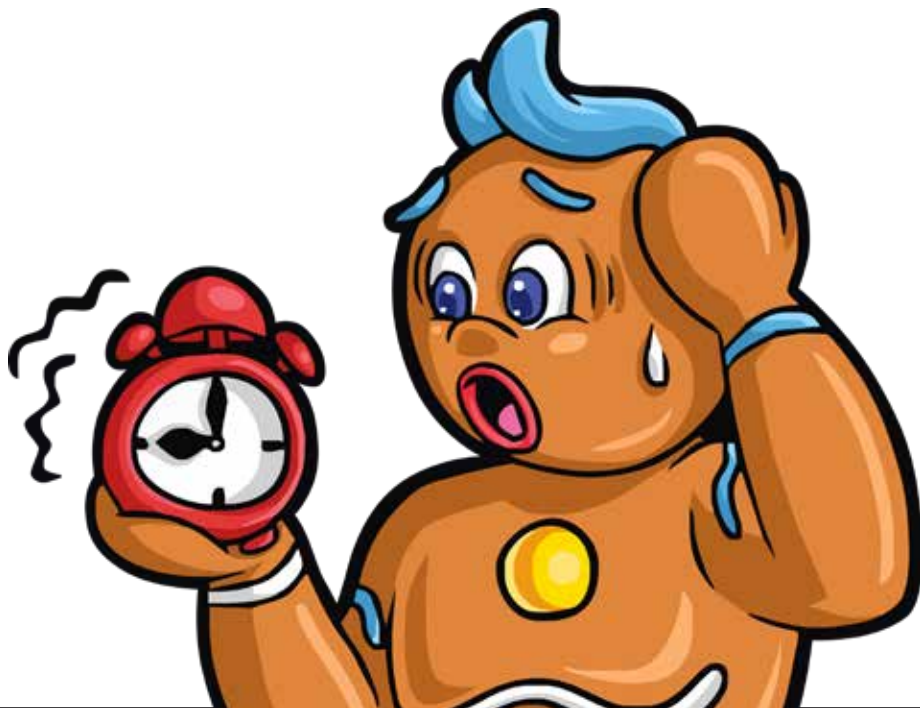


CHAPTER 2

defining stress

WHAT IS STRESS?



The word “stress” is so much a part of our thoughts and language these days, that it feels as if it has always been there. In fact, the term is borrowed from physics and was first used in its modern sense by physician Hans Selye in 1936. It refers to the body’s non-specific response to an external demand.

Walter B Cannon had already shown that animals produce adrenalin in response to stressors - which was the first proof that the physical environment could trigger a bodily response.

Selye took the concept one step further, identifying many other hormones that were produced in response to stress and demonstrating how these could have lasting physical consequences to the body.

So how do we define this ubiquitous term today?

Flick through the Oxford English Dictionary and you'll come across a number of definitions.

'A real or imagined threat and your body's response to it.'

'A condition or feeling experienced when a person perceives that demands exceed the personal and social resources the individual is able to mobilise.'

'A failure to adapt to the world, and our immediate situation, as it is.'

'Nothing more than a socially acceptable form of mental illness.'

'A state of mental or emotional strain or tension resulting from adverse or demanding circumstances.'

For illustrative purposes, let's use the Stress Management Society's 'engineer's definition' of stress:

'Force over area equals pressure'.

In other words, when a bridge is carrying too much weight, it will eventually collapse (and you will be able to notice the signs before it happens). The same applies to humans, with the excessive demands and challenges placed on us, and the 'collapse' will manifest in different ways.

It is worth noting that human beings cannot distinguish between real dangers and imagined ones. Both elicit the same physical response, which is probably why thrillers are so popular - people feel totally involved in the action.

Another word to highlight is the increasingly popular term *'resilience'*, which is the power to bounce back from whatever life throws at us. It acknowledges that whilst we will be given challenges and obstacles, heartbreak and grief, we have the ability to cope and carry on, and these coping skills can be learned... more of that later!

So.

Stress is the body's natural reaction to an increase in pressure or demands, stemming from a problem (real or imagined), turning into worry and anxiety and, left unchecked, potentially affecting our health and wellbeing.

It is also important to differentiate between 'stress' (the feeling we have when under pressure) and a 'stressor', (the stimulant or problem in our environment or mind that causes the stress in the first place).

