



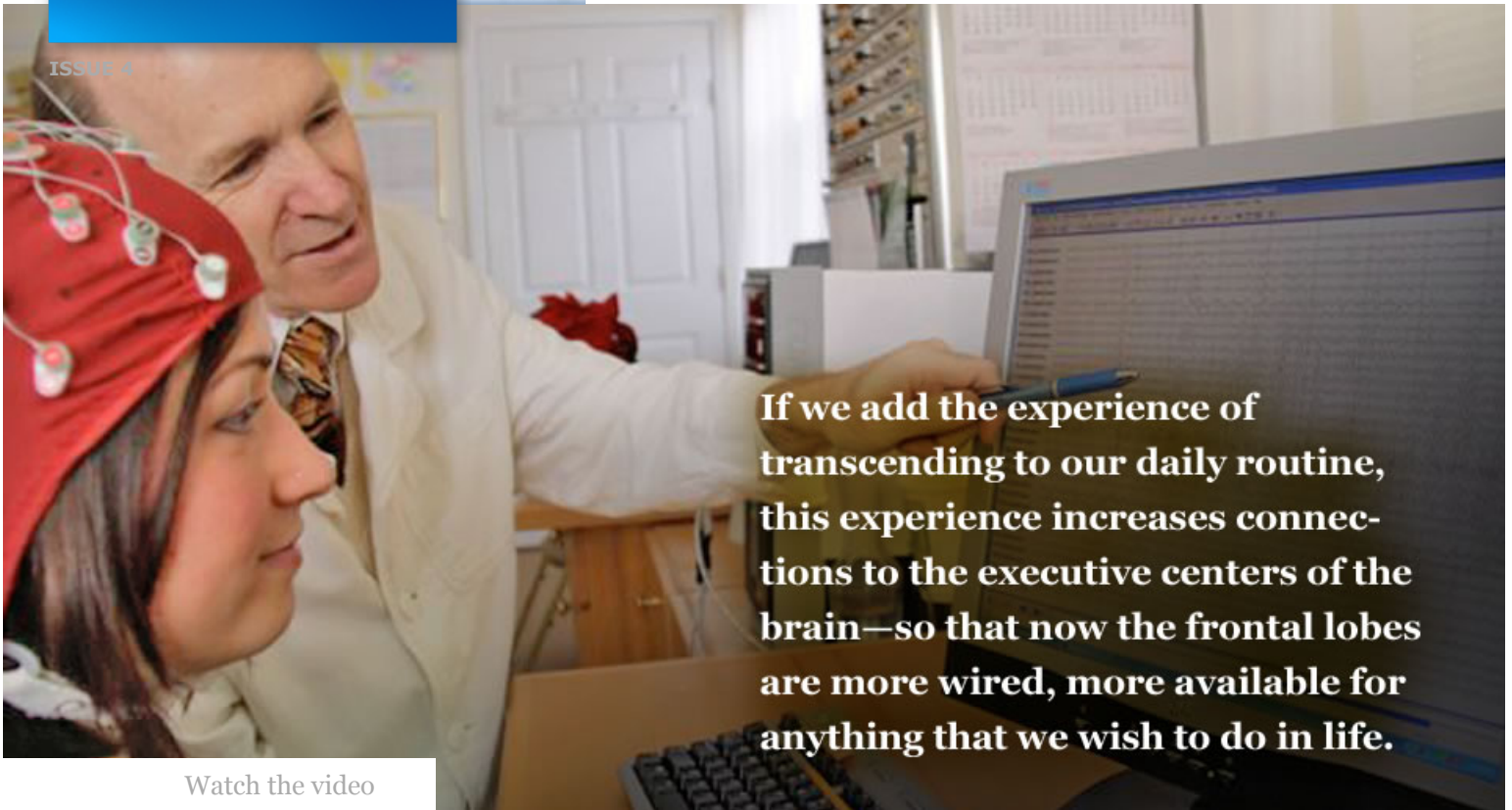
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ISSUE 4



**If we add the experience of transcending to our daily routine, this experience increases connections to the executive centers of the brain—so that now the frontal lobes are more wired, more available for anything that we wish to do in life.**

[Watch the video](#)

## Stress, the Brain, and Student Life: *A Researcher's Reflections*

Fred Travis, Ph.D., is the Director of the Center for Brain, Consciousness, and Cognition at Maharishi University of Management. He is the author of more than 50 research papers that investigate the relation between brain wave patterns, conscious processes, states of consciousness, and meditation practice. He regularly teaches undergraduate and graduate courses, gives seminars, and speaks at conferences on brain development around the world.

**Enlightenment:** A considerable amount of research is being conducted on the brain. Can you tell us why this area of research is so important?

**Dr. Fred Travis:** The brain is our interface with the world. We perceive the world and respond to the world based on the functioning of our brain. The brain transforms our experiences of the outer world so that our consciousness can understand it, and it transforms our conscious impulses so we can respond to the world around us.

