

CHANGE YOUR MIND. CHANGE THE WORLD.

2015 Annual Report

CHANGE YOUR MIND. CHANGE THE WORLD.

"Because of your support, this pivotal research continues to advance to the next level. Together, we're continuing this journey of discovery in pursuit of a kinder, more compassionate human experience."

Richard Davidson



Center for Investigating Healthy Minds

University of Wisconsin-Madison
1500 Highland Avenue, Suite S119
Madison, Wisconsin 53705-2280
General Number: 608-263-6321
Email: info@investigatinghealthyminds.org

This report was designed by our friends at Marketing Support, Inc. (www.msinet.com) and printed on recycled paper.

Special thanks to David Nevala and Madison.com for photos.



Mission

To cultivate well-being and relieve suffering through a scientific understanding of the mind



Contents

- Message from the Founder..... **03**
- A Unique Approach..... **04**
- Advancing the Research..... **05**
- Inspiring Innovation..... **14**
- Building the Movement **16**
- Building a World-Class Team **18**
- Looking Ahead..... **22**

Research at the Center for Investigating Healthy Minds seeks to understand well-being and how it can be cultivated by leveraging a variety of techniques, including tools to measure physical responses to different prompts during studies. Pictured: Dania Shoukfeh, undergraduate research assistant

Message from the Founder

Ten years ago, participating in an international panel at the World Economic Forum on the topic of well-being and emotion regulation would be difficult to fathom. Though many scientists and members of the public expressed early interest in the neuroscience of well-being, our path was largely uncharted and uncertain.

This is why I'm deeply grateful for a recent opportunity to further the global conversation on well-being with Thomas Insel, National Institute of Mental Health Director, at this year's **World Economic Forum**. This meeting, among many others around the globe, have made it clear to me we're at a propitious moment:

An increasing number of individuals, companies and organizations are joining us in embracing the idea that well-being can be learned and has tremendous import for education, work and healthcare. Along with close friends and colleagues Matthieu Ricard and Antoine Lutz, we delved into these ideas and scientific evidence associated with them in a recent issue of *Scientific American*, representing one of many ways we're sparking public conversations on meditation and well-being.

We're honored and grateful to be pursuing this global mission with you – and honestly, because of you. Your support and engagement in our community allow us to navigate through uncharted territory and

tenaciously pursue our mission in increasingly formidable federal and state budget climates.

We have so much to learn, and so much work ahead of us, as you'll learn on the following pages. But being in this together – forging a kinder, more compassionate world through a scientific understanding of the mind – makes any challenge surmountable.

With warmest best wishes,

Richard J. Davidson
Founder

A Unique Approach

Founded and led by world-renowned neuroscientist Richard Davidson, the Center for Investigating Healthy Minds (CIHM) at the Waisman Center, University of Wisconsin-Madison is a global leader in conducting novel research to revolutionize our understanding of the mind, emotions and well-being. Our mission is to cultivate well-being and reduce suffering through a scientific understanding of the mind. There are three pathways that guide our work toward a kinder, more compassionate world: Research, Innovation and Movement. The Research pathway is at the core of what we do at UW-Madison. A new non-profit organization, CIHM, Inc., was recently formed to support the Innovation and Movement pathways, whose synergies drive CIHM's distinct contribution to transforming the human experience.

ADVANCING THE RESEARCH

Conducting rigorous scientific research that generates breakthrough discoveries about the mind and how to cultivate well-being

