

and Adolescents (Prince-Embury, 2008) measures sense of mastery, sense of relatedness, and emotional reactivity.

Biopsychosocial Factors Associated with Resilience

Numerous genetic, developmental, neurobiological, and psychosocial factors have been associated with resilience and the individual's response to stress (Yehuda, Flory, Southwick & Charney, 2006). To date, genetically-mediated differences in reactivity of the hypothalamic-pituitary-adrenal axis, sympathetic nervous system and serotonergic systems, among others, have been linked to posttraumatic psychopathology and/or resilience. It is likely that these differences have a moderating influence on how effectively the individual manages stress (Meaney & Ferguson-Smith, 2010; Russo, Murrough, Han, Charney & Nestler, 2012; Yehuda, 2006).

Developmental factors also have a marked impact on how one handles stress both as a child and as an adult (Cicchetti, 2013; Masten, 2001; 2014). For example, animal and human studies have shown that repeated stress that is unmanageable, overwhelming and out of one's control can lead to exaggerated behavioral, emotional, sympathetic nervous system, and hypothalamic-pituitary-adrenal axis responses to future stressors (Anacker, O'Donnell & Meaney, 2014). In contrast, repeated exposure to stress that the young animal or child can master tends to have a "steeling" or "inoculating" effect, which can foster behavioral, emotional and neurobiological responses to stress that are better modulated than those observed in young animals and children who have been exposed to uncontrollable or even minimal stress (Lyons, Parker & Schatzberg, 2010).

The neurobiology of resilience is highly complex (see Davidson & McEwen, 2012; Russo, Murrough, Han, Charney & Nestler, 2012). To date, neurobiological research on resilience has primarily focused on neural circuits involved in fear, reward, learning, social connection, and emotion regulation; specific brain structures such as the amygdala, hippocampus, insula, anterior cingulate/prefrontal cortex and the nucleus accumbens; and neurochemicals including dopamine, norepinephrine, epinephrine, cortisol, serotonin brain-derived neurotrophic factor, endocannabinoids, glutamate and neuropeptide Y. One neural mechanism that likely contributes to resilience during highly stressful situations involves activation of the left prefrontal cortex, which sends inhibitory signals to the amygdala with a resultant decrease in anxiety and fear, as well as improved capacity to plan and act more effectively.

A broad range of psychosocial factors have been associated with resilience (Southwick & Charney, 2012a, 2012b). Some of the factors that have received the greatest support from research include positive emotions and optimism, active problem-focused coping, moral courage and altruism, attention to physical health and fitness, capacity to regulate emotions, cognitive flexibility, religiosity/spirituality, high level of positive social support and commitment to a valued and meaningful cause, purpose or mission. While many of these psychosocial factors have been linked to reduced symptoms of traumatic stress, as well as positive mental health and resilience, they do not operate in isolation but typically interact with biological and other factors.

Positive emotions and optimism repeatedly have been associated with good mental and physical health as well as longevity (Duckworth, Steen & Seligman, 2005). A number of investigations have shown that negative emotions tend to increase physiological arousal while positive emotions tend to reduce arousal, broaden focus of attention, and foster more flexible and creative responses to stress and trauma (Fredrickson, 2004).

A great deal of anecdotal evidence suggests that believing in and honoring a personal moral/ethical code can facilitate resilience when these codes are challenged. For example, many former Vietnam prisoners of war describe the resilience-enhancing effects of living by a military code of conduct that included directives such as "do not accept early release unless all prisoners are offered early release" or "accept no favors from the enemy unless all prisoners are offered the same favors" (Vietnam POW Steve Long, as cited in Southwick & Charney, 2012a, p.70). Altruism has also been associated with well-being and resilience in both children and adults. The positive effects of altruism may be related to focusing attention on others rather than self, a reframing of one's own challenging experiences, and/or enhanced self-acceptance and self-confidence.

Physical activity is believed to protect against the negative effects of stress by suppressing cortisol and increasing the production of neurotrophic factors, which promote the repair and growth of neurons (see discussion in Silverman & Deuster, 2014). Physical activity and aerobic fitness are also known to enhance the capacity to manage stress by improving attention, mood, memory, and decision-making.

The capacity to regulate emotions has an enormous impact on stress reactivity (Gross, 2013). While negative emotions can be adaptive in some circumstances, if left unchecked they can dramatically increase physiological reactivity and impair executive function, such as rational decision-making. Resilience has been associated with the capacity to regulate emotions through strategies such as cognitive reappraisal (i.e. the reframing of negative or adverse events into a more positive light), acceptance (i.e. learning to accept that which is not within one's control), and mindfulness (i.e. focusing on the present moment rather than on past experiences or on future worries and fears) (Buhle et al., 2014).

For dealing with stressful situations, active problem-focused coping strategies (e.g., gathering information, acquiring skills, cognitively reappraising negative information in a more positive light) have generally been found to be more effective than passive emotion-based coping strategies (e.g., avoiding or withdrawing, denying that a problem exists, diverting or distraction attention, avoiding or withdrawing, using substances of abuse). However, research (Bonanno & Burton, 2013) has also shown that passive coping strategies may be useful in some situations and that resilience may be most closely associated with "regulatory flexibility" or the capacity to employ a variety of different coping mechanisms depending on the specific situation or context.

High levels of social support have been associated with better outcomes after a variety of traumas (e.g., combat, child abuse) and with better overall psychological and physical health among new mothers, widows, unemployed workers, college students and children with serious medical illnesses. It is possible that social

support fosters health and resilience (Olff, 2012) by dampening physiological responses to stress, stimulating the release of oxytocin that is known to reduce fear, increasing self-confidence, and fostering active rather than passive approaches to solving problems.

