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Undergraduate



BY ANNA CASTELLO

From claims that meditation can improve interpersonal relationships, enrich mental health, or turn practitioners into better people, it seems that there is nothing that a little sitting down in the quiet cannot fix. Before researching meditation for this article, I, like many others, was quite suspicious and frankly tired of having so-called ‘wellness gurus’ tell me how to live my life. But the research might suggest that these ‘wellness gurus’ might be on to something after all. Though sitting in a dark room with eyes closed for half an hour a day, or saying affirmations in the mirror is not for everyone, taking a brief moment to breathe and shift perspectives while driving, for example, is enough to reap wonderful benefits.

### MINDFULNESS MEDITATION

In the West, “meditation” often refers to the practice of mindfulness medita-

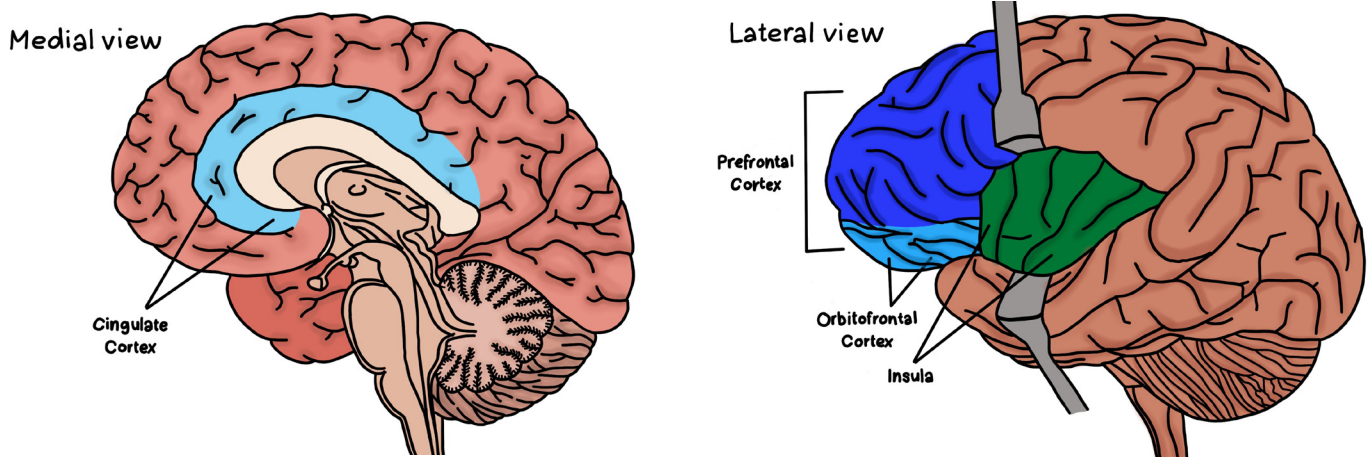
tion, where one permits thoughts to pass through oneself in the present moment without interpretation or judgment. This is often done by redirecting attention to one’s breathing when a thought hijacks our stillness or awareness. But can this redirection of attention really change someone’s life?

Since the early 2000s, studies have purported to show that meditation can change the structure of the brain. Unfortunately, many of these studies had flawed methodologies, as meditation and well-being can be two factors that are hard to test in controlled settings due to their innately subjective nature and lack of universal definitions.<sup>1</sup> In more recent years, however, more well-designed research on mindfulness meditation has come to light.

One meta-analysis found that the brains of regular meditators tend to be linked to being of larger size in parts of the insula and cingulate cortex, orbitofrontal cortex, and the prefrontal cortex, the re-

gions involved in emotional self-awareness, self regulation, and attention respectively (Figure 1).<sup>2</sup> A number of studies have highlighted the potential of meditation programs such as Mindfulness-Based Stress Reduction (MBSR), an eight-week long program developed at University of Massachusetts with the goal of reducing stress by teaching participants how to be present in one’s thoughts and body. MBSR has been linked to increases in the cortical thickness of the hippocampus, an area of the brain responsible for learning and memory retention, as well as a reported decrease in the volume of the amygdala: the brain region mediating fear, anxiety, and stress. This suggests that MBSR can help reduce stress in meditators.<sup>3,4</sup> These changes demonstrate that not only does meditation shape our brain, but it does so in a manner where we actually feel better.

