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Psychoeducation Series
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The Benefits of Meditation – A Neuroscience Perspective



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This handout is relatively comprehensive (12 sections within 20 pages).

It has been written to provide relevant scientific evidence that supports the many benefits of meditation.

But don't stress out! You don't have to read it all.

You can go directly to the section(s) that are of most interest to you.

Sebastian Salicru
Registered Psychologist
Board-Approved Supervisor
PTS Psychology Canberra

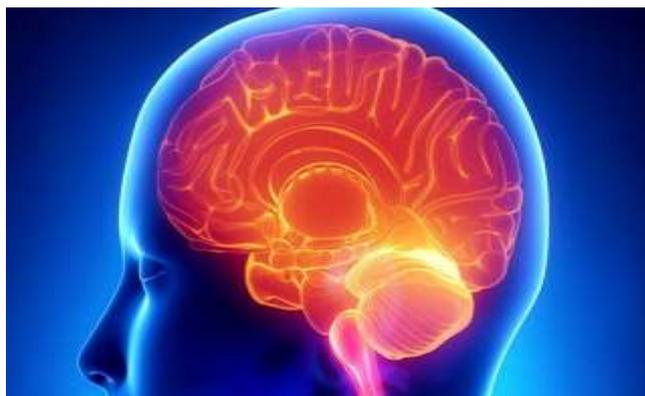
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1. What is Meditation?



Meditation

The word 'meditation' derives from Latin 'meditari', which means "to engage in contemplation or reflection". Meditation can be defined as both a process and a state.

Meditation is a practice where by using a technique (e.g. mindfulness, or focusing the mind on a particular object, thought or activity) you train your attention and awareness to achieve a mentally clear and emotionally calm stable state.

Meditation is the act of inward contemplation and the intermediate state between mere attention to an object/concept and complete fusion within it.

Aim

Meditation aims to slow down your mind by noticing what's in your mind and sensing your body. That is, training your mind to become aware of your wandering mind, automatic responses, and bodily sensations.

Benefits

The practice of meditation leads to a state of awareness, equanimity, equilibrium, balance, calmness, serenity, peacefulness, composure, poise, security, and strength.

Research links meditation to significant improvements of physical, emotional and mental/psychological health, including cognitive abilities.

Experience

During meditation, you will experience a state of restful alertness that is extremely refreshing for the body and mind.

Research on Meditation

Meditation and its effect on brain activity and the central nervous system has become a major focus of collaborative research in neuroscience, psychology and neurobiology during the latter half of the 20th century.

Summary of Science-Based Benefits of Meditation

- Less Stress and Anxiety.
- Improved Sleep (Less Insomnia).
- Longer Attention Spans.
- Better Pain Management.
- Greater Self-awareness.
- Less Depression and Improved Emotional Health.
- Better Memory.
- Decreased Blood Pressure.
- Assistance in Overcoming Addictions.
- More Kindness and Positive Emotions.

❖ *In the following pages, I provide more details about these benefits along with specific references to research evidence.*

Unfortunately, there are various myths attached to meditation. So, let me dispel them to begin with.

2. Myths and Facts About Meditation

Myths About Meditation	Facts About Meditation
<p>1. Meditation is not for me because I can't seem to quiet my mind</p> <p>The idea that you have to quiet your mind to have effective meditation practice, or that you're not supposed to have any thoughts while you meditate, is completely false.</p>	<p>1. Meditation is simply about noticing your thoughts.</p> <p>Meditation is not about stopping your thoughts or trying to empty our mind. Both of these approaches only create stress and more noisy internal chatter. The nature of the mind to move from one thought to another is in fact the very basis of meditation.</p>
<p>2. It takes years of practice to benefit from meditation.</p> <p>You don't need months or years to benefit from or perfect your meditation. The very notion of perfection is counterproductive.</p>	<p>2. The benefits of meditation are both immediate and long-term.</p> <p>You can begin to experience benefits the first time you meditate and in the first few days of daily practice.</p>
<p>3. I don't have time to meditate.</p> <p>I'm busy, busy, busy. So busy. You've no idea of how shockingly busy I am!</p> 	<p>3. If you make meditation a priority, you will do it.</p> <p>We all are busy. Meditating in the morning will focus you and make your day go slower. You can actually get more things done and feel more productive after meditation.</p> <p>Because meditation sharpens your focus and lowers stress, you actually can fit more in if you take the time to practice it.</p> <p>In life's paradoxical way, if you spend time meditating on a regular basis, you will actually have more time. You will notice that you're able to accomplish more while doing less.</p>
<p>4. Meditation is a religious practice.</p> <p>Meditation and religion are two very different concepts. Religion is an organised system of beliefs, ceremonies, and rules used to worship a god or a group of gods.</p> <p>Meditation is not about praying either.</p>	<p>4. Meditation is a practice that takes you beyond the noisy chatter of the mind into a place of stillness and silence.</p> <p>While most meditation practices are rooted in Buddhism and Hinduism, the practice of meditation doesn't require any specific spiritual belief. You can be an atheist, agnostic, spiritual or religious person and practice meditation without any conflict.</p>
<p>5. Meditation will solve of my problems.</p> <p>Some people expect that meditation will solve all their problems, or that they will experience visions, see colors, levitate, hear a choir of angels and trumpets, or a glimpse of enlightenment when they meditate.</p> <p>Yes, right!</p>	<p>5. The real benefits of meditation are what happens in the other hours of the day when you are going about your daily life.</p> <p>After a meditation session, you will take some of the stillness and silence of your practice with you. This will allow you to be more peaceful, calm, serene, centered, creative, compassionate, tolerant, and loving to yourself and others.</p>

3. Meditation and Neurotransmitters in the Brain



What are Neurotransmitters?

Neurotransmitters are chemical messengers in the body. Their job is to coordinate the transmission of signals from one nerve cell to the next. These target cells may be in muscles, glands, or other nerves.

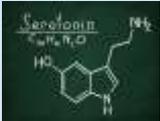
Neurotransmitters regulate a wide variety of brain processes including:

- Mood and emotions (e.g. fear, pleasure, joy, anger);
- Memory; attention; concentration; alertness; energy; appetite; cravings; sleep; and
- Perception of pain.

Neurotransmitters play a key role in **modulating and regulating behavior and anxiety. Meditation releases neurotransmitters that modulate anxiety.**

Meditation naturally boosts the following five neurotransmitters.

