

# SUCSSO, A MODERN EPIDEMIC

In my journey as a yoga teacher, I always try to be updated about health, wellness, and other subjects that can enrich my practice and share with my students. I have noticed that more and more scientific studies are being published that show the benefits of yoga to treat diseases of the most varied origins.

One of them, I have seen advancing outside the classroom and in the students that enter the classroom, is stress. I attribute this growth to modern life, which overloads and imbalances our physiological functions and our general state of health. This modern evil can trigger numerous diseases from heart disease to cancer.

Yoga is effective in mitigating the effects of stress as the practice helps maintain homeostasis and physical and mental harmony. Yes, reducing negative emotional states helps minimize the health effects of stress. I am not saying that we should eliminate all stress from our lives because that would be impossible and not good for our health.

There is a positive version of stress, eustress, that can motivate us and make us happier. This is unlike the negative variety of stress, distress, which causes fear and anxiety and puts us in a state of high alert, reducing our ability to cope and react effectively to stressors.

A daily amount of positive stress will not harm you and can even improve your health. One of my recommendations for adding positive stress to your life is establishing the habit of taking cold showers. Despite the discomfort in the first few days, over time, the body gets used to it. From a neuroplastic point of view, this happens because the brain starts to recognize a cold shower as something good.

ave you ever stopped to think about what happens to us when we are stressed? In these moments we send a message to the nervous system that is activated via neural connections. At this instant, physiological, emotional, and behavioral reactions occur. Doses of noradrenaline, dopamine, serotonin, and cortisol are released according to the individual's emotional state. At this moment, each person reacts in their own way. Some become paralyzed, others fight or flee, and then our bodies return to normal.

This is a natural response. Although, if stress happens too often, we get stuck in this state and develop chronic stress. Chronic stress involves higher levels of hormones known to damage our well-being and trigger diseases.

In a way, through the experience of chronic stress, we can understand that nature is always very adaptable, and very malleable. When something in us realizes that stress will not go away, we accept chronic stress as normal. This is the moment when the illness starts to happen.





It doesn't need to be this way though, we can channel our adaptive capacities to build health, rather than foster illness and disease. It is essential that you learn to deal with stress, know how to be resilient to it, and become healthier.

So the important thing is not to try to contain the phenomenon of stress, but to have mechanisms that allow us to manage it regularly. Stress can almost always be very positive as long as it doesn't become chronic and thus sickening.

Yoga practice can help you live well, even in the face of stressors, because the yogi learns to operate in a balanced frequency and to get rid of the common belief that human beings do not develop better when experiencing chronic stress. Living this way is unsustainable. The good news is we can learn new ways to live well.

In the following pages, I list some scientific studies that give us some clues on how to act to improve your relationship with stress. Some of them explore how yoga can contribute to overcoming stressful situations.

Happy reading.







Stress affects every system and organ in our body, although we often only experience certain aspects of it. Shortness of breath, shaking, heart palpitation, headaches or stomachaches, and muscle tension are some of the physical symptoms that most people attribute to stress. Then there are the emotional or cognitive symptoms related to stress such as anxiety, depression, and attentional issues.

Of course, these manifestations vary from individual to individual, but the effects can be profound and often we don't associate our physiological responses with the stresses and strains of everyday life.

As I said above, in stressful situations our brain releases large doses of hormones such as cortisol, adrenaline, and norepinephrine, promoting physiological changes. These are the well-known fight-or-flight reactions that help us respond to the dangers that surround us, even if they are not always life-threatening.

In fact, for most people stress is not arising from life-threatening situations or even major life events, but through everyday life. We experience daily doses of stress from work pressure, lack of work, our economic situation, and personal and emotional issues. These silent doses can build up until they explode into chronic stress and affect our body's organs and systems.

Janice Kiecolt-Glaser, director of the Behavioral Medicine Research The Institute at Ohio State University College of Medicine, said in an interview with The Washington Post, that people know what the big stressors they face, but they don't pay attention to the smaller ones that accumulate and can affect their health. The report listed the effects of stress throughout the body.



