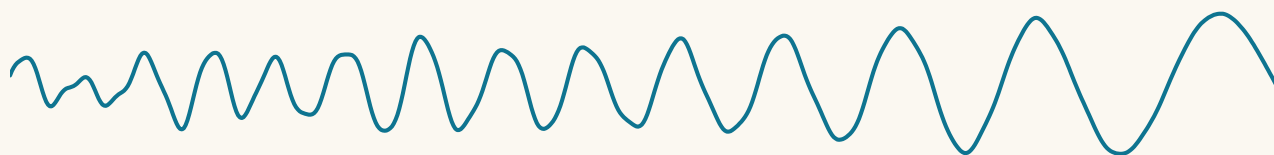


DIVYA JYOTI JAGRATI SANSTHAN

INNER SCIENCE LAB · WHITEPAPER

The Science of Inner Stillness

A Practical Whitepaper for Modern Seekers



What research shows about meditation, the brain, the heart and the stress response, in plain English, with every study cited and every limit stated.

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About this paper

This paper is published by Divya Jyoti Jagrati Sansthan (DJJS) for newcomers, students and professionals who want an honest account of what science says about meditation. Each study we describe is listed in full at the end, so you can read it yourself.

An important distinction. Most of the research summarized here studied mindfulness and related practices, not the Brahm Gyan meditation that DJJS shares. We say so wherever it matters, and we explain the difference in section 6.

Not medical advice. This paper is for general education. Meditation and breathing exercises can complement professional care; they do not replace it. If you live with a physical or mental-health condition, talk to a qualified clinician.

About the figures. Both figures are illustrations drawn from textbook patterns. Neither is recorded data from a person.

SECTION 1

In plain English: the summary

Meditation research is real, growing and, for the most part, modest. The clearest findings concern attention, stress and anxiety. The weakest concern the biggest claims: rewiring the brain, curing illness, peak performance.

- **Brain rhythms.** EEG studies of mindfulness most often report more alpha and theta activity during practice, a pattern linked with relaxed but alert attention (Lomas et al., 2015). EEG shows what accompanies a state of mind, not the experience itself.
- **Brain structure.** Experienced meditators differ from non-meditators in several brain regions (Fox et al., 2014), but the largest randomized trial to date found no structural change after an 8-week course (Kral et al., 2022). The honest verdict: not yet known.
- **Heart and stress.** Slow, steady breathing, at around six breaths a minute, reliably increases heart rate variability, a marker of the body's calming branch (Zaccaro et al., 2018; Lehrer & Gevirtz, 2014). Effects of meditation on the stress hormone cortisol are mixed and modest (Pascoe et al., 2017; Koncz et al., 2021).
- **Mind and mood.** In a large review of randomized trials, meditation programs showed moderate evidence of small improvements in anxiety, depression and pain, and low or insufficient evidence for attention, sleep and weight (Goyal et al., 2014).
- **Where science stops.** Science measures what accompanies inner experience: rhythms, heartbeats, hormones, reaction times. It cannot measure the experience itself. Brahm Gyan, as DJJS shares it, is offered as a direct inner experience to be verified by each seeker (section 6).

SECTION 2

Brainwaves and neuroplasticity

What EEG measures

Brain cells communicate with tiny electrical signals. When large groups of them fire together, they produce rhythms strong enough to detect through sensors on the scalp: the electroencephalogram, or EEG. Researchers sort these rhythms into frequency bands, measured in hertz (Hz), or cycles per second.

Band	Frequency	Typically associated with
Gamma	above ~30 Hz	Fast activity linked with integrating information; hard to record cleanly at the scalp
Beta	14–30 Hz	Active, effortful thinking and alertness; also anxious, racing thought
Alpha	8–13 Hz	Relaxed wakefulness, especially with the eyes closed
Theta	4–7 Hz	Drowsiness, memory processes and some deep, inward meditative states
Delta	below 4 Hz	Deep sleep

Every healthy brain produces all of these rhythms all the time, in changing mixtures, and band boundaries vary slightly between laboratories. None of them is “good” or “bad”: beta is how you solve a math problem, and theta is part of how you fall asleep.

