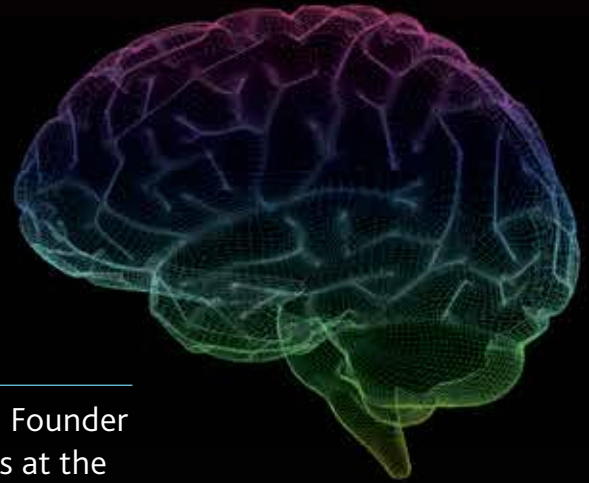
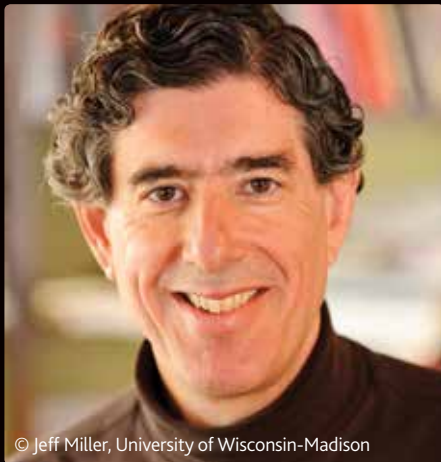


The wellspring of wellbeing



Dr Richard J Davidson, a US-based neuroscientist and Founder and Chair of the Center for Investigating Healthy Minds at the University of Wisconsin-Madison, shares the motivation behind his work on neuroplasticity, emotion regulation, mindfulness and their impacts on wellbeing and education



© Jeff Miller, University of Wisconsin-Madison

Could you provide an overview of your current research activities and explain what prompted your interest in these areas?

I have been deeply interested in human emotion since I began my professional life as a scientist. What particularly fascinates me about emotion is the extraordinary range of individual variation in how humans respond to emotional challenges. There are remarkable individual differences in response to adversity, in how we regulate our emotions and in the maintenance of wellbeing. I have been interested in the neural bases and biobehavioural correlates of these individual differences as well as in how we can promote more adaptive and optimal affective styles to cultivate resilience and improve wellbeing.

What is the main mission of your work? From what context did this research emerge?

The overall goals of our work are to investigate the neural bases and biobehavioural consequences of individual differences in emotion regulation and wellbeing;

to characterise how the central circuits of emotion and emotion regulation are connected to peripheral biological systems that are implicated in physical health – such as immune and endocrine function; and to investigate methods to cultivate resilient emotional styles in both children and adults, and their underlying mechanisms.

This research emerges from the understanding that how a person responds to life's slings and arrows determines much about their mental and physical health. It also emerges from a conviction that health is not simply the absence of illness and that preventative strategies can be implemented to cultivate both psychological and physical wellbeing. The work is also rooted in efforts to meaningfully connect modern neuroscience with ancient contemplative traditions in which various meditative practices were developed that are now being rigorously studied using modern scientific methods.

How does mindfulness affect a child's learning experience, interaction with others and social-emotional wellbeing?

Training in simple secular mindfulness practices in young children appears to strengthen selective attention, cognitive control and empathic accuracy. If future research supports these early findings, it would suggest that mindfulness training in young children can enhance self-control and beneficially impact a range of related outcomes – including future health outcomes, substance use, financial planning and success. It may also strengthen a range of prosocial skills that include emotion regulation and resilience.

What research questions do you still hope to answer and why?

There are many research questions that we still hope to investigate – but the 'why' is motivated by a deep curiosity toward

understanding the basic mechanisms by which the mind and brain work and can be transformed. In addition, the research is motivated by a sincere aspiration that this work could be of some benefit to others who may be suffering, or who may not enjoy the highest levels of wellbeing they might attain.

Is funding limited for this area of research?

There are quite severe budget constraints for government funding of this research in the US today – we critically need a diverse range of support for this work. Some of the studies we are conducting are so highly novel that even if there were more funds available at the US federal level, such work would not be prioritised. Thus, a combination of government and private sources of support are needed.

Have any of your research recommendations been implemented in schools? How has your work been received by education professionals and policy leaders?

