

"Mobbing" at Work:
How to Prevent It

**THE TRULY CRAZY THINGS
WE DO BEHIND THE WHEEL**

**Tara Brach: Stop Being
So Hard on Yourself**

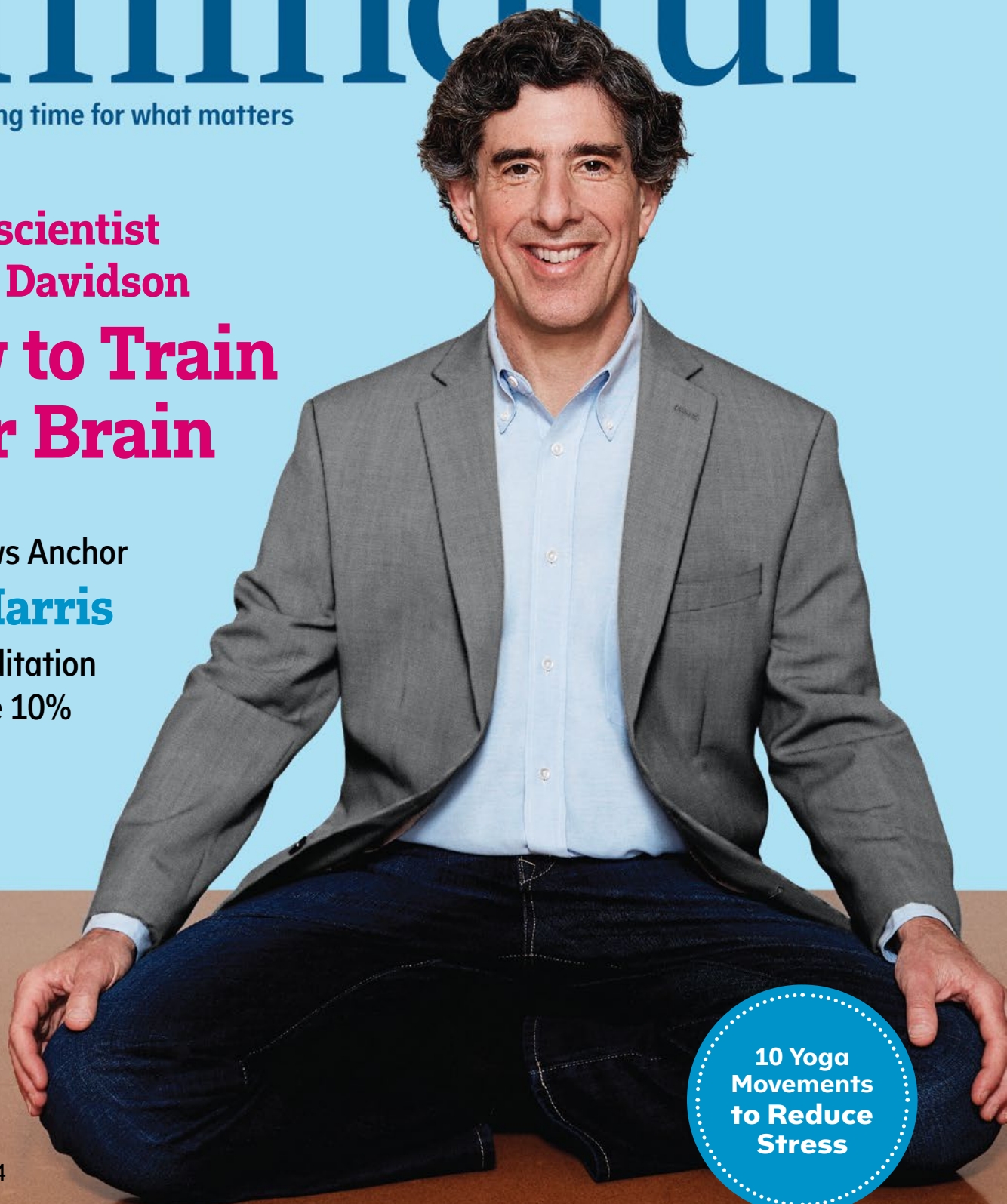
mindful