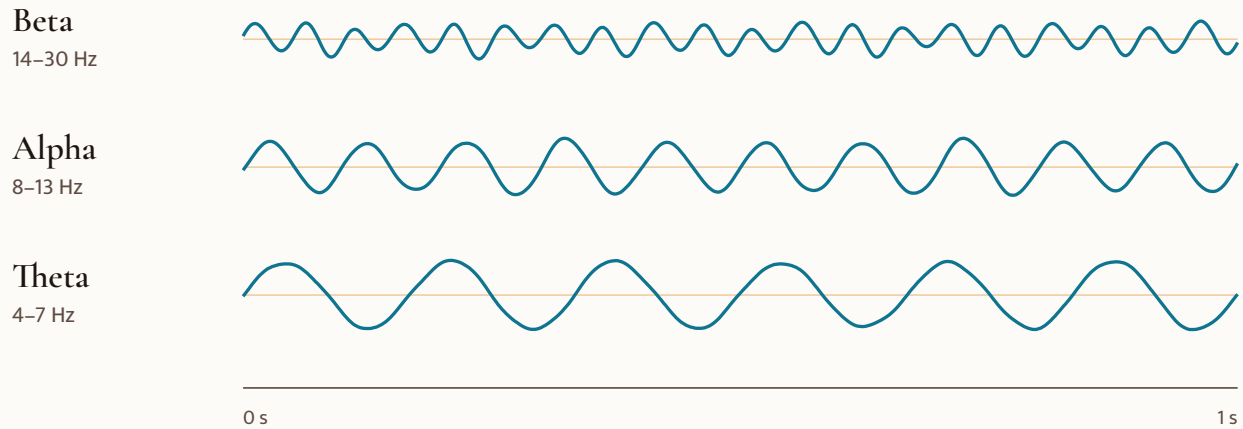


Figure 1. An illustration, not a recording. One second of each band drawn from textbook waveforms. Real EEG mixes all the bands at once and is far noisier.

What meditation studies report

Lomas and colleagues (2015) systematically reviewed 56 EEG studies of mindfulness meditation, with more than 1,700 participants. The most common finding was **increased alpha and theta power** compared with resting with the eyes closed, in both healthy people and patient groups, which the authors read as a sign of “relaxed alertness”. The pattern was not reported uniformly, and no consistent pattern appeared in the other bands.

Neuroplasticity: what changes, and what we do not know

Neuroplasticity means that the brain changes with use: connections strengthen with what we practice, as when we learn a language or an instrument. That the brain is plastic is well established. Whether, how much and how quickly meditation reshapes it is still being worked out.

Fox and colleagues (2014) pooled 21 brain-imaging studies of about 300 meditation practitioners and found eight regions that consistently differed from non-meditators, including areas involved in body awareness (the insula), memory (the hippocampus) and self- and emotion-regulation (the anterior and mid cingulate and the orbitofrontal cortex). The average difference was medium in size. The authors were candid that publication bias and methodological limits were “strong concerns”: most studies were small and compared different people at a single point in time, so they cannot show that meditation caused the differences.

Kral and colleagues (2022) then ran the most rigorous test so far: two combined randomized controlled trials with 218 newcomers to meditation, assigned to the popular 8-week Mindfulness-Based Stress Reduction (MBSR) course, a matched active program or a waiting list. They found **no evidence of structural brain change** from MBSR compared with either control group.

IN PLAIN ENGLISH

Meditation is reliably accompanied by calmer, more inward brain rhythms. Long-term practice may shape the brain, as many skills do, but short courses have not been shown to, and claims that meditation “grows your brain” go beyond the evidence.

SECTION 3

Heart rate variability, vagal tone and the stress response

Your automatic nervous system

The autonomic nervous system runs what you never have to think about: heartbeat, breathing, digestion. It has two main branches that work like an accelerator and a brake.

- **The sympathetic branch** (“fight or flight”) speeds the heart and mobilizes energy for effort or threat.
- **The parasympathetic branch** (“rest and digest”) slows the heart and supports recovery. Much of its effect on the heart travels through the **vagus nerve**; the strength of that influence is often called **vagal tone**.

Stress also switches on a slower, hormonal pathway (the hypothalamic–pituitary–adrenal, or HPA, axis), which releases **cortisol**. Cortisol is essential to life: it helps the body mobilize energy and it rises and falls naturally through the day. Problems arise when stress keeps it high, or out of rhythm, for long periods.

Heart rate variability

A healthy heart does not tick like a metronome. Even at rest, the gap between beats keeps changing by a few hundredths of a second, lengthening as you breathe out and shortening as you breathe in. This beat-to-beat change is **heart rate variability (HRV)**. Researchers use certain HRV measures as an index of cardiac vagal activity (Laborde et al., 2017).

Higher resting HRV is generally associated with more flexible responses to stress. But HRV also depends on age, fitness, posture, breathing, medication and time of day, so it is best compared within the same person under the same conditions. One reading, on its own, says little.