On the Brain: According to Wendy Suzuki, professor of neuroscience and psychology at New York University and author of Good Anxiety: Harnessing the Power of the Most Misunderstood Emotion, acute forms of stress can be beneficial in the short term because it causes the brain to release the hormones that motivate us and increase our

focus and performance. However, if cortisol levels – a characteristic of chronic stress and Post–Traumatic Stress Disorder (PTSD) – remain high, this can interfere with and damage the brain's hippocampus, the region responsible for long–term memory. If the condition is prolonged, the prefrontal cortex of the brain is affected and impairs our capacity for cognitive processes that help us organize, plan, solve problems, and even control impulses.



In the Cardiovascular System: In times of acute stress our heart rate speeds up and our blood pressure rises as part of the preparation to fight or escape the threat. Outside of risk, these functions should return to normal levels, but this is not what happens in the modern world, as we are always faced with new sources of stress. Long-term

exposure to chronic stress can cause high blood pressure, increased body fat, insulin resistance, and systemic inflammation processes, according to Ahmed Tawakol, codirector of the Center for Cardiovascular Research and director of nuclear cardiology at Massachusetts General Hospital and Harvard Medical School. The longer you spend in this situation, the greater the risk of developing heart issues, as there can be a narrowing of blood vessels and increased blood clotting.



On the Respiratory System: stress causes the sympathetic nervous system to speed up, promoting a discharge of hormones that speed up breathing. If you can't catch your breath, you will have difficulty properly getting rid of carbon dioxide in the blood and will feel dizzy and lightheaded. Stress, acute or chronic, can cause asthma attacks or

Chronic Obstructive Pulmonary Disease (COPD).



In the Gastrointestinal System: Another symptom of stress is deregulation of the gut and nausea, bloating, or constipation. In addition, it alters the gut microbiome which triggers inflammatory or hormonal responses, because the intestinal barrier does not function properly, and food by-products can escape from the intestinal tract into

the circulation. Thus irritable bowel syndrome and inflammatory bowel disease develop. Gastroenterologist Cindy Yoshida, professor of medicine at the University of Virginia Health System in Charlottesville, in a 2020 study, found that psychological stress was related to flare-ups of Crohn's disease and ulcerative colitis among 1078 people with inflammatory bowel disease.



On the Skin: The human body's largest organ is not immune to the effect of stress, as evidenced by reports of people who say they suffer from acne or eczema at times of stress. According to Rick Fried, dermatologist, clinical psychologist, and clinical director of Yardley Dermatology Associates and the Yardley Research Clinic in Pennsylvania,

the skin has its own immune system that constantly interacts with the brain. So when a person experiences stress, this system is activated and can lead to inflammations such as rosacea, psoriasis, hives, and eczema. Another symptom is increased oiliness because stress hormones cause the sebaceous glands to produce more oil.







Stress can cause extensive damage to our systems, thus it is essential to consider the danger that this enemy of modern society poses in your life, if not addressed. Italian researchers Laura Musazzi, Paolo Tornese, Nathalie Sala, and Maurizio Popoli reported in a scientific article that a good part of neuropsychiatric disorders such as depression, mood, and anxiety are related to stress, including diseases such as schizophrenia and bipolar disorder. The latter is the result of a combination of genetics and adverse events.

According to them, each individual responds differently to the pressures of life and stress. If for some people it is a stimulus to improve and increase cognitive ability, for others it is difficult to adapt to environmental changes, both because of genetic characteristics and their personal histories. The more exposure to strong or repeated stressful situations, the greater the difficulty to react. In these cases, in addition to mental illnesses, cardiovascular and metabolic diseases are possible.

The scientists also described that a single exposure to traumatic stressors is enough to trigger a neuropsychiatric disorder. As an example, they cited the residents of L'Aquila, Italy, who in April 2009 experienced the terror of an earthquake measuring 6.3 on the Richter scale. The quake was so strong that it destroyed houses and buildings and killed 309 people, injuring 1600 others.

Ten months later, 900 survivors participated in a study to identify Post Traumatic Stress and the results showed that 41.3% reported symptoms of this disorder which is one of the most studied, frequent, and debilitating. It is usually related to a deep stress caused by a sudden incident, such as the earthquake that hit the Italian city.

he different reactions to stress intrigue researchers, especially to understand resilient versus vulnerable responses. Resilience, which depends on genetics and environmental factors, is an active process that occurs because of brain neuroplasticity that allows a new balance in the environment to be achieved. In other words, resilience is when we adapt to change.