A healthy brain, functioning without the restrictions caused by stress, is especially important. Probably the



**TM NEWS**

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Everything we do has an impact on the brain and will physically change the brain. Stress, fatigue, etc. makes the brain less adaptable, and we become handicapped in how we process and respond to our world.

**Enlightenment: What does research reveal about the effect of the Transcendental Meditation technique in helping the brain recover from stress?**

**Dr. Travis:** When a person is under stress, the prefrontal cortex, which is involved in decision-making and executive functions, is less involved in activity. It's as if it goes "offline."

The Transcendental Meditation technique has the exact opposite effect on the brain. Neuroimaging studies show increased activity in the frontal area of the brain during Transcendental Meditation practice, as compared to just sitting in eyes-closed rest. In addition to increased activity in the frontal areas, we also see increased activity in the back of the brain—the parietal areas. These two parts of the brain are part of the attentional circuit.

The TM® technique strengthens the attentional circuits in the brain responsible for decision-making and executive functions, so that when we need broad comprehension it will be there—even when we are under stress.

technique, the switchboard of sensory experience becomes more rested.

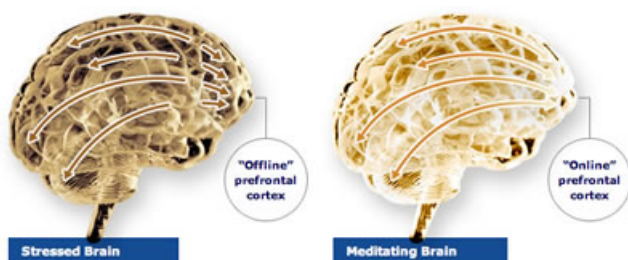
**Enlightenment: Can you talk about your research study at American University, in which the students experienced such deep rest through TM practice that they were able to function better even under the pressure of exams?**

**Dr. Travis:** College today is a time of incredible stress. Many students self-medicate to cope with stress. Almost half of college students binge-drink, and 20% use non-prescribed drugs. According to research, 80% of college students report being fatigued on a regular basis.

In our randomized controlled research study, published in the *International Journal of Psychophysiology*, we asked: how are students' brains functioning before they start the TM technique and how are they functioning

most important characteristic of a healthy brain is adaptability because the world is constantly changing and the brain has to change with the moment-by-moment demands of the environment around us. When we are restricted by stress, fatigue, and other negative factors, then the brain is less adaptable, and we become handicapped in how we process and respond to our world.

Research demonstrates how alcohol, drugs, stress, poverty, and sleep deprivation change the brain so that it has a diminished ability to reflect, remember, and process. Everything we do has an impact on the brain and will physically change it.



[Click here for a description of stressed brain versus meditating brain.](#)

Repeated experience changes the brain, and what we are doing every time we practice the Transcendental Meditation technique is strengthening our attentional circuits. If we want to build up our shoulder muscles, then we do specific exercises to strengthen the shoulder muscles and then use those muscles, for example, to carry our groceries home. Similarly, the Transcendental Meditation technique strengthens the attentional circuits so that when we need broad comprehension it will be there—even when we are under stress—because these frontal circuits are stronger than before.

Also, the unique experience of restful alertness during Transcendental Meditation practice gives rest to the core of the brain, the thalamus. The thalamus is like a switchboard: all sensory information comes into the thalamus and then goes to the brain. With the practice of the Transcendental Meditation

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The three-month study showed that meditating students were less tired and fatigued; they recovered from stressful stimuli better and showed increased scores on the Brain Integration Scale, which is correlated with emotional stability, higher moral reasoning, and decreased anxiety.

after they've been practicing the TM technique for three months. The three-month measurement was taken right before spring semester exams—probably the most stressful time of the year. During final exams, students typically stay up late for several days, eating bad food, getting no exercise, and feeling acute anxiety. Any one of these factors by itself is known to decrease the integrated functioning of the brain.

We found that students who did not practice the TM technique experienced a decline in brain functioning, alertness, and ability over the three-month period in which the study was conducted. In contrast, the practice of the Transcendental Meditation technique by students buffered the effects of the high-stress college lifestyle. Meditating students were less tired and fatigued; they recovered from stressful stimuli better and showed increased scores on the Brain Integration Scale, which is correlated with emotional stability, higher moral reasoning, and decreased anxiety.

The Brain Integration Scale measures whether the brain is functioning as an integrated whole or as isolated parts. Not only was the stress of finals week not affecting the meditating students, but they were actually functioning at a higher level than before they learned the TM technique. Transcending through Transcendental Meditation practice fundamentally changes brain functioning so that students are able to live life more effectively and successfully, without suffering from the deleterious effects of stress. It allows students to live life in a state of evenness and wholeness rather than in anxiety and stress.

