BETTER

BY SAM SCOTT

BELIEVE IT

A psychology professor's quest to explain—and demonstrate—the power of the mind over our health.

LIA CRUM'S LONG HISTORY of experiments exploring the mind's influence over the body began with a record-scratch moment midway through her undergraduate career at Harvard, in the early 2000s. At the time, Crum was a member of Harvard's ice hockey team, a juggernaut that would go to three consecutive NCAA championship games during her four years in Cambridge. Crum was a role player, but her dedication was total. If the team trained three hours, she would top it off with an hour alone on the StairMaster. All the sweat equity, however, didn't much impress psychology professor Ellen Langer, Crum's academic adviser. "You know that exercise is just a placebo, right?" Crum recalls Langer saying.

The comment left Crum momentarily stunned. "Like, um, what did you just say?" But almost as quickly, it crystallized thoughts Crum had long had. Her studies—and life experiences—had made her keenly aware of the power of the mind to sway the body. Later that year, she would write a life mission statement, one that describes her work at Stanford today: "To help improve people's health and happiness through increased understanding of the mind-body connection." So, was she getting fitter and stronger because of all those hours in the gym? Or was it because she believed she would get fitter and stronger? What had sounded like a preposterous claim became an invitation for Crum to dig deeper.

Working under Langer, Crum recruited 88 female housekeepers from seven hotels to test the influence of their beliefs on their physical health. Few of the women said they got regular exercise—a third said they got none. Then the researchers gave half the women presentations revealing a hidden truth. Just by doing their jobs—where they might, for example, burn 60 calories in 15 minutes cleaning bathrooms—they were easily satisfying the surgeon general's recommendation for a healthy lifestyle.

This change in perception seemed to change reality. Four weeks later, the women who heard the presentation perceived themselves as getting more exercise, despite reporting no change in their job duties or outside activities. Their bodies seemed likewise convinced. They showed a decrease in weight, waist-to-hip ratio, and systolic blood pressure, which dropped an average of 10 points.

"These results support the hypothesis that exercise affects health in part or in whole via the placebo effect," the pair wrote in the ensuing paper, published in *Psychological Science* in 2007. Crum may have been the first author, but the paper's restrained academic tone didn't come close to capturing the wonder she felt. "It really opened the floodgates," she says. "If placebo-like effects matter in shaping the benefits of exercise, where else are they playing a role that we're not paying attention to?"

MIND AS MESSENGER

NEARLY TWO DECADES LATER, Crum's work suggests that similar belief effects are everywhere. To be clear, Crum—who became an elite triathlete after college—doesn't think the benefits of exercise are purely mental in origin, but she absolutely believes that our beliefs about exercise influence the benefits we get. Ditto in every other aspect of our lives. "The total effect of anything is a combined product of what you're actually doing and what you think about what you're doing," says Crum, an associate professor of psychology and lead investigator at the Stanford Mind & Body Lab.

The crux of Crum's work is that we deploy mental filters, or mindsets, to simplify and respond to a complex outside world. These mindsets affect what we pay attention to, what we expect to happen, and how we act in response, she says. They write the stories we tell ourselves to explain our own experiences, and they help shape the outcomes. Crum's goal is to understand how mindsets can be tweaked and tuned to improve performance, well-being, and especially health.

Her work echoes that of Stanford psychology professor Carol Dweck, whose research made *mindset* a household word. While Dweck's work has taught us that a growth mindset—looking at ability as something that can be developed—can matter more to a person's performance than innate talent, Crum is applying a similar idea to our physiology. "She brought [mindset] into the health and medicine realm and started asking a bunch of new, profound, important questions," Dweck says.

Perhaps Crum's greatest inspiration, though, is the oft-maligned, frequently mythologized placebo effect: the human tendency to reap benefits from inert medicines. In some ways, Crum says, the placebo effect is among medicine's most documented phenomena. Since the 1960s, any successful drug candidate has had to outperform fake treatments—a surprisingly high hurdle, thanks to the placebo effect's power.

Too often, Crum says, this effect is either relegated to the realm of the mysterious or disregarded as a nuisance to be overcome in testing. To her, it's neither. "The placebo effect is just a microcosm of this very real phenomenon that our beliefs create our reality, to some degree," she says. You don't need sugar pills in a clinical drug trial to invoke it; you can use mindset interventions, such as the facts she presented to the hotel housekeepers.