Our kindness curriculum for preschool children has been adopted by the Madison Public Schools. Many other school districts from around the US as well as from a number of other countries have expressed great interest in using this curriculum, as well as using the video games we are developing. In general, the work has been received extremely well by leaders in education, but we face challenges in scaling the curriculum widely since it currently depends upon expert instructors to provide the training. We are in the process of evaluating whether it is possible to provide just eight to 10 weeks of training for the regular classroom teachers and then have them teach the kindness curriculum. We do not yet know how feasible this might be. Nor do we know what impact the digital games might have. We should be in a position to answer these key questions within the next 12 months.

Can we learn wellbeing and resilience?

Researchers at the Center for Investigating Healthy Minds at the Waisman Center, **University of Wisconsin-Madison**, USA are developing simple secular techniques derived from meditative traditions to cultivate wellbeing in children and adults and to decrease suffering in those afflicted with various neuropsychiatric disorders

MEDICAL AND SCIENTIFIC COMMUNITIES have shown a growing interest in recent years in the Eastern approach to wellbeing, particularly as various secular-based meditation practices have been incorporated into mainstream clinical practice. The main difference between the two approaches to health is that while Western medicine places considerable emphasis on disease, the contemplative traditions of the East focus on wellness. As serious research interest in these methods to cultivate wellbeing increases, there is recognition that these two great wisdom traditions have much to learn from one another.

Indeed, many people attest to the benefits of wellness practices such as meditation, yoga and tai chi – and their positive impacts on health have sometimes been confirmed in scientific research, although the mechanisms underlying their effects remain elusive. This is changing, however, as basic advances in scientific understanding of neuroplasticity now provide a framework in which to appreciate how simple



Long-term meditation practitioner prepared for recording high density brain electrical activity in the Center for Investigating Healthy Minds.
© Waisman Laboratory for Brain Imaging and Behavior, University of Wisconsin-Madison

contemplative practices might impact the brain and thereby produce behavioural changes in qualities such as attention, as well in the regulation of emotion.

AFFECTIVE NEUROSCIENCE

Emotional responses are a deeply personal part of the human psyche, and vary widely among individuals. Emotional styles refer to consistent differences among people in patterns of emotional responding and emotion regulation. Sometimes one's emotional style is advantageous and other times they can be problematic and increase an individual's vulnerability to psychopathology. Resilience is an emotional style that has been operationalised as the rapidity of recovery from adversity and can be measured in specific neural systems. If interventions to shift individuals into a more resilient emotional style can be developed, particularly in young children, then there is a potential to prevent the subsequent development of psychopathology and improve developmental outcomes. More generally, if children could be taught to be more emotionally intelligent, the consequences for social and academic success could be significant.

A group of researchers at the University of Wisconsin-Madison is working to bring to fruition this exact educational advance. The Center for Investigating Healthy Minds, led by Dr Richard Davidson, aims not only to answer fundamental questions pertaining to the biobehavioural patterns of emotional development, but also to link these patterns with specific interventions for young students, teachers and other groups. The researchers have already identified a number of fascinating trends in this area that may illuminate further paths to wellbeing – and their deeply novel work, which often draws on ancient contemplative traditions in combination with rigorous neuroscience, has attracted the interest of many organisations around the world.

EARLY EXPERIENCES

As part of their basic research, Davidson's team is particularly interested in studying the impact of early experience on the development of the brain and behaviour – and it has already shown some interesting results in this area. The group's studies have revealed that early life stress experienced within the first year has ripple effects that can still be detected in late adolescence. For example, abnormalities in connectivity between the amygdala and the prefrontal cortex could be measured in 18-year-old girls who suffered from early adversity. In earlier work, Davidson and colleagues had established the importance of prefrontal-amygdala connectivity for emotion regulation.

These findings suggest that constructs such as attention, cognitive control and prosocial behaviour are best regarded as skills that can be enhanced through training

This work clearly demonstrates that early experience has long-term consequences, and the complex emotional regulation circuitry of the brain may not express these consequences until much later in life.

The practical element of the team's research lies in developing interventions for early age groups, which could be beneficial to the development of social and emotional behaviour in the long term. The researchers are specifically developing interventions to cultivate mindfulness, kindness and prosocial behaviour in young children. A major component of this work is the 'kindness

curriculum', a 12-week course geared towards preschool and kindergarten students. The programme calls for 90 minutes of dedicated classroom instruction per week delivered by trained mindfulness teachers – and early results are already showing that students taking part in the programme demonstrate better attention, cognitive control and prosocial behaviour than students in a comparison condition who receive a standard curriculum. These findings suggest that these constructs are best regarded as skills that can be enhanced through training.

Prior to introducing the Kindness Curriculum into the classroom, the Wisconsin team provided teachers a 10-week training in mindfulness. This training was based upon Mindfulness-based Stress Reduction (MBSR) that was originally developed by Jon Kabat-Zinn at the University of Massachusetts Medical School. This separate study found that mindfulness had a significant impact on teachers as well as students; teacher burnout was reduced, self-compassion was enhanced and observer-rated classroom organisation improved. These findings, along with others in the literature, suggest that mindfulness approaches benefit both students and teachers.