Vulnerability also has a genetic background and stems from previous adverse life events, which through epigenetic changes can alter the shape of the future stress response. Understanding how to be more resilient to stress is the path that researchers believe is best for developing more effective treatments for stress-related disorders. With the help of natural mechanisms, they argue, it is better than the action of traditional drugs like antidepressants.

Another group of researchers reviewed several scientific studies to understand how the neural mechanisms of resilience and vulnerability to stress work and how they are established at behavioral, cellular, and molecular levels. After all, each of us reacts differently to stressful events and others may develop sequelae for a long period of time. Tamara B. Franklin, Bechara J. Saab, and Isabelle M. Mansuy agree that some individuals fail to adapt to stressors and give inappropriate responses that impair restoration, making the stress state persistent. These have higher levels of vulnerability and do not adapt well to adverse situations.



Resilient people, on the other hand, perceive adversity yet soon develop physiological and psychological responses to adapt to it, even in the long term. They explain that coping style varies between individuals and situations, and influences the neuroendocrine and neuroimmunological systems that are activated in response to stress.

In the review, the scientists explain that the anatomical and functional connectivity of the brain determines how resilient or vulnerable an individual copes with stress. The neuroendocrine system is strongly related to each person's reaction, as it has variable functions that alternate these responses. This is because the HPA axis (hypothalamus, pituitary, and adrenal) regulates many systems in the body, such as the metabolic, cardiovascular, immune, reproductive, and central nervous systems.

The differential activity of the HPA axis, the researchers point out, is related to gender differences in response to stress: several disorders are more prevalent in women than in men. In a study of people who have experienced major trauma and similar stressors in their life, the specialists found that 31% of women develop PTSD; in men, the rate is only 19%.

Throughout the review, the researchers go through numerous systems and areas of the brain that are affected or modulated by stress hormones, but it caught my attention when they discuss epigenetic mechanisms in resilience and vulnerability to stress.

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According to them, in addition to specific neural mechanisms and pathways that modulate HPA activity, neurotransmission, and signaling, resilience and vulnerability involve processes at the level of chromatin - DNA double strand and histone proteins - and genetic and epigenetic factors that together control the expression of genes critical for stress regulation.

By looking at decades of research in human genetics, they have found that complex brain diseases depend on a combination of genetic and environmental factors. In this tangle of knowledge, risk factors for vulnerability or resilience to stress have been identified, but epigenetic mechanisms, they say, are now also recognized as strong candidates for geneenvironment interactions that affect stress.

Importantly, epigenetics is the set of processes that induce mitotic or meiotic heritable changes in gene expression without altering the DNA sequence itself, the scientists describe. They clarify that epigenetic mechanisms occur primarily in chromatin and involve several extremely technical mechanisms, such as DNA methylation, and covalent histone post-translational modifications (HPTMs), among others.

What is known is that these mechanisms can act both individually and in synergy with others to modulate chromatin structure and are very dynamic and can be influenced by environmental factors such as diet, social environments, and stress. Their dysregulation has been implicated in stress-related neurodevelopmental and psychopathological disorders. For them, there is still much to be unraveled about how epigenetic changes are triggered, and maintained in the brain and the gametes, and whether they can be reversed to mitigate the effects of stress. However, there is a good indication that this is possible.

The fact is that the varied responses of individuals to stress are due to complex and sometimes indeterminate genetic and environmental factors that interact and cause these particularities. In the review, it was noted that the mechanisms that establish resilience or vulnerability likely operate throughout life, but may operate differently and affect distinct neural pathways at varying stages of development and into adulthood.





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Another enlightening article on the physiology of stress that I came across was from the Neuroepigenetics Research Group in the School of Clinical Sciences at the University of Bristol in England. In the text, the researchers show what role glucocorticoid hormones play in resilience, what are the recently discovered mechanisms that help regulate their availability, the epigenetic influence, and the contribution of physical activity to increase resilience to stress.