Five Key Neurotransmitters Released by the Brain During Meditation

Neurotransmitter	Effects on the brain
1. Serotonin 	<p>Serotonin is also known by scientists as <u>the “happy” neurotransmitter</u>. It is key to helping relay signals from one part of the brain to another.</p> <p>Serotonin is an inhibitory neurotransmitter, and has a profound impact on our mood, appetite, blood clotting, sleep, and the body’s circadian rhythm, contributing greatly to our overall state of well-being.</p> <p><u>When we don’t have enough Serotonin, we feel depressed and when we have enough, we have a sense of wellbeing.</u> A number of studies show that meditation such as mindfulness increases serotonin.</p>
2. Endorphins	<p>Endorphins are <u>the “feel good” neurotransmitter</u>. They <u>inhibit pain signals and create an energised, euphoric feeling</u>. They are also <u>the body’s natural pain relievers</u>.</p> <p>Perhaps the most widely known, endorphins are most associated with exercise. <u>Runner’s “high”</u> is a common effect and similar descriptions have been given to many other activities in the exercise category.</p> <p>Research also indicates that <u>laughter releases endorphins</u>.</p> <p>Meditation studies have shown increases in endorphins after meditation are at higher levels than exercise.</p>
3. GABA (Gamma Aminobutyric Acid)	<p><u>GABA is a mood regulator</u>, and a major inhibitor of the central nervous system. It is <u>associated with feelings of calm. Not having enough of this chemical can create problems including anxiety, nervousness, racing thoughts, and sleeplessness</u>. In 2010, Psychiatrists at the Boston University School of Medicine found a 27% increase in GABA levels after only 60 minutes of meditation.</p>
4. DHEA	<p>Although DHEA is technically a hormone, it acts directly on neurotransmitter systems to regulate synaptic transmission. When in a balanced state, the presence of DHEA facilitates what we call the “longevity molecule”. Meditation stimulates the correct amount of DHEA which in turn puts us in a position to take advantage of the “DHEA effect”.</p>
5. Cortisol	<p>Cortisol is a crossover between a hormone and a neurotransmitter. It is considered to be related to stress and whether it is acting as a hormone or a neurotransmitter. <u>If you have too much, you will experience high levels of stress. Meditation helps to reduce cortisol levels.</u></p>

4. How Meditation Changes the Brain: Neuroplasticity

Neuroscience research has proven that meditation can make real, lasting changes in your brain in key regions for attention, cognition, memory, fear and learning.

Seven Ways Meditation Can Make Real Changes in Your Brain

Brain Region

Type of Change in the Brain



Meditation Can Thicken Your Prefrontal Cortex

Our prefrontal cortex (PFC) is our attentional control centre. It helps us plan and organise. It is the part of the brain that most separates us from other animals. As you age, your prefrontal cortex becomes thinner. **Meditation, however, can maintain the thickness of your prefrontal cortex through aging.** According to a study by Dr. Sarah Lazar, at Harvard, long-term meditators in the 40s and 50s had the prefrontal cortex thickness of 20-30-year olds.

Reference: Lazara, et al. (2005). Meditation experience is associated with increased cortical thickness. *Neuroreport*, 16(17), 1893-1897. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1361002/>



Mediation Can Increase the Density of Your Grey Matter

Grey (or gray) matter is a major component of the central nervous system. It is the mass of our cells and dendrites that make up most of our brain and fine interconnections. Einstein, for example, is said to have had more grey matter than the average person. **Dr Lazar demonstrated that just an 8-week course in meditation increased grey matter density.**

Reference: Hölzel, B. K., Carmody, J., Vangel, M., Congleton, C., Yerramsetti, S. M., Gard, T., & Lazar, S. W. (2010). Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry Research*, 191(1), 36-43. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4529365/>



Meditation Can Increase the Density of Your Hippocampus

Our hippocampus is the area of our brain responsible for many types of memory. Meditators – some with only weeks of meditation – had more grey matter volume in their hippocampal areas compared to non-meditators. **More grey matter means more connections which can mean greater learning and memory abilities.**

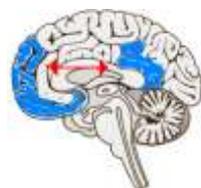
Reference: Luders, E., Kurth, F., Toga, A. W., Narr, K. L., & Gaser, C. (2013). Meditation effects within the hippocampal complex revealed by voxel-based morphometry and cytoarchitectonic probabilistic mapping. *Frontiers in Psychology*, 4, 398. <https://doi.org/10.3389/fpsyg.2013.00398>



Meditation Can Decrease the Activity of the Amygdala – your ‘Fight or Flight’ response

Most parts of our brain thicken and increase their connectivity with meditation. **Your amygdala, which is responsible for your ‘fight or flight’ response, shrinks. Therefore, it can fire less often as you increase your meditation practice,** and with long term meditators it can even decrease its size. This explains why meditators can be cool in stressful situations.

Reference: Hölzel, B. K., Carmody, J., Evans, K. C., Hoge, E. A., Dusek, J. A., Morgan, L., Pitman, R. K., ... Lazar, S. W. (2009). Stress reduction correlates with structural changes in the amygdala. *Social Cognitive and Affective Neuroscience*, 5(1), 11-7. <https://doi.org/10.1093/scan/nsp034>



Meditation Can Quiet Your Default Mode Network (DMN)

Another region that decreases its activity is your default mode network (DMN). **Default mode network is the network that links your ‘Prefrontal Cortex’ and your ‘Posterior Cingulate Cortex’.** **It’s responsible for that endless chatter that goes on in your brain when you are at rest.** According to a Harvard study, 46.9% of our thoughts are about the past or the future, as opposed to the present moment. According to that study, this makes us unhappy. Meditation down-regulates the activity of the DNM, quieting the chatter and giving us the mental space for insight and to focus on what we want.

Reference to Harvard Study: Killingsworth, M. A., & Gilbert, D. T. (2010). A wandering mind is an unhappy mind. *Science*, 330(6006), 932-932. <http://pascal-francis.inist.fr/vibad/index.php?action=getRecordDetail&idt=23452164>

References to DFM: Garrison, K. A., Zeffiro, T. A., Scheinost, D., Constable, R. T., & Brewer, J. A. (2015). Meditation leads to reduced default mode network activity beyond an active task. *Cognitive, Affective & Behavioral Neuroscience*, 15(3), 712-720. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4529365/>



Meditation Can Increase Your Compassion and Perspective Taking

In a study of meditators engaging in a compassion-based meditation (in which participants wish for good things for others in the world), scientists saw actual changes in the brain in areas related to compassion. For example, they saw an increase in activity in the temporo-parietal junction, the area of the brain involved in compassion, empathy and perspective taking.

Reference: Lutz, A., Brefczynski-Lewis, J., Johnstone, T., & Davidson, R. J. (2008). Regulation of the neural circuitry of emotion by compassion meditation: effects of meditative expertise. *PLoS one*, 3(3). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2267490/>



Meditation Has Been Shown to Reduce Overall Brain Aging

According to the work of Dr. Eileen Luders at UCLA who undertook an extensive study looking at MRI of meditators and non-meditators, the brain of a long-term meditator at 50 years old looked on average 7.5 years younger, compared to non-meditators. This is across a number of different regions. And even better, the definition of a long-term meditator was someone who had practised an average of only 5 years.

Reference: Luders E., Kurth F., Mayer E.A., Toga A.W., Narr K.L., Gaser C. (2012). The unique brain anatomy of meditation practitioners: Alterations in cortical gyrification. *Frontiers Human Neuroscience* 29(6), 34. <https://pubmed.ncbi.nlm.nih.gov/22393318/>

Meditation and Neuroplasticity

Neuroplasticity, also known as ‘**brain plasticity**’, refers to changes in neural pathways and synapses which are due to changes in behavior, environment and neural processes.