Resilience-Enhancing Interventions

In order to promote resilience in the individual, it is important to consider that humans are embedded in families, communities, societies and cultures, and organizations, and that interventions targeted at any one of these levels will affect other levels. For example, Hobfoll and colleagues (2007) identified five empirically supported intervention principles to be used as guidelines for the immediate/mid-term care of individuals directly affected by mass violence and disasters. At the level of community, interventions to enhance resilience typically require integrated educational and training programs that involve a diverse group of experts, systems, and community members (see Norris, Stevens, Pfefferbaum & Wyche, 2008). Interventions designed to enhance resilience can be directed at individuals of all ages, and can be employed before, during or after stressful/traumatic situations.

Children

One of the most effective ways to promote resilience is to provide children with a supportive, protective, and appropriately stimulating and challenging environment in which to grow (Cicchetti, 2013; Masten 2001, 2014). This means loving parents/caretakers, strong role models, healthy peer relationships, effective schools or learning opportunities, protection from repetitive uncontrollable stress, repetitive challenges that can be mastered, and sufficient economic resources. Such environments promote the healthy development of adaptive systems (e.g., attachment, mastery/motivation, and self-regulation systems) that are essential for successfully meeting future challenges and stressors. Interventions designed to enhance these skills might be directed toward parents (e.g., classes in effective parenting), schools (e.g., academic and behavioral expectations that are lofty but that can be achieved through support from the school) or communities (e.g., services that provide economic and psychosocial resources for children in need (Masten, 2014).

Adults

For adults, cognitive-behavioral approaches are often used to enhance resilience. One such approach involves learning to modify one's appraisal of threat and adversity. This may be achieved through training in attention control, cognitive reappraisal and enhancing self-efficacy. Methods to increase attention control include cognitive control training and mindfulness. Cognitive control training (Hertel & Matthews, 2011) teaches the trainee how to selectively direct their attention toward positive and relevant negative information, while filtering out irrelevant negative information. A second method, mindfulness training (e.g., Goyal et al., 2014), teaches the student to focus on their thoughts in the present moment by bringing themselves back (repeatedly) to the present, noticing what is experienced (e.g., "a thought is just a thought, an emotion is just an emotion"), and choosing what to do with it (e.g., "see it for what it is, let it go"). Learning to control where one directs one's attention is believed to decrease negative biases, modify appraisals of threat, and increase capacity to regulate emotions (see Southwick & Charney, 2012a, 2012b).

Training in positive cognitive reappraisal is another cognitive strategy that can help enhance resilience. For example, some research suggests that positive cognitive reappraisal can reduce emotional and physiological responses to stress by increasing activation of the prefrontal cortex while decreasing activation of the amygdala (see discussion in Buhle et al., 2014; Davidson & McEwen, 2012; Southwick & Charney, 2012b). Training in cognitive reappraisal is an important element of cognitive-behavioral approaches that have been used to reduce depression and anxiety, and to enhance resilience.

Behavioral approaches to enhance resilience are generally designed to increase coping self-efficacy. High coping self-efficacy predicts positive adjustment and resilience after exposure to a broad variety of traumatic stressors. To increase coping self-efficacy, programs typically train the individual in the skills needed to successfully meet a specific challenge, and then gradually expose the trainee to relevant stressful situations that are more and more difficult (see discussion in Southwick & Charney, 2012a). After the trainee has mastered a specific situation, he/she moves on to the next most challenging one. As trainees master these challenges they typically experience an increase in coping self-efficacy. Police, firefighting and military training all incorporate behavioral programs to enhance self-efficacy.

Comprehensive Programs

A number of comprehensive programs have been specifically designed to enhance resilience, including stress inoculation training and hardiness training. Stress inoculation training (Meichenbaum & Deffenbacher, 1988) focuses on the individual's appraisal of their capacity to cope with environmental demands and stressors. The training involves three phases: 1) a conceptual and educational phase; 2) a skill acquisition and rehearsal phase; and 3) a practice phase. During the third phase, the individual practices using coping skills learned during phase two (e.g., problem solving, relaxation training, cognitive restructuring) in situations that are progressively more challenging. As the trainee masters one challenge, he/she moves on to a more challenging situation. Stress inoculation training has been shown to significantly reduce symptoms of posttraumatic stress and depression among survivors of sexual assault.

Hardiness is a psychological construct (e.g., Maddi, 2008) that is composed of three interrelated components: control or believing that one has influence over life events; commitment or feeling strongly involved in one's life, relationships, oneself and activities; and challenge or the capacity to experience stressful and adverse events as challenges. Hardiness has been associated with appraisal of negative events as being less threatening, a more optimistic appraisal of ability to cope with stressful situations, and increased resistance to developing PTSD. While hardiness is believed to develop early in life and remain relatively stable thereafter, there is evidence that hardiness can change and that it can be increased through training. Hardiness training teaches trainees to handle stress by enhancing attitudes of control, commitment and challenge, and by building two-way relationships that involve both receiving and giving social support.

Other examples of comprehensive resilience training programs are the Psychoeducational Resilience Training Program (Steinhardt & Dolbier, 2008), which was developed to enhance

resilience among college students, and the military's Comprehensive Soldier Fitness Program (Corman, Matthews & Seligman, 2011) designed to build self-confidence and mental toughness among soldiers. To date, there are relatively few published studies assessing the efficacy of comprehensive resilience training programs. Of note, there is some published data supporting the efficacy of training programs that address constructs related to resilience such as social support among alcoholics (e.g., Network Support Therapy), optimism (e.g., Learned Optimism Therapy) and well-being (Well-being Therapy) (see discussion in Southwick, Litz, Charney & Friedman, 2011).

