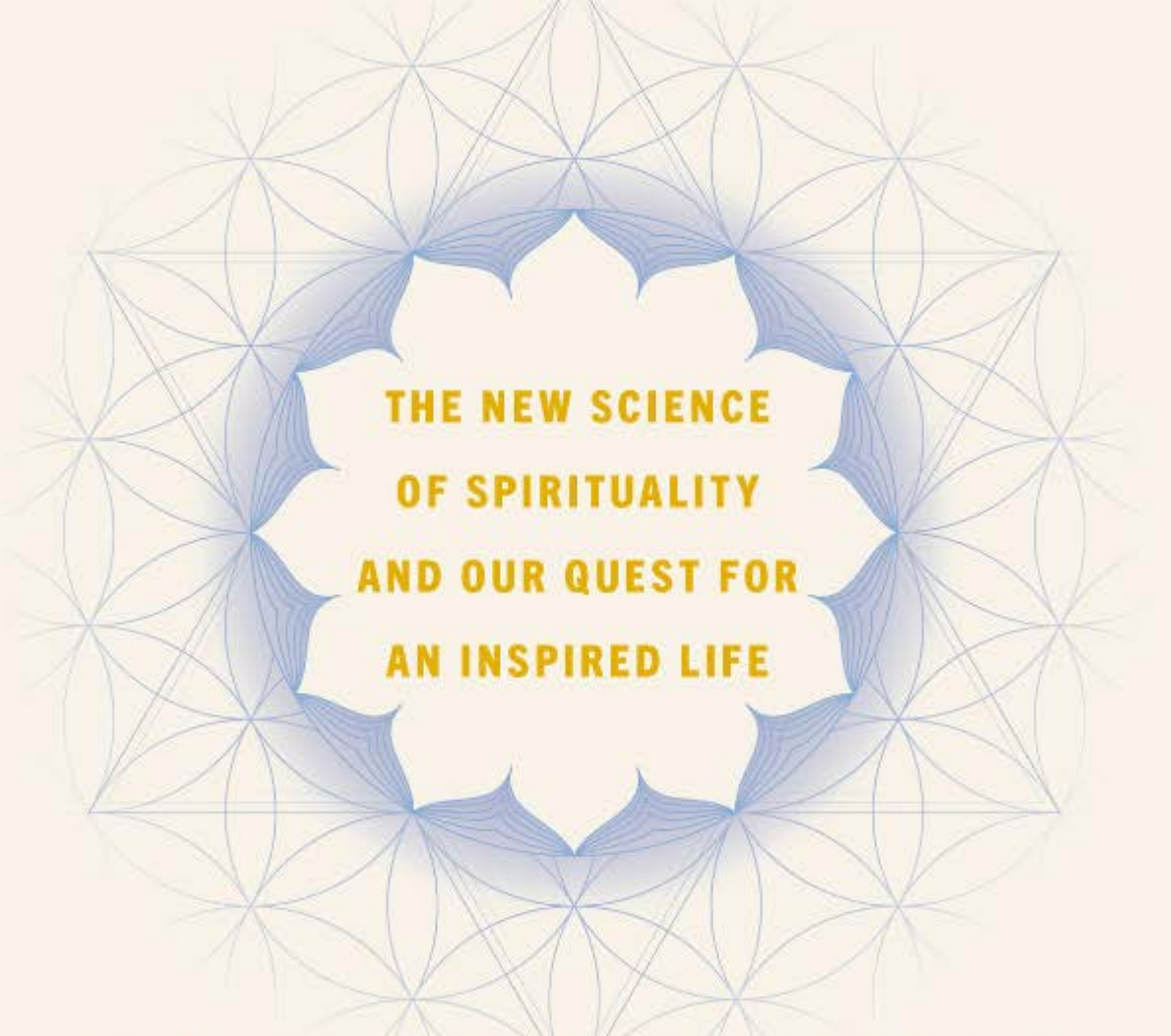


"A new revolution of health and well-being and a testament to, and celebration of, the power within." —**DEEPAK CHOPRA, MD**

