

Science for the Yoga Therapist

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LEARNING OBJECTIVES

- Identify internal and external factors that may be predictors of resilience.
- Understand how a mind-body approach may facilitate shifts in brain and central nervous system function.
- Recognize the need to address systemic and cultural components in yoga therapy protocols.

Resilience: The Illusion of a Simple Solution

By Lilith Bailey-Kroll

As yoga therapists in a self-regulating profession, we are tasked with bridging our understanding of yogic practices with biomedical and psychological knowledge. The concept of resilience lies at the heart of our practice's aim "to promote health and well-being within a therapeutic relationship," as the official IAYT definition of yoga therapy says. This article examines how evidence-informed practice, which at its best embraces practitioner wisdom and the client's needs and preferences while harnessing current research, can be used to cultivate resilience.

Background

The study of resilience has changed dramatically since the 1970s, when a first wave of researchers began to investigate why some children seemed to thrive despite exposure to significant adversity and trauma. These studies were based on developmental psychopathology and sought to address stress-induced patterns of disease by identifying risks.

The focus on positive traits came later as the science moved beyond a disease model to include an exhaustive examination of internal and external factors including globalization, climate change, international and financial crises, pandemics, war, terrorism, childhood adversity, age, race, socioeconomic status, medical history, familial genetic liability, as well as physiological and cellular aspects.

Resilience is messy, nonlinear, and even circular; it is a journey of reintegrating rather than a destination of biopsychosocial-spiritual homeostasis.

Resilience is the idea that all individuals are in constant adaptation; the process of adaptation is a facet of resilience and not just the final outcome.¹ Resilience is a journey rather than a destination and cannot be separated from adversity and stress because, by definition, we must be exposed to at least one adverse event. It is this author's intention to share current research on the biological mechanisms of stress and to illuminate how the awareness and self-observation we develop in yoga can cultivate resilience in response to disruption.

Multisystem Resilience—Not Pulling Yourself up by Your Bootstraps

The study of resilience is cross-disciplinary and multilayered, with the health of individuals, communities, and the planet at its core. Understanding its multisystem nature is important because resilience cannot be measured just by outward markers of success. The skin-deep resilience hypothesis suggests that outward resilience—good psychological and educational outcomes—may be a double-edged sword and not necessarily correlated with physical health.² In practice, navigating systemic challenges with neoliberal ideals of pulling yourself up through self-control and self-reliance is metabolically and behaviorally demanding to sustain, and we can expect moving through the world in this way to trigger the long-term presence of elevated stress hormones. Likewise, economic hardship, downward mobility, neighborhood poverty, and racial discrimination contribute to allostatic load and epigenetic aging.³ Illustrating these ideas, a study tracking medical students enrolled at Johns Hopkins University over 40 years found that educated, affluent physicians who had experienced childhood adversity were 2.4 times more likely to have coronary heart disease at age 50 than physicians who had been raised in households with high socioeconomic status.⁴ Although a person may have learned to be outwardly resilient within capitalism and systems of oppression, this kind of resilience does not necessarily correlate to biological health.

Research taking multiple systems into account, such as childhood adversity, age, race, socioeconomic status, medical history, familial genetic liability, as well as physiological and cellular aspects, found that early life adversity primes immune cells to mount an excessive inflammatory cytokine response, the most critical being interleukin-1 β (IL-1 β), interleukin-6 (IL-6), and tumor necrosis factor- α (TNF- α); such adversity also promotes epigenetic changes that result in diminished sensitivity to glucocorticoid (GC) signaling.⁵ Additionally, these early life stressors led to hyperfunctioning of the locus coeruleus–norepinephrine (LC-NE) system and increased amygdala responsiveness to negative facial expression as well as hypervigilance for threat, mistrust of others, and poor self-regulation.

Research has pointed to the following factors as predictors of resilience:

- a strong sense of identity and culture,
- relationships that promote social cohesion and belonging, and
- the experience of power and control as well as social justice and access to basic material resources.⁶

This is where having the resource of a supportive, close network of people shines. The upside of the research is that family-centered prevention programs can benefit health by reducing inflammation,

helping to preserve telomere length, and inhibiting epigenetic aging.³

And while epigenetics shows the individual potential for resilience, this aspect of our systems is only part of the whole; crucially, individuals and groups also must have the capacity to navigate resources that sustain well-being in a culturally meaningful way. Yoga therapy interventions that only emphasize individual resilient traits, such as mindfulness, without addressing the multiple systems failures are harmful, unethical, and an avoidance of critical thinking. Researcher Michael Ungar, PhD, has created a free manual for those interested in creating a resilience-building program informed by “what works” (<https://resilienceresearch.org/files/WhatWorks-Ungar-WebVersion.pdf>).

Resilient Pathways

The Power of Perception

Stress was initially deemed to be cumulative. The prevailing view stated that there was no advantageous effect to stress and postulated that chronic stress progressively increased the risk of disease.