Neurobiological Approaches

In addition to cognitive-behavioral approaches, there are some potential neurobiological approaches that may help enhance resilience (see Davidson & McEwen, 2012; Southwick & Charney, 2012b). For example, pharmacological approaches might include interventions that: 1) help regulate the sympathetic nervous system (e.g., neuropeptide Y); 2) help regulate the hypothalamic-pituitary-adrenal axis (e.g., CRH antagonist, dehydroepiandrosterone [DHEA]); 3) enhance neurogenesis and protect against stress-induced neuronal damage (e.g., antidepressants); or 4) prevent over-consolidation of memory for traumatic events (e.g., beta-blockers). Cognitive-behavioral interventions might also be used to regulate neural pathways that are believed to be important for resilience, including those involved in attention, regulation of emotions, learning and memory, motivation and reward, fear and contextual sensitivity, and adaptive social behaviors.

Summary

Most individuals are resilient and able to successfully deal with a wide range of life stressors and traumas. In fact, Masten (2001) coined the term "ordinary magic" to point out that resilience is not rare. Humans are endowed with natural protective systems that help them adapt to change and adversity. However, in order for these protective systems to develop and operate effectively individuals need basic social and material resources, and, ideally, healthy family and community environments (see discussion in Southwick, Bonanno, Masten, Panter-Brick & Yehuda, 2014).

In the future, it will be important to investigate resilience from multiple perspectives and levels of analysis. Genetic, epigenetic, developmental, psychological, cognitive, biological, social, cultural and religious/spiritual factors all play a role in how one responds to stress, trauma, and the challenges of life. While it is important for researchers to investigate general principles related to characterizing and enhancing resilience, it is also important to recognize that no two people are exactly alike and that determinants of resilience may vary from one person to the next. With the shift from a pure deficit model of trauma-related psychological outcomes to one that includes both natural and supported resilience, the field of traumatic stress/resilience can ultimately develop increasingly effective strategies to help people negotiate and potentially grow from stress and adversity (Ryff, 2013).

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FEATURED ARTICLES

Anacker, C., O'Donnell, K.J. & Meaney, M.J. (2014). **Early life adversity and the epigenetic programming of hypothalamic-pituitary-adrenal function**. *Dialogues in Clinical Neuroscience, 16*, 321-333. PMID: PMC4214175 We review studies with human and nonhuman species that examine the hypothesis that epigenetic mechanisms, particularly those affecting the expression of genes implicated in stress responses, mediate the association between early childhood adversity and later risk of depression. The resulting studies provide evidence consistent with the idea that social adversity, particularly that involving parent-offspring interactions, alters the epigenetic state and expression of a wide

range of genes, the products of which regulate hypothalamic-pituitary-adrenal function. We also address the challenges for future studies, including that of the translation of epigenetic studies towards improvements in treatments.

Bonanno, G.A. & Diminich, E.D. (2013). **Annual research review: Positive adjustment to adversity – trajectories of minimal-impact resilience and emergent resilience.** *Journal of Child Psychology and Psychiatry*, 54, 378-401. *Background:* Research on resilience in the aftermath of potentially traumatic life events (PTE) is still evolving. For decades, researchers have documented resilience in children exposed to corrosive early environments, such as poverty or chronic maltreatment. Relatively more recently, the study of resilience has migrated to the investigation of isolated PTE in adults. *Methods:* In this article, we first consider some of the key differences in the conceptualization of resilience following chronic adversity versus resilience following single-incident traumas, and then describe some of the misunderstandings that have developed about these constructs. To organize our discussion, we introduce the terms emergent resilience and minimal-impact resilience to represent trajectories of positive adjustment in these two domains, respectively. *Results:* We focused in particular on minimal-impact resilience, and reviewed recent advances in statistical modeling of latent trajectories that have informed the most recent research on minimal-impact resilience in both children and adults and the variables that predict it, including demographic variables, exposure, past and current stressors, resources, personality, positive emotion, coping and appraisal, and flexibility in coping and emotion regulation. *Conclusions:* The research on minimal-impact resilience is nascent. Further research is warranted with implications for a multiple levels of analysis approach to elucidate the processes that may mitigate or modify the impact of a PTE at different developmental stages.

Bonanno, G.A. & Burton, C.L. (2013). **Regulatory flexibility: An individual differences perspective on coping and emotion regulation.** *Perspectives on Psychological Science*, 8, 591-612. doi:10.1177/1745691613504116 People respond to stressful events in different ways, depending on the event and on the regulatory strategies they choose. Coping and emotion regulation theorists have proposed dynamic models in which these two factors, the person and the situation, interact over time to inform adaptation. In practice, however, researchers have tended to assume that particular regulatory strategies are consistently beneficial or maladaptive. We label this assumption the fallacy of uniform efficacy and contrast it with findings from a number of related literatures that have suggested the emergence of a broader but as yet poorly defined construct that we refer to as regulatory flexibility. In this review, we articulate this broader construct and define both its features and limitations. Specifically, we propose a heuristic individual differences framework and review research on three sequential components of flexibility for which propensities and abilities vary: sensitivity to context, availability of a diverse repertoire of regulatory strategies, and responsiveness to feedback. We consider the methodological limitations of research on each component, review questions that future research on flexibility might address, and consider how the components might relate to each other and to broader conceptualizations about stability and change across persons and situations.

