What Is Stress?

There Are Reasons We Experience Stress

Stress is a physical expression of our "Fight or Flight" survival mechanism. A threatening situation will trigger a stress response, which prepares us to confront or flee a possible danger. This helps for immediate danger but unfortunately the stress response is also triggered by tense situations where physical action is not an option, such as unreasonable boss, heavy traffic, or financial problems.

Two types of stress

1. Acute - Acute stress prepares us for fight or flight, and is generally short-term.
2. Chronic – Chronic stress is long term and is the main cause of stress-related health problems.

Stress causes chemical changes in the body that, left unchecked, can have negative effects on both mental and physical health. High levels of stress contribute to health issues as diverse as depression, insomnia, heart disease, skin disorders and headaches.

Acute Stress in Detail

Acute stress is a short-term response by the body's sympathetic nervous system. How long acute stress lasts may vary—the response can last for a few minutes or a few weeks. During an acute stress response, the adrenal medulla (part of the adrenal glands, two small glands located on top of each kidney) begins to release catecholamine hormones (including adrenaline and noradrenaline). In all, over seventeen different hormones are released during an acute stress response.

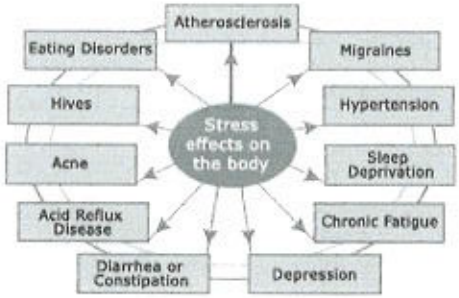
Physical responses

- blood sugar levels rise
- additional red blood cells are released (to carry extra oxygen)
- peripheral blood vessels constrict
- pulse quickens
- blood pressure rises
- digestion stops

Chronic Stress in Detail

Chronic stress occurs when continuous acute stress responses keep the body on alert continuously, negatively affecting health. The ongoing stress response causes the hypothalamus and pituitary gland (portions of the brain) to release a chemical known as ACTH (adrenocorticotropic hormone). ACTH, known as the "stress hormone" stimulates the adrenal gland to produce and release cortisol.

Cortisol is one of the hormones associated with waking and sleeping. Levels of cortisol naturally fluctuate during the day. Cortisol levels are highest in the morning and lowest at night. Higher levels of cortisol in the morning help us wake up. When chronic stress stimulates cortisol production, the daily cycle of cortisol levels is disrupted. High levels of cortisol may occur at night. This can result in insomnia.



Stress Affects Your Health

Imbalances of cortisol and other stress-related hormones weaken health over time and the effects are not immediately seen. Practicing stress management techniques can help minimize the effects of stress on your health.

High Levels of Stress (Cortisol) Contributes to Weight Gain

Cortisol promotes the synthesis of glucose from proteins in order to make more glucose available as fuel in response to stressful situations. This reduces lean muscle mass and increases blood sugar levels. Research has shown that cortisol also increases the depostion of abdominal fat and increases cravings for food, especially carbohydrates (sugars). This helps to set up the vicious cycle of stress and overeating (especially of unhealthy foods), which created more stress and more overeating, etc. By supporting a person's adrenal glands and lowering cortisol output, this vicious cycle can be broken.

THE ANATOMY OF ANXIETY

For the full article click here
The Science of Anxiety

TIME Diagram by Joe Lertola.
Text by Alice Park

WHAT TRIGGERS IT ...