taking time for what matters

**Neuroscientist
Richie Davidson
How to Train
Your Brain**

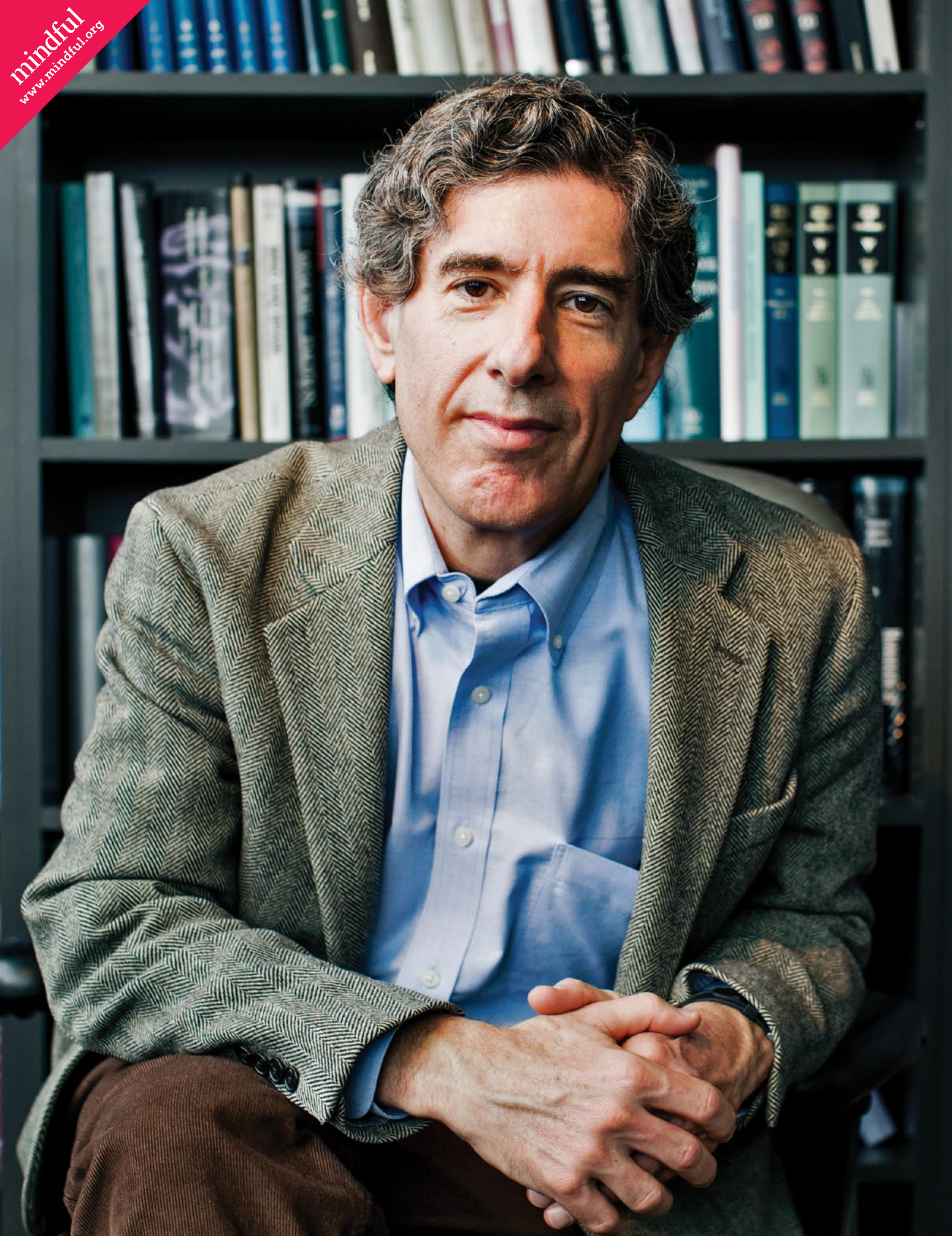
ABC News Anchor
Dan Harris

"How meditation
made me 10%
happier"



