent results. More recent research has been directed toward memory reconsolidation and dissociation of emotion and fear from memories (Donovan, 2010). Przybyslawski and fellow researchers discovered in rats that reactivation of memory triggers a β receptor-dependent cascade of intracellular events, which recapitulates what occurs during the initial post-acquisition consolidation. This may lead to the reorganization of an existing memory as a function of new information in the retrieval environment (Przybyslawski, Roullet, & Sara, 1999). However, others have found that propranolol has had no effect (Muravieva & Alberini, 2010). So much is left to be discovered about the mechanism of action in using beta-blockers and other medications to treat PTSD.

For psychiatrists, psychoanalysts, and other mental health professionals, the subject of resilience incorporates key psychodynamic ideas and considerations. These include the nature of the ego and its mechanisms of defense, whether a trauma has been an actual event or based in fantasy, and how stress can have both positive and negative aspects. Such considerations have implications for approaches to treatment and care. As shown by empirical and clinical evidence, psychodynamic approaches may be especially effective in treating complex PTSD by increasing the ability to rely on mature defenses and improved reactions to trauma through better reflective functioning, reconstructing social capabilities, and healthier relationships. Despite high nonresponse and dropout rates, studies of psychodynamic therapy have demonstrated post-treatment continuation of improvements (Schottenbauer, Glass, Arnkoff, & Gray, 2008).

In the past, stress-induced disorders have been treated with talk therapy, and many psychodynamic approaches to PTSD are still valid. A meta-analysis of data from controlled studies of psychotherapy for PTSD between the years of 1980 and 2003 suggested that PTSD responds well initially to psychotherapy with a large improvement from baseline. Yet questions have been raised regarding the state of patients post-treatment, with many having substantial residual symptoms. This may be due to low completion rates, since promisingly, of patients who do complete treatment, 67% no longer meet criteria for PTSD (Bradley, Greene, Russ, Dutra, & Westen, 2005). It is thought that dissociation may be an adaptive response to decrease distress from overwhelming threat (Busch, Milrod, Singer, & Aronson, 2012). However, this kind of "adaptation" is not beneficial when the actual threat has passed. Psychologically, at that time the dissociation becomes an unsuccessful, unconscious attempt at avoidance. The fear-associated effects persist, but are disconnected from the traumatic events. The psychodynamic interventions, therefore, concentrate on identifying the unconscious mental contents and associated effects that contribute to symptoms (Busch, Milrod, Singer, & Aronson, 2012). Panic attacks may seem like they are out-of-the-blue because the mental content is dissociated from the person.

In psychodynamics, the ego-resiliency construct exists, referring to a personality that is able to adapt and sufficiently express emotional impulses, whereas an ego-brittle personality tends to perseverate and becomes fragile and disorganized when faced with stress (Letzring, Block, & Funder, 2005; Nelson, 1994). Various self-report measures and other studies have demonstrated that personalities of ego-resilient individuals exhibit a few main components, such as "confident optimism, productive and autonomous activity, interpersonal warmth and insight, and skilled expressiveness" (Klohnen [abstract], 1996). Based on reviews immediately following treatment and one year later, psychodynamic approaches resulted in material stable reductions in symptoms, both specific and general (Sachsse, Vogel, & Leichsenring, 2006).

Interestingly, psychoanalysts believe that attachment styles increase or decrease the risk of developing PTSD, with secure attachment protecting against it and insecure attachment enhancing the risk (Busch, Milrod, Singer, & Aronson, 2012). Psychodynamic treatment of the condition often attempts to articulate and understand elements of the traumatic experience that related to the person's sense of self (Boulanger, 2002, 2007). While an experience may be objectively dissimilar, it may provoke a response based in some element unconsciously reminiscent of the trauma. This process has been referred to as the "repetition compulsion" in psychoanalytic literature (Corradi, 2009). The response may

defend against seemingly unbearable feelings of pain, rage, humiliation, and other powerful emotions. Defensive maneuvers may also include dissociative states (Busch, Milrod, Singer, & Aronson, 2012).

Furthermore, it is well known that patients with PTSD often experience significant anxiety. Psychodynamically, symptoms may be connected to underlying feelings of guilt, shame, and other complex emotions relating to the traumatic experience. For example, a traumatized individual may have internalized a sense of disgust about the experience and feel an unconscious need to punish himself or herself. Responses may also be counter-phobic and lead to re-victimization. Survivors may also confuse fantasy and reality (Busch, Milrod, Singer, & Aronson, 2012).

In addition, psychoanalysts must consider a person's experience prior to the trauma. Both the conscious and unconscious meaning a patient gives to a traumatic experience is important in understanding his or her reactions to the trauma. Childhood experience is a template through which the subsequent experience is processed, a lens through which it is seen. So an open-ended or long-term psychodynamic psychotherapy may be helpful in exploring such connections to a patient's past. Greater insight and an increased capacity for mentalization help decrease the core anxiety of PTSD. Furthermore, the relationship with a non-judgmental therapist may help a person to regain trust in others, which is often part of psychological healing.

