BOUNCE

SCIENTISTS NOW KNOW WHY SOME PEOPLE REBOUND SO WELL FROM SETBACKS.

Illustration by Joe Magee for TIME

BACK

THEY ALSO KNOW HOW THE REST OF US CAN BE MORE LIKE THEM. *BY MANDY OAKLANDER*

DR. DENNIS CHARNEY KNOWS THAT EACH of his five children has hated him at some point or another—particularly when he dragged them along on one of his "semi-dangerous" adventure trips. He recalls a perilous hike with one of his daughters, who was 13 at the time. "Some weather came in, and there was some wildlife. When she said she despised me it came, like, from her *soul*," says Charney, 64, who is now dean of the Icahn School of Medicine at Mount Sinai in New York City.

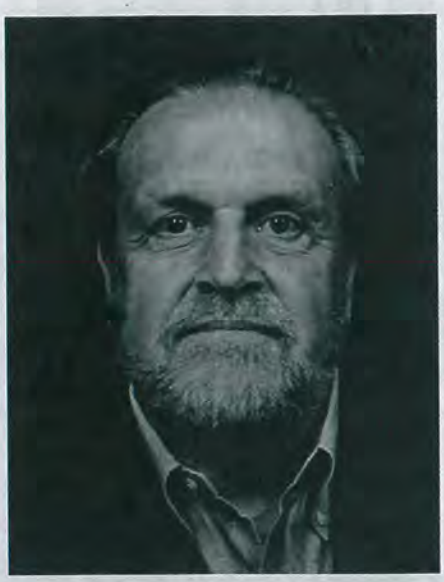
His son Alex knows the feeling. A decade ago, Charney took him on a kayaking trip to Patagonia with his best friend, Dr. Steven Southwick. It rained the entire time, the life jackets didn't fit, and Alex had to share a broken-ruddered boat with his dad for 12-mile runs every day. When it was all over, Alex informed his father he never wanted to speak to him again.

But as a psychiatrist who, with Southwick, has studied the science of resilience for two decades, Charney knows there are benefits to forcing people out of their comfort zone. Resilience is essentially a set of skills—as opposed to a disposition or personality type—that make it possible for people not only to get through hard times but to thrive during and after them. Just as rubber rebounds after being squeezed or squished, so do resilient people.

It's a tantalizing arena for neuroscientists, who are getting better at understanding why some people bounce back from difficult experiences—both those they seek out and those that blindside them—while others don't fare quite so well. And thanks to modern imaging, scientists can peer inside the brain in real time to see how, and to what extent, stressful situations change the structure and functions of the brain. They are also learning that training for resilience can change the brain to, well, make it more resilient.

Much of the new evidence suggests that with a little practice, anyone can develop resilience, says Southwick, 67, a professor of psychiatry at the Yale School of Medicine. There are lots of ways to intervene so that stress or trauma doesn't derail you, he says. No one size fits all.

That's good news, because humans get stressed far more than they realize. The hot-and-cold boss, the traffic delays, the spat with their spouse, the monthly bills—these are all registered as stress in the brain. "The vast majority of us will be faced with one or more major traumatic stressors during a lifetime," says Southwick. But the countless smaller stresses also take a toll. Resilience, research shows, can help with that, and it's not a moment too soon, given that nearly all our modern ills, including heart disease and possibly even brain disorders like Alzheimer's disease, have stress as a common risk factor.



'FOR RESILIENCE, THERE'S NOT ONE PRESCRIPTION THAT WORKS. FIND WHAT WORKS FOR YOU.'

—DR. DENNIS CHARNEY, DEAN, ICAHN SCHOOL OF MEDICINE

With heart disease killing far more Americans than anything else and rates of Alzheimer's expected to double in the coming decades, scientists are hard at work to find promising ways to prepare a large, aging population for healthier ways of dealing with stress. "Resilience training can help people deal effectively with chronic disease and improve their quality of life," says Charney. "It helps people cope."

Forget the old adage that you won't know what you're made of until you're tested; the latest science shows that if you train your brain, how you act under pressure can, in large part, be up to you.

Understanding Resilience

STUDYING THE CAPACITY TO SUCCESSFULLY adapt to challenges wasn't on researchers' radar before World War II. Ann Masten, a resilience researcher and professor of child development at the University of Minnesota, notes that the war produced no shortage of traumatized and displaced people—many of them children who were orphaned, injured or sick, which is precisely the kind of thing that puts people at risk for trouble later on. But psychologists caring for these children noticed that some fared improbably well, despite their circumstances.

Researchers wondered why, and by the 1950s, Emmy E. Werner, a developmental psychologist and pioneer in resilience research, was inching toward an answer. In 1955 she and a team from the University of California, Berkeley, began what's considered the most important longitudinal study in the field: a 40-year project following nearly 700 children in Kauai, Hawaii, many of whom had alcoholic parents. Her research showed that a third of the most vulnerable children adapted exceedingly well over time. Werner wanted to know what makes a person thrive in the aftermath of adversity. The study found that factors like having a tight-knit community, a stable role model and a strong belief in their ability to solve problems helped children succeed.