**10 Yoga
Movements
to Reduce
Stress**

AUGUST 2014
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Stalking the Meditating Brain

World-renowned neuroscientist **Richie Davidson** wants you to know three things: ❶ You can train your brain to change ❷ that change is measurable ❸ and new ways of thinking can change it for the better. Not so long ago this would have sounded like science fiction. Now the world's most-cited scientist on mindfulness and his colleagues take it for granted, as they spearhead cutting-edge brain research in the heart of Middle America.

By Tracy Picha
Photographs by Cameron Wittig

Your brain is unlike any other organ in the body—it's designed to adapt constantly. "The brain is not static. It is meant to change," says Richie Davidson, professor of psychology and psychiatry at the University of Wisconsin–Madison. No matter what we do, he tells me enthusiastically—whether it's learning to play tennis or spending time playing "Words with Friends" on our phones—we are shaping our brains. The brain is not like a car that comes off the production line and stays the same (except for breaking down and decaying). The brain keeps changing over its entire lifespan. And Davidson thinks that is very good news.

A demonstration of a video game intended to train children's brains in the direction of kindness and empathy.

Here's one very big reason that "neuroplasticity"

is such good news: Davidson's research shows that spending as little as 30 minutes per day training our minds to do something different can result in measurable changes that can be tracked in a brain scanner. And much of that research is being done by the 60-65 scientists, post-docs, research assistants, and graduate students at the Center for Investigating Healthy Minds (CIHM) at the Waisman Center, UW-Madison, for which Davidson serves as director and which he founded in 2008.

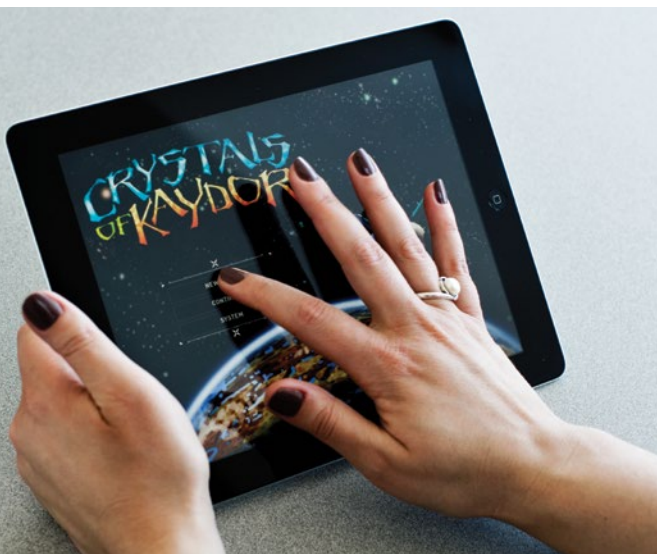
"We can intentionally shape the direction of plasticity changes in our brain," Davidson says from his office on a sunny February day in Madison.

"By focusing on wholesome thoughts, for example, and directing our intentions in those ways, we can potentially influence the plasticity of our brains and shape them in ways that can be beneficial. That leads us to the inevitable conclusion that qualities like warm-heartedness and well-being should best be regarded as skills. They are skills that can be cultivated."