The standard course of treatment dictated by the United States Department of Defense for PTSD is cognitive behavioral therapy (CBT), which seeks to replace negative thought patterns and behaviors with those that are less distressing (Hassija & Gray, 2007). Neuropsychological studies of veterans with PTSD have shown dysfunction of the fronto-limbic neural circuits and impaired cognitive functioning, and point to a consideration of neurocognitive functioning as a critical step in clinical management of patients with PTSD (Wrocklage et al., 2016). Gaining cognitive control has been suggested as a way to rewire the emotional mediation system of the brain (Hildebrandt, McCall, Engen, & Singer, 2016).

Along similar lines, cognitive processing therapy (CPT) is another effective therapy as it focuses on confronting fear and re-evaluating negative emotions. It uses the Socratic method of teaching, and through talk and reasoning, a trauma survivor may be able to better appraise a current situation. This process is likely to facilitate prefrontal cortical inhibition of the amygdala (Southwick & Charney, 2012). Leaders in the field have conducted critical research in cognitive-emotional training, primarily testing major depressive disorder (MDD), but some cognitive training tasks, such as the emotional faces memory task, as performed

by researchers on 21 participants with MDD, can perhaps be applied to other stress-inducing images to treat PTSD (Iacoviello et al., 2014).

Exposure therapy is considered a form of cognitive behavioral therapy in which individuals are taught various coping techniques, such as relaxation and mindfulness, and then gradually exposed to their prior traumas in safe settings until they are able to face them with reduced or no fear. Further study is necessary, but recent research has been promising, suggesting that prolonged exposure treatment for PTSD extinguishes maladaptive trauma associations though promoting synaptic plasticity and structural change in the rostral anterior cingulate cortex (Helpman, Papini et al., 2016). A longitudinal fMRI study of 58 participants, 30 with PTSD and 28 trauma-exposed matched controls who underwent behavioral fear condition, extinction, and recall paradigm, exhibited reduction in rostral ACC activation during extinction recall from pre- to post-treatment, as well as an increase in functional coherence with ventral prefrontal regions (Helpman, Marin et al., 2016).

More targeted techniques and approaches are faster than traditional therapy and promising as well, specifically eye movement desensitization and reprocessing (EMDR). In EMDR, the patient is asked to remember the trauma while visually tracking the therapist's finger as it moves back and forth. Initially, researchers believed that the eye movements facilitated mental processing of the trauma. However, studies by Roger Pitman and others suggest that recalling the trauma is the key therapeutic element and not the eye movement component (Southwick & Charney, 2012, p. 53).

Various adjustment programs for military veterans have been developed to help them manage the stresses of reintroduction to civilian life (Koenig, Maguen, Monroy, Mayott, & Seal, 2014). Readjustment for children after a trauma can also be a tremendous struggle. Traditional, intensive individual play therapy, that expresses and works through trauma, can be helpful (Birch, 2000). Clinicians have shown several successful, evidence-based case studies (Banbury, 2016).

Regarding psychodynamic therapies, there is a clinical consensus that they clearly help in treating traumatic stress. That approach is well established in therapeutic practice. In fact, it is included in the Practice Guideline for treating PTSD from the International Society for Treatment of Traumatic Stress. However, like much of psychodynamic work, it is not well studied and has a limited evidence base.

One meta-analysis of randomized trials of psychotherapy for PTSD showed that the majority of patients recovered or improved (Bradley, Greene, Russ, Dutra, & Westen, 2005). Another found a positive correlation between psychodynamic treatment prototypes by expert clinicians and treatment outcome (Ablon & Jones, 1998). Other studies

have shown efficacy of psychodynamically oriented trauma-focused treatment for PTSD (Sachsse, Vogel, & Leichsenring, 2006). However, the studies tend to be with small samples and study subjects with other co-morbidities or complicating variables. A randomized controlled clinical trial of psychodynamic psychotherapy in adolescents showed it to be effective in decreasing symptoms, especially when behavioral therapy was added (Gilboa-Schechtman et al., 2010). Psychodynamic treatments for PTSD and its sequelae may also help to improve a patient's self-esteem, reflective functioning, adaptive defenses, and social functioning, to name a few of its other benefits (Schottenbauer, Glass, Arnkoff, & Gray, 2008).

Psychopharmacological therapies have proven of limited help in managing and treating symptoms of PTSD. Medications for PTSD are not necessarily the best or most effective modality of treatment, as most studies have indeterminate or even negative findings. In fact, the only medications that are approved by the FDA to treat PTSD are selective serotonin reuptake inhibitors (SSRIs), specifically sertraline, paroxetine, and fluoxetine (Jeffreys, 2016). Other antidepressants, mood stabilizers, and atypical antipsychotics have not yet been approved for PTSD, but some medications have been shown to be helpful, such as monoamine oxidase inhibitors (MAOIs), hydrocortisone, and D-cycloserine (Jeffreys, 2016).