While at Harvard and later at Yale, where she earned her PhD, Crum probed how mindsets can influence workers' stress and productivity, as well as people's relationships with food and exercise. Since arriving at Stanford in 2014, Crum has increasingly collaborated with colleagues at the School of Medicine, where she studies the impact of mindset in treatment contexts ranging from food allergies to cancer. "Ali Crum is the preeminent health psychologist of her generation," says Adam Grant, an organizational psychologist at the Wharton School of the University of Pennsylvania and the bestselling author of five science and psychology books. "She has not merely studied how to improve our health; she has actually done so."

LUCKY BREAK

GROWING UP in Aspen, Colo., Crum was fascinated with mindset long before the term became ubiquitous. Her mother, Cathy, had been raised a Christian Scientist, a religion

known for its faith in the healing power of prayer. Although Crum didn't grow up in the church, her mother modeled the belief that the mind has leverage over the body. She might take an Excedrin for a headache after, say, hiking one of Colorado's fourteeners, Crum recalls. Otherwise, she seemingly never took medicine and never got sick.

On the other hand, Crum's father, Tom—a college football star turned aikido master, motivational speaker, and author—was always taking vitamins. Yet he provided even more vivid illustrations of the power of the mind. She remembers him clad in the hakama of an aikido black belt, hosting outdoor mind, body, and meditation workshops. He would ask participants to stretch an arm outward and keep it straight as a partner tried to bend it at the elbow. Inevitably, the arms would bend. But then her dad would direct them to think of their arms surging with a flow of energy to someone they loved. Suddenly the arms around the group would become unyielding.

Crum experienced the power of his message firsthand as a young gymnast. In grade school, she was practicing for the chance to go to nationals when she slammed her ankles together on the vault. The pain, she says, was excruciating. Over the coming days, she did everything she could to recuperate by resting, elevating, and icing her ankle. Her dad, meanwhile, emphasized to her that healing wasn't just a matter of tending to the body. He had her visualize her routines over and over, and directed her to send energy to her ankle. That weekend, she performed painlessly on the floor, bars, beam, and vault, qualifying for nationals. But the pain returned once she was off the mat. An X-ray revealed she'd been competing on a broken ankle.

Her experience stoked an unabating curiosity. "How could we do this better?" she wondered. "Are there limits? Could I have competed on two broken ankles? I always had those questions."

When she left for Harvard nearly a decade later, she could feel the disconnect between a world that bought into the concept of a healing energy and an academic mainstream that dismissed such talk as New Age pap. But she was also exposed to researchers like Langer who took the ideas seriously. And there she gravitated. "I became increasingly fascinated by the power of research to provide not just validation for things that I experienced firsthand or had seen others experience firsthand but also to take it further," she says. "I felt like if we could actually understand what was going on here, we could leverage it even more than we do already."

A THUMB ON THE SCALE

ONE NIGHT, in the middle of grad school at Yale, Crum was working late in the lab—beset with stress over deadlines and doubts about her dissertation—when a friend peeked in and read the anxiety on her face. "It's just a cold, dark night on the side of Everest," he said, as Crum recounted recently on an episode of *Hidden Brain*, a radio show and podcast hosted by Shankar Vedantam, MA '93.

It took weeks for the meaning of the comment to dawn on her. She was at one of the world's great universities trying to contribute new understandings to the field of psychology. Climbing the metaphoric mountain wasn't supposed to be easy. The insight helped her recast the pressure making her miserable as the force pushing her higher. It also inspired her to look for similar ways to help others.

During the great economic upheaval of 2008, Crum and her collaborators—including Peter Salovey, '80, MA '80, now Yale's president—worked with nearly 300 financial workers to assess the influence of positive versus negative messaging about stress. One group watched short videos reinforcing the corrosive sides of stress. The other saw videos emphasizing the power of stress to enhance performance. The latter group later reported not only higher levels of engagement at work but also fewer negative physical symptoms of stress, such as backaches, muscle tension, and insomnia.

It's not that either mindset was wrong, Crum says: Stress can bring out the best in people *and* it can be toxic—but your expectations can act as the thumb on the scale in deciding which prevails. Her research suggests that simple interventions, such as the three-minute videos, can last for months, even years, due to a kind of virtuous circle. "You believe stress is enhancing, you act and respond in ways that make stress enhancing, and then those outcomes fortify the belief," she says.