The broad windows of Davidson's office on this day feature a cold, snowy canvas overlaid with geometric shadows cast from the interconnected buildings that make up the Waisman Center and the CIHM, situated near the UW Hospital and Clinics on the university's campus. In midwinter here in Madison, the blistering cold meets its match in the ready warmth of the locals. Call for a cab here and you're asked the question: Do you mind sharing? While it bursts at the seams when university is in session, it retains a hometown-America feel. People have time to chat and seem naturally prone to lending a hand. The fact, then, that a center devoted to exploring healthy qualities of mind such as kindness, compassion, forgiveness, and mindfulness is situated here seems a logical fit.

The center's founding marked a personal and professional triumph for Davidson. As a graduate student in the mid-1970s, Davidson shocked his professors by taking off for India to explore meditation practice and Buddhist teachings. After three months there and in Sri Lanka, he came back convinced he would do meditation research. He was quickly disabused of this notion by his professors, who let him know that if he had any hope of a career in science, he'd better stow the meditation and follow a more conventional path of research. He became a closet meditator and an affective neuroscientist—a deep student of the emotions.

In the early days, Davidson says, whatever "research" there was on meditation wasn't convincing, filled with extravagant claims of magical results but not following standard protocols or building on the methodologies of previous research in related areas. A study that correlated drops in crime with the activity of Transcendental Meditation practitioners in the vicinity (and similar misguided efforts) tainted meditation research and helped keep him in the closet. As well, he says, "the science and the methods of the time were not suited to the task of studying subtle internal experience." They lacked technology like fMRI (functional magnetic resonance imaging), which takes a moving picture of brain activity. They didn't have any appreciation of epigenetics, the process by which our gene makeup can be changed throughout our lifetime. But above all, Davidson says, "we lacked an understanding of neuroplasticity. It is now widely accepted that the brain is an organ designed to change in response to experience and, importantly for our work, in response to training." →



CURRENT RESEARCH AT CIHM

Games to Train the Mind

Elena Patsenko

Elena Patsenko landed her position at UW–Madison from the University of Geneva, Switzerland. She is currently assisting on a study funded by the Bill and Melinda Gates Foundation that is developing two video games for adolescents—currently being tested on 11- and 12-year-olds. One of the games is designed to cultivate mindful awareness, particularly awareness of the body. The other, “Crystals of Kaydor,” is designed to cultivate empathy, pro-social behavior, and kindness.

“Crystals of Kaydor” asks a player to navigate through impressive graphics to an Earth-like planet inhabited by alien creatures who exhibit human emotional traits. Part of the challenge of the game is, upon encountering Kaydorians, the player has to correctly identify which emotion they’re exhibiting (surprise, happiness, fear, etc.), then move a dial to indicate the points when those emotions become heightened.

“We do MRI scans with the kids before and after they play the games,” Davidson explains. “We give them many different kinds of behavioral tests and apply other kinds of measures. We will be following these kids for some time.”

While details are not being shared at this early stage (there will be neither data nor results to report on until later this year), the CIHM scientists involved in the project had difficulty hiding their excitement about this work. Davidson will say one thing for certain, though: An hour and a half of playing a video game can actually produce a structural change in the brain. “Literally,” he says, “a change that is measurable.”

The current project is designed to “ask the question of whether we can use video games as a novel vehicle for training the mind in ways that may be more wholesome than *Grand Theft Auto*, or other video games,” Davidson says. “There is absolutely no question at this point in time, based upon the science that’s out there, that violent videogames have negative emotional consequences.

“So it’s our aspiration to try to convince those relevant interested parties—both parents and kids, as well as game designers and the gaming industry—that it’s actually possible to create games that are interesting and captivating that kids will want to play that are pro-social and can cultivate healthy qualities of mind.” ●





Happier and Healthier Lives

A key part of the center's mandate is to do what is now commonly called translational research—which involves real people in real life settings. It helps people while also advancing scientific knowledge and educating others about the value of meditation from a scientific perspective. Davidson has devoted his life to uncovering scientific discoveries that can help people live happier, healthier lives through mental skills training.