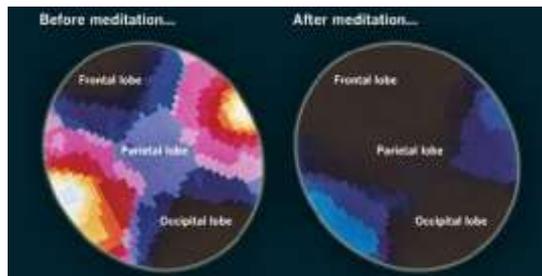
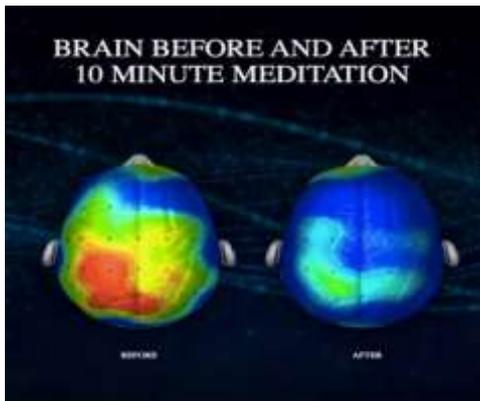
Neuroplasticity has replaced the formerly-held view that the brain is a physiologically static organ, and explores how – and in which ways – **the brain changes throughout life.**

Neuroplasticity occurs on a variety of levels, ranging from cellular changes due to learning, to large-scale changes involved in cortical remapping in response to injury. The role of neuroplasticity is widely recognised in healthy development, learning, memory, and recovery from brain damage.



When it comes to your brain, you actually can teach an old dog new tricks. Once thought to be hard-wired after early childhood, the brain actually has a remarkable ability to change and heal itself. Known as neuroplasticity, this remodelling due to our environment, behavior, and feelings happens throughout our whole lives.

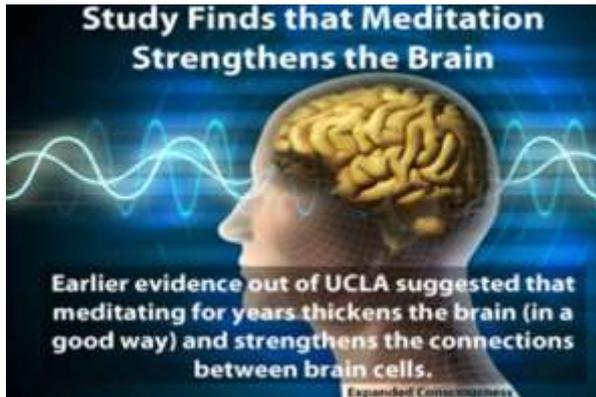
How Meditation Shapes Your Brain – For the better!



In summary, meditation can make real significant positive changes in your brain. Meditation profoundly impacts the functions of the brain in addition to exhibiting other biological effects. Meditation is a source of positive affect (expression of cheerfulness, enthusiasm, energy, and joy). Meditation can be extremely beneficial (life-changing) for you, but only if you actually sit down and do it!



5. Meditation and Brain Waves



What are brain waves

At the root of all our thoughts, emotions and behaviours is the communication between neurons within our brains. Brainwaves are produced by synchronised electrical pulses from masses of neurons communicating with each other.

Brain waves are measured by frequency, which is cycles per second or hertz (Hz), and they range from very slow to very fast. Humans display five different types of electrical patterns or 'brain waves' across the cortex that correspond to different brain activities.

Brain waves can be observed with an EEG (or electroencephalograph) – an instrument that allows researchers to note brain wave patterns. Each brain wave has a purpose and helps serve us in optimal mental functioning.

Meditation enables you to move from higher frequency brain waves to lower frequency, which activates different centres in the brain. Slower wavelengths (more time between thoughts) enable greater opportunity to skillfully choose which thoughts you invest in and what actions you take. When slower brainwaves are dominant, we can feel tired, slow, sluggish, or dreamy. The higher frequencies are dominant when we feel wired or hyper-alert.

Five Types of Brain Waves or States:

1. **Gamma State** (between 40–100Hz). This is the state of hyperactivity and active learning. Gamma state is the most opportune time to retain information. This is why educators often have audiences jumping up and down or dancing around – to increase the likelihood of permanent assimilation of information. Over stimulated, however, can lead to anxiety.
2. **Beta State** (between 12–40Hz). This is where we function for most of the day. Beta State is associated with the alert mind state of the prefrontal cortex. This is a state of the 'working' or 'thinking mind' (analytical, planning, assessing, and categorising).
3. **Alpha State** (between 8–12Hz). This is when brain waves start to slow down out of thinking mind. **We feel more relaxed, calm, peaceful and grounded.** We often find ourselves in an Alpha State after a yoga class, a walk in the woods, a pleasurable sexual experience, or during any activity that helps relax the body and mind. **We are lucid, reflective, alert, and with mind/body integration. The hemispheres of the brain are more balanced (neural integration).**
4. **Theta State** (between 4–8Hz). When you are extremely relaxed, your brain produces theta waves. **Then you are able to begin meditation.** At this the point, where the verbal/thinking mind transitions to the meditative/visual mind. **We begin to move from the planning mind to a deeper state of awareness, with stronger intuition, more capacity for wholeness and complicated problem solving.** The Theta state is associated with visualisation.
5. **Delta State** (between 0–3Hz). These are the slowest recorded brain waves in human. They are found most often in infants as well as young children. Tibetan monks who have been meditating for decades can reach this in an alert, wakened phase, but most people reach this final state during deep, dreamless sleep.

Beta waves (14-30 Hz)

- * Linear, externally directed left-brain thinking
- * Associated with stress, anxiety and fear.
- * Unsynchronized waves
- * Useful for short term memory and routine jobs.



Alpha waves (8-13.9 Hz)

- * Relaxed focus and good health
- * Mental coordination
- * Long-term memory
- * Creativity and visualization.
- * Associated with light meditation.



Theta waves (4-7.9 Hz)

- * Reduced consciousness
- * Deep meditation, intuition
- * Vital for learning & memory
- * High creativity, flashes of insight and inspirations.
- * Spontaneous healing.



Delta waves (1-3.9 Hz)

- * Deep sleep, unconsciousness
- * Growth hormone released
- * Loss of body awareness.
- * Deep physical relaxation.
- * Access to collective unconscious mind.



Genius Brain waves

Gamma waves (40 to 200/sec)

- * Genius brain waves
- * Higher level of consciousness.
- * Experienced by monks & visionaries.
- * Mystical experiences and out of body experiences.
- * Hyper concentration & focus
- * Crucial for *Self awareness & insight.



Epsilon waves (below 0.5 Hz)

- * Experienced in very deep and advanced states of meditation
- * Ecstatic states of consciousness
- * High-level inspiration and creation.
- * Spiritual insight and out-of-body and mystical experiences.