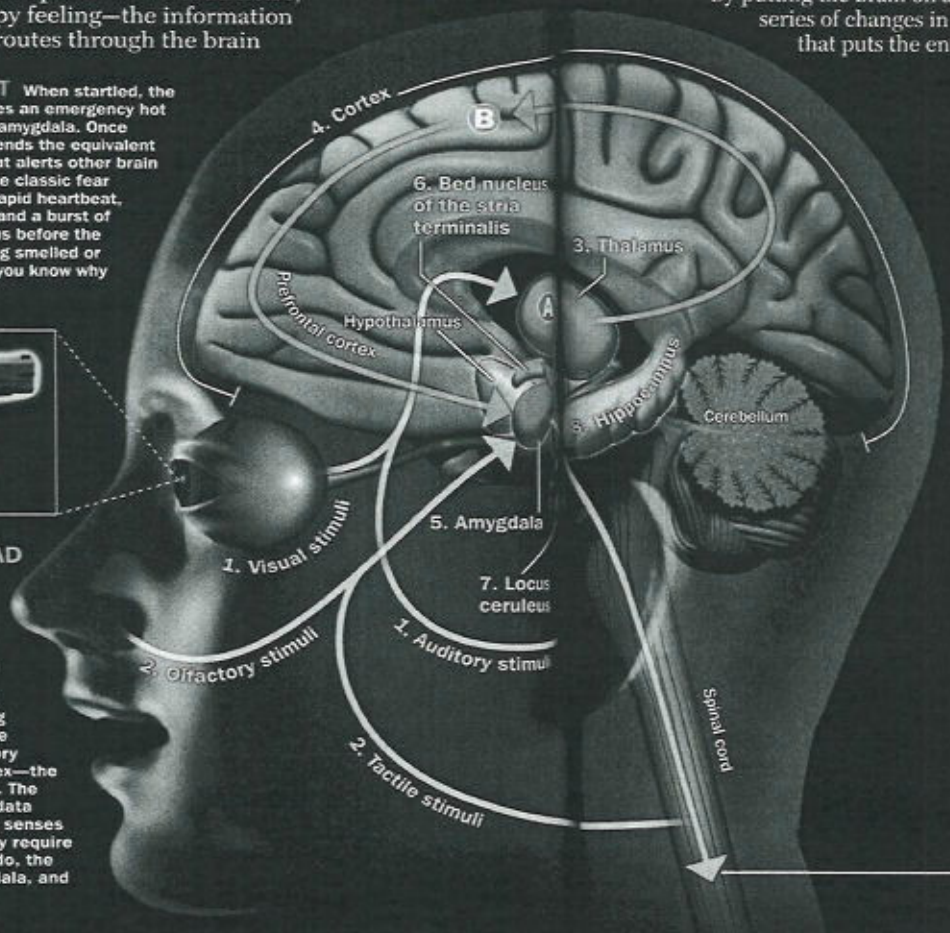
When the senses pick up a threat—a loud noise, a scary sight, a creepy feeling—the information takes two different routes through the brain

A THE SHORTCUT When startled, the brain automatically engages an emergency hot line to its fear center, the amygdala. Once activated, the amygdala sends the equivalent of an all-points bulletin that alerts other brain structures. The result is the classic fear response: sweaty palms, rapid heartbeat, increased blood pressure and a burst of adrenaline. All this happens before the mind is conscious of having smelled or touched anything. Before you know why you're afraid, you are

B THE HIGH ROAD Only after the fear response is activated does the conscious mind kick into gear. Some sensory information, rather than traveling directly to the amygdala, takes a more circuitous route, stopping first at the thalamus—the processing hub for sensory cues—and then the cortex—the outer layer of brain cells. The cortex analyzes the raw data streaming in through the senses and decides whether they require a fear response. If they do, the cortex signals the amygdala, and the body stays on alert

... AND HOW THE BODY RESPONDS

By putting the brain on alert, the amygdala triggers a series of changes in brain chemicals and hormones that puts the entire body in anxiety mode



STRESS-HORMONE BOOST Responding to signals from the hypothalamus and pituitary gland, the adrenal glands pump out high levels of the stress hormone cortisol. Too much cortisol short-circuits the cells in the hippocampus, making it difficult to organize the memory of a trauma or stressful experience. Memories lose their context and become fragmented

RACING HEARTBEAT The body's sympathetic nervous system, responsible for heart rate and breathing, shifts into overdrive. The heart beats faster, blood pressure rises and the lungs hyperventilate. Sweat increases, and even the nerve endings on the skin tingle into action, creating goose bumps

FIGHT, FLIGHT OR FRIGHT The senses become hyperalert, drinking in every detail of the surroundings and looking for potential new threats. Adrenaline shoots to the muscles, preparing the body to fight or flee

DIGESTION SHUTDOWN The brain stops thinking about things that bring pleasure, shifting its focus instead to identifying potential dangers. To ensure that no energy is wasted on digestion, the body will sometimes respond by emptying the digestive tract through involuntary vomiting, urination or defecation

1. Auditory and visual stimuli Sights and sounds are processed first by the thalamus, which filters the incoming cues and shunts them either directly to the amygdala or to the appropriate parts of the cortex