For many meditators, talking about “the brain” seems materialistic, as if all we were was a lump of electrically charged flesh; similarly, many scientists are uncomfortable talking about something as intangible as mind. Where is it? How do you measure it? Davidson is comfortable talking about both, and says that nowadays many more researchers are, too. Mind may not be so easily defined and delineated as brain, but the center uses the term healthy minds, he says, because it is minds—different types of minds—that can be trained in beneficial ways. And the effects of this training leave their mark on the brain, and can be observed and measured. These demonstrable positive results are the point. Not only do they increase Western science's understanding

of the brain's nature and capabilities, they offer convincing evidence for U.S. institutions like the Department of Education, the National Institutes of Health, the Department of Defense, even the Department of Energy, that mind/brain training could offer beneficial results that would help them fulfill their missions.

In his capacity as neuroscientist and as *New York Times* bestselling author, Davidson is featured widely in popular media—everywhere from *Time* magazine to *O, The Oprah Magazine*, to the *Harvard Business Review*. Between his work and his writing, he is beyond extremely busy. Even as a long-time meditator, Davidson is quick to acknowledge how challenging it is for any of us with busy 21st-century lives to add yet another “habit”—albeit, one that science is proving leads to greater happiness and better quality of life.

“Basic neuroscience evidence suggests that small, short periods of practice done many times in a way that can actually be sprinkled throughout the day is a really powerful way to promote enduring change in the brain,” Davidson says. “It has yet to be studied in the specific area of meditation practice, but we can ask the question, for example, is it better to sit for 30 minutes a day, or is it better to have 10 three-minute

Staff members at the Center for Investigating Healthy Minds sit together in the center's meditation hall. Personal experience with mindfulness helps the researchers better understand what they're studying.

CIHM is designing short practices for the workplace that will appear on people's computers and pop up throughout the day. Users will also get feedback on how they're doing: "It's like a Fitbit for the mind," says Davidson.

periods of practice that are sprinkled throughout the day? We don't know the answer to that."

But Davidson is taken with the question. So much so, he's involved in a new initiative this year: developing curricula for the workplace. "The short practices will be designed to be self-administered on a computer and are meant to be sprinkled throughout the day—practices you will get feedback on. It's kind of like a Fitbit for the mind."

Any good communicator—and Davidson is one—knows the power of the sound bite. What impresses, though, is witnessing him toggle between highly complex neuroscience and very real-world concerns of how to live a better life. Our conversation veers toward how teaching mindfulness can sometimes be mistaken as training people to simply improve their own performance—through better concentration, through better training of attention and awareness. Davidson, interjects: "What we do always needs to be in the service of others. That's the difference."

Davidson's research and message has been embraced globally, including by the political and business communities. A few weeks prior to our meeting, he attended the 2014 World Economic Forum in Davos, Switzerland, where he spoke to world leaders and CEOs about precisely those healthy qualities of mind and the importance of cultivating them.

Studying Well-being as a Skill

It has taken Davidson decades of rigorously designed scientific studies to say with certainty that well-being is a skill that can be learned. Neuroplasticity, now a widely accepted concept, was a key development.

"Research on neuroplasticity has given us a broad conceptual framework in which to place the research on meditation," he says. "And what we see is that even short amounts of practice can induce measurable changes in the brain."

"Our brains are constantly being shaped, wittingly or unwittingly—mostly unwittingly. We tend to be pawns of the forces around us. Our work, by →

CURRENT RESEARCH AT CIHM

Veterans and Anxiety

Dan Grupe

When Dan Grupe started examining brain activity, brain structure, and function in individuals with different anxiety disorders—he now has a Ph.D. in psychology from UW–Madison—he didn't think he would eventually be looking at images of the brains of American veterans returning from Iraq. But that's where his research will potentially have a significant impact.

Grupe was involved in a study that measured the impact of yogic breathing exercises (called Sudarshan Kriya) on veterans returning from combat with post-traumatic stress.