It is no secret that exercise and physical activity are beneficial for our general health, but fewer people tend to think of them as treatments for mental health issues. However, there is an abundance of evidence to show that simple exercise helps with depression, anxiety, stress, and other ailments. Several neurobiological mechanisms may be at work. Exercise increases endorphins, which improve mood, and increases serotonin and dopamine, which lessens depression. Regular exercise dampens the release of cortisol, a steroid hormone, which can negatively impact neurons in the hippocampus. Aerobic exercise also enhances neurogenesis by increasing the production of neurotrophic growth factors such as BDNF, a protein that promotes growth and repair of neurons (Southwick & Charney, 2012, pp. 135–136).

Meditation and mindfulness have a strong impact on the brain regions involved in emotion and attention regulation. Perhaps not surprisingly, they have been shown to help people cope with symptoms of stress, anxiety, and depression. One approach is to focus attention away from intrusive thoughts, and enhance cognitive control to reduce excess negative arousal (Southwick & Charney, 2012, p. 153). A study of 27 participants researching dispositional mindfulness and cortical ac-

tivity revealed there may be a negative feedback mechanism in which increasing activation of prefrontal cortex decreases activation of the amygdala (Creswell, Way, Eisenberger, & Lieberman, 2007). Another study of 16 enrolled participants and 17 control participants using the mindfulness training program Mindfulness-Based Stress Reduction (MBSR) found an increased concentration of gray matter in several brain regions, notably the left hippocampus, which plays a central role in the modulation of arousal and responsiveness, and the regulation of emotion, and which is significant given that several pathological conditions, including posttraumatic stress disorder, are associated with a decreased volume of the hippocampus (Holzel et al., 2011). Significantly, the RDoC-based treatment program designed to enhance resilience has been informed by mindfulness-based therapy and yoga. This may indicate another direction of treatment (Blom et al., 2014).

Finally, keeping your humor, like other positive emotions, helps to build resilience. It can be seen as a form of cognitive reappraisal (Southwick & Charney, 2012). The eminent neurologist and psychiatrist Viktor Frankl, a Holocaust survivor, wrote that humor is "another of the soul's weapons in the fight for self-preservation. It is well-known that humor, more than anything else in the human makeup can afford an aloofness and an ability to rise above any situation, even if for a few seconds" (Frankl, 1963, p. 63). Frankl was the founder of logotherapy, which means "healing through meaning," and numerous studies have shown the healing quality of having a sense of purpose and looking to the future to promote growth (Southwick & Charney, 2012).

In summary, thus far, the most successful interventions for treating PTSD have been cognitive-behavioral therapy (CBT), such as prolonged exposure therapy (PE) and cognitive processing therapy (CPT), and medication, such as sertraline (Zoloft) and paroxetine (Paxil). Eye movement desensitization and reprocessing (EMDR) and stress inoculation therapy (SIT) have also been successful in many cases, as well as other antidepressants, especially with adjuvants such as the alpha-1 adrenergic antagonist prazosin (Friedman, 2016). It is especially necessary to research further into the most effective intervention methods during the immediate aftermath of a trauma, as critical incident stress debriefing (CISD), a widely used intervention has shown only tenuous success rates (Friedman, 2016). Furthermore, in developing a research classification system for mental disorders based upon neurobiology and behavior, the RDoC project may be instrumental in the future treatment of PTSD and other psychiatric conditions (Cuthbert & Insel, 2013).

CONCLUSION

The study of resilience, trauma, and its treatment is still a work in progress. Since the scope of the subject is vast, it has been important to demarcate it in specific terms. We now have useful definitions of trauma and related conditions that allow us to better examine its etiology, measure its symptomatology and impact, and develop more effective treatment strategies and ways of coping. The RDoC clinical-research framework for categorizing mental disorders may allow us to obtain a more brain-based understanding of PTSD, which can inform its further study and treatment.

Cognitive-behavioral and psychodynamic therapies as well as psychopharmacological interventions all play a useful role in the treatment of trauma. We are becoming more sophisticated in the way these modalities are applied, and they can often be utilized in complementary ways. In addition, we have identified a critical period after trauma has occurred but before symptoms have developed during which effective therapeutic interventions can be made. So one recommendation is for early intervention post-trauma to prevent symptoms from developing. Several novel medications and innovative treatments are also in the pipeline.

As clinicians, we are becoming more oriented to preventing conditions rather than simply treating symptoms and disorders after their onset. Strategies for bolstering resilience are integral to such approaches. We now have a more scientific understanding of resilience in terms of its neurobiology and its genetics and epigenetics, which allows us to better utilize and even bolster it. Also, promoting exercise, meditation, a positive outlook, and other ways of managing stress can be an important part of treatment. Obviously, each person is an individual, so no one treatment fits all. Still, we can now begin to tailor treatments for trauma in more informed and personalized ways.

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