Buhle, J.T., Silvers, J.A., Wager, T.D., Lopez, R., Onyemekwu, C., Kober, H., et al. (2014). **Cognitive reappraisal of emotion: A meta-analysis of human neuroimaging studies.** *Cerebral Cortex*, 24, 2981-2990. doi:10.1093/cercor/bht154 In recent years, an explosion of neuroimaging studies has examined cognitive reappraisal, an emotion regulation strategy that involves changing the way one thinks about a stimulus in order to change its affective impact. Existing models broadly agree that reappraisal recruits frontal and parietal control regions to modulate emotional responding in the amygdala, but they offer competing visions of how this is accomplished. One view holds that control regions engage ventromedial prefrontal cortex (vmPFC), an area associated with fear extinction that in turn modulates amygdala responses. An alternative view is that control regions modulate semantic representations in lateral temporal cortex that indirectly influence emotion-related responses in the amygdala. Furthermore, while previous work has emphasized the amygdala, whether reappraisal influences other regions implicated in emotional responding remains unknown. To resolve these questions, we performed a meta-analysis of 48 neuroimaging studies of reappraisal, most involving downregulation of negative affect. Reappraisal consistently 1) activated cognitive control regions and lateral temporal cortex, but not vmPFC, and 2) modulated the bilateral amygdala, but no other brain regions. This suggests that reappraisal involves the use of cognitive control to modulate semantic representations of an emotional stimulus, and these altered representations in turn attenuate activity in the amygdala.

Cicchetti, D. (2013). **Annual research review: Resilient functioning in maltreated children – past, present, and future perspectives.** *Journal of Child Psychology and Psychiatry*, 54, 402-422. doi:10.1111/j.1469-7610.2012.02608.x *Background:* Through a process of probabilistic epigenesis, child maltreatment progressively contributes to compromised adaptation on a variety of developmental domains central to successful adjustment. These developmental failures pose significant risk for the emergence of psychopathology across the life course. In addition to the psychological consequences of maltreatment, a growing body of research has documented the deleterious effects of abuse and neglect on biological processes. Nonetheless, not all maltreated children develop maladaptively. Indeed, some percentage of maltreated children develops in a resilient fashion despite the significant adversity and stress they experience. *Methods:* The literature on the determinants of resilience in maltreated children is selectively reviewed and criteria for the inclusion of the studies are delineated. *Results:* The majority of the research on the contributors to resilient functioning has focused on a single level of analysis and on psychosocial processes. Multilevel investigations have begun to appear, resulting in several studies on the processes to resilient functioning that integrate biological/genetic and psychological domains. *Conclusions:* Much additional research on the determinants of resilient functioning must be completed before we possess adequate knowledge based on a multiple levels of analysis approach that is commensurate with the complexity inherent in this dynamic developmental process. Suggestions for future research on the development of resilient functioning in maltreated children are proffered and intervention implications are discussed.

Davidson, R.J. & McEwen, B.S. (2012). **Social influences on neuroplasticity: Stress and interventions to promote well-being.** *Nature Neuroscience*, 15, 689-695. doi:10.1038/nn.3093

Experiential factors shape the neural circuits underlying social and emotional behavior from the prenatal period to the end of life. These factors include both incidental influences, such as early adversity, and intentional influences that can be produced in humans through specific interventions designed to promote prosocial behavior and well-being. Here we review important extant evidence in animal models and humans. Although the precise mechanisms of plasticity are still not fully understood, moderate to severe stress appears to increase the growth of several sectors of the amygdala, whereas the effects in the hippocampus and prefrontal cortex tend to be opposite. Structural and functional changes in the brain have been observed with cognitive therapy and certain forms of meditation and lead to the suggestion that well-being and other prosocial characteristics might be enhanced through training.

Duckworth, A.L., Steen, T.A. & Seligman, M.E.P. (2005). **Positive psychology in clinical practice.** *Annual Review of Clinical Psychology*, 1, 629-651. doi:10.1146/annurev.clinpsy.1.102803.144154

Positive psychology is the scientific study of positive experiences and positive individual traits, and the institutions that facilitate their development. A field concerned with well-being and optimal functioning, positive psychology aims to broaden the focus of clinical psychology beyond suffering and its direct alleviation. Our proposed conceptual framework parses happiness into three domains: pleasure, engagement, and meaning. For each of these constructs, there are now valid and practical assessment tools appropriate for the clinical setting. Additionally, mounting evidence demonstrates the efficacy and effectiveness of positive interventions aimed at cultivating pleasure, engagement, and meaning. We contend that positive interventions are justifiable in their own right. Positive interventions may also usefully supplement direct attempts to prevent and treat psychopathology and, indeed, may covertly be a central component of good psychotherapy as it is done now.

Fredrickson, B.L. (2004). **The broaden-and-build theory of positive emotions.** *Philosophical Transactions of the Royal Society of London B Biological Sciences*, 359, 1367-1377. doi:10.1098/rstb.2004.1512

The broaden-and-build theory describes the form and function of a subset of positive emotions, including joy, interest, contentment and love. A key proposition is that these positive emotions broaden an individual's momentary thought-action repertoire: joy sparks the urge to play, interest sparks the urge to explore, contentment sparks the urge to savour and integrate, and love sparks a recurring cycle of each of these urges within safe, close relationships. The broadened mindsets arising from these positive emotions are contrasted to the narrowed mindsets sparked by many negative emotions (i.e. specific action tendencies, such as attack or flee). A second key proposition concerns the consequences of these broadened mindsets: by broadening an individual's momentary thought-action repertoire—whether through play, exploration or similar activities—positive emotions promote discovery of novel and creative actions, ideas and social bonds, which in turn build that individual's personal resources; ranging from physical and intellectual resources, to social and psychological resources. Importantly, these resources function as reserves that can be drawn on later to improve the odds of successful coping and survival. This chapter reviews the latest

empirical evidence supporting the broaden-and-build theory and draws out implications the theory holds for optimizing health and well-being.

