Mindful Exercise in Health & Disease

Science and Practice Part 1

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AGENDA

The Spectrum of Mindful Therapies

Psychobiology of mindful exercise practices & select studies

The practice of select mindful exercise programs and how they fit in with chronic disease prevention programs

Objectives

1. Examine the psychobiologic basis for mindful exercise based on peer-reviewed research.

2. Determine essential physical and physiologic elements of classical forms of mindful exercise including hatha yoga, tai chi, qigong, and several contemporary forms.

3 Incorporate practice guidelines for select forms of mindful exercise for improving musculoskeletal, behavioral and cardiometabolic health.

Mind-Body Therapies in Complimentary & Integrative Medicine

Meditation

Mindful exercise/Somatic movement disciplines

Energy medicine

Hypnotherapy

Prayer

Qigong

Aromatherapy

Biofeedback

Guided imagery

Psychospiritual

Music therapy

Anger management

Relaxation therapies

Cognitive-behavioral therapies

Emerging therapies

NIH NCCIM

Mindful therapies play a significant role in managing chronic diseases

Cardiometabolic disease

Hypertension

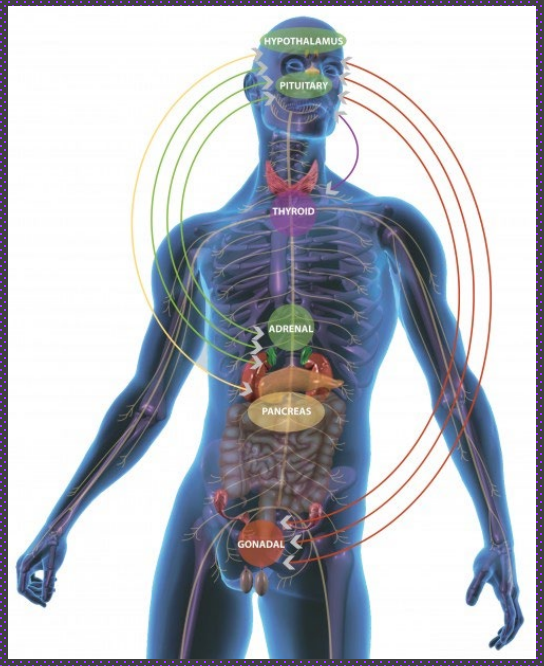
Cancer

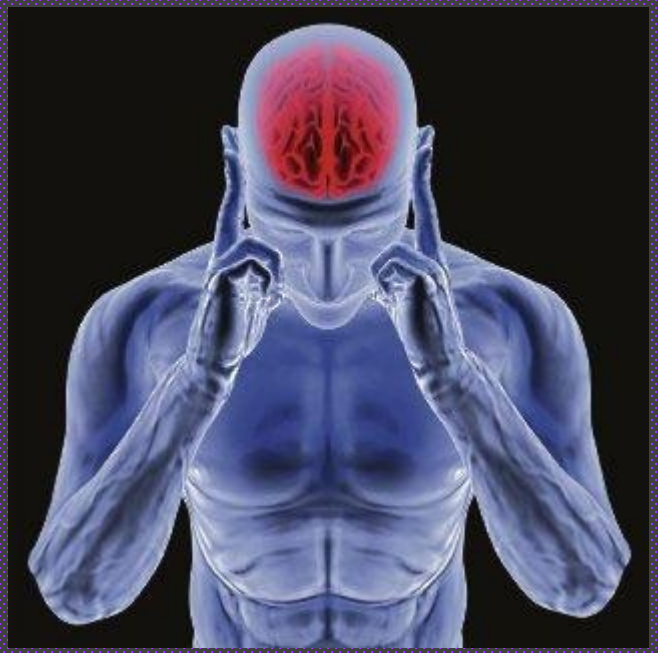
Depression/anxiety

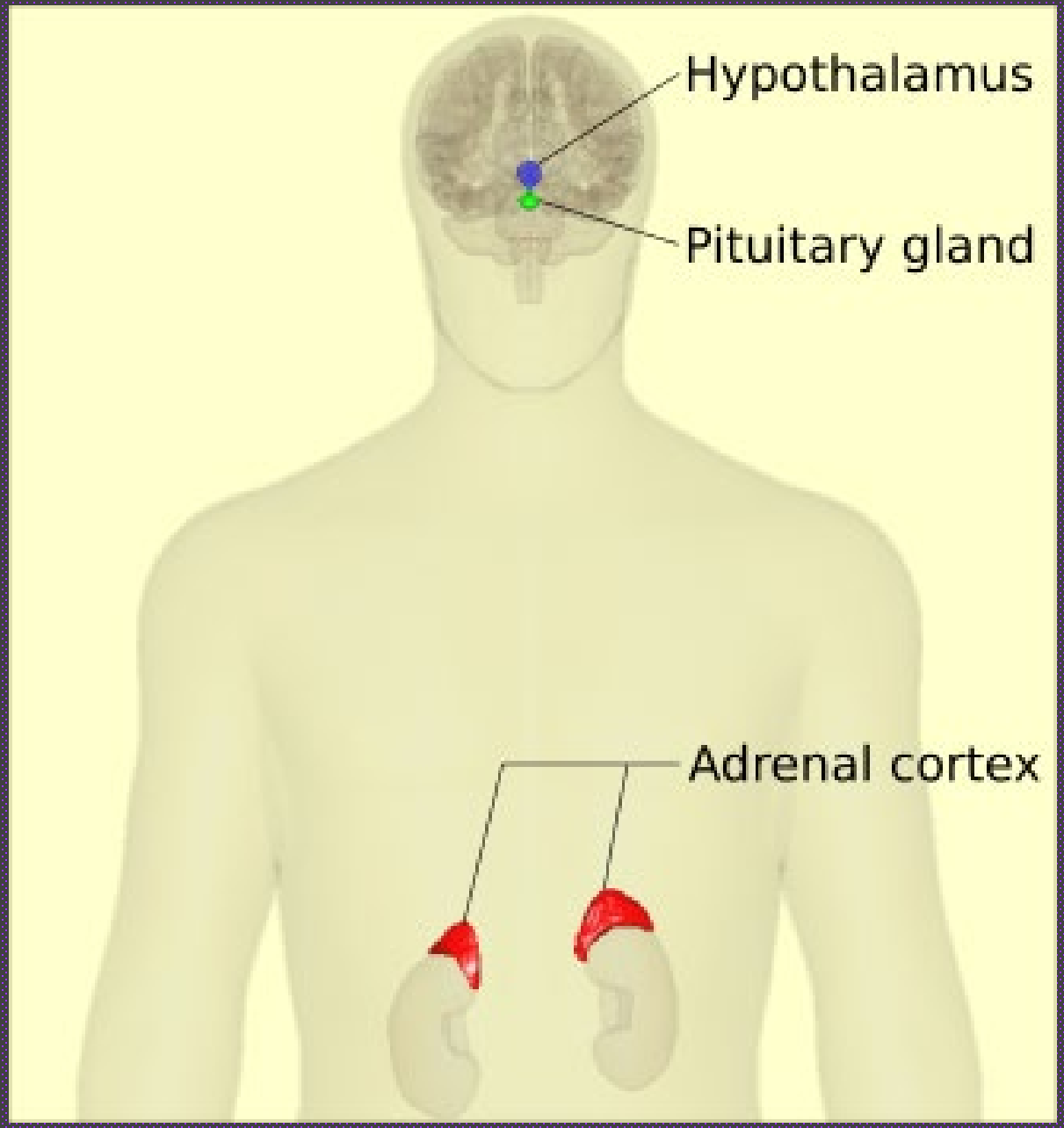
So, what 2 psychoneurobiologic mechanisms might be responsible for many of the benefits observed in mindful practices ?