6. Meditation, Neuroscience, Psychology, and Neurobiology

Meditation and its effect on brain activity and the central nervous system became a focus of collaborative research in neuroscience, psychology and neurobiology during the latter half of the 20th century.

Research on meditation reveals that its effects on the brain can be divided into two main categories:

1. State changes and trait changes, respectively alterations in brain activities during the act of meditating; and
2. Changes that are the outcome of long-term practice.

Matthieu Ricard, a French Buddhist monk who used to be a biochemist, says meditation fundamentally rewires the brain towards joy. Research suggests he's right.



- Brain scans and EEGs reveal that Buddhist monk M. Ricard has largest capacity for happiness ever recorded.
- Meditation “completely changes your brain and therefore changes what you are”, says M. Ricard.
- He says you can do this by learning how to let your thoughts drift.

M. Ricard may seem like an unusual person to hold the title – but is the world's happiest man, according to researchers.

The 66-year-old turned his back on Parisian intellectual life 40 years ago and moved to India to study Buddhism. He is now a close confidante of the Dalai Lama and respected western scholar. He believes meditation can alter the brain and improve people's happiness in the same way that lifting weights puts on muscle.

Listen to this story on this BBC World Service podcast released on 18 February 2020 – Available for over a year.

How meditation changes your brain

<https://www.bbc.co.uk/sounds/play/w3csyx39>

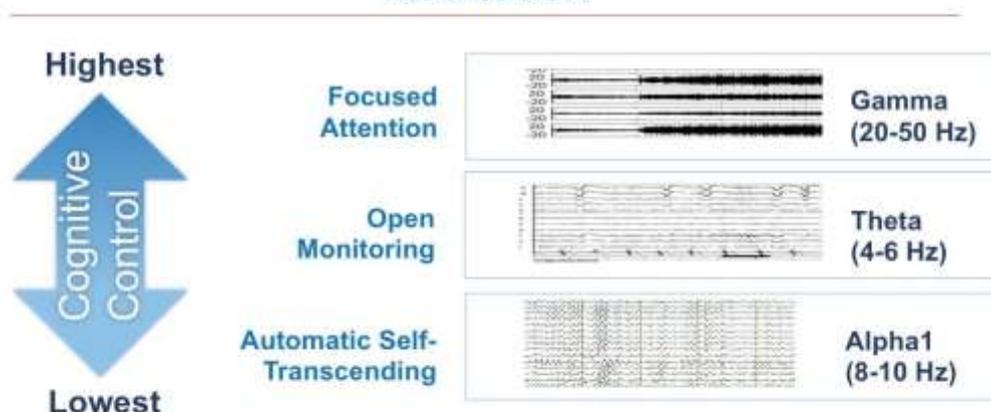
7. Styles of Meditation

There are **three major styles or types of meditation.**

The first two are types of Mindfulness Meditation (MM) – a form of attentional control training by which individuals develop the ability to direct and maintain attention towards the present moment. MM can not only reduce mind-wandering during practise, but it can also influence mental performance after practise, and improve well-being in everyday life. Hence, it has developed as a clinical intervention.

1. **Focused Attention – or Concentrative – Meditation (FAM)** focuses on clearing your mind of thought by concentrating attention on a single object, thought, sound or visualisation. It emphasises ridding your mind of attention and distraction. This meditation entails paying attention to the breath, bodily sensations, an idea or feeling, or a mantra (image or calming sound). Zazen and Vipassana meditations are example of this style of meditation.
2. **Open Monitoring Meditation (OMM)** entails disengaging emotionally by just observing, being present, and mindful. That is, broadening awareness of all aspects of your environment, train of thought, and sense of self. It may include becoming aware of thoughts, feelings or impulses that you might normally try to suppress.
3. **Automatic Self-Transcending (AST)** involves neither concentration nor training the mind. Includes a technique designed to transcend their own activity. This contrasts with **focused attention**, which keeps attention focused on an object; and **open monitoring**, which keeps attention involved in the monitoring process. Automatic self-transcending allows the active thinking mind to experience quieter and quieter levels of thought, and then transcend thought and experience the self – our own unbounded nature. This is Transcendental Meditation (TM).

EEG Distinctions Between Three Types of Meditation



Travis, F. T., & Shear, J. (2010). Focused attention, open monitoring and automatic self-transcending: Categories to organize meditations from Vedic, Buddhist and Chinese traditions. *Consciousness and Cognition*, 19(4), 1110-1118.

- ❖ **Mindfulness Meditation (MM)** consists of focused attention meditation (FAM) and open monitoring meditation (OMM). They both reduce activation of the default mode network (DMN) and mind-wandering. Both FAM and OMM aim to keep your attention away from distractors, such as particular bodily sensations, feelings, and thoughts, which evoke mind-wandering. Compared with FAM, it is more difficult to disengage attention from these distractors during OMM because meditators do not have a target object.

Fujino, M., Ueda, Y., Mizuhara, H., Saiki, J., & Nomura, M. (2018). Open monitoring meditation reduces the involvement of brain regions related to memory function. *Scientific Reports*, 8(1), 1-10. <https://www.nature.com/articles/s41598-018-28274-4>

8. Transcendental Meditation (TM)

Meta-analyses (statistical analysis of multiple research studies) have found that TM is more effective than other meditation or relaxation techniques in producing a range of results, such as:

➤ Reducing Anxiety

Eppley, K. R., Abrams, A. I., & Shear, J. (1989). Differential effects of relaxation techniques on trait anxiety: A meta-analysis. *Journal of Clinical Psychology*, 45(6), 957-997. [https://doi.org/10.1002/1097-4679\(198911\)45:6<957::AID-JCLP2270450622>3.0.CO;2-Q](https://doi.org/10.1002/1097-4679(198911)45:6<957::AID-JCLP2270450622>3.0.CO;2-Q)

➤ Increasing Self-actualisation

Alexander, C. N., Rainforth, M. V., & Gelderloos, P. (1991). Transcendental meditation, self-actualization, and psychological health: A conceptual overview and statistical meta-analysis. *Journal of Social Behavior and Personality*, 6(5), 189–248. <https://psycnet.apa.org/record/1991-24184-001>

➤ Decreasing Blood Pressure

Rainforth, M. V., Schneider, R. H., Nidich, S. I., Gaylord-King, C., Salerno, J. W., & Anderson, J. W. (2007). Stress reduction programs in patients with elevated blood pressure: A systematic review and meta-analysis. *Current Hypertension Reports*, 9(6), 520-528. <https://europepmc.org/article/PMC/2268875>