Surprisingly, practitioners of MBSR seem to feel the effects of this eight-week



**Figure 1: Brain Anatomy.** Highlighted in blues and green are some areas of the brain that demonstrate an increase in size in regular meditators.

long course even years after the training. In a study designed to test the long-term effects of MBSR patients diagnosed with anxiety disorder, from a previous study where they underwent MBSR training, were analyzed again after three years. All 18 patients had maintained their improvements from the original study. Moreover, the majority of participants in the study continued regularly meditating even after the completion of the course.<sup>5</sup>

With a plethora of studies suggesting that mindfulness meditation can be beneficial for one's mental well-being, how does it compare to other tried and tested methods such as exercise and antidepressants? A study looking precisely to compare MBSR to aerobic exercise, an alternative stress reduction intervention, used functional magnetic resonance imaging (fMRI), a tool that looks at brain activity, to investigate changes in the brain in areas associated with emotional regulation. Participants with diagnosed generalized social anxiety disorder were divided in two groups and had fMRI taken before and after their experiences. The first group underwent the eight-week long MBSR training course and the second had to adhere to an eight-week long aerobic exercise training course. The study demonstrated that participants who underwent MBSR were better suited to emotionally regulate their negative self-beliefs compared to those who underwent the eight-week aerobic exercise training, indicating the MBSR is a viable option to help with generalized social anxiety disorder (Figure 2).<sup>6</sup> MBSR has also been compared

to antidepressants. A meta-analysis done at Johns Hopkins University found meditation to be as effective as antidepressants at reducing depression, anxiety, and pain.<sup>7</sup>

Because mindfulness meditation is rooted in focusing one's attention, it is no surprise that it has been found to help with concentration. Adhering to a two-week mindfulness meditation program has been shown to help improve cognitive function. One study looked at the effects of meditation on concentration, working memory capacity, occurrence of distracting thoughts, and reading comprehension scores during the GRE. On average, the participants experienced a 16 percentile increase in the verbal reasoning section of the GRE.<sup>8</sup> These results suggest that the effects of mindfulness meditation are tangible in an academic setting. Discoveries such as this have caused an increase in mindfulness meditation programs targeted towards schools with the goals of helping students concentrate and improve academically. A 2018 study looked at 16 classrooms from districts with two different socio-economic backgrounds exposed to daily audio-guided mindfulness training. The study found that those who participated in the training reported an increase in math, social studies, and overall GPA scores. The researchers did highlight, however, that there was a lot of pre-existing variation between the schools leading to a decrease in statistical significance of these results.<sup>9</sup> This study does still greatly contribute to the conversation of implementing meditation programs across schools,

something that especially over Zoom has started to occur more widely.

### COMPASSION MEDITATION

Mindfulness meditation seems to be linked to an abundance of benefits, but when it comes to altruism, compassion meditation is a fierce competitor.<sup>10</sup>