"As soon as people began to pay more attention to positive outcomes and positive development, they realized there were a lot of children doing well," Masten says.

Most resilience research is still done on survivors of catastrophes—floods, fires, tsunamis, drought—as well as on soldiers. But while it's tempting to think of resilience as a skill people won't need until they're locked in a cell or their home is sucked into a tornado, resilience experts say those extremes are a kind of psychological exaggeration of the things the rest of us go through.

After interviewing scores of Vietnam prisoners of war, Army Special Forces and survivors of horrific tragedies, Charney and Southwick became convinced that anyone could train him- or herself to be more resilient. POWs told Southwick and Charney that with only two resources—free time and their minds—they were able

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to do remarkable things they couldn't do before; one developed a knack for multiplying huge numbers in his head, while another built a house in his imagination (and then later, on solid ground). "It said to us that there's enormous untapped capacity of the human brain," Charney says.

Discovering why some of us fare better than others has always been at the heart of resilience research. Now techniques like functional magnetic resonance imaging make it possible for scientists to look beyond their own observations of people and into the parts of their brains that govern emotion. By observing patterns of blood flow, they can measure brain activity and see, for instance, what stress looks like in different people—which is useful because how we respond to stress is a critical part of resilience. Like the animal whose pulse returns quickly to normal once it has successfully outrun a predator, resilient brains seem to shut off the stress response and return to baseline quickly. "Resilient people seem to have the capacity to appropriately regulate the subcortical fear circuits under conditions of stress," says Charney.

It doesn't take a predator to trigger a stress response in modern humans. Some research shows that even feelings of social pain—like rejection and loneliness—zoom along the same neural pathways as fear. "This notion that I'm going to be rejected or fail or won't be accepted by the group activates the same circuits as if I saw a wolf," Southwick says. It's an evolutionary hanger-on from when our ancestors survived only in groups.

The problem is, even though we're no longer bumping into wolves, we're constantly activating the same neural pathways of fear with everyday stressors—worrying about the future, fretting about the past. The more we use this neuronal superhighway, the more efficient it grows, and this mode of thinking becomes our default. But new research shows humans can train their brains to build and strengthen different connections that don't reinforce the fear circuit. Over time, if people use this new pathway enough, it can become the new response to stress.

Richard Davidson, a neuroscientist at the University of Wisconsin, Madison, thinks he's found a connection in the brain that is especially important for resilience: the path from the prefrontal cortex—the seat of cognition and planning—to the amygdala, an emotional part of the brain that responds to threats. A stronger connection means the prefrontal cortex can more quickly tell the emotional amygdala to quiet down, Davidson writes in his book *The Emotional Life of Your Brain.*

'VERY FEW HIGHLY RESILIENT PEOPLE ARE STRONG IN AND BY THEMSELVES. YOU NEED SUPPORT.'
—DR. STEVEN SOUTHWICK, YALE SCHOOL OF MEDICINE

Scientists can see how resilient brains respond to emotion differently, found Martin Paulus, scientific director and president of the Laureate Institute for Brain Research in Tulsa, Okla. In a series of brain-imaging experiments on resilient Navy SEALs, Paulus showed the SEALs a color cue that signaled they were about to see an emotional picture. Paulus saw that their brains anticipated the emotion more quickly than the average brain, letting them jump nimbly between different types of emotions. Paulus says that in his research he has seen differences in the brains of people with anxiety or depression that suggest they have a hard time letting go of emotions and are often too engaged in emotional processes. The Navy SEALs, on the other hand, weren't glued to the emotional experiences. Why? "They're more resilient," he says. And just like working your biceps or your abs, say experts, training your brain can build up strength in the right places—and at the right times—too.

The Workout for Your Brain

A GOOD WAY TO GAUGE HOW CLOSE YOU are to resilience is to consider how you react when things don't go your way, Davidson says. His research shows that the way we cope with little stressors strongly predicts how we'll do once the big stuff hits. Personality is not as big a factor as one might think: Pollyannas are not always more resilient than pessimists, and even stubborn curmudgeons can pick up traits associated with resilience.

What's more, scientists have identified at least a dozen ways that people can up their resilience game, which Charney and Southwick detail in their 2012 book, *Resilience: The Science of Mastering Life's Greatest Challenges*, to be updated this year with reams of new research on the topic. "For resilience, there's not one prescription that works," Charney says. "You have to find what works for you."

So far, researchers have found that facing the things that scare you relaxes the fear circuitry, making that a good first step in building resilience. They have also found that developing an ethical code to guide daily decisions can help. Studies have shown that traits scientists once thought of as nice but unnecessary—like having a strong network of social support—are critical to resilience. "Very few highly resilient individuals are strong in and by themselves," Southwick says. "You need support." There are even neurobiological elements to social support. When people are exposed to a stressor in a lab, their heart rate and blood pressure don't go up quite as much if a friend is in the room as they do if they're alone.