The more stressors, the greater the stress!

So the solution could be to reduce the number of stressors in our lives - which, of course, is easier said than done. Or we could just alter the way we respond to them.

But we're getting ahead of ourselves, so before moving on, let's recap what we have learnt.

We now know that it's impossible to live our lives without stress, and even if we could, life would lack motivation, fun and purpose. We need, as Brendan Brazier (ex-professional Ironman, vegan creator of the Thrive Diet) labels it, **complementary stress** to regenerate our cells and achieve goals. This is the type of positive stress that boosts your energy and supports higher performance.

However, there's a tipping point, and too much stress isn't healthy. It's what Brazier calls '**uncomplementary stress**' - anxiety that produces no benefit and furthermore depletes our energy. This negative stress can come from the air we breathe, the food we eat and the thoughts we have, as well as the activities and responsibilities we find ourselves with. Throughout the rest of this book, when I refer to 'stress', I am referring to uncomplementary stress, rather than its more fruitful sibling.

So stress is a big deal. Let's now turn our attention to what we can do as individuals to protect ourselves, and as businesses to protect our employees. We should start by understanding the impact that negative stress has on our minds and bodies.

HOW STRESS AFFECTS OUR BODIES

Mother Nature, in her brilliance, has designed our bodies to be able to survive in the face of life-threatening situations (like all of our cousins in the animal world).

If a situation like a mugger snatching your bag, or you losing sight of your 7-year-old son in a super-busy tourist area in Paris occurs (the latter happening to me at the Sacre Coeur last spring), your body's stress response, commonly known as 'Fight, Flight or Freeze', will kick in automatically to protect you and enable you to **fight** the threat, **run** (away) as fast as you can, or **stop** still and hope to be unnoticed. Total priority is given to the threat, to the exclusion of everything else - which has a huge impact on our heart rate, blood pressure and muscles, with all non-essential functions (like thinking) shutting down.

This response has been in place since the beginning of time, and though the stressors have changed from sabre-toothed tigers and woolly mammoths to problems relating to relationships, work, money, a major life event, a tough economy or fear of terrorism, the physical response is the same - and can heavily impact our physical and emotional wellbeing.



Contrast this with a restful state where your breath is deep, your body is calm, your muscles are relaxed; food can be digested more easily, your heart slows down and your blood circulates freely through your body's tissues, feeding them with nutrients and oxygen. It is not difficult to see how this state is most beneficial to the body's wellbeing.

Medical science has hugely progressed our understanding of the impact that stress has on our health. For instance, in the early 1980s, psychologist Janice Kiecolt-Glaser, PhD, and immunologist Ronald Glaser, PhD, of the Ohio State University College of Medicine, were inspired by animal studies that linked stress with infection.

From 1982-1992, studying medical students, they found that each year, during exam-week, the students' immunity reduced. They had a lower number of natural killer cells, which fight tumours and viral infection. Their production of immunity-boosting gamma interferon almost stopped and infection-fighting T-cells only had weak responses.

Furthermore, in a 2005 study of college students, Sarah Pressman, PhD, Sheldon Cohen, PhD, and fellow researchers at Carnegie Mellon University's Laboratory for the Study of Stress, Immunity and Disease, found that social isolation or feelings of loneliness both weakened the immunity of first-year students.

When you're faced with a stressor, your 'fight, flight or freeze' response is triggered by your reptilian brain (the amygdala), followed by the hypothalamus, which stimulates the adrenal glands to produce a surge of hormones such as cortisol, which can compromise the functioning of the immune system, and adrenaline and noradrenalin, which raise the blood pressure and make you sweat (see Fig: 1). Bloodflow to the skin is reduced, making you go pale, your arms and legs are mobilised, and stomach activity is reduced (which can greatly impede digestion).