Glucocorticoids are hormones that play an essential role in individuals' response to stressors, but increased secretion of glucocorticoids following risk situations can be detrimental to health. Hyper- or hyposecretion is related to the development of metabolic, immunological, endocrine, and neuropsychiatric disorders. Stress-related psychiatric disorders can be major depression and anxiety disorders, for example, post-traumatic stress disorder (PTSD).

Genetic traits and traumatic events early in life can likelihood increase the that a person will develop psychiatric illnesses, scholars say. However, there is evidence that a physically active lifestyle strengthen resilience. They concluded that long-term physical activity causes changes in the control of the HPA axis, sleep, and anxiety. We yogis know the power of consistent practice for our longevity.





Going back to the article, the researchers said that the glucocorticoid dual-binding receptor system regulates physiological responses, including endocrine and autonomic, and behavioral responses under stress conditions. Thus, it maintains homeostasis and facilitates long-term adaptation, which is nothing more than the body's resilience. Each person's ability to cope and adapt to stressors is influenced by lifestyle, genetic vulnerability, and personal history.

We know that each person decides how they want to lead their own life, but prioritizing health is a fundamental factor in keeping well both physically and mentally. Scientists have shown in their studies that it is necessary to exercise regularly to have better cardiovascular health and not alter other functions of our body. According to them, many physical activities, such as yoga and meditation, are advisable.

Many studies show the impact of physical activities on the molecular, cellular, physiological, and behavioral levels, i.e. they have profound effect on many functions of the body. In the long term, exercise affects the physiological system, such as the HPA axis, the sympathetic nervous system, and sleep regulation. As a mechanism to adapt to stress, physical activity outperforms the use of drugs, not least because it has no adverse effects.

In adulthood, according to the British researchers, resilience is impaired by times of chronic depression, post-traumatic stress disorder, and other mental disorders. Many individuals develop chronic depression due to adversity experienced in childhood, such as parental neglect and physical or sexual abuse. When analyzing some studies, they concluded that a troubled childhood can make a person, in adulthood, to live with mood disorders, anxiety, bipolar disorder, PTSD, ADHD, and alcohol and/or drug use among other issues.

However, according to the Connor-Davidson Resilience Scale, the presence of resilience characteristics such as robustness, tenacity, and adaptability may diminish the negative effect of early childhood stress on some of these disorders. Studies show that the physiological effects of childhood trauma on the stress coping systems – the HPA axis – show that complex changes occur in both the response of this hormone and the hormone ACTH – produced by the pituitary gland and responsible for stimulating the production of cortisol, aldosterone, and androgens – in circulating levels of glucocorticoids.

Some studies say that long-term changes in the function of the HPA axis caused by childhood trauma are related to changes in the epigenome. There is evidence of an epigenetic link between these experiences in early life to lifelong changes that occur because of HPA axis function.

scholars Interestingly, some of human development argue that early experiences can enhance the ability to adapt to adverse situations. This is the psychiatric illness matching/ incompatibility hypothesis. It suggests that individuals are best adapted to an environment that matches their early life experience. Thus, although childhood stress causes long-term changes in the HPA axis and stress responses, it is possible to improve resilience in adulthood. There is still much to be studied on the topic and to evaluate which environmental and social factors contribute to confirm this hypothesis, but it demonstrates the diversity of human behavior in the face of trauma.

Another interesting finding came from American researchers Susan K. Wood and Seema Bhatnagar. They reviewed studies on social stress models in which individuals' different strategies to respond to the situation produce resilience or vulnerability.

They argue that socially stressful events such as bullying, the death of a loved one, or psychological abuse contribute to the development of psychopathologies. However, the pathogenic potential is not limited to the severity of the event, but also to how the person reacted. Even if one experiences a common stressor, some become more resilient while others become vulnerable.

One example cited in the article is of a group of American veterans who were exposed to many traumas throughout their lives, but by adulthood, 70% of them were resilient. This characteristic can be explained by the way each of us deals with stress.

Some have an active (or proactive) response and use their own resources to minimize the physical, psychological or social damage of a situation. This behavior, in addition to being resilient to stress and symptoms of mental illness, is typical of individuals who have a sense of coherence in their lives or community and who exercise self-control by developing a strong sense of identity.