In an interesting twist, scientists have learned that working the body's muscles makes people's minds more resilient as well. That's because exercise also spurs the development of new neurons, which are quite literally damaged by stress, Southwick says. Over time, regular exercise can tamp down a person's stress response.

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The most compelling new research about resilience focuses on mindfulness—an area in which most people would do well to improve, since people spend 47% of their days thinking about things other than what they're actually doing, a 2010 Harvard study found.

In a study published last year, Paulus and researchers at the University of California, San Diego, trained four Marine infantry platoons in an eight-week mindfulness course, and four platoons trained as usual. The Marines then spent a day at the Infantry Immersion Trainer facility, an elaborate mock Iraqi village the Marines use to prepare for deployment, where they were ambushed and otherwise stressed. A subset of both groups had their brains scanned before and after the intervention. When the experiment was over, researchers found that the Marines who trained in mindfulness returned to baseline levels of heart rate and breathing rate faster than those who hadn't been trained.

They also showed lower activation in the region of the brain associated with emotional reactions. By the end of training, their brains actually *looked* more resilient, Paulus says. "We were able to show, at least in the brain, that we can train people to modify their brain processes toward the direction of resilience."

Even though the Marines' brains changed to reflect those of more resilient people, they didn't report feeling more resilient. So researchers did another experiment, using Olympic BMX athletes. This time, they told them how their mindfulness course could be affecting their brains. "That's particularly helpful for people who may initially not be as susceptible to mindfulness," says Paulus, who led the research. "They may say, 'Well, this may not be for me.' But when we showed them that we can actually change their brains, it becomes much more interesting to them."

Like the mindful Marines, the mindful BMX cyclers showed less emotional reactivity to a stressful task than they had before they took the course. Unlike the Marines, however, they also said they *felt* more resilient—likely because they had been primed to associate the exercise with that benefit. Shortly after the study ended, the athletes competed in a major BMX competition and swept the gold, silver and bronze medals. (Two years before, at the London Olympics, they hadn't placed.) There's no control group in real life, of course, and they might have done just as well without the training. "But they at least told us that it was particularly noticeable to them," Paulus says.

EXPERT TIPS FOR RESILIENCE

1. DEVELOP A CORE SET OF BELIEFS THAT NOTHING CAN SHAKE
2. TRY TO FIND MEANING IN WHATEVER STRESSFUL OR TRAUMATIC THING HAS HAPPENED
3. TRY TO MAINTAIN A POSITIVE OUTLOOK
4. TAKE CUES FROM SOMEONE WHO IS ESPECIALLY RESILIENT
5. DON'T RUN FROM THINGS THAT SCARE YOU: FACE THEM
6. BE QUICK TO REACH OUT FOR SUPPORT WHEN THINGS GO HAYWIRE
7. LEARN NEW THINGS AS OFTEN AS YOU CAN
8. FIND AN EXERCISE REGIMEN YOU'LL STICK TO
9. DON'T BEAT YOURSELF UP OR DWELL ON THE PAST
10. RECOGNIZE WHAT MAKES YOU UNIQUELY STRONG—AND OWN IT

The Meditation Miracle?

IT MIGHT SEEM TOO TOUCHY-FEELY TO BELIEVE that becoming tougher has everything to do with tuning into the mind, the body and the present moment. But that's precisely what Davidson from the University of Wisconsin is finding. In 1992 he wrote a letter to the Dalai Lama asking if he could study Tibetan Buddhist monks to see how meditation changes the structure or function of their brains. To his surprise, the Dalai Lama wrote back with a request that Davidson devote as much time to studying the effects of kindness and compassion on the brain as depression, anxiety and fear.

Since then, Davidson has used brain imaging to watch the brains of all kinds of people while they're in meditation states, from novices to Buddhist monks. He's found that consistent practice changes how the brain looks as well as how it operates. The more experienced the meditator, the more quickly the brain recovers from stress. Another recent study shows that meditation can even help decrease expression of pro-inflammatory genes.

"The changes we see aren't just changes during the meditation state itself, but they're changes that persist beyond the meditation state," Davidson says. "They transform our baseline." And a solid baseline state is what we really need when the waters get rough, he says.

That's why Charney and Southwick emphasize again and again the importance of finding resilience-building skills you'll stick with. When Charney lost his granddaughter and Southwick's mother died, each leaned on the other to get through it—a case of resilience-building social support in action.

And while you won't find Charney joining Southwick in meditation, and you won't spot Southwick bench-pressing next to Charney in the med students' gym at Mount Sinai, you'll almost certainly find them building resilience together and apart. Because as they've learned, this stuff really pays off when you need it. ■