

Effect of breathwork on stress and mental health: A meta-analysis of randomised-controlled trials (2023)

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Abstract

Deliberate control of the breath (breathwork) has recently received an unprecedented surge in public interest and breathing techniques have therapeutic potential to improve mental health. Our metaanalysis primarily aimed to evaluate the efficacy of breathwork through examining whether, and to what extent, breathwork interventions were associated with lower levels of self-reported/subjective stress compared to non-breathwork controls. [...] Most studies were deemed as being at moderate risk of bias. [...] Overall, results showed that breathwork may be effective for improving stress and mental health.

Research Article Quotes & Comments

"[Regarding breathwork, various] psychophysiological mechanisms of action are proposed to underpin such techniques: from **polyvagal theory** and **interoception** literature along with **interoception, central nervous system effects**, and increasing **heart-rate variability** (HRV) via modulation of the

autonomic nervous system (ANS) and increased parasympathetic activity. **ANS activity can be measured using HRV**, the oscillations in heart rate connected to breathing (i.e., the fluctuation in the interval between successive heart beats). **Fundamentally, as one inhales and exhales, heart rate increases and decreases, respectively. Higher HRV, arising from respiratory sinus arrhythmia, is typically beneficial as it translates into robust responses to changes in breathing and thus a more resilient stress-response system."**

Not until I started looking deeper into the science of the breath did I start paying attention to my own breathing rate and depth. By way of example, what I thought of as an anxious breath (every now and again I'd take in a deep breath, seemingly out of nowhere) was actually a physiological sigh; breathlessness was soon seen as my nervous system amping up; breath-holding a freeze response—all these motivated me to get a hold on my breath and learn way to regulate. Articles like these steeled my resolve. Writing, too, kept me going. At the bottom of it all is becoming aware to begin with—of the breath, of your naivety thereof, and your own biases—and then choosing whether to learn more and practice...

"Polyvagal Theory [...] posits that **vagal nerves are major channels for bidirectional communication between body and brain**. Bodily feedback has profound effects on mental states as **80% of vagus nerve fibres transmit messages from body to brain**. [...] high vagal tone is associated with improved health along with emotional and cognitive functioning. **Vagal nerves form the main pathway of the parasympathetic nervous system**, and high HRV indicates greater parasympathetic activity. **Modifying breathing alters communication sent from the respiratory system, rapidly influencing brain regions regulating behaviour, thought and emotion**. Likewise, respiration may entrain brain electrical activity with **slow breathing resulting in synchrony of brain waves**, thereby enabling diverse brain regions to communicate more effectively. It has been observed that **adept long-term Buddhist meditation practitioners can achieve states where brain waves are synchronised continuously."**

"It is important that hype around breathwork is grounded in evidence for efficacy—and effects are not overstated to the public. [...] So far, there is no existing meta-analysis of RCTs on the effect of breathwork on psychological stress."

"We conducted the first comprehensive systematic review and meta-analysis of RCTs on the effect of breathwork on self-reported/subjective stress, analysing 12 studies which comprised a total of 785 participants."

"recent emergence of research into breathwork, which may have been accelerated by the covid-19 pandemic."

"There were only two studies primarily focused on **fast-paced breathwork** and stress, insufficient to make a meaningful comparison with the ten studies primarily focused on **slow-paced breathwork**."

Think Wim Hof Method cf. Coherence Breathing.

"**just one session of slow, deep breathing had beneficial effects on anxiety and vagal tone in adults**, with vagal tone being measured, albeit indirectly, through HRV. This may be likened to 'micro dosing' breathwork, similar to single session mindfulness meditation practices."

"**People with stress and anxiety disorders tend to chronically breathe faster and more erratically**, yet with increased meditation practice, respiration rate can become gradually slower, potentially translating into better health and mood, along with less autonomic activity."

"HRV can be improved [...] (tenfold) by simply breathing at a rate around **5-6 breaths/min** and some Zen Buddhist monks have been found to naturally respire around this rate during deep meditation."

Consider what Anna Ferguson (somatic therapist) said about HRV in her book *The Vagus Nerve Reset*: "Usually individuals with high HRV are more resilient to stressful experiences and also report a greater sense of well-being. [...] In general, **lower HRV can be a sign of a less resilient nervous system, with a lower capacity to handle changing situations and can be an indicator of future health issues**. Less variability between heartbeats actually signals that there is an imbalance in your ANS, or sympathetic dominance. [...] Individuals who have higher resting heart rates tend to have lower HRV, due to their heart beating faster, meaning there is less time in between each beat of the heart and therefore less of an opportunity for variability."

"**experienced meditators have been found to breathe at over 1.5 times slower than nonmeditators**, during meditation and at rest. This translates into **approximately 2000 less daily breaths** for the former group of adept meditation practitioners (i.e., around 700,000 less breaths in a year), placing **less demand on the ANS**."

Final thoughts: Slow-paced breathing improves HRV and, thus, increases stress tolerance. This forms a biological basis for breathwork, and a good argument for the latter. There

are many variations, but the ones that kept creeping up on the studies are breathing less and slower. That's not to say others don't help ... just that more research is needed.

My book *Polyvagal Breathing* talks more about the importance of breathing, adding a Polyvagal lens to the equation.

In all, teach yourself to breathe less and you'll be less stressed..

Notes collected by psychotherapist and author Emil Barna in 2026 in his efforts to assist with professional development and further education for himself and those who read them. You can find out more about Emil by visiting www.barnacc.com

"A text without a context is a pretext to a proof text."

—Dr. Don Carson