INSPIRING INNOVATION

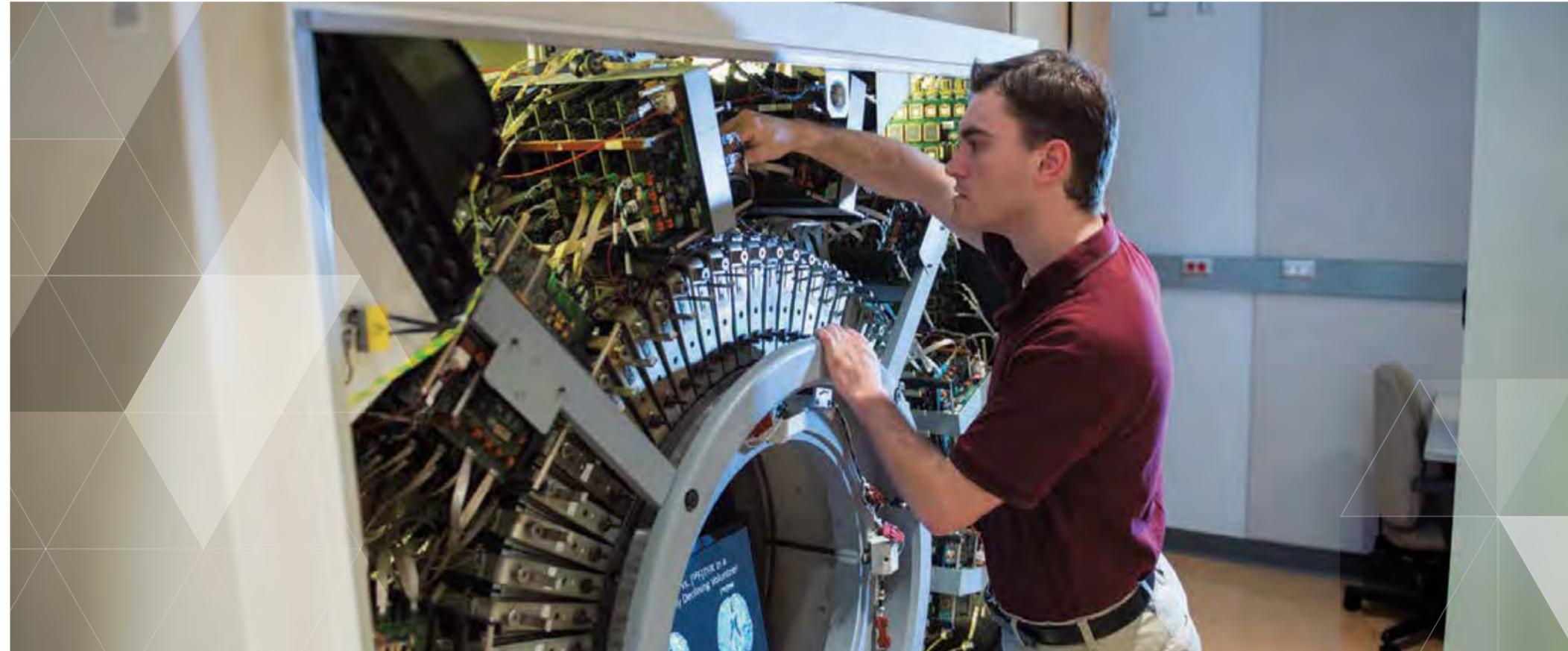
Developing research-based tools that help people around the world build skills that improve well-being

BUILDING THE MOVEMENT

Engaging a critical mass of people who embrace practices that cultivate well-being and inspiring a global shift toward a kinder, more compassionate world

The Center is primarily funded by outside sources that include a portfolio of federal, foundation and individual donors. When we say "thank you" for your support, we mean it. Gifts from people like you and private foundations provide a significant portion of our funding, which allows us to continue advancing the research, building the movement, inspiring innovation and retaining our talented team of scientists and staff who have invested so much in this work. We are dedicated to cultivating well-being and relieving suffering through a scientific understanding of the mind, and we would not be able to accomplish what we have without your investment in our work.

Thank you.



Waisman Center Research Intern Andrew Higgins assists with the positron emission tomography (PET) scanner, which allows researchers to track the neurochemistry of the brain.



Drawing valuable information from functional Magnetic Resonance Imaging (fMRI) scans, scientists can explore how certain areas of the brain respond to lab-generated stimuli and other prompts. Pictured: Waisman Center Brain Imaging Core Manager Michael Anderle examines processed brain scan data.