Garnezy, N., Masten, A.S. & Tellegen, A. (1984). **The study of stress and competence in children: A building block for developmental psychopathology.** *Child Development*, 55, 97-111. <http://www.jstor.org/stable/1129837>

This article discusses the building blocks for a developmental psychopathology, focusing on studies of risk, competence, and protective factors. The current Project Competence studies of stress and competence are described, with particular attention to the methodology and strategies for data analysis. The authors present a three-model approach to stress resistance in a multivariate regression framework: the compensatory, challenge, and protective factor models. These models are illustrated by selected data. In the concluding section, an evaluation of the project is offered in terms of future directions for research.

Gross, J.J. (2013). **Emotion regulation: Taking stock and moving forward.** *Emotion*, 13, 359-365. doi:10.1037/a0032135

The field of emotion regulation has now come of age. However, enthusiasm for the topic continues to outstrip conceptual clarity. In this article, I review the state of the field. I do this by asking—and attempting to succinctly answer—10 fundamental questions concerning emotion regulation, ranging from what emotion regulation is, to why it matters, to how we can change it. I conclude by considering some of the challenges that confront this rapidly growing field.

Hobfoll, S.E., Watson, P., Bell, C.C., Bryant, R.A., Brymer, M.J., Friedman, M.J., et al. (2007). **Five essential elements of immediate and mid-term mass trauma intervention: Empirical evidence.** *Psychiatry*, 70, 283-315. doi:10.1521/psyc.2007.70.4.283

Given the devastation caused by disasters and mass violence, it is critical that intervention policy be based on the most updated research findings. However, to date, no evidence-based consensus has been reached supporting a clear set of recommendations for intervention during the immediate and the mid-term post mass trauma phases. Because it is unlikely that there will be evidence in the near or mid-term future from clinical trials that cover the diversity of disaster and mass violence circumstances, we assembled a worldwide panel of experts on the study and treatment of those exposed to disaster and mass violence to extrapolate from related fields of research, and to gain consensus on intervention principles. We identified five empirically supported intervention principles that should be used to guide and inform intervention and prevention efforts at the early to mid-term stages. These are promoting: 1) a sense of safety, 2) calming, 3) a sense of self- and community efficacy, 4) connectedness, and 5) hope.

Krystal, H. (2008). **Resilience: Accommodation and recovery.** In *The Unbroken Soul: Tragedy, Trauma and Resilience*. J. Parens, H. Blum & S. Akhtar, (Eds). Lanham, MD: Jason Aronson.

The study of the Holocaust has provided insight into how people respond to unspeakable horrors and traumas. Responses depended on specific challenges that prisoners had to face, as well as the individual's assets, personal traits and patterns of behavior. While every victim of the Holocaust was deeply affected by their imprisonment and by the systematic genocide of millions of innocent people, some patterns of behavior that seemed to favor survival. Protective or resilience factors included "healthy" infantile omnipotence which derives from

loving, adoring and empathic parenting early in life and forms the foundation for a future sense of security, the belief that one will be welcomed and liked by others, and optimism in situations of danger and stress; the ability to accept a traumatic situation as being highly abnormal but temporary; intrapsychic resistance and the abiding belief that one will survive and return to a normal life; maintaining pre-trauma goals and ideals as well as the belief in a cause or mission; maintaining social positive social relations, group loyalty and the sense of belonging; giving to others who are suffering when possible; extraordinary flexibility with the ability to accept and react to change and the unpredictable; identifying with something transcendent, something that would endure like God or one's religion or culture; defensive reprocessing of traumatic memories which protect the survivor from potential re-traumatization; the capacity to grieve in order to accept, as much as possible, traumatic losses; the capacity to mobilize one's powers of love, the foundation for self-healing and self-reintegration.

Luthar, S.S., Cicchetti, D. & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Development, 71*, 543-562. doi:10.1111/1467-8624.00164

This paper presents a critical appraisal of resilience, a construct connoting the maintenance of positive adaptation by individuals despite experiences of significant adversity. As empirical research on resilience has burgeoned in recent years, criticisms have been leveled at work in this area. These critiques have generally focused on ambiguities in definitions and central terminology; heterogeneity in risks experienced and competence achieved by individuals viewed as resilient; instability of the phenomenon of resilience; and concerns regarding the usefulness of resilience as a theoretical construct. We address each identified criticism in turn, proposing solutions for those we view as legitimate and clarifying misunderstandings surrounding those we believe to be less valid. We conclude that work on resilience possesses substantial potential for augmenting the understanding of processes affecting at-risk individuals. Realization of the potential embodied by this construct, however, will remain constrained without continued scientific attention to some of the serious conceptual and methodological pitfalls that have been noted by skeptics and proponents alike.

Lyons, D.M., Parker, K.J. & Schatzberg, A.F. (2010). Animal models of early life stress: Implications for understanding resilience. *Developmental Psychology, 52*, 616-624. doi:10.1002/dev.20500

In the mid-1950s, Levine and his colleagues reported that brief intermittent exposure to early life stress diminished indications of subsequent emotionality in rats. Here we review ongoing studies of a similar process in squirrel monkeys. Results from these animal models suggest that brief intermittent exposure to stress promotes the development of arousal regulation and resilience. Implications for programs designed to enhance resilience in human development are discussed.