"We brought these guys in, collected a whole lot of self-report data, did a brain-imaging scan, and assessed them at baseline. We looked at brain structure along with the white-matter pathways that connect different parts of the brain. We also looked at brain function. And then we looked at all of this using a task best described as a threat-of-shock paradigm."

"Participants would see one of two colored squares. A blue square means you're never going to receive a shock, a yellow square means you might receive a shock. Then we looked at brain activity when this kind of unpredictable future threat was present—one that may or may not happen, and if it does happen, you won't know when to expect it."

"We found there were differences in functional connections between the prefrontal cortex and the amygdala," Grupe says.

"There was disrupted communication between those regions in veterans with post-traumatic stress. In veterans with higher PTSD symptoms, the part of the prefrontal cortex that's involved in signaling safety, and under conditions of safety seems to decrease activity in the amygdala—that part of the prefrontal cortex just wasn't differentiating between those two conditions at all."

Essentially, there are men returning from combat, where being hyper-vigilant could and would save their life and the lives of others, with brains that are still trained for combat.

"In the same study," says Grupe, "we found that those veterans who reported the highest levels of hyper-arousal, and the highest levels of hyper-vigilance, they were the ones showing the least differentiated activity in this part of the prefrontal cortex." ●





Above: Davidson at ease in the hallway of the center he helped to build—and where he spends his time when he's not traveling the world sharing the results of his work.

Right: Just a few minutes spent meditating in the center's fMRI will yield voluminous amounts of brain data that can be studied for months to come. Researchers are able to look at what are essentially movies of the brain at work.



“Our brains are constantly being shaped, wittingly or unwittingly—mostly unwittingly. We tend to be pawns of the forces around us. Our work, by contrast, is inviting us all to actually take more responsibility for our minds and our brains.”

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So what’s being measured and how? Fortunately, technology is steadily providing non-invasive ways to observe the human brain at work. CIHM relies on some of the best tech available: magnetic resonance imaging, or MRI, and positron emission tomography, or PET-CT scanner, which generates 3D images of functional processes in the body and brain.

The elegantly shaped, massive machinery sits in the CIHM’s dimly lit, cooled rooms. The ceiling above the MRI is removable: A crane can lift one out and lower a new one in whenever a replacement is deemed necessary. That is, of course, after millions of dollars have been raised to procure such a thing.

Just one of the ways CIHM is putting that technology to use is by exploring how the brain affects the body—and vice versa. Davidson underscores that “these pathways are bidirectional.” Essentially, changing our brain can change our body, and changing our body can change our brain.

“One of the important foci in our research is looking at inflammation, which has been implicated in many chronic illnesses,” Davidson says. “And there’s now increasing evidence to suggest that at a very basic biological level, certain kinds of meditation practices seem to modulate inflammatory systems. They down-regulate particular molecules—we call these proinflammatory cytokines—which are directly implicated in inflammation.”

He cites a CIHM study that was published in the February, 2014 issue of *Psychoneuroendocrinology*—“we looked at gene expression in peripheral blood lymphocytes—looking specifically at genes that have been implicated in inflammation.”

For that study, Davidson and others, including scientist Melissa Rosenkranz, examined participants who, over the course of one day engaged in intensive meditation practice. They were, as Davidson describes them, “people like us, with day jobs” and regular lives—albeit people who were familiar enough with meditation practice that doing it for a day in the lab was feasible. These were not, however, the long-term meditators Davidson studied in the early 2000s, monks whom he had hooked up to electrodes in order to study brain function both during and after meditation.

Participants for the gene study came into the lab and meditated for eight hours. Blood samples were taken before and after those hours of practice and then Davidson and crew looked for gene-expression changes over the course of that time in the lab. Results from this meditator group were compared to a control group that was not familiar with meditation and that came into the laboratory for “a day of leisure.” That group watched quiet videos, read, and took gentle walks.