Research Is at Our Core

A growing body of evidence suggests that emotion regulation plays an important role in early childhood development, mental health, resilience and life success. Yet we still know little about the underlying brain processes associated with these outcomes and how individuals differ in emotional styles – people's unique emotional make-up that determines how they respond to life's slings and arrows.

Continuing to publish scientific findings in high-impact, peer-reviewed journals is vital to pursuing our mission of cultivating well-being and relieving suffering through an understanding of the mind.

The following highlights are just a few snapshots of the research underway at CIHM. For a full list of recent publications, visit investigatinghealthyminds.org/cihmScientificPub.html

'KINDNESS CURRICULUM'

BOOSTS SCHOOL SUCCESS IN PRESCHOOLERS

Over the course of 12 weeks, twice a week, the prekindergarten students learned their ABCs. Attention, Breath and Body, Caring practice – clearly not the standard letters of the alphabet.

Rather, these 4- and 5-year-olds in the Madison Metropolitan School District were part of a Center study assessing a new curriculum aimed at promoting social, emotional and academic skills.

Researchers found that children who had participated in the curriculum earned higher marks in academic performance measures and showed greater improvements in areas that predict future success than kids who had not. The results were recently published in the journal *Developmental Psychology*.

“This work started a number of years ago when we were looking at ways to possibly help children develop skills for school and academic success, as well as in their role as members of a global community,” says study lead author Lisa Flook, a Center scientist. “There was a strong interest in looking at cultivating qualities of compassion and kindness.”

While mindfulness-based approaches for children have become popular in recent years, few are backed by rigorous scientific evidence – a challenge the research team set out to address.

The team developed a curriculum to help children between the ages of 4 and 6 years learn how to be more aware of themselves and others through practices that encourage them to bring mindful attention to present moment experience. These practices, the researchers hypothesized, could enhance the children’s self-regulation skills – such as emotional control and the capacity to pay attention – and influence the positive development of traits like impulse control and kindness.

Throughout the study period, trained CIHM instructors taught the curriculum in diverse classrooms throughout the Madison area and worked with students through hands-on activities involving movement, music and books.

For example, kids were encouraged to think about people who are helpful to them – sometimes those they may not know well, like the bus driver – and to reflect on the role these people play in their lives, Flook says.

Teachers reported one of the kids’ favorite activities was a practice called “Belly Buddies,” in which they listened to music while lying on their backs with a small stone resting on their stomachs. They were asked to notice the sensation of the stone, and to feel it rising and falling as they breathed in and out.

4K students at Stephens Elementary School in Madison, Wisconsin, participate in the “Belly Buddy” breathing exercise from the Center’s Kindness Curriculum.



“It’s something that’s so simple and it allows them to experience internal quietness and a sense of calm,” says Flook.

The researchers measured the impact of the curriculum on sharing by using stickers the kids could choose to give to a variety of others or keep for themselves. They measured the kids’ ability to delay gratification by choosing one small reward to have immediately or waiting to receive a larger treat later.

In addition to improved academics, the 30 students who went through the curriculum showed less selfish behavior over time and greater mental flexibility than the 38 kids in the control group.

Flook cautions that while the study was designed as a randomized control trial, additional, larger studies are needed to demonstrate the curriculum’s full potential by replicating the results in another group of children.

“I think there’s increasing recognition of how social, emotional and cognitive functioning are intermingled; that kids may have difficulty in school when emotional challenges arise and that impacts learning,” she adds. “Can you imagine how this could shift the climate of our schools, our community, our world, if cultivating these qualities was at the forefront of education?”



IT'S NOT ALL WEDDED BLISS

Marital stress may make people more vulnerable to depression, according to Center researchers. The long-term study, published in the journal *Psychophysiology*, shows that people who experience chronic marital stress are less able to savor positive experiences, a hallmark of depression. They are also more likely to report other depressive symptoms.

The findings are important because they could help researchers understand what makes some people more vulnerable to mental and emotional health challenges. They might also help scientists develop tools to prevent them.

Married people are, in general, happier and healthier than single people, according to numerous studies. But marriage can also be one of the most significant sources of long-lasting social stress. It's not all wedded bliss.