Maddi, S.R. (2008). The courage and strategies of hardiness as helpful in growing despite major, disruptive stresses. *American Psychologist, 63*, 563-564. http://dx.doi.org/10.1037/0003-066X.63.6.563

Maddi provided commentary on King and Hicks 2007 article entitled "Whatever happened to what might have been? Regrets, happiness, and maturity," King and Hicks posited that developmentally speaking, the interruption or loss (significant or mundane events) of an

individual's goals might actually be helpful, rather than merely detrimental. Maddi described the importance of having a full awareness of losses, but also being able to harness that awareness – to learn and move past a stressor. He posited that this might actually spur a re-jiggering of what it means to be happy, causing the individual to move along a more enriched, mature developmental track. Maddi summarized this process as being similar to his work with colleagues in hardiness training, suggesting that persons who experienced a life-changing stressor might benefit from active consideration of the ideas posed by King and Hicks – utilizing full awareness and consideration of one's trauma (or more mundane setback) to re-conceptualize what happiness in life may mean.

Masten, A.S. (2001). Ordinary magic: resilience processes in development. *American Psychologist, 56*, 227-238. http://dx.doi.org/10.1037/0003-066X.56.3.227

The study of resilience in development has overturned many negative assumptions and deficit-focused models about children growing up under the threat of disadvantage and adversity. The most surprising conclusion emerging from studies of these children is the ordinariness of resilience. An examination of converging findings from variable-focused and person focused investigations of these phenomena suggests that resilience is common and that it usually arises from the normative functions of human adaptational systems, with the greatest threats to human development being those that compromise these protective systems. The conclusion that resilience is made of ordinary rather than extraordinary processes offers a more positive outlook on human development and adaptation, as well as direction for policy and practice aimed at enhancing the development of children at risk for problems and psycho pathology.

Meichenbaum, D.H. & Deffenbacher, J.L. (1988). Stress inoculation training. *Counseling Psychologist, 16*, 69-90. doi:10.1177/0011000088161005

This article outlines the theory, research, and procedures of stress inoculation training (SIT). SIT consists of three overlapping phases. The first phase, conceptualization, is an education phase that emphasizes the development of a warm, collaborative relationship through which a careful assessment and problem reconceptualization are completed. The second phase, skill acquisition and rehearsal, target and develop a repertoire of palliative and instrumental coping skills for anxiety reduction. A table of common cognitive coping skills is included to exemplify the range of coping skills employed. The third phase, application and follow-through, focuses upon activities that transfer coping skills to real life and prevent relapse. Finally, guidelines for the selection and design of individual and group application of stress inoculation training are provided.

Olf, M. (2012). Bonding after trauma: On the role of social support and the oxytocin system in traumatic stress. *European Journal of Psychotraumatology, 3*, 18597. 1-18. doi:10.3402/ejpt.v3i0.18597

This paper outlines the state of affairs in psychobiological research on psychotrauma and PTSD with a focus on the role of the oxytocin system in traumatic stress. With a high prevalence of trauma and PTSD in the Netherlands, new preventive and therapeutic interventions are needed. The focus is on the role of social support and bonding in coming to grips with psychological trauma, about the oxytocin system as a basis for reducing the

stress response and creating a feeling of bonding, about binding words to painful emotions in psychotherapy, and about the bonds between researchers and clinicians.

Panter-Brick, C. (2014). **Health, risk, and resilience: Interdisciplinary concepts and applications.** *Annual Review of Anthropology*, 43, 431-448. doi:10.1146/annurev-anthro-102313-025944 Risk and resilience articulates major explanatory frameworks regarding the persistence of healthcare disparities. Specifically, scholars have advocated a sophisticated knowledge of risk, a more grounded understanding of resilience, and comprehensive and meaningful measurements of risk and resilience pathways across cultures. The goal is to operationalize research issues into sustainable healthcare practice and equity-focused policy. This article synthesizes current understandings on risk and resilience from the lens of medical anthropology: It reviews key insights gained from the standpoint of cultural narratives, political economy, and life history theory, as well as current shortcomings. The emergent literature on health-related risk and resilience is breathing new life into collaboration and dialogue across diverse fields of research and policy.

Russo, S.J., Murrough, J.W., Han, M-H., Charney, D.S. & Nestler, E.J. (2012). **Neurobiology of resilience.** *Nature Neuroscience*, 15, 1475-1484. doi:10.1038/nn.3234 Humans exhibit a remarkable degree of resilience in the face of extreme stress, with most resisting the development neuropsychiatric disorders. Over the past five years, there has been increasing interest in the active, adaptive coping mechanisms of resilience; however, in humans, most published work focuses on correlative neuroendocrine markers that are associated with a resilient phenotype. In this review, we highlight a growing literature in rodents that is starting to complement the human work by identifying the active behavioral, neural, molecular and hormonal basis of resilience. The therapeutic implications of these findings are important and can pave the way for an innovative approach to drug development for a range of stress-related syndromes.