The researchers explain that not everyone adopts adaptive strategies such as those mentioned above. Some are passive (or reactive). These people have a profile marked by a feeling of helplessness,



blame others for the solution to their own stress, and are more vulnerable. The distinction in decision-making between active and passive strategies impacts physiological and neuroendocrine outcomes.

One of these is freezing, a classic manifestation of passive coping. It is accompanied by low plasma levels of norepinephrine and high plasma levels of corticosterone. This behavior is also related to the high reactivity of the HPA axis. On the other hand, the active has low HPA axis reactivity and high sympathetic reactivity to stressful situations.

The diversity of stress responses in active versus passive coping individuals in the face of chronic stress can cause negative physiological and psychological consequences when the response is not adequate to reduce the effect of stress on the body.

The researchers raised that psychiatric disorders caused by stress, in addition to having effects on mental health, increase the risk of developing other comorbidities such as cardiovascular disease and hypertension. Social stress can also cause urological disorders. According to the researchers, cases of trauma or loss of a loved one have been reported to cause urinary retention in the patients studied.

## HOW YOGA CONTRIBUTES to resilience

Being resilient is to adapt positively or have the ability to maintain or regain physical and mental health, even when facing adverse situations throughout our lives. As we saw above, the point is not to run away from stress, because this is impossible, but to know how to deal with it. One of the resources is yoga, and I don't say this just because of what I have experienced in classrooms throughout my life; some scientists have also considered the practice as a tool to mitigate the negative effects of stress.

A multidisciplinary group of researchers from Ohio University in the United States compared the inflammatory and endocrine responses of novice and experienced yoga practitioners before, during, and after a class. The goal was to understand whether the practice accelerated the individual's recovery. After all, inflammation is an indicator of mortality from most diseases in the elderly, so preventing the onset of this process contributes to a person's longevity.

It is well known that yoga contributes to reducing stress and has mental health benefits. The researchers pointed out that some studies report that the practice reduces symptoms of anxiety and depression because it decreases the activity of the sympathetic nervous system and increases vagal tone, factors that may have favorable endocrine and immunological consequences, including reduced inflammation.

They drew on a study showed positive results inflammation after heart failure patients practiced yoga for two months. The classes promoted a 22% reduction in Interleukin-6 (mediator of the inflammatory response) and a 20% reduction in CRP in patients, compared to others who had traditional medical care. Another group that took classes for 6 weeks, some with and some without coronary artery disease, had significant reductions in blood pressure, heart rate, and body mass index (BMI).

In the study conducted by the group, 50 healthy women were evaluated, 25 novices and 25 experienced. The yoga sessions were held after stressful events, so it was possible to examine whether the regular practice would have any reactivity to the stressor. An interesting detail is that the postures that comprised the classes were gentle for both novices and experienced practitioners.

At the end of the study, it was possible to identify that novice and experienced practitioners had different responses. One of them was the average level of interleukin-6 (which identifies violent inflammatory states): in novices, the index was 41% higher than in those who had already been practicing yoga for some years. To the researchers, this data suggests that regular yoga practice can reduce inflammation below levels predicted by risk factors such as age, abdominal fat, cardiorespiratory capacity, and depression.

Another very interesting topic I found was about how stress affects our immune response by Indian researchers, Sarika Arora and Jayashree Bhattacharjee. According to them, our immune system is a network of glands, nodes, and organs that work to protect the body from bacteria, viruses, fungi, and other health threats. When we are under stress, a complex network of signals between the central nervous, endocrine, and immune systems is compromised. The mediators of these interactions are mainly neurotransmitters, neuropeptides, hormones, and cytokines that, as we have already seen, have altered levels in stressful moments.

According to them, at the molecular level, our immunity is mediated by the release of cytokines in the immune system and endothelial cells. Stress alters the concentration of cytokines; when their production increases, it can cause inflammation, and when it stabilizes, it inhibits it. There are still other complex processes in the physiology of stress and its impact on human immunity that involve hormones, but I would like to focus on the relevance of this for understanding how yoga can reduce the damage of stress to our health.