Center researchers thought chronic marital stress could provide a good model for how other common daily stressors may lead to depression and similar conditions.

"How is it that a stressor gets under your skin and how does that make some people more vulnerable to maladaptive responses?" asks Center graduate student Regina Lapate, lead author on the paper.

In the eleventh year, the participants were invited to the laboratory to undergo emotional response testing to measure resilience, or how quickly a person can recover from a negative experience.

The participants were shown a mix of negative, neutral and positive photographs such as a smiling mother-daughter pair while researchers measured the electrical activity of their "frowning muscle." Study participants who reported higher marital stress had shorter-lived responses to positive images than those reporting more satisfaction in their unions. There was no significant difference in the timing of negative responses.

"What can we do to learn to cultivate a more resilient emotional style?"

"This is not an obvious consequence of marital stress, but it's one I think is extraordinarily important because of the cascade of changes that may be associated with it," says Richard Davidson. "This is the signature of an emotional style that reveals vulnerability to depression."

By understanding the mechanisms that make individuals more prone to depression and other emotional disturbances, researchers are hoping to find tools — such as meditation — to stop it from happening in the first place.

The research drew from a large-scale longitudinal study that is part of the National Institute on Aging-funded Midlife in the United States (MIDUS) initiative directed by Carol Ryff, Director of the Institute on Aging at UW-Madison. This particular project examined married adult participants who completed questionnaires rating their stress on a six-point scale.

Participants were asked questions like how often they felt let down by their partner or how frequently their spouse criticized them. They were also evaluated for depression. Roughly nine years later, the questionnaire and depression assessments were repeated.

Looking forward, Center researchers are interested in how to help people change this weakened ability to enjoy positive experiences in order to enable them to become more resilient to stress.

"To paraphrase the bumper sticker: 'Stress happens,' " says Davidson. "There is no such thing as being completely buffered from the slings and arrows of everyday life."

EVERY BREATH COUNTS

Mindfulness – a focus on the here and now through awareness of the present moment – can be both practiced and, importantly, measured by simply counting your breath, according to new studies led by Center researchers and published in *Frontiers in Psychology*.

The practice of mindfulness has recently gained popularity in the United States, and studies show it can reduce stress, improve student academic performance and more. But researchers have lacked a scientifically rigorous way to measure it, sometimes hindering its credibility, says Richard Davidson.

With breath counting, the team of researchers says it has found that measure. It is, after all, a practice that dates back 1,500 years as a tool to train mindfulness, says Daniel Levinson, graduate student and lead author of the paper.

It has long been seen as the domain of monks and mystics, but Levinson would like to see it become as common as yoga and running are today. He wants to see more physicians and others using it as a tool to promote well-being and to engage in common conversation around mindfulness. He is hopeful this measure can help.

“It’s easy to answer self-report questionnaires in ways that are consistent with what a person thinks mindfulness represents and the expectations about how a highly mindful person will behave,” says Davidson, but when it comes to keeping track of breaths, people can’t “fake good.”

To examine the practice as a tool for measuring mindfulness, participants in the study were asked to keep track of nine breaths in sequence by striking one computer key at each breath and a different key on the ninth breath in each sequence. To do so accurately, a person must be aware of each breath as it happens.

“Counting isn’t the main focus; it’s the experiential awareness of breath,” Levinson says. Breath counting is not mindfulness; rather, it’s a tool for measuring it, much like a thermometer is a tool for assessing the season.

Of the more than 400 people studied, all completed breath-counting tasks. Some were asked to provide their mood prior to doing so. Other participants were trained for four weeks in breath counting and then compared to people trained in a memory task or not trained at all.



Yet others – including novice and long-term meditators – were trained in a distraction task where they were paid to correctly identify a colored object on a screen of objects, followed by testing where they were asked to identify a different colored object. During the testing, the subjects were no longer paid for their efforts, but they were “distracted” with the presence of the original colored object.

Center scientists found that positive mood was associated with better breath-counting accuracy, long-term meditators were better breath counters than novices, better breath counters performed better in distraction tasks, and participants trained in breath counting completed test tasks more accurately than those not trained in breath counting.