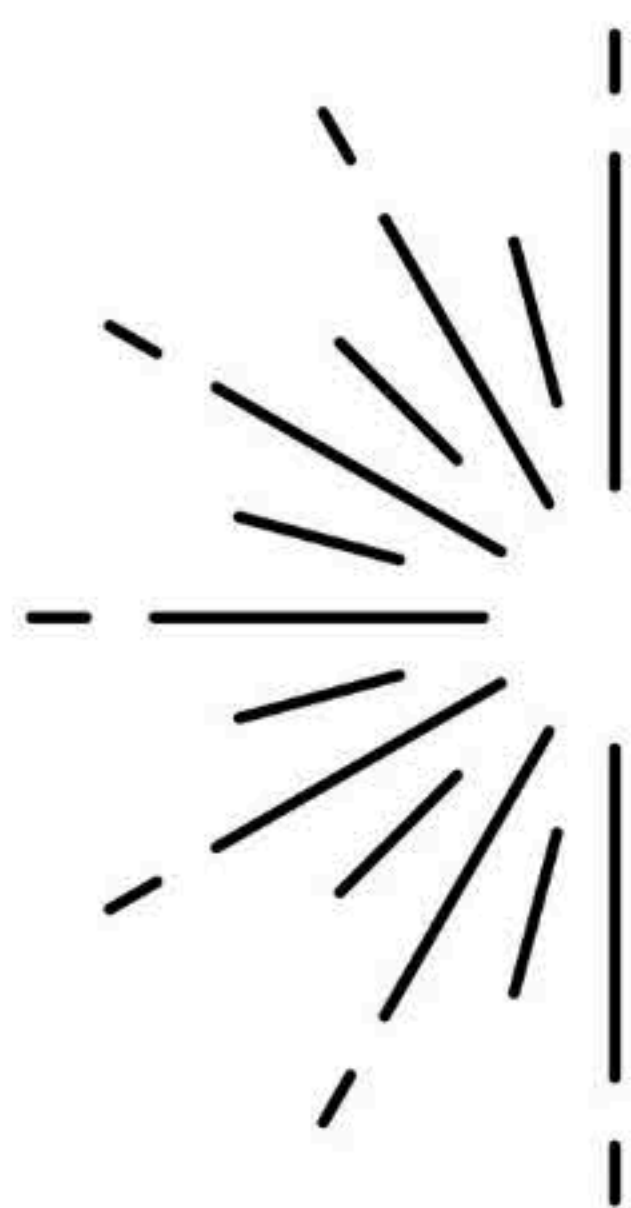
The Awakened Brain



**THE NEW SCIENCE
OF SPIRITUALITY
AND OUR QUEST FOR
AN INSPIRED LIFE**

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CHAPTER 11

WIRED FOR SPIRITUALITY

In 2009, researchers at my colleague Dr. Brad Peterson's lab at Columbia began asking the questions about depression that I was asking about spirituality: Is there a physiological foundation for depression? Is it visible in the brain? Brad

and his team posited that an established path of depression might be visible—that there might be not only specific brain activity but also specific brain structures associated with depression and other mood disorders and mental illness. In an amazing contribution to the field, Brad's lab used neuroimaging techniques to examine the brain structures of 131 people in Myrna Weissman's extensive data sample. The subjects ranged in age from six to fifty-four. Half had a family history of depression, while the other half were at low risk.

The subjects with parents and grandparents who'd experienced depression showed significant—up to 28 percent—*relative thinness in the brain's right cortex*. The outermost

surface of this region of the brain was much thinner in people at high risk for depression. Brad said that what he considered most extraordinary about the finding was that “you’re seeing it two generations later, and you’re seeing it in both children and adults. And it’s present even if those offspring themselves have not yet become ill.”

He said the cortical thinning wasn’t necessarily a familial genetic trait—that it could be “a consequence of growing up with parents or grandparents who are ill. Studies have shown that when parents are depressed, it changes the environment in which children are growing up.”