VIDEO GAMES FOR MINDFULNESS AND KINDNESS

The Wisconsin researchers are also keen to determine if digital technology can be used to teach simple skills of mindfulness and kindness to middle-school children aged 11-13 years. The group has created two video games designed to cultivate mindfulness and kindness respectively, and their current studies evaluate the impact of game playing on brain function and structure, assessed with MRI and behavioural performance on various tasks designed to measure attention, cognitive control and prosocial behaviour. Children are randomly assigned to play either a commercial video game or one of two custom-built games – one designed to emphasise mindfulness, the other empathy, prosocial behaviour and kindness – for between 20 and 30 minutes each day. These results are expected to be available after the study is concluded in March 2014.

PERIPHERAL BIOLOGY

Although the researchers' work on the developing brain and programmes for use in early education is an important focus, and one that has garnered much attention from

scientific and educational communities around the world, it is far from their only interest. Their broad research programme has produced a variety of discoveries – for example, they have shown that mindfulness exercises not only alter emotional networks in the brain, but also down-regulate inflammatory markers and the expression of genes implicated in the inflammatory cascade. What is more, in several of their tests, they found that these benefits correlate in magnitude to the lifetime hours spent practicing mindfulness.

VETTING VETERANS

Davidson and his colleagues have also put their findings into applications beyond education. One study, for example, has been concerned with using mindfulness exercises alongside breathing exercises derived from yoga to improve the lives of veterans. Soldiers suffering from post-traumatic stress syndrome after returning from Iraq and Afghanistan are the subject of this ongoing study, which fits into the broader arc of the team's research into which interventions and exercises are most effective for different types of neuropsychiatric disorders. To this end, the emotional and cognitive styles of the veterans will be assessed at the beginning of the study and relations between individual differences on these measures and response to treatment will be determined. In addition, changes in brain function and structure that may be associated with symptom change will be examined. This study is ongoing.

A CONTINUING CONTRIBUTION

Davidson's Center has already produced some very compelling results, and the practical applications that this research promises are atypical in studies so novel as these. With a sound neuroscientific foundation to draw upon, and a clear vision of the possible applications of this kind of work, the Wisconsin researchers seem certain to succeed in their aims. They are poised, therefore, to sustain contributions to the wellbeing of people at many different ages and to the reduction of suffering among those with neuropsychiatric disorders, and victims of adversity.

INTELLIGENCE

NEURAL BASES OF RESILIENCE, VULNERABILITY AND WELLBEING

OBJECTIVES

To investigate the causes and consequences of resilience, vulnerability and wellbeing from a neuroscientific perspective.

Studies include the impact of early adversity on brain function and structure over the first two years of life; basic research on the fundamental neural mechanisms of emotion regulation and their dysregulation in mood and anxiety disorders; and the impact of secular contemplative-based interventions designed to promote wellbeing on brain function and structure and behaviour in both adults and in children from preschool to adolescents.

KEY COLLABORATORS

Collaborators at the University of Wisconsin-Madison and elsewhere throughout the world. The major Wisconsin collaborators include: **Ned Kalin; Marilyn Essex; Hill Goldsmith; Su-Chun Zhang; Carol Ryff; Giulio Tononi; William Busse; Andrew Alexander; Seth Pollak; Constance Steinkuhler; Kurt Squire**

FUNDING

National Institute of Mental Health • National Center for Complementary and Alternative Medicine • National Institute on Aging • Shriver Institute of Child Health and Human Development (all branches of the National Institutes of Health) • John Templeton Foundation • Several generous family foundations and individual donors

CONTACT

Professor Richard J Davidson
Principal Investigator

University of Wisconsin-Madison
1500 Highland Avenue Madison
Wisconsin 53705-2280, USA

T +1 608 265 8189
E rjdavids@wisc.edu

RICHARD J DAVIDSON is the William James and Vilas Professor of Psychology and Psychiatry, Director of the Waisman Laboratory for Brain Imaging and Behavior and Founder and Chair of the Center for Investigating Healthy Minds, at the Waisman Center, University of Wisconsin-Madison. He received his PhD from Harvard University in Psychology and has been at Wisconsin since 1984. He is co-author (with Sharon Begley) of the New York Times bestseller *The Emotional Life of Your Brain* that was published in 2012. Davidson has been a member of the Mind and Life Institute's Board of Directors since 1991.

In 2006, he was named one of the 100 most influential people in the world by Time magazine, and in 2007, Madison Magazine named him Person of the Year. In 2011, he was given the Paul D MacLean Award for Outstanding Neuroscience Research in Psychosomatic Medicine.