The findings show that mindfulness as measured through breath counting is associated with more self-awareness, less mind wandering, better mood and less distraction caused by the “want” of financial gain.

And while it may seem easy, Levinson says that when people are off-count, they’re unaware of it roughly two-thirds of the time. “The cool thing is we always are breathing, so we can do this anytime, anywhere,” Davidson says.

Breath Counting Tool available at <http://bit.ly/1KoL9nc>

Photo by Hernán Piñera on Flickr

MOTHER-INFANT STUDY SEARCHES FOR INSIGHT INTO EARLY DEVELOPMENT

For participants in the Center's Baby Behavior and Brain Project, naptime isn't just a break for new moms.

These daily rituals also provide researchers an important window for scientific discovery. Using cutting-edge neuroimaging techniques, they are exploring the impact of early experience on child well-being. In the brief span of a 45-minute sleep cycle, the research team observes how brain structures and connections work in a resting state.

"Babies seem like such quiet little beings, but so much is going on from a developmental perspective," says Nicci Schmidt, manager of the project. "We know a lot about emotional development and how early emotions relate to adolescent brain development, but we know very little about the interplay between the earliest stages of brain and behavioral development."

Schmidt and colleagues are welcoming mothers and infants participating in a five-year project, which gathers a range of data beginning during pregnancy through the second year of life. Researchers are observing infant behavior, analyzing umbilical cord blood and drawing from extensive surveys with the goal of better understanding how experience shapes the infant brain and promotes child well-being at a behavioral and cellular level.

The project, in partnership with co-investigator and Fluno Bascom Professor and Leona Tyler Professor

of Psychology Hill Goldsmith, builds upon more than 25 years of joint investigation on the nature of emotional individuality, unearthing links between early behavior and adolescent brain development. These results underscore the importance of early experience, but figuring out exactly how experience shapes the brain has been difficult to study until recent years with advancements in fMRI technology.

Scientists know sensitive developmental periods such as preschool, the first formal years of schooling and adolescence are important, which is one reason why the Baby Project focuses on this earliest frame.

Overall, Schmidt says they're very early in the research, with the first babies in the study born in fall of 2014. Each week, three to four new babies are born, quickly expanding the Center's research family, she says. That poses many unique family schedules to work with at each testing occasion.

"The entire project is fully centered on the babies," Schmidt says. "We ensure the testing occasions are scheduled when babies are fed, rested and comfortable, and work around the schedules of each family."

In other studies in the future, Schmidt says the team hopes to expand the research to look at how meditation and other practices during pregnancy affect infant brain development.

Research Specialist Corrina Frye works with families participating in the study, allowing the team to glean information about early brain development.



INSPIRING INNOVATION

Our Inspiring Innovation strategy takes the discoveries and insights gleaned from our research and transforms them into tools to cultivate well-being that will be available nationally and globally. These innovations are supported through the Center's non-profit, which is dedicated to supporting the mission of the Center for Investigating Healthy Minds. Ongoing research and feedback will provide refinement, generate ideas for additional research and continually inform the field about what works.



Emotional Life of Your Brain. These dimensions of emotional style include attention, resilience, sensitivity to context, self-awareness, outlook and social intuition.

"These emotional styles are well-researched in individuals, with increasing evidence pointing to the idea that well-being skills can be learned" Davidson says. "We imagine this will be the case in the workplace, but we're collecting data and studying the curriculum to find out."

Scientists plan to examine how the curriculum will affect well-being and emotional dimensions such as outlook, attention and resilience while gauging their impact on workplace-relevant measures

Jill McDermott works with facilitators of the curriculum to share well-being skills in the workplace.

such as absenteeism, productivity, cooperation and distraction.

Davidson says the research component of the program will continuously shape the program's effectiveness over time.

McDermott and other facilitators involved with the collaboration have traveled regionally and nationally to pilot and evaluate the program with a range of companies and organizations, including one of the Big Four accounting firms.