The region of thinning—the cerebral cortex—is where we process emotional stimuli. Specifically, this

part of the brain is important to reasoning, planning, and mood. A thinner cortex inhibits our ability to perceive and orient in the world, and see ourselves clearly. Brad's team showed in a material, physiological way what we had only known before in a clinical sense: that depression goes hand in hand with a narrowing of the perceptual field, and a distortion in our sense of relationship with others and the larger world—the mind going round and round, failing to see the bigger view.

If there were visible biological pathways of depression, could there also be biological pathways of spirituality?



IN 2011, a unique and unexpected opportunity came my way. My long-time colleague Myrna—who had generously shared her intergenerational data with me and Brad—had gone to the John Templeton Foundation, an organization that supports scientific discovery in pursuit of answers to “the big questions.” Drawing on the award they’d given for the epidemiology paper I’d developed with her team, she asked if they might be interested in funding her lab to look at the neural correlates of depression. They offered the funding—and wanted to include the “spirituality and religion person”—me—as an investigator.

It was a dream come true. We’d have the rich data of Myrna’s beau-

tiful thirty-five-year study, a three-generation sample community that included people at high genetic risk for depression as well as people with deep spiritual lineages.

Myrna had been following the same cohort of New Haven women long enough that they'd had children and grandchildren. The oldest generation was my parents' age, and the second generation my age. Maybe we'd sat in the same coffee shops when I was in college there, or gone to see the same bands at Toad's Place. I felt a connection to the "G-2" group, because I had gone through developmental depression at the same time, in the same place, and, like many of these women, I'd had a process of spiritual emergence. I saw my story in

their story, and I think that is what data sets always are to me: human stories. Now, for the first time, we had the funding and the research sample to investigate the relationship between depression and spirituality in the same cohort of women I'd been following for much of my life as a scientist.

Slowly, we established the design for the study. We decided to examine the occipital, parietal, and precuneus regions of the brain—regions other researchers had found to be associated with depression. The occipital lobe, located at the back of the head, is most commonly thought of as the brain's visual perception center; the parietal, a bit higher up, helps us orient ourselves within a field of sen-

sory information; and the precuneus is the part of the parietal lobe used in reflection.

Focused on the brain's regions of perception, orientation, and reflection, we would take magnetic resonance imaging (MRI) scans of people at high and low genetic risk for depression, and compare and contrast the brain structures of high-risk participants who reported a strong personal spirituality and those who did not.

“What exactly do you think we’ll find in there?” my colleagues warmly ribbed. “Do you *really* believe we’ll see anything?”

I couldn’t say. But the strength of the epidemiology data and the emerging imagery studies on depression suggested a possibility that our scan-

ner research might also lead to a clear finding. And I trusted the numbers to show what was true.

But I was completely unprepared for what we saw on the day eighteen months into the study when the MRI team met to review the new findings—the day Ravi, the data analyst, passed out the composite images of the high-spiritual and low-spiritual brains and we had our first clear and breathtaking view of the awakened brain.

The subjects for whom spirituality and religion were highly important had a healthier neural structure than did those for whom spirituality and religion held medium, low, or no importance. As I gazed at the printout of what the MRI team would come

to call the “red brain”—the high-spiritual brain, with its broad and pervasive regions of cortical thickness—I could see the material counterpart to what I’d discovered in the last twenty years of clinical and epidemiological work. The red brain had something to do with the buffering effect of spirituality, how some of us are more protected against depression when going through developmental windows of risk. How we can struggle and doubt in a way that deepens our spiritual awareness and determines how we see life and choose to engage in every moment.

The finding opened a new door in our understanding of the psyche. For spiritually aware people across faith traditions—and including those

without a faith tradition—the brain appeared able to protect itself from the long-standing neurological structures of depression.

ONE OF MY favorite aspects of publishing findings in scientific journals is the process of peer review—the practice of sending articles that are being considered for publication to at least two scientists who perform external analysis. It's generally understood in the scientific community that *any* article is improved through collaboration, and that many articles might be strengthened by added analyses or revisions. Because our MRI study on the awakened brain was

such breakthrough research, so far outside the mold of anything *JAMA Psychiatry* had ever published before, we had to be even more meticulous. Our study went through a complete second round of peer review to ensure that the rigorous analysis was exceptionally ironclad.