2. Olfactory and tactile stimuli Smells and touch sensations bypass the thalamus altogether, taking a shortcut directly to the amygdala. Smells, therefore, often evoke stronger memories or feelings than do sights or sounds

3. Thalamus The hub for sights and sounds, the thalamus breaks down incoming visual cues by size, shape and color, and auditory cues by volume and dissonance, and then signals the appropriate parts of the cortex

4. Cortex It gives raw sights and sounds meaning, enabling the brain to become conscious of what it is seeing or hearing. One region, the prefrontal cortex, may be vital to turning off the anxiety response once a threat has passed

5. Amygdala The emotional core of the brain, the amygdala has the primary role of triggering the fear response. Information that passes through the amygdala is tagged with emotional significance

6. Bed nucleus of the stria terminalis Unlike the amygdala, which sets off an immediate burst of fear, the BNST perpetuates the fear response, causing the longer-term unease typical of anxiety

7. Locus ceruleus It receives signals from the amygdala and is responsible for initiating many of the classic anxiety responses: rapid heartbeat, increased blood pressure, sweating and pupil dilation

8. Hippocampus This is the memory center, vital to storing the raw information coming in from the senses, along with the emotional baggage attached to the data during their trip through the amygdala

Source: Dennis S. Charney, M.D., National Institute of Mental Health

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Understanding the stress response

Chronic activation of this survival mechanism impairs health.

For two years in a row, the annual stress survey commissioned by the American Psychological Association has found that about 25% of Americans are experiencing high levels of stress (rating their stress level as 8 or more on a 10-point scale), while another 50% report moderate levels of stress (a score of 4 to 7). Perhaps not surprising, given continuing economic instability in this country and abroad, concerns about money, work, and the economy rank as the top sources of stress for Americans.

Stress is unpleasant, even when it is transient. A stressful situation — whether something environmental, such as a looming work deadline, or psychological, such as persistent worry about losing a job — can trigger a cascade of stress hormones that produce well-orchestrated physiological changes. A stressful incident can make the heart pound and breathing quicken. Muscles tense and beads of sweat appear.

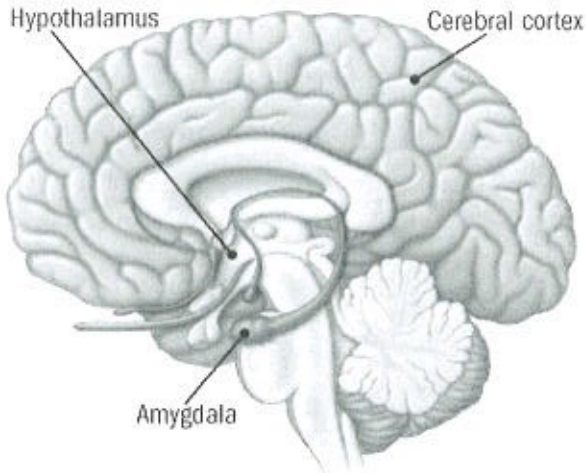
This combination of reactions to stress is also known as the "fight-or-flight" response because it evolved as a survival mechanism, enabling people and other mammals to react quickly to life-threatening situations. The carefully orchestrated yet near-instantaneous sequence of hormonal changes and physiological responses helps someone to fight the threat off or flee to safety. Unfortunately, the body can also overreact to stressors that are not life-threatening, such as traffic jams, work pressure, and family difficulties.

Over the years, researchers have learned not only how and why these reactions occur, but have also gained insight into the long-term effects stress has on physical and psychological health. Over time, repeated activation of the stress response takes a toll on the body. Research suggests that prolonged stress contributes to high blood pressure, promotes the formation of artery-clogging deposits, and causes brain changes that may contribute to anxiety, depression, and addiction. More preliminary research suggests that chronic stress may also contribute to obesity, both through direct mechanisms (causing people to eat more) or indirectly (decreasing sleep and exercise).

Sounding the alarm

The stress response begins in the brain (see illustration). When someone confronts an oncoming car or other danger, the eyes or ears (or both) send the information to the amygdala, an area of the brain that contributes to emotional processing. The amygdala interprets the images and sounds. When it perceives danger, it instantly sends a distress signal to the hypothalamus.

Command center



When someone experiences a stressful event, the amygdala, an area of the brain that contributes to emotional processing, sends a distress signal to the hypothalamus. This area of the brain functions like a command center, communicating with the rest of the body through the nervous system so that the person has the energy to fight or flee.