Hypothalamus-Pituitary-Adrenal Axis

Primary Mind-Body Physiological Link in Therapies with a Cognitive or Meditative Component





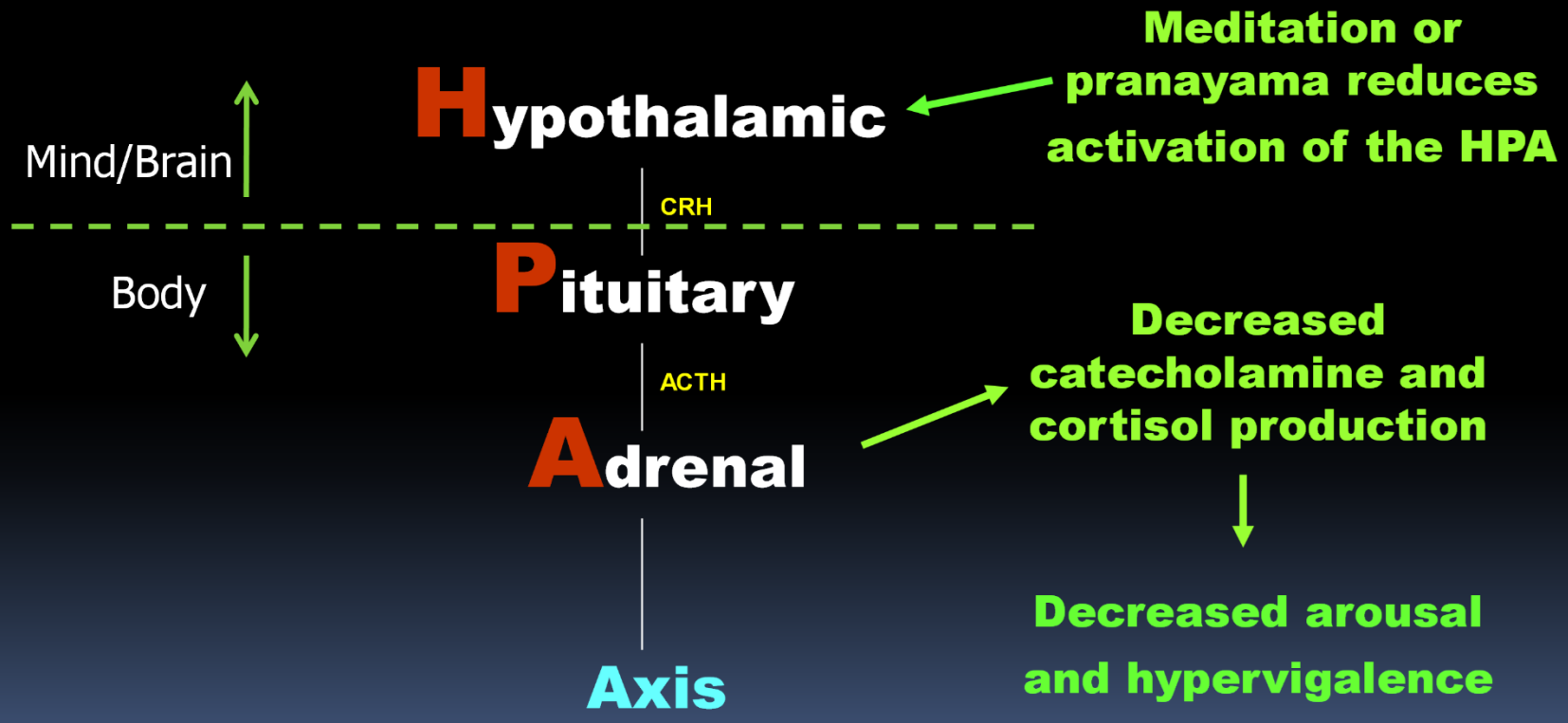


H

P

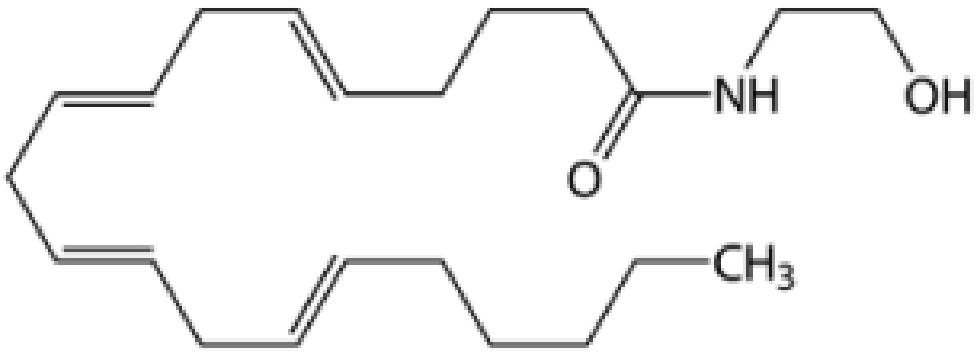
A

Much of the affective and neuroendocrine response to cognitive therapies including mindful exercise is mediated through the hypothalamic-pituitary-adrenal axis (HPA)



The role of endorphins and endocannabinoids and mindful exercise mood alterations

Cannabinoids: Endocannabinoids



Anandamide

Key Point

Quiescent meditation and meditative-contemplative-type activity including Mex decrease *real-time* activation of those areas of the central nervous system that produce deleterious peptides, inflammatory cytokines, and neurohormones which decrease immunocompetency and increase atherogenic processes.

* *Perceived hope, social support, joy, and prayer generate similar psychophysiological responses*

Mindful Exercise

Low to moderate-intensity exercise coupled with breath and an internally-directed cognitive, meditative focus

Unlike conventional physical exercise that may focus on form, heart rate target zone, intensity etc. -

mindful exercise emphasizes the coordination between breathing, body sensation awareness, and bodily movement execution

Han Y.M. et.al Nature, Scientific Reports | (2023) 13:10948

For instance, Tai Chi has been shown to be effective at improving motor control in patients with stroke and Parkinson's disease, promoting psychological well-being in older adults and enhancing cognitive functions in both healthy and clinical elderly populations.