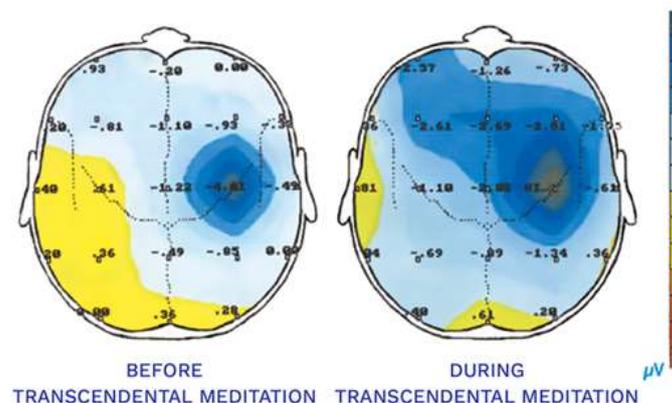
➤ Reducing Addiction

Alexander, C. N., Robinson, P., & Rainforth, M. (1994). Treating and preventing alcohol, nicotine, and drug abuse through Transcendental Meditation: A review and statistical meta-analysis. *Alcoholism Treatment Quarterly*, 11(1-2), 13-87. https://doi.org/10.1300/J020v11n01_02

Transcendental Meditation (TM) refers to a specific form of silent, mantra meditation and less commonly to the organizations that constitute the Transcendental Meditation movement.^{[1][2]} Maharishi Mahesh Yogi created and introduced the TM technique and TM movement in India in the mid-1950s (Wikipedia).



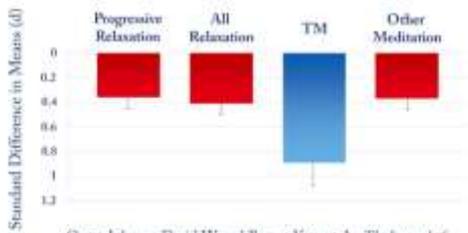
Increased Use of Hidden Brain Reserves



Transcendence is the experience of the united source of all there is. It is a non-local experience, a bit like an individual wave melting into its source, the infinite ocean (e.g. in touch with our higher self).

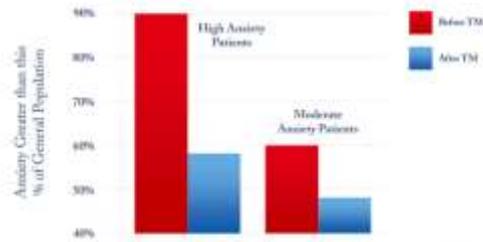
In modern times, the effect of this experience on our brains can be measured through a variety of brain-imaging systems. This experience affects a much larger part of our brain, including the so-called “hidden reserves” (Human Physiology, 25: 171–180, 1999).

Decreased Anxiety



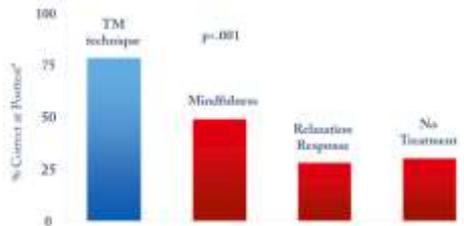
Orme-Johnson David W. and Barnes Vernon A., *The Journal of Alternative and Complementary Medicine*, May 2014, 20(5): 330-341. doi:10.1089/acm.2013.0204.

Meta-Analysis of Anxiety Studies



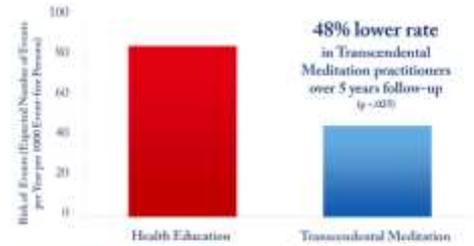
Orme-Johnson D, Barnes V. (2012). Effects of the Transcendental Meditation Technique on Trait Anxiety: a meta-analysis of randomized controlled trials. *Journal of Alternative and Complementary Medicine*. doi:10.1089/acm.2013.0204

Improved Cognitive Flexibility



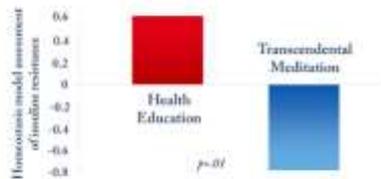
Alexander, C.N., E.J., Newman, R.L., Chandler, H.M., and Davies, J.L. (1999). Transcendental Meditation, mindfulness, and longevity: an exploratory study with the elderly. *Journal of Personality and Social Psychology*, 77(6):950-964.

Reduced Rates of Heart Attack, Stroke, and Death



Schneider RH, Guise CE, Rajivoli MA, Kotchen TA, et al. Stress reduction in the secondary prevention of cardiovascular disease: Randomized controlled trial of Transcendental Meditation and health education in heart patients. *Circulation, Cardiovascular Quality and Outcomes*, 5(6):250-9, 2012.

Decreased Insulin Resistance



This randomized controlled clinical trial among individuals with stable coronary heart disease found that 16 weeks of practice of the Transcendental Meditation Program, in contrast to participation in a health education program, led to a significant reduction in insulin resistance based on a ratio of glucose to insulin. *Reference: Archives of Internal Medicine* 166: 1219-1224, 2006.

Decreased Cortisol The Stress Hormone



Plasma cortisol is a stress hormone. The study shows that plasma cortisol decreased during Transcendental Meditation, whereas it did not change significantly in control subjects during ordinary relaxation. *International Society for Transpersonal Psychology and Behavioral Health* 10(1): 54-60, 1975.

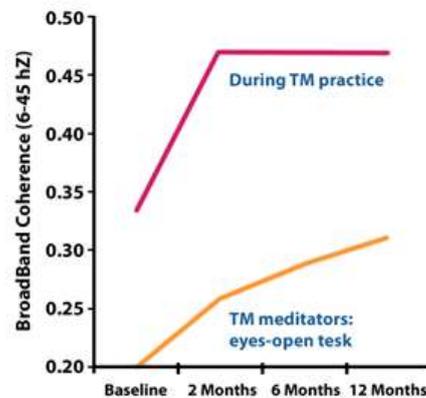
Reduced Symptoms of PTSD



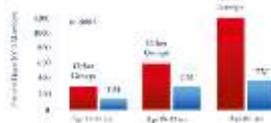
Bronk, 1991. *Journal of Counseling and Development* 69: 212-15. Rosenfeld, 2011. *Medical Medicine* 15, no. 4: 456. Ross, 2014. *Journal of Transpersonal Psychology* 46, no. 1: 112-21. Ross, 2015. *Journal of Transpersonal Psychology* 47, no. 1: 14-21. Shapiro, 2011. *American Psychologist* 66: 469-476. Shapiro, 2012. *Journal of Clinical Psychology* 68, no. 1: 22-35. King, 2013. *Alzheimer and Dementia* 9, no. 7: 849-85. Orme-Johnson, 2014. *Meta-analysis of meditation and PTSD outcomes*.

Frontal Brain Coherence

THROUGH THE TRANSCENDENTAL MEDITATION PROGRAM



Reduced Hospitalization Rates



Schneider et al. (2012). The Transcendental Meditation technique. *International Journal of Transpersonal Psychology* 10(1): 47-70.