All this produces a physical reaction and sequence that you'll be very familiar with:

- Your lungs, throat and nostrils open up to allow your breathing to become more rapid, allowing more oxygen into your blood
- Your cardiovascular system leaps into action, increasing your heart rate so that more blood can carry oxygen to important muscles, allowing them to work harder for longer
- Your sweat glands open up to help you cool down
- Your senses sharpen to keep you alert to any threats, for example your pupils dilate, enabling you to see more clearly, and your hairs stand on end, making you more sensitive to your environment
- Your stored fat from fatty cells and glucose from your liver are converted into sugar for fast energy
- Your digestive system slows down to conserve energy, you may experience a dry mouth and maybe even loss of bladder and bowel control (in extreme cases)
- Your blood vessels contract to reduce blood loss in case of injury and your blood pressure rises
- Your immune system slows down (preventing and fighting disease is not a priority while under threat)



Hormones 101

There are three important hormones that come into play during a stressful situation:

Adrenaline: 'The warrior hormone'. It's the first hormone to help your heart start pumping faster and harder, expand your airways, and secrete insulin to utilise glucose for energy - ready for action.

Noradrenalin: When your body needs to react quickly to a stressor, noradrenalin increases blood pressure, gets your muscles ready to escape or fight, increases alertness, dilates your pupils and causes you to sweat.

Cortisol: 'The spy hormone'. It kicks in within minutes to back up adrenaline and maintain high energy levels. It helps turn stored fat and protein into sugar for your body to use as fuel, and helps create a 'seize the day' heightened state and better memory.

Fig 1

Impact of stress

Once the perceived threat has passed, your stress hormones and all bodily functions return to normal. However - and here's the thing - if you are constantly under stress, **these hormones remain in your body** and 'chronic stress' results. Your body stays on high alert, which affects your physical and emotional wellbeing in the following ways:

SKIN

Stress can cause 'pro-inflammatory cytokines' (including stress hormones and other chemicals) to be released. This makes the skin more sensitive and more reactive, according to dermatologist and clinical psychologist Richard G. Fried (MD, PhD). This can lead to a range of skin problems, for example acne, blisters, psoriasis, breakouts, eczema and other types of dermatitis.

HEAD

When we are stressed, we often develop headaches or migraines. This is due to a build-up of tension around the head, neck and shoulder area. Stress can affect the brain as well. Research suggests that stress extended over long periods of time stimulates the growth of proteins that lead to memory loss and might cause Alzheimer's.

Individuals who are stressed also tend to smoke more, drink more alcohol and become engaged in harmful activities like drug-taking, all of which can damage the brain.

Stress is also in the same 'burnout continuum' as depression, and if left unchecked could lead to more serious mental health issues.

HEART

Because stress increases our blood pressure, there is a direct link with heart disease. Prolonged stress also affects blood-sugar levels, which can have implications on the way the heart functions or lead to insulin resistance, which can result in type 2 diabetes.

The emotional effects of stress can also alter the heart rhythms or release inflammatory markers into the bloodstream, both of which could lead to a heart attack or stroke.

STOMACH

Our stomachs are very sensitive to stress. Our brains and guts are directly connected via a system of tiny little nerves, stemming from the vagus nerve, which communicate messages between the brain and the stomach. Thus, the brain (and related stress) can easily affect gut function.



Stress doesn't only affect the functioning of the gut, but it can even change the composition of the microbes in the body (through a combination of stress hormones and poor dietary choices). Research is increasingly showing that *gut bacteria* help boost the immune system as well as aiding digestion. An imbalance can therefore lead to conditions such as IBS, as well as a compromised immune system.

Stress can also change the amount of gastric juices produced by the stomach. If you eat after a stressful situation, the nutrients in the food will not be absorbed as well as they would if you were calm.

Chronic stress exposure can lead to a variety of gut-related issues like gastro oesophageal reflux disease, peptic ulcer disease, IBD, IBS and even food allergies.

INTESTINES

Similar to the stomach, stress directly affects how well our intestines function. Stress-response in the intestines results in reduced nutrient absorption, decreased oxygenation of the gut, 4 times less blood flow to our digestive system, and a decreased enzyme output by as much as 20,000-fold, all leading to less efficient digestion.

As you can see, stress is incredibly detrimental to the health of your digestive system and can even damage the delicate tissue, leading to inflammatory diseases and conditions like multiple sclerosis (MS),

type 1 diabetes, rheumatoid arthritis, osteoarthritis, lupus, Crohn's disease, ulcerative colitis, chronic skin conditions, kidney problems, urinary conditions, allergic and atopic conditions, degenerative conditions, chronic fatigue syndrome, fibromyalgia, and a variety of other inflammatory bowel disease (IBS, IBD, etc.).