#### **Enlightenment: Does the TM technique work with people who have learning challenges such as ADHD—Attention Deficit Hyperactivity Disorder?**

**Dr. Travis:** Yes, we found that the TM technique had a positive effect on children diagnosed with ADHD in a 2011 study published in *Mind & Brain, The Journal of Psychiatry*. Dr. Sarina Grosswald and Dr. William Stixrud were coauthors on this research. In this study, 18 children aged 10-14 years, who attended a special private school for learning disorders, were randomly assigned to either learn the TM technique immediately or to continue their normal academic activities and learn after three months.

Three months of TM practice significantly affected brain functioning and performance on a test of letter fluency. ADHD is marked by a pattern of brain waves in which there is high theta (4-8 Hz) EEG activity. The brain naturally generates theta activity to block out irrelevant information during any task, for instance, during memory tasks. Children with ADHD have higher levels of theta activity than normal, which has the effect of blocking out relevant as well as irrelevant activity. If you call their name, they do not respond because they don't hear it.

Also, children with ADHD have too little of a second frequency, called beta activity, which is involved in thinking and executive functioning. A child with ADHD has too much theta and too little beta. Their brain is blocking things out, and it's hard for them to focus. The ratio of theta to beta activity (dividing one by the other) is used to quantify the severity of ADHD symptoms.

At pretest, the theta/beta ratios of all of the students were three times above the normal range. Three months later, the theta/beta ratio of the TM group moved closer to the normal range. And after six months of practice, the TM group was at the upper end of normal brain functioning.

In just six months, the study found that the brain functioning of the meditating students diagnosed with ADHD had

In just six months, the brain functioning of the meditating students had moved from being solidly within clinical ADHD symptoms to just within normal brain functioning. What that means in practical terms is that they will be able to start self-regulating both physical and mental impulses. So, for example, they'll be able to remember to raise their hand before speaking.

We also looked at a second EEG measure, called coherence,

moved from being solidly within clinical ADHD symptoms to just within normal brain functioning.

which reflects how the different parts of the brain are working together. From the baseline to six-month posttest, we saw significant increases in coherence in all parts of the brain in four frequency bands: theta (focused inner attention), alpha (sense of self), beta (processing), and gamma (focused outer attention). Higher coherence in all frequencies implies that the parts of the brain involved in these different processes were coordinated together—the children could regulate their

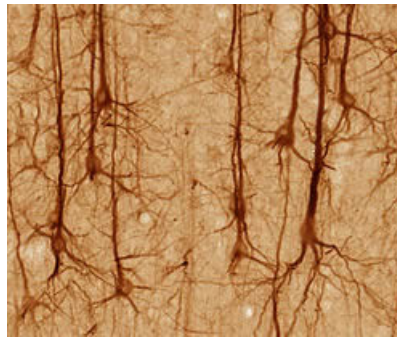
behavior. The brain is ceasing to function as isolated modules and is beginning to function more as a whole.

Greater integration of brain functioning was reflected in their cognitive functioning. The TM group also improved in letter fluency, which measures the ability of the frontal lobes to generate many new ideas.

**Enlightenment: Thank you for discussing the latest TM research on the brain. Is there anything else that we should know about how the brain functions to help us live a more successful, stress-free life?**

**Dr. Travis:** All of your readers should know that every experience changes the brain. Research shows that 70% of brain connections change every single day. This is called neuroplasticity.

On the cellular level, when two neurons fire together they get wired together. When two neurons fire, proteins in the cells support growth of more input and output fibers, the axons get larger in diameter, and the two cells become primed to fire again, which is called long-term potentiation.



**Our brain is constantly changing; 70% of synaptic connections change each day. The brain is a river, not a rock.**

If we add the experience of transcending to our daily routine, then brain connections that support the experience of pure consciousness are strengthened. This is the reality of growth to enlightenment. It happens every day with every session of the Transcendental Meditation technique.

It's a constant cortical dance. Our brain is a river and not a rock. Every time you experience something in your life, it creates a pattern of activation over the brain that gives us experience. At the same time, it's leaving its mark in the connections between neurons. Maharishi has said that what we put our attention on grows stronger in our life. This is happening on the material level of brain connections.

For instance, in violin players, because the left hand is responsible for playing the notes, the part of the brain that corresponds to the left hand is more complex than the part of the brain that corresponds to the right hand, which is holding the bow. Another study looked at expert taxicab drivers in London and found bigger brain structures underlying the thinking processes that generated routes, identified landmarks, and determined how to change a route when road construction blocked the highway.

If we are constantly under stress, then the part of the brain that triggers the fight-or-flight response grows thicker, and we find ourselves reacting to small stresses as if they are life-threatening.

But—and this is the take-home point—if we add the experience of transcending to our daily routine, then brain connections that support the experience of pure consciousness are strengthened. This is the reality of growth to enlightenment. It happens every day with every session of the Transcendental Meditation technique.