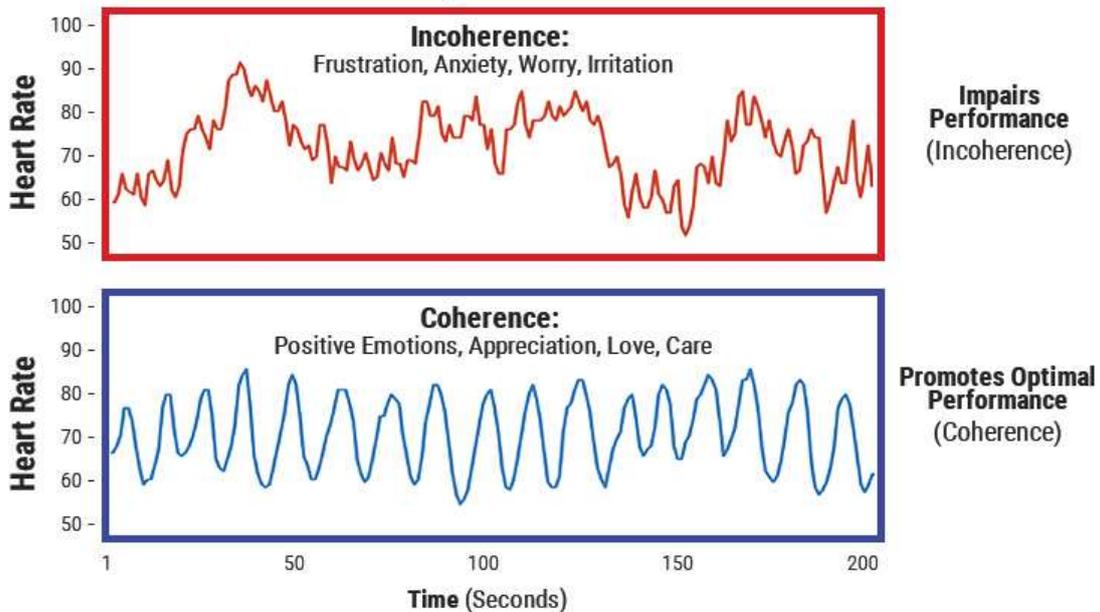
9. Brain Coherence



Brain coherence is a measure of how effectively two sites are able to link and unlink. This connectivity describes the networks of functional and anatomical connections across the brain. Coherence is a mathematical method that can be used to determine if two or more sensors, or brain regions, have similar neuronal oscillatory activity with each other.

Brain and Heart Coherence is Essential in Managing Stress, Anxiety, and Sustainable Behaviour Change

Heart-Rhythm Patterns



The heart sends more information to the brain than the other way around.

Coherence happens when the heart, mind, and emotions are aligned and work together harmoniously.

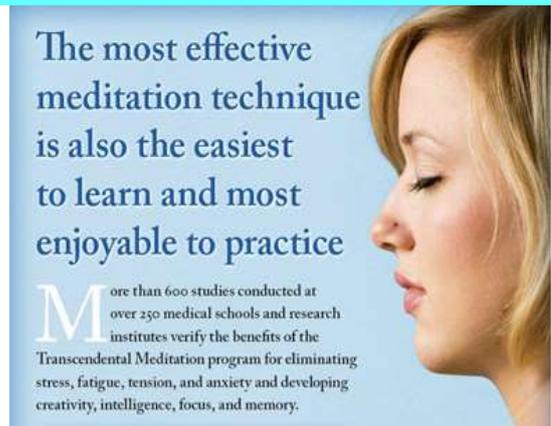
One of the most effective ways to reduce stress and anxiety is to change the rhythm of the heart, because it sends a different neural message to the brain.

So, by shifting the rhythm of your heart, you can quickly improve your brain functioning, and reduce your stress and anxiety.

HeartMath Institute Science – Scientific Foundation of the HeartMath System
<https://www.heartmath.org/science/>
Connecting with the Heart's Intelligence: Rollin McCraty
<https://www.youtube.com/watch?v=KurPSsFNZK0>

During normal activities, brain coherence is quite low (between 30% and 40%). However, through transcending, the mind experiences a state of unity and this has an immediate, measurable impact on the brain. The brain starts working more as a unified whole. The video below shows this process taking place in real-time.

Upgrade Your Executive Brain: EEG Nexus Demo of Transcendental Meditation Practice 2min
 (This short video illustrates the rapid and sustained high levels of alpha brainwaves during onset of TM practice (eeg signal and coherence of the prefrontal cortex, F3-F4).
<https://www.youtube.com/watch?v=XNkir2vzq3o>



10. How to Practise Meditation

When we meditate, we use an object to focus our attention such as our breath, an image, or a mantra, which allows our mind to relax into this silent stream of awareness.

When thoughts arise, as they inevitably will, we don't need to judge them or try to push them away. Instead, we acknowledge them and gently return our attention to our object of attention.

In every meditation, there are moments – even if only microseconds, when the mind is able to experience the refreshment of pure awareness.

As you meditate on a regular basis, you will spend more and more time in this state of stillness, silence, and expanded awareness.

Readings on How Meditation Helps with Depression

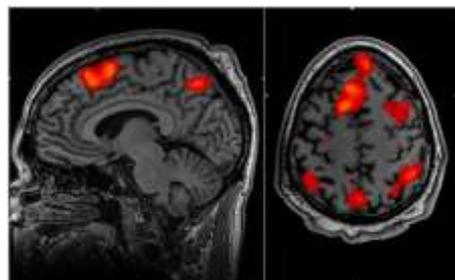
[How Meditation Helps with Depression](https://www.health.harvard.edu/mind-and-mood/how-meditation-helps-with-depression)

<https://www.health.harvard.edu/mind-and-mood/how-meditation-helps-with-depression>



[Mindfulness Can Change Brain Patterns of Depression](https://www.bostoneveningtherapy.com/2018/10/mindfulness-can-change-brain-patterns-of-depression/)

<https://www.bostoneveningtherapy.com/2018/10/mindfulness-can-change-brain-patterns-of-depression/>



11. Resources

The Science of Meditation – Educational Resources

The Science of Meditation

<https://www.youtube.com/watch?v=BI5JNDs-Azk>

Sara Lazar - How Meditation Changes the Brain

<https://www.youtube.com/watch?v=GOlwtTmpe-I>

How Meditation Can Reshape Our Brains: Sara Lazar at TEDxCambridge 2011

<https://www.youtube.com/watch?v=m8rRzTtP7Tc&t=14s>

The Meditating Brain - Pt. 1 with Dr. Sara Lazar

https://www.youtube.com/watch?v=JMBkg_8Ods

Dr. Sara Lazar: The Impact of Mindfulness Training on Brain Plasticity and Cognition

<https://www.youtube.com/watch?v=1vDN2UcRcqY>

How Meditation Impacts the Brain and Implications for Health

<https://www.youtube.com/watch?v=PCymeUQECOs>

The Scientific Power of Meditation

<https://www.youtube.com/watch?v=Aw71zanwMnY>

How Does Meditation Change the Brain? – Instant Egghead #54

<https://www.youtube.com/watch?v=q0DMYs4b2Yw>

10 Mind-Blowing Benefits of Meditation

<https://www.youtube.com/watch?v=wXsxwIjnUJk>

Relaxation and Meditation Resources

Deep Sleep Meditations (Suitable if you suffer from insomnia)