Rutter, M. (2013). **Annual research review: Resilience – clinical implications.** *Journal of Child Psychology and Psychiatry*, 54, 474-487. doi:10.1111/j.1469-7610.2012.02615.x **Background:** It is a universal finding that there is huge heterogeneity in people's responses to all kinds of stress and adversity. Resilience is an interactive phenomenon that is inferred from findings indicating that some individuals have a relatively good outcome despite having experienced serious adversities. **Methods:** Resilience can only be inferred if there has been testing of environmental mediation of risks and quantification of the degree of risk. The use of 'natural experiments' to test environmental mediation is briefly discussed. The literature is then reviewed on features associated with resilience in terms of a) those that are neutral or risky in the absence of the risk experience (such as adoption); b) brief exposure to risks and inoculation effects; c) mental features (such as planning, self-regulation or a sense of personal agency); d) features that foster those mental features; e) turning point effects; f) gene-environment interactions; g) social relationships and promotive effects; and h) the biology of resilience. **Results:** Clinical implications are considered with respect to a) conceptual implications; b) prevention; and c) treatment.

Conclusion: Resilience findings do not translate into a clear programme of prevention and treatment, but they do provide numerous leads that focus on the dynamic view of what may be involved in overcoming seriously adverse experiences.

Ryff, C.D. (2013). **Psychological well-being revisited: Advances in the science and practice of eudaimonia.** *Psychotherapy and Psychotherapeutics*, 83, 10-28. doi:10.1159/000353263 This article reviews research and interventions that have grown up around a model of psychological well-being generated more than two decades ago to address neglected aspects of positive functioning such as purposeful engagement in life, realization of personal talents and capacities, and enlightened self-knowledge. The conceptual origins of this formulation are revisited and scientific products emerging from 6 thematic areas are examined: 1) how well-being changes across adult development and later life; 2) what are the personality correlates of well-being; 3) how well-being is linked with experiences in family life; 4) how well-being relates to work and other community activities; 5) what are the connections between well-being and health, including biological risk factors, and 6) via clinical and intervention studies, how psychological well-being can be promoted for ever-greater segments of society. Together, these topics illustrate flourishing interest across diverse scientific disciplines in understanding adults as striving, meaning-making, proactive organisms who are actively negotiating the challenges of life. A take-home message is that increasing evidence supports the health protective features of psychological well-being in reducing risk for disease and promoting length of life. A recurrent and increasingly important theme is resilience – the capacity to maintain or regain well-being in the face of adversity. Implications for future research and practice are considered.

Southwick, S.M. & Charney, D.S. (2012b). **The science of resilience: Implications for the prevention and treatment of depression.** *Science*, 338, 79-82. doi:10.1126/science.1222942 Human responses to stress and trauma vary widely. Some people develop trauma-related psychological disorders, such as PTSD and depression; others develop mild to moderate psychological symptoms that resolve rapidly; still others report no new psychological symptoms in response to traumatic stress. Individual variability in how animals and humans respond to stress and trauma depends on numerous genetic, developmental, cognitive, psychological, and neurobiological risk and protective factors.

Southwick, S.M., Bonanno, G.A., Masten, A.S., Panter-Brick, C. & Yehuda, R. (2014). **Resilience definitions, theory, and challenges: Interdisciplinary perspectives.** *European Journal of Psychotraumatology*, (525338). doi:10.3402/ejpt.v5.25338 In this paper, inspired by the plenary panel at the 2013 meeting of the International Society for Traumatic Stress Studies, Dr. Steven Southwick (chair) and multidisciplinary panelists Drs. George Bonanno, Ann Masten, Catherine Panter-Brick, and Rachel Yehuda tackle some of the most pressing current questions in the field of resilience research including: 1) how do we define resilience, 2) what are the most important determinants of resilience, 3) how are new technologies informing the science of resilience, and 4) what are the most effective ways to enhance resilience? These multidisciplinary experts provide insight into these difficult questions, and although each of the panelists had a slightly different definition of resilience,

most of the proposed definitions included a concept of healthy, adaptive, or integrated positive functioning over the passage of time in the aftermath of adversity. The panelists agreed that resilience is a complex construct and it may be defined differently in the context of individuals, families, organizations, societies, and cultures. With regard to the determinants of resilience, there was a consensus that the empirical study of this construct needs to be approached from a multiple level of analysis perspective that includes genetic, epigenetic, developmental, demographic, cultural, economic, and social variables. The empirical study of determinates of resilience will inform efforts made at fostering resilience, with the recognition that resilience may be enhanced on numerous levels (e.g., individual, family, community, culture).

Walsh, F. (2003). **Family resilience: A framework for clinical practice.** *Family Process, 42*, 1-18. doi:10.1111/j.1545-5300.2003.00001.x

This article presents an overview of a family resilience framework developed for clinical practice, and describes its advantages. Drawing together findings from studies of individual resilience and research on effective family functioning, key processes in family relations are outlined in three domains: family belief systems, organizational patterns, and communication/problem-solving. Clinical practice applications are described briefly to suggest the broad utility of this conceptual framework for intervention and prevention efforts to strengthen families facing serious life challenges.

Yehuda, R., Flory, J.D., Southwick, S. & Charney, D.S. (2006). **Developing an agenda for translational studies of resilience and vulnerability following trauma exposure.** *Annals of the New York Academy of Sciences, 1017*, 379-396. doi:10.1196/annals.1364.028

Here we outline a translational research agenda for studies of resilience, defined as the process of adapting well in the face of adversity or trauma. We argue that an individual differences approach to the study of resilience, in which the full range of behavioral and biological responses to stress exposure is examined can be applied across human samples (e.g., people who have developed psychopathology versus those who have not; people who have been exposed to trauma versus those who have not) and even, in some cases, across species. We delineate important psychological resilience-related factors including positive affectivity and optimism, cognitive flexibility, coping, social support, emotion regulation, and mastery. Key brain regions associated with stress-related psychopathology have been identified with animal models of fear (e.g., extinction and fear conditioning; memory reconsolidation) and we describe how these regions can be studied in humans using neuroimaging technology. Finally, we cite recent research identifying neuroendocrine markers of resilience and recovery in humans (e.g., neuropeptide Y [NPY], DHEA) that can also be measured, in some cases, in other species. That exposure to adversity or trauma does not necessarily lead to impairment and the development of psychopathology in all people is an important observation. Understanding why this is so will provide clues for the development of therapeutic interventions for those people who do develop stress-related psychopathology, or even for the prevention of adverse outcomes.