The hypothalamus is a bit like a command center. This area of the brain communicates with the rest of the body through the autonomic nervous system, which controls such involuntary body functions as breathing, blood pressure, heartbeat, and the dilation or constriction of key blood vessels and small airways in the lungs called bronchioles. The autonomic nervous system has two components, the sympathetic nervous system and the parasympathetic nervous system. The sympathetic nervous system functions like a gas pedal in a car. It triggers the fight-or-flight response, providing the body with a burst of energy so that it can respond to perceived dangers. The parasympathetic nervous system acts like a brake. It promotes the "rest and digest" response that calms the body down after the danger has passed.

After the amygdala sends a distress signal, the hypothalamus activates the sympathetic nervous system by sending signals through the autonomic nerves to the adrenal glands. These glands respond by pumping the hormone epinephrine (also known as adrenaline) into the bloodstream. As epinephrine circulates through the body, it brings on a number of physiological changes. The heart beats faster than normal, pushing blood to the muscles, heart, and other vital organs. Pulse rate and blood pressure go up. The person undergoing these changes also starts to breathe more rapidly. Small airways in the lungs open wide. This way, the lungs can take in as much oxygen as possible with each breath. Extra oxygen is sent to the brain, increasing alertness. Sight, hearing, and other senses become sharper. Meanwhile, epinephrine triggers the release of blood sugar (glucose) and fats from temporary storage sites in the body. These nutrients flood into the bloodstream, supplying energy to all parts of the body.

All of these changes happen so quickly that people aren't aware of them. In fact, the wiring is so efficient that the amygdala and hypothalamus start this cascade even before the brain's visual centers have had a chance to fully process what is happening. That's why people are able to jump out of the path of an oncoming car even before they think about what they are doing.

As the initial surge of epinephrine subsides, the hypothalamus activates the second component of the stress response system — known as the HPA axis. This network consists of the hypothalamus, the pituitary gland, and the adrenal glands.

The HPA axis relies on a series of hormonal signals to keep the sympathetic nervous system — the "gas pedal" — pressed down. If the brain continues to perceive something as dangerous, the hypothalamus releases corticotropin-releasing hormone (CRH), which travels to the pituitary gland, triggering the release of adrenocorticotropic hormone (ACTH). This hormone travels to the adrenal glands, prompting them to release cortisol. The body thus stays revved up and on high alert. When the threat passes, cortisol levels fall. The parasympathetic nervous system — the "brake" — then dampens the stress response.

Techniques to counter stress

The findings of the national survey mentioned earlier support what mental health clinicians experience in their own practices — many people are unable to find a way to put the brakes on stress. Chronic low-level stress keeps the HPA axis activated, much like a motor that is idling too high for too long. After a while, this has an effect on the body that contributes to the health problems associated with chronic stress.

Persistent epinephrine surges can damage blood vessels and arteries, increasing blood pressure and raising risk of heart attacks or strokes. Elevated cortisol levels create physiological changes that help to replenish the body's energy stores that are depleted during the stress response. But they inadvertently contribute to the buildup of fat tissue and to weight gain. For example, cortisol increases appetite, so that people will want to eat more to obtain extra energy. It also increases storage of unused nutrients as fat.

Fortunately, people can learn techniques to counter the stress response.

Relaxation response. Dr. Herbert Benson, director emeritus of the Benson-Henry Institute for Mind Body Medicine at Massachusetts General Hospital, has devoted much of his career to learning how people can counter the stress response by using a combination of approaches that elicit the relaxation response. These include deep abdominal breathing, focus on a soothing word (such as peace or calm), visualization of tranquil scenes, repetitive prayer, yoga, and tai chi.

Most of the research using objective measures to evaluate how effective the relaxation response is at countering stress have been conducted in people with hypertension and other forms of heart disease. Those results suggest the technique may be worth trying — although for most people it is not a cure-all. For example, researchers at Massachusetts General Hospital conducted a double-blind, randomized controlled trial of 122 patients with hypertension, ages 55 and older, in which half were assigned to relaxation response training and the other half to a control group that received information about blood pressure control. After eight weeks, 34 of the people who practiced the relaxation response — a little more than half — had achieved a systolic blood pressure reduction of more than 5 mm Hg, and were therefore eligible for the next phase of the study, in which they could reduce levels of blood pressure medication they were taking. During that second phase, 50% were able to eliminate at least one blood pressure medication — significantly more than in the control group, where only 19% eliminated their medication.