After participating in the *Cultivating Well-Being* program, Ron Sliwinski, president and CEO of UW Hospital and Clinics, says his organization plans to leverage the curriculum at the launch of UW Health at The

American Center, its new health and wellness facility, opening this August on Madison's east side. Rather than viewing well-being skills and mindfulness practices as a luxury in the workplace, he sees it is an investment.

"It's not how we recover from the burnout, fatigue and tension; it's how we change the way we manage these stressors so the outcome isn't burnout, fatigue and tension," he says. "To me, that is the power of this message – we can approach work in a different fashion, like preventive medicine versus curative medicine."

To learn more about the program, visit uwcultivatingwellbeing.com.

Team members of the workplace curriculum brainstorm ideas and approaches to refine the program for a growing list of local and national clients.

COLLABORATION PROMOTES WELL-BEING IN THE WORKPLACE

The Center's non-profit is dedicated to supporting the mission of the Center for Investigating Healthy Minds by disseminating tools developed at the Center and promoting well-being in the world.

Standing in front of a room of business professionals, Jill McDermott shares a number: 2 quadrillion – the number of megabytes of information broadcast daily. She pauses to let the audience reflect on how this inundation of information contributes to distractions in the workplace that can chip away at a person's

well-being and ability to respond to daily challenges, whether it's giving projects the attention they deserve or shaking off a setback or conflict with a colleague.

Estimates suggest distractions in the workplace cost more than \$650 billion per year in U.S. workplaces. These are challenges McDermott, program director of a new partnership between the Center's non-profit and the Wisconsin School of Business Center for Professional and Executive Development, hopes to address.

The curriculum, *Cultivating Well-Being: A Neuroscientific Approach*,

fits into a larger conversation about employee well-being in the workplace and how organizations are adapting to promote health among their employees, she says.

"Many workplaces are shifting their focus to encompass the whole person," McDermott says. "Each of us – no matter what role we play in the organization – can bring our whole person to that. Those lines between personal and professional are dissolving, if not totally gone."

The skill-based program draws from scientifically derived concepts adapted from CIHM Founder Richard Davidson's best-selling book *The*



BUILDING THE MOVEMENT

Building the Movement is our strategy to shift the belief that nurturing our minds can be embraced as part of one's daily routine. Just like society's shift in knowledge and behaviors regarding exercise, building the movement requires rigorous scientific evidence and cultural acceptance to envision the possibility of a kinder, more compassionate world. These strategies are supported through the Center's non-profit.

Paper cranes have adorned the entrance of the Center since its opening in 2010, serving as a playful reminder of our progress over the past five years and the paths that lie ahead.

MORE THAN HEARTS AND MINDS

If what carries us through life's journeys could be represented by cars, heart surgeon Chris King says he would be a muscle car – powerful and fast-paced. But around four years ago, he found his fuel tank running on empty.

"All of a sudden, I felt my life wasn't sustainable," says King, who works at a hospital in the Pacific Northwest. "I didn't know how I was going to get through it to find peace with all of the anxiety."

Life's challenges seemed relentless as he experienced the death of his mother, edged close to burnout from the stress of a hospital environment and struggled maintaining quality relationships with his wife and kids.

King sought refuge in books in search of ideas, finding solace in meditation practices from apps and professionals in the field. While perusing titles in an airport bookstore, he picked up a copy of Richard Davidson's *The Emotional Life of Your Brain*, which offered a scientific perspective of the exact contemplative practices King was exploring.

"Richie really presented the science behind it through research and published papers – it really gave me a way to talk more smartly about these topics in my work environment," he says. "The idea of implementing the Center's work is revolutionary and could be a saving piece of the puzzle in healthcare. We waste so much time and effort on emotions."

King confronts difficult emotions daily, whether it's understanding the values and sources of suffering of patients and their families or staying completely focused while leading open-heart surgery.

At work, King channels his passion for cultivating well-being by serving on committees devising novel strategies to address patients' pain and making emotions a more central focus of the healthcare experience. In the future, he hopes to learn more about new metrics for emotional well-being as well as how these skills may translate into cost savings, length of stay and patient satisfaction.