Psychologist and author Kelly McGonigal, PhD, is among those who have challenged these widely accepted views and ideas. Her book and Ted Talk, *The Upside of Stress: Why Stress Is Good for You and How to Get Good at It*, ask us to reframe stress as a helpful energizer that prepares us for action. She asserts that one’s perception of stress is what matters, not the actual experience of stress. McGonigal references a study that looked at data linked from a National Health Survey to the National Death Index for 186 million U.S. adults as an example of how stress can help you become resilient or how it can kill you: Individuals who experienced stress AND perceived that stress affected their health had a 43% increased risk of premature death over those who did not hold the belief.⁷ Although this statistic is breathtaking, resilience is based on a much more complex dance than simple positive thinking.

A hypothesis put forth as an integrative framework for psychophysiological research is that mind-body therapies work with bidirectional pathways that provide lines of communication between mind/brain and body. Top-down processes of intentional mental activities, such as meditation, facilitate a coordinated shift in brain function. Bottom-up processes, such as breathing and movement practices, may provide corrective feedback to the central nervous system. Both result in increased heart rate variability (HRV, a marker of autonomic function), reduced expression of proinflammatory cytokines, and functional changes in central neural processing.⁸

The physiological effects of yoga are becoming clearer, with a better-established research base. A meta-analysis of randomized clinical trials with active controls indicates that interventions including yoga asana improve regulation of the autonomic nervous system and the hypothalamic-pituitary-adrenal (HPA) axis. Specifically, yoga asana practice appears to have inhibitory effects on physiological stress, as demonstrated by decreased cortisol, blood pressure, and cytokine levels.⁹ To drill down into the findings, a systematic review and meta-analysis shows that yoga is a viable antihypertensive lifestyle therapy that produces the greatest blood pressure benefits when breathing techniques and meditation/mental relaxation, rather than only asana, are included.¹⁰ Reliable associations

have been shown between increased HRV and slow-breathing techniques at six breaths per minute.¹¹

The Power of Physiology

What does it mean for yoga to regulate the HPA axis? Do the biomarkers of cortisol, blood pressure, and cytokine levels positively affect stress and resilience? Here is what we have learned to date: There is a vicious cycle between heightened and prolonged stress, physiological dysregulation, and chronic disease and depression.¹²

The biomedical view of stress is rooted within a disease model. Stress is defined as a perceived threat to an individual’s homeostasis or well-being. The negative consequence or effects of stress is called *allostatic load*—the cumulative burden of chronic stress and life events, identified by the use of biomarkers and clinical criteria such as posttraumatic stress disorder and major depressive disorder.¹³ A hallmark of allostatic load is sustained activation of the LC-NE in parallel with HPA axis hyperactivity, resulting in an excessive inflammatory cytokine response that diminishes sensitivity to GC signaling, as explained below.

When stress is encountered, the sympathetic nervous system (SNS) is activated almost immediately, resulting in the secretion of epinephrine and norepinephrine (NE), also known as adrenaline and noradrenaline. Most NE, a powerful neurotransmitter, is synthesized and released from neurons of the LC in the pons area of the brain.¹⁴ NE modulates the fight-or-flight (SNS-dominated) response, promoting instinctual responses over more complex cognitive responses and elevating the heart and respiratory rates; NE is one of the organic chemicals that makes us feel anxious. NE also excites and mobilizes us, directing our attention to the present moment and making us more aware, awake, and focused. Its presence protects us in the short term.

Microseconds after the SNS is activated, the HPA axis is stimulated. The hypothalamus responds to signals like NE and secretes vasopressin (a hormone that helps to control and coordinate a number of systemic functions) and corticotropin-releasing hormone (CRH). CRH enters blood circulation and reaches the pituitary, leading to the release of adrenocorticotropic hormone (ACTH); ACTH, in turn, acts in the cortex of the adrenal glands to promote the release of GCs. The primary functions of GCs are to promote mobilization and utilization of energy during stress as well as to act on the hypothalamus and pituitary (to suppress CRH and ACTH production) in a negative feedback cycle that stops the response from escalating out of control (Fig. 1).

As yoga therapists we have the potential to intervene here. Through top-down processes of intentional mental activities we can cultivate tools of observation that reposition stress as an aid to present-moment awareness—moving from a place of identifying with the stress (“I am stressed”) to a place of observation (“I feel my body reacting; this is important”). Be Here Now. We also are able to share bottom-up processes that use the body and breath to complete the stress cycle with receptivity, empathy, and compassion. Rather than ruminating on ways to bolster comfort, yoga therapy’s promise is the potential to share teachings that embrace uncertainty, discomfort, and impermanence. And in the end, as Yoga Sutra 1.2 says, *Yoga chitta vritti nirodha*—yoga is the stilling (or ceasing) of the mind.