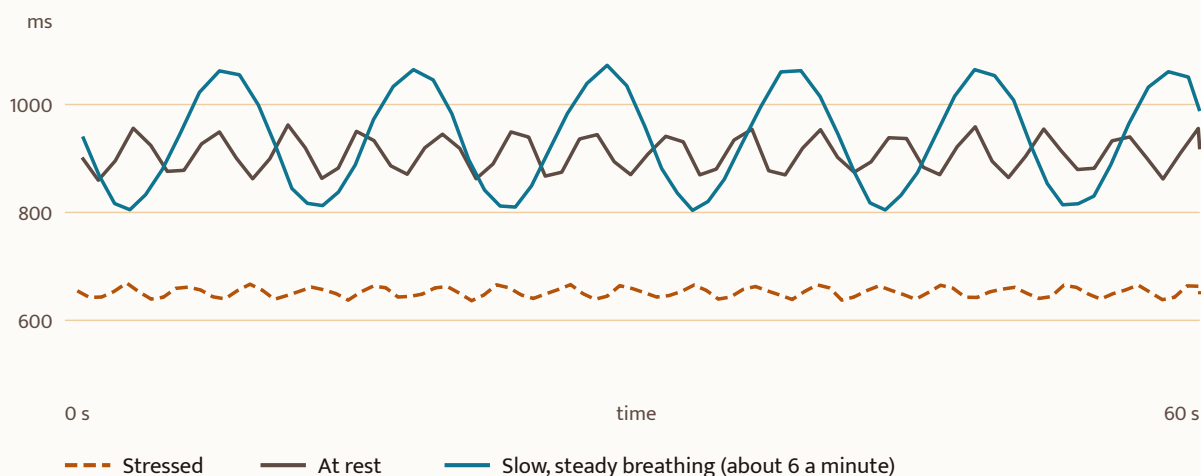


Figure 2. An illustration, not a recording. Gaps between heartbeats, in milliseconds, over one minute. Under stress the heart beats faster and the gaps barely change; at rest they are longer and vary with the breath; with slow, steady breathing the swings become large and regular. The values are typical textbook patterns, not data from a person.

Slow breathing: one of the most reliable findings

Zaccaro and colleagues (2018) systematically reviewed studies of slow breathing (fewer than 10 breaths a minute) in healthy people. Slow breathing increased HRV and the breath-linked swing in heart rate, and people reported more comfort and relaxation and less anxiety and anger. Only 15 studies met their criteria, so the base is small, but the direction was consistent. A separate review of the physiology of slow breathing reached a similar picture (Russo et al., 2017).

Why around six breaths a minute? At about that pace (one breath every ten seconds), the rhythm of breathing and a blood-pressure reflex called the baroreflex reinforce each other, producing the largest swings in heart rate. This “resonance” is the basis of HRV biofeedback, a technique used in clinics and sport (Lehrer & Gevirtz, 2014).

TRY THIS: A BREATHING EXERCISE

Sit comfortably. Breathe in gently through the nose for about five seconds, and out for about five seconds. Continue for three to five minutes, without straining. Stop if you feel dizzy or uncomfortable; if you have a heart, lung or anxiety condition, check with a clinician first.

This is a breathing exercise that anyone can learn from a page. It is not Brahm Gyan meditation, and DJJS does not teach it as such.

Cortisol: modest and mixed

Pascoe and colleagues (2017) pooled 45 randomized trials that compared meditation with an active control group and reported lower cortisol, blood pressure and heart rate after meditation. Koncz and colleagues (2021) looked more closely: in studies that measured cortisol in blood, the reduction appeared only in at-risk groups (people with a physical illness); in studies using saliva, the overall effect was small and not statistically significant, with a border-line effect for people living in stressful situations.

IN PLAIN ENGLISH

Slow, steady breathing reliably shifts the heart toward its calmer rhythm while you do it. Meditation may help lower stress hormones, especially for people under strain, but the effect is not guaranteed. Nothing here “resets” the nervous system or cures anything.

SECTION 4

Attention and emotional regulation

Attention is a skill you can train

In a randomized study of 40 Chinese undergraduates, Tang and colleagues (2007) found that five days of 20-minute sessions of a meditation method called integrative body-mind training improved performance on a standard attention-conflict test more than relaxation training did. The group also reported less anxiety and fatigue and showed a smaller cortisol response to a stressful task. The study was short and small, but it was one of the first to use random assignment.

Jha and colleagues (2010) followed military personnel through the high-stress months before deployment. Working memory capacity, the mental workspace used to juggle information and manage emotion, declined in a comparison group. Among those who took an 8-week mindfulness course, it fell in people who practiced little and rose in those who practiced more. Groups were not randomly assigned and were small (31 and 17 people).

Emotional regulation

Guendelman and colleagues (2017) reviewed psychological, brain-imaging and clinical research and concluded that mindfulness supports emotion regulation through both “top-down” routes (deliberately noticing and reframing) and “bottom-up” routes (reacting less strongly in the first place). At work, a randomized field study of 64 employees found that a brief, self-guided mindfulness training reduced emotional exhaustion and increased job satisfaction (Hülshager et al., 2013).