Bonanno, G.A. & Diminich, E.D. (2013). **Annual research review: Positive adjustment to adversity – trajectories of minimal-impact resilience and emergent resilience.** *Journal of Child Psychology and Psychiatry, 54*, 378-401. doi:10.1111/jcpp.12021

Background: Research on resilience in the aftermath of potentially traumatic life events (PTE) is still evolving. For decades, researchers have documented resilience in children exposed to corrosive early environments, such as poverty or chronic maltreatment. Relatively more recently, the study of resilience has migrated to the investigation of isolated PTE in adults. *Methods:* In this article, we first consider some of the key differences in the conceptualization of resilience following chronic adversity versus resilience following single-incident traumas, and then describe some of the misunderstandings that have developed about these constructs. To organize our discussion, we introduce the terms emergent resilience and minimal-impact resilience to represent trajectories of positive adjustment in these two domains, respectively. *Results:* We focused in particular on minimal-impact resilience, and reviewed recent advances in statistical modeling of latent trajectories that have informed the most recent research on minimal-impact resilience in both children and adults and the variables that predict it, including demographic variables, exposure, past and current stressors, resources, personality, positive emotion, coping and appraisal, and flexibility in coping and emotion regulation. *Conclusions:* The research on minimal-impact resilience is nascent. Further research is warranted with implications for a multiple levels of analysis approach to elucidate the processes that may mitigate or modify the impact of a PTE at different developmental stages.

Masten, A.S. (2014). *Ordinary magic: Resilience in Development.* New York: Guilford Press. Masten provides a comprehensive and nuanced overview of resilience theory and research to date, with an emphasis on early development, and multi-level interactions of theory, current research and implementation/practice. Key models of resilience are identified, with case illustrations. Factors that have emerged from resilience research are discussed, and include neurobiology, social context of a child's environment (e.g., school, family and culture). Policy and practice/research implementation are treated in a concluding section. In summary, Masten emphasizes the overarching imperative to utilize what is known to support the natural resilience of children who are in currently in need, but also looks forward to expanding the fourth wave of resilience research – one that is multi-level, integrative, dynamic and system-oriented.

Meaney, M.J. & Ferguson-Smith, A.C. (2010). **Epigenetic regulation of the neural transcriptome: The meaning of the marks.** *Nature Neuroscience, 13*, 1313-1318. doi:10.1038/nn1110-1313

The field of epigenetics provides neurobiologists with candidate mechanisms for experience-dependent changes in gene transcription. The ability to realize the potential of epigenetics in defining the causal pathways lying between environmental signals, transcriptional regulation, and neural function will depend on moving beyond correlational studies focusing on individual epigenetic marks. Here we attempt to provide a conceptual framework for integrative research on nucleotide sequence, chromatin modifications, RNA signaling, and their interactions in understanding experience-dependent phenotype plasticity. Studies in genomic imprinting may serve as an existing model for such approaches.

ADDITIONAL CITATIONS *continued*

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. doi:10.1007/s10464-007-9156-6

Communities have the potential to function effectively and adapt successfully in the aftermath of disasters. Drawing upon literatures in several disciplines, we present a theory of resilience that encompasses contemporary understandings of stress, adaptation, wellness, and resource dynamics. Community resilience is a process linking a network of adaptive capacities (resources with dynamic attributes) to adaptation after a disturbance or adversity. Community adaptation is manifest in population wellness, defined as high and non-disparate levels of mental and behavioral health, functioning, and quality of life. Community resilience emerges from four primary sets of adaptive capacities—Economic Development, Social Capital, Information and Communication, and Community Competence—that together provide a strategy for disaster readiness. To build collective resilience, communities must reduce risk and resource inequities, engage local people in mitigation, create organizational linkages, boost and protect social supports, and plan for not having a plan, which requires flexibility, decision-making skills, and trusted sources of information that function in the face of unknowns.

Southwick, S.M., Litz, B.T., Charney, D. & Friedman, M.J. (Eds.). (2011). *Resilience and mental health: Challenges across the lifespan.* Cambridge [England]: Cambridge Press. doi:10.1017/CBO9780511994791

This edited textbook on resilience has brought together experts from a broad array of scientific fields whose research has focused on adaptive responses to stress. The chapters, which are organized into five sections, summarize the current literature on the adaptive responses to stress from various relevant fields and domains. Section 1 introduces the reader to state-of-the-art advances in theory and empirical research on pathways to resilience, approaching this discussion from multiple perspectives. Section 2 examines developmental determinants of resilience across the lifespan, from infancy to old age. Section 3 describes the impact of social context, in the form of family, community and society, on adaptation to adversity. The chapters in Section 4 focus on challenges to resilience when dealing with specific adversities, including loss and grief, disasters, rape and assault, combat, terrorism, poverty, and chronic mental illness. The final section brings together what is currently known about enhancing resilience and includes chapters specifically devoted to children, military members, and disaster workers. In summary, each of the five sections in this edited textbook examine adaptive responses to trauma, spanning from factors that contribute to and promote resilience, to populations and societal systems in which resilience is employed, to specific applications and contexts of resilience, and interventions designed to better enhance resilience.