The findings? The control-group participants didn’t show the same kind of gene-expression changes, Davidson says. It’s the first study that shows “we can actually see gene-expression changes within a very short period of time.”

As any hard-nosed scientist would, Davidson is quick to put things in context. “This is really just the beginning,” he says. “There are many more questions this study raises than we were able to answer.”

Understanding how gene expression is “not fixed and deterministic” is not a new concept for Davidson. He addresses it in his 2012 book, *The Emotional Life of Your Brain*, written with Sharon Begley:

Our DNA is more like an extensive CD collection. Just because you have a CD doesn’t mean you will play it, and just because you have a gene doesn’t mean that it is turned on (or as geneticists say, “expressed”). Instead, the extent to which genes are expressed is strongly affected by the environment. Thus, while we may have, say, a genetic propensity for anxiety, being raised in an environment that nurtures equanimity can silence that “anxious DNA” and prevent it from having an effect in the brain and thus on our behavior or temperament. It is as if we never slip that CD into the player.

Davidson invites us to imagine how contemplative practices being a habitual and widespread part of daily life might keep nudging us toward healthy habits of mind. He also creates environments where contemplative practices do become habitual so that he and other scientists can directly test the effect meditation might have in real-world settings.

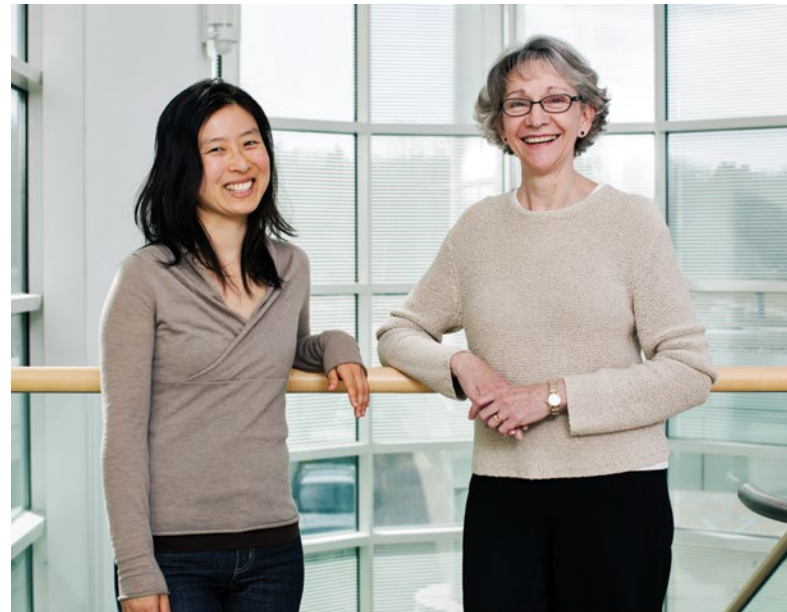
To date, there are more than 20 studies underway at CIHM. Some examine mental and physical health and illness. Others look at the effects of meditation and compassion training. Others consider the effect on our brains of acts of compassion, and still others look at child development and education. It’s no wonder funding agencies, the university, his colleagues, and a whole generation of newly minted neuroscientists put their faith in Davidson and his work. It’s going to help a lot of people. It already is. ●

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Tracy Picha is a freelance writer and former Editor of *Mindful*. Her most recent piece, about her brain on tango, appeared in the February 2014 issue.

CURRENT RESEARCH AT CIHM

Kindness Curriculum

Lisa Flook and Laura Pinger



The focus of CIHM’s “Kindness Curriculum,” now being tested in Madison schools, is three-fold: social and emotional learning, emotion regulation, and pro-social skills. “We hope developing these skills will increase social and emotional health and enable kids to be more available for learning,” says teacher Laura Pinger.

The curriculum, designed to help both children and teachers in the classroom, is a result of a collaboration between Lisa Flook, whose research interests include prevention and early intervention strategies to promote well-being early in life, and Pinger, who has 30 years’ teaching experience, including teaching mindfulness. (Davidson was one of her students.)