Interestingly, the connection between the stomach and gut actually works both ways. Not only does the brain affect the digestive tract, but the digestive tract affects our emotions. According to Harvard researchers, "A troubled intestine can send signals to the brain, just as a troubled brain can send signals to the gut. Therefore, a person's stomach or intestinal distress can be the cause or the product of anxiety, stress, or depression. That's because the brain and the gastrointestinal (GI) system are intimately connected – so intimately that they should be viewed as one system."

PANCREAS

The pancreas responds to the 'fight, flight or freeze' signals by producing a more-than-required amount of insulin, which if consistently elevated (in the case of chronic stress) can damage our arteries, and put us at risk for diabetes and obesity – both of these can be forerunners of cancer.

IMMUNE SYSTEM

As we all know, the immune system helps to defend the body against foreign bodies like bacteria, viruses and cancerous cells. When we are stressed, chemicals that are released can suppress the effectiveness of the immune system by lowering the number of lymphocytes (disease-fighting white blood cells) available in the blood, making us more susceptible to infections.

We all get stressed, and short-term suppression of the immune system isn't dangerous. However, when this stress becomes chronic and intense, the immune system is consistently compromised. The stress hormone cortisol, when raised long-term, renders the cells of the immune system unable to respond to hormonal control, requiring even more hormones to be released, subsequently leading to high levels of inflammation that promote disease.

Stress can also have an indirect effect on the immune system, because when people are stressed, they often reach for things to quickly reduce the stress - like alcohol, cigarettes, etc., which themselves negatively impact the immune system.

JOINTS AND MUSCLES

Aches and pains in the bones, joints and muscles may also be stress-induced. Studies have shown correlations between increased depressive symptoms and reported stress with neck and shoulder pain as well as lower back pain.

REPRODUCTIVE SYSTEM

Stress is known to decrease fertility and sexual drive. Stress hormones like glucocorticoids lower the levels of a brain hormone called 'gonadotropin releasing hormone' or GnRH (the body's main sex hormone), and also boost levels of another hormone (GnIH) that suppresses GnRH – a double whammy for the reproductive system.

Women who are trying to conceive when stressed may have reduced success, as has been documented in numerous cases. When glucocorticoids are released in response to stress, our pituitary gland stops releasing follicle-stimulating hormones as well as gonadotropin luteinizing hormones, and thus suppresses testosterone and oestradiol production and dampens sexual behaviour.

Summary: How stress impacts our organs

Head: Headaches or migraines. Long-term stress can lead to depression, Alzheimer's or dementia. Can also lead to poor habits such as smoking, drinking or drugs which can further damage the brain

Pancreas: Produces more insulin than required, which if constantly elevated can cause diabetes.

Heart: Blood pressure goes up, putting pressure on the heart. It can also affect blood sugar levels, which can impact the way the heart functions. The emotional affects of stress can alter the heart rhythm, causing an irregular heartbeat, leading to a heart attack or stroke.

Stomach: Brain and guts are directly connected. Changes in the composition of the microbes from chronic stress can lead to gut-related diseases such as peptic ulcer diseases, IBD, IBS.

Intestines: Decreased nutrient absorption, decreased oxygenation to the gut, less blood flow to the digestive organs, decreased digestion of food / other inflammatory diseases, such as Crohn's, colitis, chronic fatigue, IBS, etc.

Skin: Skin problems like acne and eczema

Immune system: Chronic stress will constantly compromise the immune system, leading to high levels of inflammation (the cause of many degenerative diseases).

Joints and muscles: Aches and pains in your bones, joints and muscles may also be stress-induced.

Reproductive system: Drop in sex drive, as well as drop in fertility, lower success if trying to conceive

Clearly, it is in our best interests to reduce and manage the stress in our lives as much as we can.

We are all different and stress will manifest in a range of ways.

For instance, last year, I was dealing with a major restructure at work, my mother was having some serious health issues AND I was trying to complete a course. It was all too much and eventually, a serious migraine attack forced me to slow down. Other people will suffer from stomach upsets, skin disorders or a weakened immune system in the short-term, or longer-term, heart disease, high blood pressure or another degenerative illness.

The important thing to note is that these symptoms are *messages* from the body, it's just that we don't always want to listen!

For your sake, please do listen.