But to pursue this work and keep his fuel tank full, King draws energy from his own practices to cultivate well-being.

"After working at it, I no longer see myself as that muscle car. I've traded it in for a Tesla, which isn't to say I'm still racking up speeding tickets," King says. "My fuel is clean, nearly limitless and non-polluting. I am a much better surgeon, friend, mentor, leader, father and husband. I'm present in other people's lives."



Heart surgeon Chris King draws energy from his own practices to inspire well-being in the healthcare field.

BUILDING A WORLD-CLASS TEAM

Our most significant scientific discoveries stem from our bright and talented scientists, scholars and staff, who bring diverse interests and expertise to the Center. This year, we welcome the following individuals to further our mission.



Center Founder Richard Davidson discusses research updates with a group of graduate students, including David Perlman and Tammi Kral.



Brianna Schuyler, Ph.D.,
Research Associate and
Scientific Co-Director



Sasha Sommerfeldt,
Associate Research Specialist



Jeanette Mumford, Ph.D.,
Associate Scientist



Pelin Kesebir, Ph.D.,
Assistant Scientist



Jeanne Harris,
Research Specialist



Daniela Dentico, M.D., Ph.D.,
Assistant Scientist



Marianne Spoon,
Director of Communications & Marketing



Molly Schwebach,
Senior Outreach Specialist



Andy Schoen,
Research Intern



Kunga Choenyi Sadutshang,
Research Intern



Corinna Frye,
Research Specialist



Chris Harty,
Associate Research Specialist



Cara Knoeppel,
Associate Research Specialist



Maria Jesson,
Research Specialist



Lori Gustafson,
Outreach Specialist



Talia Miller,
Outreach Specialist



Chad McGehee,
Outreach Specialist

LOOKING AHEAD

Because of your support, we've created a journey together to think big and create change in the world.

These are just a few of the areas we plan to investigate in the future:

How can we unlock the mysteries of the mind?

Some of our research focuses on understanding the brain mechanisms that underlie emotional styles such as resilience, outlook and attention, and how different emotional styles are associated with different neural networks. Increasingly, there's recognition that there's no one-size-fits-all approach and each person's emotional style provides a framework for individualized interventions to promote well-being. These insights form the building blocks for designing innovative tools, curricula and technology to help people in real-life settings.



Center research shows promise for people of diverse ages and backgrounds. Pictured: Center family member Kristina Vack and daughter peering into an fMRI simulator.

How can we ensure children have the best chance to succeed in life?

Increasing evidence points to the critical role emotional awareness and regulation play early in life and how they contribute to social and decision-making skills that influence a child's life-long success. We also know there are certain periods when young children's brains are more pliable, impressionable and vulnerable. These sensitive periods present a myriad of opportunities to build critical emotional skills to cultivate well-being. We are committed to learn the most optimal ways to provide interventions for children to increase emotion regulation.

We have pioneered research – and continue to do so – in this area by studying the impact of our Kindness Curriculum, videogames designed to build skills in empathy and attention as well as the impact of early trauma on young children. We plan to scale up these studies and better understand how children learn and what they need to flourish in life.

Can we learn skills that could reduce suffering from chronic disease?

Chronic illness – from asthma to heart disease, arthritis and more – accounts for the majority of total healthcare costs in the U.S. Although we're beginning to understand the role inflammation plays in triggering many chronic diseases, we are trying to learn more about how emotional stress affects inflammation. We're seeking to find out whether skills that reduce psychological stress can lessen the symptoms of chronic disease – or even prevent disease. Early work in this area shows promise.

How can we generate the critical evidence necessary to inspire real change?

Imagine a world where people embraced the idea that you can learn well-being – a place where everyone nurtures qualities such as attention, creativity, resilience and kindness through simple practices. We're dedicated to shifting the belief that exercising to nurture our minds can be embraced the same way we exercise to nurture our bodies. Similar to society's change in opinion for physical health outcomes related to behaviors such as exercise or smoking, our movement draws from rigorous scientific evidence and a tenacious strategy to make well-being skills a part of daily life.