[Deep Sleep Meditation](#)

[Deep Sleep Music – 4 Hours – Collection 3](#)

[GUIDED SLEEP MEDITATION WITH DEEPAK CHOPRA – DAY 1](#)

[Fall Asleep Fast Deep Sleep Meditation for Insomnia / Mindful Movement](#)

[\[Try Listening for 3 Minutes\] FALL ASLEEP FAST | DEEP SLEEP RELAXING MUSIC](#)

Meditation and Music for Anxiety

[The Anxiety Release App](#)

[Anxietyreleaseappyoutube](#)

[Guided Meditation for Detachment From Over-Thinking \(Anxiety / OCD / Depression\)](#)

BILATERAL STIMULATION (BLS)

[How does BLS reduce anxiety?](#)

[The Anxiety Release App](#)

[Auditory Bilateral Stimulation](#)

[This website has some free samples you can listen to without purchasing them](#)

[EMDR Therapy Session Music For The Here And Now to Relax](#)

Other Meditations

[Andrew Johnson – Relax. Change. Create](#)

[Heaviness Meditation with Andrew Johnson](#)

[Moment of Relaxation with Andrew Johnson](#)

[Find Your Calm – Sleep more. Stress less. Live better](#)

[Head in the Clouds – Links to Free Online Guided Meditations](#)

[Insight Timer](#)

[PURELY BEING | Guided Meditations](#)

[Waking Up with Sam Harris - Mindfulness Meditation \(9 minutes\)](#)

[Sam Harris - 30 min Guided Meditation with Atmospheric Music](#)

[Serenity: Guided Meditation](#)

[Smiling Mind](#)

[Tara Brach Guided Meditations](#)

[Bloom – Better You](#)



UNIVERSITY OF CALIFORNIA

[UCLA Mindful Awareness Research Center – Guided Meditations](#)

https://www.uclahealth.org/marc/body.cfm?id=22&iirf_redirect=1



HARVARD UNIVERSITY RELAXATION ROOM – GUIDED MEDITATIONS

<https://wellness.huhs.harvard.edu/relaxation-room>

Meditation Styles and Venues to Learn How to Meditate

[Transcendental Meditation \(TM\)](#)

[Transcendental Meditation \(TM\) – Canberra TM Centre](#)

[Mindfulness and Meditation in Canberra](#)

[Five Places to Meditate in Canberra](#)

[Vipassana Meditation \(or Insight Meditation\) – Headspace](#)

[Vipassana Centres in Australia and New Zealand](#)

[Zazen Meditation](#)

Disclaimer:

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Author | Psychologist | Psychotherapist | Board-Approved Supervisor
PCC (Professional Certified Coach) | Leadership-Executive Coach, Facilitator & Advisor
Canberra, Australian Capital Territory, Australia

APPENDIX

12. Twelve Science-Based Benefits of Meditation

Meditation is a habitual process of training your mind to focus and redirect your thoughts that produces a satisfying experience of restful awareness.

Please find below twelve health and psychological benefits of meditation.

1. Stress Reduction

Normally, mental and physical stress cause increased levels of the stress hormone cortisol. This produces many of the harmful effects of stress, such as the release of inflammation-promoting chemicals called cytokines.

These effects can disrupt sleep, promote depression and anxiety, increase blood pressure and contribute to fatigue and cloudy thinking.

Meditation reduces the inflammation response caused by stress. It also improves symptoms of stress-related conditions, including **Irritable Bowel Syndrome, Post-traumatic Stress Disorder (PTSD)**, and fibromyalgia.

Research evidence

Rosenkranz, M. A., Davidson, R. J., MacCoon, D. G., Sheridan, J. F., Kalin, N. H., & Lutz, A. (2013). A comparison of mindfulness-based stress reduction and an active control in modulation of neurogenic inflammation. *Brain, Behavior, and Immunity*, 27, 174-184. <https://doi.org/10.1016/j.bbi.2012.10.013>

Orme-Johnson, D. W., & Barnes, V. A. (2014). Effects of transcendental meditation technique on trait anxiety: A meta-analysis of randomized controlled trials. *The Journal of Alternative and Complementary Medicine*, 20(5), 330-341. <https://doi.org/10.1089/acm.2013.0204>

2. Less Anxiety

Less stress means less anxiety.

Habitual meditation reduces symptoms of anxiety disorders (e.g. phobias, social anxiety, paranoid thoughts, obsessive-compulsive behaviors and panic attacks).

Research evidence

Carmody, J., & Baer, R. A. (2008). Relationships between mindfulness practice and levels of mindfulness, medical and psychological symptoms and well-being in a mindfulness-based stress reduction program. *Journal of Behavioral Medicine*, 31(1), 23-33. <http://pascal-francis.inist.fr/vibad/index.php?action=getRecordDetail&idt=20271209>

Kabat-Zinn, J., Massion, A. O., Kristeller, J., Peterson, L. G., Fletcher, K. E., Pbert, L., Lenderking, W. R., & Santorelli, S. F. (1992). Effectiveness of a meditation-based stress reduction program in the treatment of anxiety disorders. *The American Journal of Psychiatry*, 149(7), 936-943. <https://doi.org/10.1176/ajp.149.7.936>

Miller, J. J., Fletcher, K., & Kabat-Zinn, J. (1995). Three-year follow-up and clinical implications of a mindfulness meditation-based stress reduction intervention in the treatment of anxiety disorders. *General Hospital Psychiatry*, 17(3), 192-200. <https://iajournals.org/doi/abs/10.17761/ijyt.8.1.f5654n6515513127>

3. Less Depression and Improved Emotional Health

Some forms of meditation can improve depression and create a more positive outlook on life. Research shows that maintaining an ongoing habit of meditation may help you maintain these benefits long term.

Research evidence

Goyal, M., Singh, S., Sibinga, E. M., Gould, N. F., Rowland-Seymour, A., Sharma, R., ... & Ranasinghe, P. D. (2014). Meditation programs for psychological stress and well-being: a systematic review and meta-analysis. *JAMA Internal Medicine*, 174(3), 357-368 <http://pascal-francis.inist.fr/vibad/index.php?action=getRecordDetail&idt=28192164>

Kasala, E. R., Bodduluru, L. N., Maneti, Y., & Thipparaboina, R. (2014). Effect of meditation on neurophysiological changes in stress mediated depression. *Complementary Therapies in Clinical Practice*, 20(1), 74-80. <https://doi.org/10.1016/j.ctcp.2013.10.001>

4. Greater Self-Awareness

Meditation can help you know yourself. This can be a starting point for making other positive changes by recognising thoughts that may be harmful or self-defeating.