Physical activity. People can use exercise to stifle the buildup of stress in several ways. Exercise, such as taking a brisk walk shortly after feeling stressed, not only deepens breathing but also helps relieve muscle tension. Movement therapies such as yoga, tai chi, and qi gong combine fluid movements with deep breathing and mental focus, all of which can induce calm.

Social support. Confidants, friends, acquaintances, co-workers, relatives, spouses, and companions all provide a life-enhancing social net — and may increase longevity. It's not clear why, but the buffering theory holds that people who enjoy close relationships with family and friends receive emotional support that indirectly helps to sustain them at times of stress and crisis.

Dusek JA, et al. "Stress Management Versus Lifestyle Modification on Systolic Hypertension and Medication Elimination: A Randomized Trial," *Journal of Alternative and Complementary Medicine* (March 2008): Vol. 14, No. 2, pp. 129–38.

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McEwen B, et al. *The End of Stress as We Know It* (The Dana Press, 2002).

For more references, please see www.health.harvard.edu/mentalextra.

Source: https://www.health.harvard.edu/newsletters/Harvard_Mental_Health_Letter/2011/March/understanding-the-stress-response

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Harnessing the upsides of stress

Changing your mindset doesn't mean taking a Pollyanna view of the world. The key isn't to deny stress, but to recognize and acknowledge it — and then to find the upside, because a full-throttle fight-or-flight response is not the only possible reaction to stress (at least when the stress does not involve a potentially life-threatening situation).

In people with a more stress-hardy mindset, the stress response is often tempered by the challenge response, which accounts for the so-called excite-and-delight experience that some people have in stressful situations, such as skydiving. Like the typical stress response, the challenge response also affects the cardiovascular system, but instead of constricting blood vessels and ramping up inflammation in anticipation of wounds, it allows for maximum blood flow, much like exercise. The balance of hormones is different, too, including more DHEA.

Another modification to the stress response is called tend-and-befriend. It explains why, after the September 11 terrorist attacks in 2001, the 2013 Boston Marathon bombing, or the 2016 massacre at the Pulse nightclub in Orlando, people felt the need to reach out to friends and relatives in the community — to assure themselves that loved ones were all right, to comfort the distressed or bereaved, and to shore up social networks. Connecting in this way actually helps reduce stress as opposed to, say, watching an endless loop of TV coverage. That's because tend-and-befriend also involves different balances of hormones — in particular, increased levels of oxytocin, which enhances bonding between a mother and child or between sexual partners, for example. It makes the brain's reward centers more responsive to social contact, and it is an important part of resilience.

Dialing back from full-on fight-or-flight can be simply a matter of changing your mindset. Studies have shown that when participants are told "You're the kind of person whose performance improves under pressure," it does — by as much as one-third. How can you shift your mindset? A 2015 book called The Upside of Stress by Kelly McGonigal gives multiple ideas. Here are just a few suggestions:

- When you notice a racing heart — for example, before you give a presentation or initiate a tough conversation — realize that your body is trying to give you more energy and see if you can capitalize on that.
- If you are feeling nervous, pause to consider why, and ask yourself if it's because you're doing something that matters to you and therefore reinforces your values and gives meaning to your life.
- Don't deny the stress, but redirect your energy away from it and toward the task at hand.
- If you are feeling overwhelmed with work or cares, try doing some small act of kindness for someone and note the mental reward you reap.
- Nurture your social networks. Caring creates resilience.
- Try to focus on the larger purpose of whatever you're doing. When you're stuck in a traffic jam taking your daughter to school, remember that it's because you love her and want her to get a good education.
- Whatever you're doing, don't pretend that stress doesn't exist. People who deny it tend to isolate themselves and reinforce their fears. Instead, ask yourself why you're experiencing this stress and look for any positive aspects to it. Are you learning something from it? Are you gaining strength? Are you connecting with people on a more fundamental level? Do you feel more intensely alive?

For additional information on the dangers of stress and ways to relieve and manage it, buy Stress Management, a Special Health Report from Harvard Medical School.

One-Minute Breathing Space

Haven't there been times when you just needed some "breathing space"?
This practice provides a way to step out of automatic pilot mode and into the present moment.

What we are doing is creating a space to reconnect with your natural resilience and wisdom.
You are simply tuning in to what is happening right now, without expectation of any particular result.

If you remember nothing else, just remember the word "STOP".

