

Mindfulness and Stress Show Notes

I don't know a single teenager who doesn't experience some level of stress on a daily basis. Between school work, extracurriculars, future plans, and the emotional weight of adolescent life, our mental energies are often stretched beyond capacity. With so much to do and feel and not enough time, stress can set in like a dark cloud over our mental landscape, with no obvious reprieve.

If you listened to our episode about anxiety, you'll know that stress takes a toll on both the mind and the body. Cortisol, the stress hormone, activates muscles, suppresses the immune system, and even changes the way we metabolize our food. Stress also inhibits us from accessing old memories and using our prefrontal cortex, the rational, high-level thinking part of the brain. Without full thinking capacity in times of stress, we become less productive and intelligent, which can make us even more stressed. For many students, stress is a vicious cycle that causes breakdowns and physical illness.

In order to understand stress in the brain and how to solve it, I spoke with John Rettger, the Director of Mindfulness at Stanford University Medical School's Early Life Stress and Pediatric Anxiety Program. Dr. Rettger is a clinical psychologist as well as a yoga instructor, and he brings mindfulness techniques to students around the Bay Area to help them mitigate and deal with life stress. Dr. Rettger is extremely knowledgeable about the teenage brain and how to reduce stress through evidence-based brain techniques, and I'm excited to share our interview with you now.

Interview Highlights

What does stress look like in the brain? Can we see any structural or chemical changes in adolescents with high levels of stress?

- Check out this PBS Newshour on Dr. Rettger and his supervisor's work at Stanford.
- Children who have a history of trauma exposure have different sized hippocampus and amygdala compared to controls. These regions relate to memory and fight-or-flight response, respectively. The prefrontal cortex can also be affected, and may operate more offline in highly stressed people, while the fight-or-flight amygdala takes over.
- Recently, people at Stanford discovered that boys and girls respond differently to trauma on a neurobiological level. The link to that research is here:

<http://med.stanford.edu/news/all-news/2016/11/traumatic-stress-changes-brains-of-boys-girls-differently.html>.

How does stress affect teenagers specifically, from academic performance to mental health?

- The adolescent period of development includes many changes in the brain, especially in the limbic system (emotional and fear center) and the prefrontal cortex (rational, inhibitive, higher-level thinking center).
- Stress can impact the normal trajectory of brain development. The two major processes that could be affected are: 1) pruning, which is the decreasing of the number of connections in the brain to help the brain shed excess pathways and become more efficient; 2) myelination, which is the process of insulating different pathways in the brain to make our circuits more efficient and quick. Stress releases cortisol, which can bind to different areas of the brain and alter development, especially in regions like the hippocampus.
- The adolescent period reflects a special sensitivity to stress because so much development is taking place.
- A book called Brain Storm (not affiliated with this podcast) explains the three keystone behaviors of adolescence: impulsiveness, susceptibility to addiction, and hyperrationality, which means we do not weigh negative outcomes as much as potential positive outcomes. These topics are also discussed in our episodes, Welcome to Teenagehood, Like Everybody Else, and our Marijuana and Alcohol episodes, which you can find on the episodes page.

How does mindfulness impact the brain and human psychology?

- Sarah Lazar at Harvard ran an eight-week “Mindfulness-Based Stress Reduction” study at Harvard and found that mindfulness participants had structural changes in five different regions: the posterior cingulate (self-related processing and social cognition), the left hippocampus (learning, memory, and emotion regulation), the temporal parietal junction (interpersonal reasoning, empathy, compassion), the pons (neurotransmitter production site, helps to regulate emotions), and the amygdala (fight-or-flight response, fear, emotion). The amygdala actually reduced in size, indicating that stress and fear response decreased over the eight weeks.
- Different kinds of mindfulness training focus on how we relate to and empathize with others, explaining why regions of the brain related to interpersonal skills strengthened during the study.
- The participants in the study meditated for an average of 27 minutes per day, but anecdotal evidence suggests that even 10 minutes of mindfulness practice per day can lower stress and increase well-being.

How does your work with adolescents relate to anxiety around school and the future, and how do you help students use mindfulness to aid in these situations?

- Mindfulness is a way for teens to focus in on one's own experience in the present moment. Mindfulness also targets feelings of guilt and self-blame, much like cognitive behavioral therapy. Mindfulness also gives people an opportunity to let go of stress.
- Mindfulness and meditation require practice and commitment. These skills must be internalized for maximum results. Researchers and mindfulness practitioners are learning how to help people create "psychological space," a healthy distance from emotional responses that allows us to think through our emotions from a peaceful, distanced viewpoint. This can strengthen the prefrontal cortex and reduce activation in the amygdala, helping us to regulate emotions and encourage long-term planning and higher thinking.

What could someone like myself do after this conversation to bring mindfulness into my own life?

- The most basic practice of mindfulness is breath awareness. "Belly breathing," or the practice of slowly breathing into and out of the abdomen, can slow down the stress response and even activate the parasympathetic nervous system, which relaxes our muscles. It also gives us distances from our stress and a way to detach from the anxiety of everyday life. Slowing the rate of the exhale to twice the length of the inhale creates an especially relaxing response in the nervous system.
- Yoga is extremely positive for the breath, and also for keeping the body active in a strenuous but also gentle way. Even walking with focus on the five senses and nature can be a mindfulness practice. Being outside and connecting to nature naturally calms the brain and helps us to mitigate stress.
- Mindfulness is a natural state of being- it is simply the quiet presence underneath the stress and worry. Anyone can practice mindfulness, and it does not require intensive practice or any sort of religious doctrine.

Thank you for listening to Brainstorms. Please take a moment to rate Brainstorms on the iTunes store in order to help others find our podcast, which is a free resource for teenagers and parents around the world. Also check out the links provided by Dr. Rettger, and all of our content on the Extras pages. For more information about Brainstorms and outreach, also visit our About pages. Thank you and join us again next week!