While data gathering and analysis is ongoing, initial findings in the “Kindness Curriculum Study with Pre-Kindergarten Students” indicate that children who took part showed “improved response times on

computer measures of attention and larger gains in social competence as compared to the children who did not receive the curriculum.”

Pinger offers another snapshot. “What’s interesting for me is the number of parents who are writing to teachers or talking to them about the impact the Kindness Curriculum has made at home,” she says. The mother of one boy comes to mind. “She wrote a letter saying she had never heard her son talk about understanding how somebody else was feeling, but he’s now talking about that at home, and it’s really shifted how he’s interacting with his siblings.

“We send materials home with the children with letters explaining to parents what we’re talking about in class,” Pinger says, “but what I think is really amazing is that all of this is having enough of an impact that parents are reporting seeing differences at home.” ●

RICHIE DAVIDSON'S SPHERES OF INFLUENCE

Dan Goleman, author of Emotional Intelligence, refers to Davidson as “scientist-savant—born to be at the top of his field.” The description is apt. His curriculum vitae clocks in at 87 pages and bristles with achievements. His influence is seen in many of these important research areas.

To learn about specific projects underway at CIHM, go to mindful.org/cihm

Meditation

20 years of research on meditators new and old: How meditation works in the brain; the benefits of various practices; which practices are best for which people, and how they can use them in their daily lives—in schools, doctors' offices, hospitals, workplaces, and more.

Mental Health

Documenting brain circuitry in depression, anxiety disorders, and autism—understanding the causes of suffering and how it can be reduced; improving concentration in children and adults using both traditional meditation and video games designed to cultivate mindfulness.

Early Childhood

Six years of work on the benefits of integrating mindfulness into schools for pre-kindergarteners, fifth graders, and teachers.

Stress

Investigating brain circuitry related to psychological stress and negative emotion; producing neurally inspired therapy to increase emotional resilience.

PTSD

Helping American veterans returning from war. The purpose of the research is to expand treatment options based, in part, on contemplative approaches for PTSD and make inroads to understanding the brain mechanisms involved.

Health

Ongoing studies on how meditation can modulate inflammatory conditions, as well as asthma, chronic pain, and response to pain.

Neuroplasticity

Discovered that training the mind, even for 30 minutes a day, can result in measurable changes. Conducting brain training, using meditation, cognitive-behavior therapy, and more, to help regulate emotions, reduce stress, and even cultivate compassion.

Aging

Understanding resilience and well-being in aging and the factors responsible for improving well-being in the aging population.



1992

Meets with the Dalai Lama and three scientists to propose a study of several long-term meditators. It marks the beginning of Davidson directly studying the effects of meditation on the brain.

2001

Tibetan monk Matthieu Ricard arrives at Davidson's lab in Madison to have his brain monitored before, during, and after meditation.

2006

TIME names Davidson one of the 100 most influential people in the world.

2011-2017

Serving on the Scientific Advisory Board of the Max Planck Institute for Human Cognitive and Brain Sciences in Leipzig, Germany.

1976-1992

Between 1976 and 1992 Davidson probes the emotional brain and catalyzes the new field of “affective neuroscience”—the understanding of the brain mechanisms underlying emotion.

2000

Davidson receives the Distinguished Scientific Contribution Award, for Lifetime Achievement from the American Psychological Association.

2004

Davidson and his colleagues publish the first scientific article on changes in the brain during meditation in long-term Tibetan practitioners in *Proceedings of the National Academy of Sciences*.

2008

Founds the Center for Investigating Healthy Minds at the Waisman Center, University of Wisconsin-Madison.

2011-2013

Serves as Chair of Psychology Section of the American Association for the Advancement of Science.

2012

Publishes *The Emotional Life of Your Brain* with Sharon Begley.