The researchers reported that by proactively dealing with the stress of everyday life, we reduce the constant activation of the endocrine system, increasing the immune response. Their conclusion is based on psychoimmune studies that looked at the potential of hypnosis, relaxation, exercise to amplify coping capacity.

Yoga was also a source of the research, as the postures stretch and strengthen different parts of the body, massaging and circulating blood between internal organs while triggering the nervous system and lubricating joints. They reinforce that each asana can have a specific function and generate specific effects, but above all, yoga promotes stress relief.

16

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This is precisely why it is an effective approach to dealing with the stress. This is because it inhibits the posterior or sympathetic area of the hypothalamus, improving the body's response to stressors. The practice also reduces the activity of areas responsible for fear, aggression, and anger, stimulating reward centers in the medial forebrain and other areas. Thus, a sense of well-being is generated. As a result, the researchers claim that we feel less anxiety, our heart rate decreases, and blood pressure is regulated, among other benefits.

### CONCLUSION

#### Maintain a healthy relationship with stress

Knowing how to deal with stress is essential to mitigating its effect on your health. Running away will do no good, as it is part of everyday life in modern society, so I recommend learning to manage the impact it can have on your brain, via the nervous system, to mitigate the activation of inflammatory processes and disease.

Stressful situations, big and small, are part of daily life, so you need to learn to be more resilient to calm your body's response to these pressures. Remember that small stressors should also be considered because the accumulation is as damaging as major traumas. Recognize that negative and positive stress has only one purpose: to help you adapt to a situation.

We are all capable of coping with great demands, but we need to know how to counteract the effect of stress. As we saw above, some studies have recognized the value of yoga as a resource for relieving tension. This is because the practice is a therapy that integrates body and mind,

improving the brain synapses that help regulate the entire body.

Through yoga postures you promote positive stress in each joint in a planned and safe manner, activating a resource to rescue the potential nature of each joint. As a consequence, the brain's motor cortex is positively impacted and you enter into a process of self-education that increases your resilience. The regularity of the practice leads to a perennial state of relaxation, and the student learns to use the body in the most efficient way, as communication with the central nervous system is enhanced.

In this process, the brain understands the practice as something very good, and this message becomes dominant. Physiologically, this happens because of the peripheral nervous system, a kind of information system of the body, connected by nerves and ganglia. This communication generates signals that activate neurotransmitters (acetylcholine) in the synaptic cleft of the motor plate and interact with the muscle cell membrane, stimulating movement through muscle contraction.

Our motor cortex is a kind of map of the body in the brain. When you engage it properly, safely, and without activating defense mechanisms, there is a gradual expansion of the map in the frontal cerebral cortex. Thus, understimulated areas begin to reconnect with the rest of the body.

Within the Kaiut Yoga Method we understand that positive stress applied intelligently to one or several joints, or even to the whole body, including the organs, and lymphatic, circulatory, and nervous systems, is always positive. Yoga positions are positive external stressors that are in alignment with our nature. In restoring the resiliency of our joints, circulatory and all other systems in our body, we rescue our ancestral nature and experience improvement in our health and vitality.

In this process, the student needs emotional and intellectual support such as explanations, that help them to welcome the stress applied by the yoga position and practice overall. The student becomes mentally and emotionally resilient in the face of stressful situations—this helps them cope better with the stressful situations of everyday life. They learn to deal with stress in a positive way, so that, in a way, stress, what its cause and nature, is only a positive in their life.

The Kaiut Yoga Method is a resource for overcoming the chronic stress of modern life. The simple and subtle practice helps the body adapt to stimuli little by little. The more stimulation your body receives, perceived from the right perspective, the better your health will be. This is how we enter into a continuous progression of neural connectivity that develops in the student a taste for the practice of yoga, and begins to recognize the benefit of deeper positive stress. The combination of postures and breathing has a direct action on the nervous system, regulating all our functions, including those impacted by stress. It's as if we create a barrier that doesn't let stressful situations throw our body off balance.

The longer you dedicate yourself to the practice, the more resilient you become to adverse situations. This is how your health improves, increasing your quality of life and longevity. Through yoga, you can live with stress, but without distress!





#### STRESS, A MODERN EPIDEMIC



Social Media