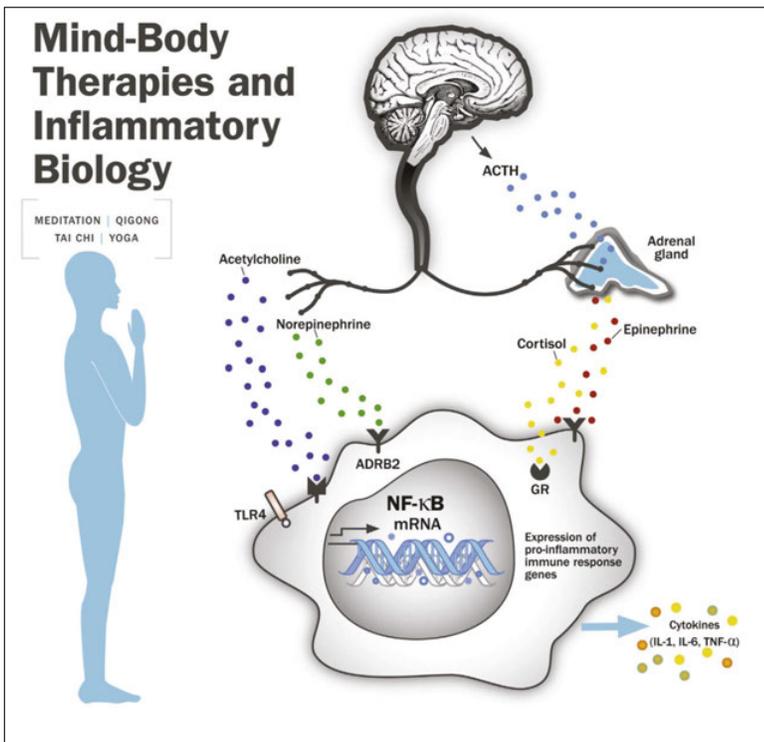


Figure 1. Potential pathways linking mind-body therapies and inflammatory biology, focusing on neuroendocrine mechanisms. Mind-body interventions may influence neural regions that regulate downstream stress response pathways, including the ANS and the HPA axis. The HPA axis may, in turn, influence the production of proinflammatory cytokines via GC receptors on immune cells. Stimulation of receptors by epinephrine and norepinephrine can activate proinflammatory transcription factors such as NF-κB, whereas stimulation of GC receptors can inhibit proinflammatory cytokine production. (Figure reprinted with the permission of the publisher, from Bower and Irwin.¹⁹)

Markers of Stress

The hormone cortisol is the most well-known and studied GC. Excessive and sustained cortisol secretion has been correlated with serious adverse effects such as hypertension, osteoporosis, immunosuppression, insulin resistance, atherosclerosis, and cardiovascular disease. The glucocorticoid-resistance model proposes that the body adapts by reducing immune cell responsiveness to GC hormones (GC resistance), allowing inflammation to flourish.^{15,16} This inability to recognize and respond to the cortisol signal weakens our immune systems and increases the risk of developing viral infections or other chronic stress-related pathologies.

Inflammation and GC-receptor resistance have an equally profound effect on our thoughts and feelings. In the 1990s, the macrophage theory of depression¹⁷ proposed a connection between depression, inflammation, and the immune system. Over the last three decades, a vast amount of research has shown correlational evi-

dence indicating that depressed patients have high levels of circulating proinflammatory cytokines. A meta-analysis of 3,212 individuals with major depressive disorder and 2,798 healthy controls confirmed increased proinflammatory markers such as IL-6 and IL-1β via GC-receptor resistance, ultimately impairing the negative-feedback regulation of the HPA axis.¹⁸

As science begins to reveal the way our thoughts change our biology, such as the finding that meditation increases telomere length,¹⁹ it is not unreasonable to assume that the practice of yoga, specifically intentional mental activities, has an impact on the responsiveness of the GC receptors. Research shows that mind-body therapies, including yoga, increase anti-inflammatory GC signaling, which co-occurs with decreases in NF-κB (the protein complex that controls transcription of DNA, cytokine production, and cell survival); this finding suggests that receptor sensitivity may be modulated by these interventions.²⁰

Final Thoughts

Resilience is not a trait. And although we may marvel at the human system's ability to persevere and even thrive in the face of adversity, resilience is not extraordinary. Having resilient systems may be protective, but it doesn't mean we will never experience difficulty or stress.

Yoga therapy interventions that only emphasize individual resilient traits, such as mindfulness, without addressing the multiple systems failures are harmful, unethical, and an avoidance of critical thinking.

At its core, resilience is the process of turning toward suffering with kindness and compassion. This does not mean that risks and problems are ignored, but rather that a broader array of strategies for change is considered.²¹ Resilience is messy, nonlinear, and even circular; it is a journey of reintegrating rather than a destination of biopsychosocial-spiritual homeostasis. As yoga therapists working in evidence-informed practice, we have the opportunity to use current research and our discriminative wisdom to support a beautifully complex kind of resilience that moves beyond the illusion of a simple solution to stress and adversity. **YTT**



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