Peer review is always anonymous. The more profound or novel the finding, the more likely it will be reviewed by well-recognized, expert scientists at the top of their field. But it's essential for the scientific validation process that the analysis be about scientific method and data analysis, not personalities, cultural vogue, or even shared areas of scientific interests. The work is evaluated purely on the merit of science.

Yet I hadn't forgotten the furrowed brows when I'd presented at Grand Rounds fifteen years ago. Even rigorous scientists hadn't been able to see the data outside the lens of their biases about spirituality as a crutch or cultural artifact. Would our peer reviews come back with the admonition to look for a hidden variable to explain the red brain?

But the reviews came back full of completely scientific, clear-minded insights, raising minor points of clarification and additional statistical follow-ups. In response to one of our findings, that cortical thickening was greater among people with not only high but sustained spirituality—high spirituality over time—one reviewer asked, “Could you test whether cor-

tical thickness protects against the level of symptoms of depression?” In other words, did the red brain protect not just against long-term, more severe diagnosis of major depression, but could it be sufficiently sensitive to ameliorate the daily mild to moderate symptoms of depression? We ran a new analysis using a depression scale to incorporate symptoms of depression, and found that cortical thickening was indeed protective against here-and-now more subtle levels of depressive symptoms, not just against periodic episodes of diagnostic depression. Without the pure scientific engagement of peer review, we might never have observed this truth.

Another reviewer noticed that the magnitude of the effect of cortical thickening was even greater in the high-risk group, and asked us to dig into this data point. Why did high-spiritual people at high familial risk of depression have greater cortical thickening than high-spiritual people at low risk for depression? My brilliant colleague Craig Tenke hypothesized that perhaps the high-risk brains were more sensitive to the impact of spirituality. It was a huge insight, that people most prone to depression might be more profoundly enriched by spirituality—that a sensitivity to depression existed alongside a sensitivity to spirituality, resulting in greater neuroanatomic strengthening. People at low risk for

depression still benefited from spirituality. But for those at high risk for depression and cortical thinning, spirituality mattered even more. Perhaps these are our artists, writers, faith leaders, shamans, and musicians, particularly sensitive to experience.

Inspired by the new insights that came from the peer review process, our team decided to investigate one more aspect of the group at high genetic risk for depression. We had study participants come into the lab and simply relax with their eyes closed, an electroencephalogram (EEG) attached to the back of their heads, near the parietal region of the brain, the posterior area where they had shown enhanced cortical thickness.

We used the EEG to measure the energy the brain gives off. The subjects with a strong personal spirituality gave off a wavelength from the back of the brain that measured as *high-amplitude alpha* (alpha is 8–12 Hz)—a wavelength that also emanates from the posterior brain of meditating monks in some forms of practice and, notably, is “jump-started” in people using SSRI medications to treat depression; for people on SSRIs, however, the posterior high-amplitude alpha wavelength disappears when they stop taking the SSRI. In our study, the high-amplitude alpha reading was even more pronounced among the participants who both had a strong personal spirituality *and* had recovered from a major depression.

Once again, we saw an amazing intertwining of depression and spirituality in the brain.

The decades-long search was over and, at once, posed questions to open a new line of inquiry. We had located a glimpse of the awakened brain. We had discovered that the parietal region—toward the back of the head, roughly the place where the bottom of a baseball cap or a Jewish kippah rides—is essential to engaging our spiritual awareness. And we had discovered reverse kindling—the way the brain can buffer and defend against the stronghold of depression across generations and through the life span.

Depression and spirituality appeared to be two sides of the same

coin, vastly different experiences that in fact share some significant physiology. I had long wondered from an epidemiological and clinical perspective if some types of depression might be a symptom of a person's craving for spirituality and a call for the spiritual self to awaken. Now we could see in a physiological, material way that spirituality is a consciousness for which all of our brains are wired; and that, long-term, the spiritually engaged brain is a healthier brain. Suddenly depression didn't look like an illness, at least not all the time. It looked like a sensitivity or perceptual capacity—a knock at the door for the opportunity of an awakened brain.