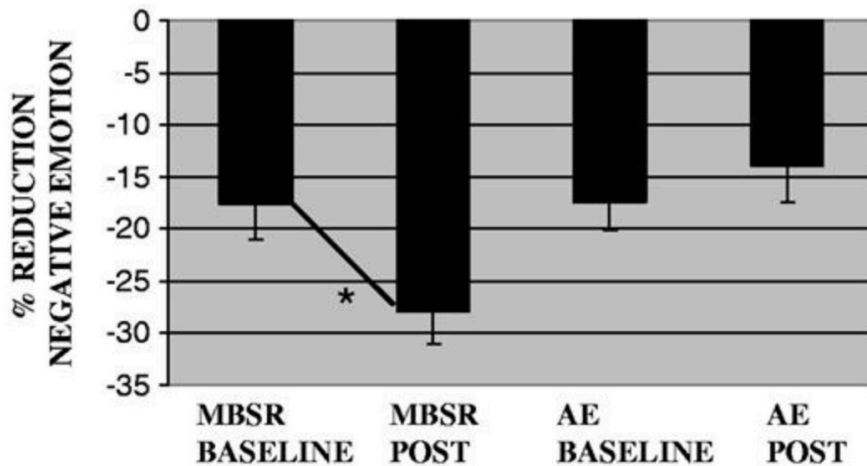
Compassion meditation cultivates compassion by encouraging practitioners to repeat mantras, think purposeful thoughts, and wishing everyone to be free from suffering. What exactly is compassion, however, and why is it something we want to actively foster?

“This study does still greatly contribute to the conversation of implementing meditation programs across schools, something that especially over Zoom has started to occur more widely.”

Compassion is when one is sensitive to the emotional suffering of others, whilst empathy is when one feels the malaise of others. It is important to curate compassion over empathy in our daily lives as it helps people connect without causing personal suffering or burnout. When looking at a systematic review on the effects of meditation on empathy, compassion, and prosocial behavior (characterized by behavior through which people benefit others), 74% of the studies in this meta-analysis found significant self-reported improvements.<sup>11</sup> A particular study conducted in Leipzig, Germany used fMRI to examine blood flow before and after eight-hour compassion trainings to see which areas of the brain were more active. The participants were divided into two groups, one exposed to compassion meditation training, involving a six hour class on extending kindness to oneself and others followed by three 45-minute sessions, and the other not. They were then shown videos of people suffering and were asked to empathize with them. The fMRI showed that people without the training had an active insula, a region of the brain related to personal pain. Those with the training, however, had regions of the brain related to love, like that of a parent for a child, light up, indicating that just eight hours of compassion meditation training has drastic effects on one's outlook and can help alleviate personal pain in stressful situations. This suggests that compassion meditation can be a useful tool in preventing burnout and allowing for better social responses.<sup>12</sup> Another fMRI study looked at highly experienced practitioners of compassion meditation and found that this practice triggers the brain's motor centers which then allow the body to physically move. This study demonstrates that compassion meditation incentivises practitioners to help people in need even while they are still in the brain scanner.<sup>13</sup>

#### WHAT NOW? DO WE ALL START MEDITATING?

Though there seems to be a lot of promise regarding both mindfulness and compassion meditation, there is still a lot more research that is needed to definitively show how they affect the brain and their



**Figure 2:** This bar graph indicates the % reduction of negative thoughts after completion of an eight week Mindfulness-Based Stress Reduction course compared to an eight week long aerobic exercise regimen. The star indicates a statistical significant difference from baseline levels of control of negative emotions when compared to after treatment. This graph demonstrates that individuals who practice MBSR are better suited to regulate negative emotions than those who implement an aerobic exercise routine.

“This suggests that compassion meditation can be a useful tool in preventing burnout and allowing for better social responses.”

efficacy in daily life. In fact, a recent 2022 study from Brown University highlights that meditation-related adverse effects are not rare.<sup>14</sup> This study highlights the importance of looking into how individual people can be affected by long-term meditation, indicating that this practice may not be for everyone. Many promises are made by hopeful practitioners that meditation can fix everything, and though it is linked to many wonderful improvements, it is important to listen to one's body and mind first.

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#### IMAGE REFERENCES

1. Banner Image: By Author
2. Figure 1: By Author.
3. Figure 2: Goldin, P., Ziv, M., Jazaieri, H., Hahn, K., & Gross, J. J. (2013). MBSR vs aerobic exercise in social anxiety: fMRI of emotion regulation of negative self-beliefs. *Social Cognitive and Affective Neuroscience*, 8(1), 65–72. <https://doi.org/10.1093/scan/nss054>