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As with the stress and exercise experiments, her next study—and to this day, probably her most famous—was influenced

ERIN ATTKISSON

by the concerns preoccupying her as a student. In the 2011 study, Crum and her collaborators gave participants two milkshakes a week apart: one ostensibly a no-frills diet shake, the other an indulgent calorie bomb. Blood tests showed that participants' levels of ghrelin—known as the hunger hormone, for its role in stimulating appetite—dropped three times faster after the calorie bomb than after the diet shake. The twist? They'd been the same shake. Only the labels had changed.

It was a personally shocking conclusion for Crum, who had struggled with disordered eating and expected the seemingly healthier choice to invoke the more beneficial mindset. Instead, the no-fat, low-calorie labeling had apparently inspired a mindset of deprivation. It led her to a new approach to her own eating, one that puts flavor and indulgence in the foreground even as she tries to eat healthfully. "Sure, get a salad," she says. "But get lots of stuff on it—get the best stuff on it. Prepare healthy vegetables, but prepare them well. Make them tasty." There was a broader lesson too, she says: The seemingly superior mindset may not actually lead to the best outcomes.

SPECIAL TREATMENT

IN 2016, Crum gave a grand rounds presentation at the School of Medicine, where she offered an overview of her research to an assembly of the school's faculty. It was part of an evolution in her focus: She was growing more interested in finding medical applications for her research. "I just feel more inspired to tackle those problems right now rather than making productive people even more productive," she says. Crum's lab has since teamed with oncologists trying to help cancer patients improve their well-being. They've also trained doctors, nurses, and staff at Stanford Primary Care to shape patient mindsets, an effort led by Crum's first doctoral student, Kari Leibowitz, MA '18, PhD '21.

In her collaboration with Kari Nadeau, a professor of medicine and of pediatrics who is a world-renowned researcher of food allergies, Crum has shown one way that physicians might harness mindset to ease the therapeutic process. Nadeau's lab had been using a treatment called oral immunotherapy to desensitize children with peanut allergies by exposing them to tiny but increasing amounts of the allergen. The treatment is highly effective, but it often produces minor allergic symptoms that can terrify kids who've spent their lives in dread of serious reactions. Some had to take anti-anxiety drugs to complete the treatment, Nadeau says. Others skipped doses, dropped out, or never started.

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The researchers divided 50 of Nadeau's patients into two groups. Both were told that minor reactions to the treatment were expected. But while one group was given the standard message that such reactions were unfortunate side effects, the other was encouraged to consider them signs of progress. Like sore muscles after weight training or a fever during an illness, the discomfort could be seen as the body gaining strength.

Both ways of looking at the symptoms were equally valid, but the results suggested they weren't equally valuable. By the end of the six-month therapy, the children who'd been encouraged to see minor allergic reactions as positive were less anxious (as were their parents) and less likely to experience side effects. That alone was a revelation for Nadeau, who says the results have transformed how researchers and companies working with similar therapies approach patients. But there was another intriguing result.

As part of the research, Crum's team had taken blood samples before and after the treatment to see whether they could track any physiological signs of the intervention's effect, the sort of physical evidence Crum showed in the milkshake study. The bloodwork indicated that children who were encouraged to see the reactions positively had a greater increase in an antibody called IgG4, a biomarker associated with allergic tolerance. "One of the things that is so inspiring about Ali's research has been the number of times she has shown that this is true," says Lauren Howe, PhD '17, the study's lead author. The finding requires further study, Nadeau says, but seeing physical manifestations from Crum's approach adds to her sense of its potential. "Not only is it helpful for behavior and helpful for outcomes," Nadeau says, "but to see that change biologically in the immune system—that's amazing."

PLACEBO POWER

WHEN SHE WAS AN UNDERGRAD, Crum was struck by the work of Fabrizio Benedetti, an Italian professor of physiology and neuroscience whose studies showed that patients who are aware that they've received a treatment—like morphine for postsurgical pain—benefited more than those who received the same dosage without knowing it, say, through a pump into their IV. Benedetti showed similar results with treatments for Parkinson's disease, anxiety, and hypertension. The placebo effect, in other words, wasn't just an artifact of fake medicine. It was also part of real medicine.

In 2017, Crum's lab looked further into where the placebo effect occurs—this time,

expanding the idea to a physician's bedside manner. The study involved giving test participants a prick of histamine on the inside of their forearm, which produces itchy red bumps. They were then given a cream (unknown to them, an unscented hand lotion) and told it would ease the irritation. Throughout the experiment, the cream didn't change, but the demeanor of the health professional providing it did. In some cases, the provider appeared warm and competent; in others, disengaged and aloof. Participants who were attended by the former saw their rashes diminish; those attended by the latter did not. The placebo treatment had been constant, but the placebo effect had not, and the participants' mindsets—shaped by the provider's performance—had made the difference.