Research evidence

Dahl, C. J., Lutz, A., & Davidson, R. J. (2015). Reconstructing and deconstructing the self: cognitive mechanisms in meditation practice. *Trends in Cognitive Sciences*, 19(9), 515-523. <https://doi.org/10.1016/j.tics.2015.07.001>

Engen, H. G., & Singer, T. (2016). Affect and motivation are critical in constructive meditation. *Trends in Cognitive Sciences*, 20(3), 159-160. <http://hdl.handle.net/11858/00-001M-0000-0029-26A5-C>

Singh, Y., Goel, A., Kathrotia, R., & Patil, P. M. (2014). Role of yoga and meditation in the context of dysfunctional self: a hypothetico-integrative approach. *Advances in Mind-body Medicine*, 28(3), 22-25. <https://pubmed.ncbi.nlm.nih.gov/25141355/>

5. Longer Attention Spans

Several types of meditation may build your ability to redirect and maintain attention. As little as four days of meditation may have an effect.

Research evidence

Jha, A. P., Krompinger, J., & Baime, M. J. (2007). Mindfulness training modifies subsystems of attention. *Cognitive, Affective, & Behavioral Neuroscience*, 7(2), 109-119. <https://doi.org/10.3758/CABN.7.2.109>

Sood, A., & Jones, D. T. (2013). On mind wandering, attention, brain networks, and meditation. *Explore*, 9(3), 136-141. <https://doi.org/10.1016/j.explore.2013.02.005>

Zeidan, F., Johnson, S. K., Diamond, B. J., David, Z., & Goolkasian, P. (2010). Mindfulness meditation improves cognition: Evidence of brief mental training. *Consciousness and Cognition*, 19(2), 597-605. <https://doi.org/10.1016/j.concog.2010.03.014>

6. Age-Related Memory Loss Reduction

The improved focus you can gain through regular meditation may increase memory and mental clarity. These benefits can help fight age-related memory loss and dementia.

Research evidence

Gard, T., Hölzel, B. K., & Lazar, S. W. (2014). The potential effects of meditation on age-related cognitive decline: a systematic review. *Annals of the New York Academy of Sciences*, 1(1307), 89-103. <https://doi.org/10.1111/nyas.12348>

Khalsa, D. S. (2015). Stress, meditation, and Alzheimer's disease prevention: where the evidence stands. *Journal of Alzheimer's Disease*, 48(1), 1-12. <https://content.iospress.com/articles/journal-of-alzheimers-disease/jad142766>

7. More Kindness

Some types of meditation may particularly increase positive feelings and actions toward yourself and others.

Research evidence

Galante, J., Galante, I., Bekkers, M.-J., & Gallacher, J. (2014). Effect of kindness-based meditation on health and well-being: A systematic review and meta-analysis. *Journal of Consulting and Clinical Psychology*, 82(6), 1101-1114. <https://doi.org/10.1037/a0037249>

Jazaieri, H., Jinpa, G. T., McGonigal, K., Rosenberg, E. L., Finkelstein, J., Simon-Thomas, E., ... & Goldin, P. R. (2013). Enhancing compassion: A randomized controlled trial of a compassion cultivation training program. *Journal of Happiness Studies*, 14(4), 1113-1126. <https://doi.org/10.1007/s10902-012-9373-z>

8. Assistance in Overcoming Addictions

Meditation develops mental discipline and willpower and can help you avoid triggers for unwanted impulses. This can help you recover from addiction, lose weight and redirect other unwanted habits. The mental discipline you can develop through meditation may help you break dependencies by increasing your self-control and awareness of triggers for addictive behaviors.

Research evidence

Gallant, S. N. (2016). Mindfulness meditation practice and executive functioning: Breaking down the benefit. *Consciousness and Cognition*, 40, 116-130. <https://doi.org/10.1016/j.concog.2016.01.005>

Tang, Y. Y., & Leve, L. D. (2016). A translational neuroscience perspective on mindfulness meditation as a prevention strategy. *Translational Behavioral Medicine*, 6(1), 63-72. <https://doi.org/10.1007/s13142-015-0360-x>

Zgierska, A., Rabago, D., Zuelsdorff, M., Coe, C., Miller, M., & Fleming, M. (2008). Mindfulness meditation for alcohol relapse prevention: A feasibility pilot study. *Journal of Addiction Medicine*, 2(3), 165-173. <https://doi.org/10.1097/ADM.0b013e31816f8546>

9. Improved Sleep

A variety of meditation techniques can help you relax and control the ‘runaway’ thoughts that can interfere with sleep. This can shorten the time it takes to fall asleep and increase sleep quality.

Research evidence

Martires, J., & Zeidler, M. (2015). The value of mindfulness meditation in the treatment of insomnia. *Current Opinion in Pulmonary Medicine*, 21(6), 547-552. <https://europepmc.org/article/med/26390335>

Ong, J. C., Manber, R., Segal, Z., Xia, Y., Shapiro, S., & Wyatt, J. K. (2014). A randomized controlled trial of mindfulness meditation for chronic insomnia. *Sleep*, 37(9), 1553-1563. <https://doi.org/10.1007/s12671-018-0911-6>

Ong, J. C., Xia, Y., Smith-Mason, C. E., & Manber, R. (2018). A randomized controlled trial of mindfulness meditation for chronic insomnia: Effects on daytime symptoms and cognitive-emotional arousal. *Mindfulness*, 9(6), 1702-1712. <https://link.springer.com/article/10.1007/s12671-018-0911-6>

10. Better Pain Management

Meditation can diminish the perception of pain in the brain. This may help treat chronic pain when used as a supplement to medical care or physical therapy.

Research evidence

Ball, M. S., & Vernon, B. (2015). A review on how meditation could be used to comfort the terminally ill. *Palliative & Supportive Care*, 13(5), 1469-1472. <https://doi.org/10.1017/S1478951514001308>

Zeidan, F., Martucci, K. T., Kraft, R. A., Gordon, N. S., McHaffie, J. G., & Coghill, R. C. (2011). Brain mechanisms supporting the modulation of pain by mindfulness meditation. *The Journal of Neuroscience*, 31(14), 5540–5548. <https://doi.org/10.1523/JNEUROSCI.5791-10.2011>

11. Decreased Blood Pressure

Blood pressure decreases not only during meditation, but also over time in individuals who meditate regularly. This can reduce strain on the heart and arteries, helping prevent heart disease.

Research evidence

Bai, Z., Chang, J., Chen, C., Li, P., Yang, K., & Chi, I. (2015). Investigating the effect of transcendental meditation on blood pressure: a systematic review and meta-analysis. *Journal of Human Hypertension*, 29(11), 653-662. <https://doi.org/10.1038/jhh.2015.6>

Koike, M. K., & Cardoso, R. (2014). Meditation can produce beneficial effects to prevent cardiovascular disease. *Hormone Molecular Biology and Clinical Investigation*, 18(3), 137-143. <https://doi.org/10.1515/hmbci-2013-0056>

12. Choice of Meditation Style

There are various different styles of meditation for you to consider incorporating into your daily routine. It's all matter of finding one that suits you (refer to page 9).

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