S – Stop and take Stock — *Checking in to Head/Heart/Body*

Bring yourself into the present moment by deliberately asking:

What is my experience right now?

Thoughts… (what are you saying to yourself, what images are coming to mind.)
Feelings… (enjoying, neutral, upset, excited, sad, mad, etc.)
Sensations… (physical sensations, tightness, holding, lightness, etc.)

Acknowledge and register your experience, even if it is uncomfortable.

T – "Take" a Breath — *Directing awareness to Breathing*

Gently direct full attention to breathing, to each inbreath and to each outbreath as they follow, one after the other.

Your breath can function as an anchor to bring you into the present and help you tune into a state of awareness and stillness.

O – Open and Observe — *Expanding awareness outward*

Expand the field of your awareness around and beyond your breathing, so that it includes a sense of the body as a whole, your posture, and facial expression, then further outward to what is happening around you: sights, sounds, smells, etc. As best you can, bring this expanded awareness to the next moments…

P – Proceed / new Possibilities — *Continuing without expectation*

Let your attention now move into the world around you, sensing how things are ***right now***. Rather than react habitually/mechanically, be curious/open, responding naturally and with kindness. You may be surprised by what happens next after having created this pause…

The Opportunity of "The Magic Quarter Second"

Pausing...making use of the magic quarter second, choosing to be present

In the book *My Stroke of Insight*, brain scientist Jill Bolte Taylor explains that the natural life span of an emotion—the average time it takes for it to move through the nervous system and body—is only a minute and a half, a mere ninety seconds. After that, we need thoughts to keep the emotion rolling. So, if we wonder why we lock into painful emotional states like anxiety, depression, or rage, we need look no further than our own endless stream of inner dialogue.

Modern neuroscience has discovered a fundamental truth: Neurons that fire together, wire together. When we rehearse a looping set of thoughts and emotions, we create deeply grooved patterns of emotional reactivity. This means that the more you think and rethink about certain experiences, the stronger the memory and the more easily activated the related feelings become.

For example, if a young girl asks her father for help and he either ignores her or reacts with irritation, the emotional pain of rejection may become linked with any number of thoughts or beliefs: "I'm not loved," "I'm not worth helping," "I'm weak for wanting help," "It's dangerous to ask for help," "He's bad. I hate him."

The more the child gets this response from either parent—or even imagines getting this response—the more the impulse to ask for help becomes paired with the belief that she will be refused and the accompanying feelings (fear or hurt, anger or shame). Years later, she may hesitate to ask for help at all. Or, if she does ask, and the other person so much as pauses or looks distracted, the old feelings instantly take over: She downplays her needs, apologizes, or becomes enraged.

Unless we learn to recognize and interrupt our compulsive thinking, these ingrained emotional and behavioral patterns continue to strengthen over time. Fortunately, it's possible to break out of this patterning.

Researcher Benjamin Libet discovered that the part of the brain responsible for movement activates a quarter-second before we become aware of our intention to move. There is then another quarter-second before the movement begins. What does this mean? First, it casts an interesting light on what we call "free will"—before we make a conscious decision, our brain has already set the gears in motion! But secondly, it offers us an opportunity.

Say you've been obsessing about having a cigarette. During the space between impulse ("I need to smoke a cigarette") and action (reaching for the pack), there is room for choice. Author Tara Bennett-Goleman named this space "the magic quarter-second." Mindfulness enables us to take advantage of it.

By catching our thoughts in the magic quarter-second, we're able to act from a wiser place, interrupting the circling of compulsive thinking that fuels anxiety and other painful emotions. For instance, if our child asks us to play a game and we automatically think "I'm too busy," we might pause and choose to spend some time with her. If we've been caught up in composing an angry e-mail, we might pause and decide not to press the send button.

The Buddha taught that to be free—not identified with or possessed by thoughts or feelings—we need to investigate each and every part of our experience with an intimate and mindful attention. The first step is pausing, making use of the magic quarter second, and the second, choosing to be present with our moment-to-moment experience. We need to recognize the fear-based thoughts and the tension in our bodies with an accepting, curious and kind attention. The fruit of this presence is a capacity to release habitual reactivity, respond to our life circumstances with a wise heart and step out of the grip of oppressive emotions.

Tara Brach is the senior teacher and founder of the Insight Meditation Community of Washington. Tara is the author of *Radical Acceptance and True Refuge.*