Across 163 studies of healthy adults, Sedlmeier and colleagues (2012) found medium-sized effects of meditation on average: strongest for emotional and relationship measures, about medium for attention, and smallest for other cognitive measures. They also noted that most of the studies they found had to be excluded for methodological problems.

What a careful review concluded

Goyal and colleagues (2014), writing for clinicians in *JAMA Internal Medicine*, reviewed 47 randomized trials (3,515 participants) that used active control groups:

Strength of evidence	Outcomes
Moderate: small improvements	Anxiety, depression, pain
Low: possible improvements	Stress and distress; mental-health-related quality of life
Low or insufficient	Positive mood, attention, substance use, eating habits, sleep, weight
Compared with active treatments	No evidence that meditation programs were better than medication, exercise or other behavioral therapies

IN PLAIN ENGLISH

Practice can train attention and help people meet difficult emotions with more steadiness. The effects are real but usually small to moderate, and they depend on actually practicing.

SECTION 5

What the evidence does not show

Van Dam and colleagues (2018), fifteen meditation researchers writing together, warned that public enthusiasm has run ahead of the science. Their critique, “Mind the Hype”, is worth reading in full. In that spirit, here is what the research does not show.

- **That meditation cures disease or replaces treatment.** It can complement care; no study shows it replaces medication, therapy or medical advice.
- **That any breathing pattern “resets” your nervous system.** Slow breathing shifts heart rhythm while you do it. That is useful, temporary and modest.
- **That any sound frequency heals.** No frequency, including 432 Hz, has been shown to heal. A calm tone can be pleasant; that is all it can honestly claim.
- **That short courses rebuild the brain.** The largest randomized trial found no structural change after eight weeks (Kral et al., 2022).
- **That a brain scan can see an inner experience.** EEG and MRI show what accompanies an experience, never its content.
- **That every practice works the same way.** “Meditation” covers very different practices, and findings about one do not automatically transfer to another (Van Dam et al., 2018). That includes Brahm Gyan, which these studies did not examine.
- **That meditation is always pleasant.** Some people report difficult experiences, such as anxiety or unsettling feelings, and researchers have called for these to be studied and reported properly (Van Dam et al., 2018). Practice with guidance, and seek help if something feels wrong.

The field also shares common weaknesses: small samples, few comparisons with active control groups, heavy reliance on self-report, enthusiastic volunteers who expect to benefit, and positive results that are more likely to be published than null ones.

SECTION 6

Meditation in the DJJS tradition

Divya Jyoti Jagrati Sansthan was founded by His Holiness Shri Ashutosh Maharaj Ji on the vision that world peace begins with self awakening. The meditation it shares, Brahm Gyan (Divine Knowledge), makes a different kind of claim from the studies above, and it is worth being precise about the difference.

- **It is not a technique.** Slow breathing and focused attention can be learned from a page, like the exercise in section 3. Brahm Gyan is not presented that way. The tradition holds that it is revealed at initiation by a perfect living Master; DJJS shares it under the guidance of His Holiness Shri Ashutosh Maharaj Ji.
- **It is an experience to verify, not a belief to accept.** The Vedic tradition names direct perception (pratyaksha) first among the valid ways of knowing. Brahm Gyan is offered as an experiential science on exactly those terms: an inner experience that each seeker perceives and tests for themselves in daily practice. The tradition describes this experience as Divine Light, Celestial Music, Holy Nectar and the Holy Name.
- **It is not what these studies measured.** None of the research in this paper studied Brahm Gyan. We share it because honest evidence about attention, stress and the inner life deserves a hearing, and because a path that asks you to verify for yourself should welcome careful questions.
- **It belongs to a whole life.** Practitioners keep their studies, work and families, and many give time to service (seva) through the Sansthan's humanitarian initiatives.

SECTION 7

How to begin

1. **Visit a center.** DJJS centers across the United States hold introductory programs, satsang (spiritual discourse) and group meditation, open to all and free of charge. Find addresses and gathering times at djjs.us/centers.
2. **Start online.** djjs.us/start explains what a first visit is like and how to join the mailing list for new research notes and invitations to free introductory sessions.
3. **Ask anything.** The Inner Science Lab at djjs.us/inner-lab has interactive versions of the figures in this paper and an anonymous form for your hardest questions.
4. **Keep a simple lab notebook.** If you try the breathing exercise, treat it as an experiment: the same time each day, a few minutes, phone in another room. Note how you feel before and after. Small and steady beats long and occasional.

Science can tell you a great deal about what accompanies a quiet mind. Whether there is more to see within is a question the tradition invites you to answer for yourself.

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