To Crum, these findings underscore that the placebo effect isn't something limited to drug trials and sham medicines—it was as present in Benedetti's study with real treatments as in hers with fake ones. The placebo effect is a constant passenger in all treatments. We can dial up its influence, through things as simple as attentiveness, presentation, and competence, or we can let it go to waste. For Dweck, this is Crum's landmark contribution. "Her ingenious studies have shown the placebo effect is an integral part of the healing process."

It's not that you can think yourself to full health, Crum says. In the peanut allergy study, mindset interventions weren't intended to cure the allergies. But they did give patients a better shot at completing an effective course of treatment. In this way, mindset interventions can be helpful in fighting cancer and other diseases. In collaboration with Stanford oncologists, the Crum lab found that cancer patients had a spectrum of attitudes that could be broken down into three categories: that the disease was a catastrophe, that it was manageable, or that it was an opportunity. These attitudes did not vary by the type of cancer or its severity. Those who considered the cancer a catastrophe reported lower levels of physical, social, and emotional functioning.

Sean Zion, PhD '21, then a doctoral student in Crum's lab, led the creation of a series of short documentary-style videos featuring former cancer patients talking about how they pivoted during treatment toward a more hopeful mindset, as well as psychologists and psychiatrists providing strategies on how to do so. In one video, survivors talked about how cancer can be a catalyst for a greater appreciation for life, as well as for personal growth, stronger relationships, new possibilities, and a greater sense of purpose.

At the end, participants who watched the videos and completed directed reflections about their experiences displayed a significant shift in mindset away from the idea that cancer is a catastrophe toward the idea that the disease is manageable or even an opportunity. Accordingly, they also reported greater physical, social, emotional, and functional well-being than those in the control group, and they showed less distress over symptoms. (COVID-19 sabotaged plans to include medical outcomes as part of the study, Crum says, but those will be part of a sequel.) "Just thought I'd let you know that I had a mastectomy 12/31 and will start radiation therapy soon," one woman said, according to anonymized comments Crum provided. "'Cancer is manageable' and 'My body is capable' have become my mantras. I'm doing well and looking forward to becoming a very old lady with perky breasts."

"For me, as a cancer doctor, it has been obvious for 30 years that for us to be as effective as we can be as physicians and healers, we need to take everything the person brings, not just their pathology report," says Lidia Schapira, a medical oncologist focused on breast cancer and cancer survivorship who first connected with Crum at her grand rounds talk. "Ali got it, and she was able to come up with some very creative ways of targeting what I was hoping to target all these years."

TESTING THE LIMITS

TO BE SURE, there are skeptics. Back when Crum's housekeeper study came out, Martin Binks, then director of behavioral health at the Duke Diet and Fitness Center in North Carolina, told NPR he doubted that the housekeepers' health benefits came from a mindset change. "There's a very high likelihood that [the housekeepers] behaved differently after they received that information," he said, "and they were being more active and eating more healthfully."

Fifteen years later, some still find it hard to accept that the mind can affect physical health and wellness. A doctor quoted in the *New York Times* last year likened a growing fascination with placebos to a return to medicine's dark ages. "The idea that we can use placebos as a panacea for a range of health conditions is really problematic," said Chris Maher, a professor at the University of Sydney's School of Public Health. "It is bad for science and bad for patients."

Ted Kaptchuk, a professor at Harvard Medical School and the director of a program in placebo studies, takes a more nuanced view. He has conducted experiments that showed that placebo treatments can ease discomfort from asthma and from irritable bowel syndrome. In the case of cancer, he says, placebo treatments can help with nausea, fatigue, and pain. But to attack the cancer itself, you need "real drugs that shrink tumors" and radiation.

Crum cautions that part of the reason the placebo effect is seen as most powerful against things like pain, depression, and anxiety is that's where the lion's share of the research has been focused. "There's probably a lot more that we can do," Crum says. "Can we cure a tumor? Maybe." But as a practical matter, she acknowledges there is a long way to go to harness mindsets with curative intent against diseases. The only way to understand whether that might be possible is through rigorous scientific inquiry.

Ultimately, Crum thinks we don't yet know enough to say when mindset doesn't matter. There is a phrase she ascribes to Langer, the professor whose guidance helped Crum begin her career: "The power of the mind is likely not limitless, but we just don't know where those limits are."

"That," Crum says, "I resonate with." ■

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