Similar positive clinical effects have been observed when qigong or hatha yoga is performed.

Han Y.M. et.al Nature, Scientific Reports | (2023) 13:10948

Understanding Mind-Body Disciplines: A Pilot Study of Breathing and Dynamic Muscle Contraction on Autonomic Nervous System Reactivity

Michael S. Chin Stefanos N. Kale, Stress Health. 2019 Jul 26. Harvard/Vanderbilt Univ.

Breathing combined with rhythmic muscle contraction led to greater activation of the parasympathetic response than either alternating contractions or breathing alone, which may help explain the stress reducing benefits of mind-body disciplines.

n=48

Example Mindful Exercise Modalities
A Simple Taxonomy

Classical

- Hatha yoga
- Tai Chi
- Qigong exercise
- Baduanjin exercise
- Select ethnic & spiritual dance

- Breathwork therapies (pranayama)

"Contemporary"

- NIA
- Meditation walking
- Pilates
- GIO
- Physiosynthesis
- Breathwork
- Somatics
- E-motion
- Feldenkrais
- Alexander technique
- Laban movement
- Ideokinesis
- Composite forms

Mindful Exercise
Research Outcome Reporting Measures

QOL (e.g. SF-12, SF-8)

Resting blood pressure

Energy expenditure (kcal or steps/wk)

Pulmonary function (e.g. FEV-1)

Balance control scale

Tinnetti fear of falling scale

Anxiety/stress measures (STAI, POMS)

Pain or symptom scales

ADL functionality

Muscular strength & flexibility measures

Biomarkers of stress (e.g., CRP, IL-6)

Spirituality measures (eg. SIWB, SEI, FICA)

Muscle Element

Meditative *plus*

Proprioception
+
Kinesthesis

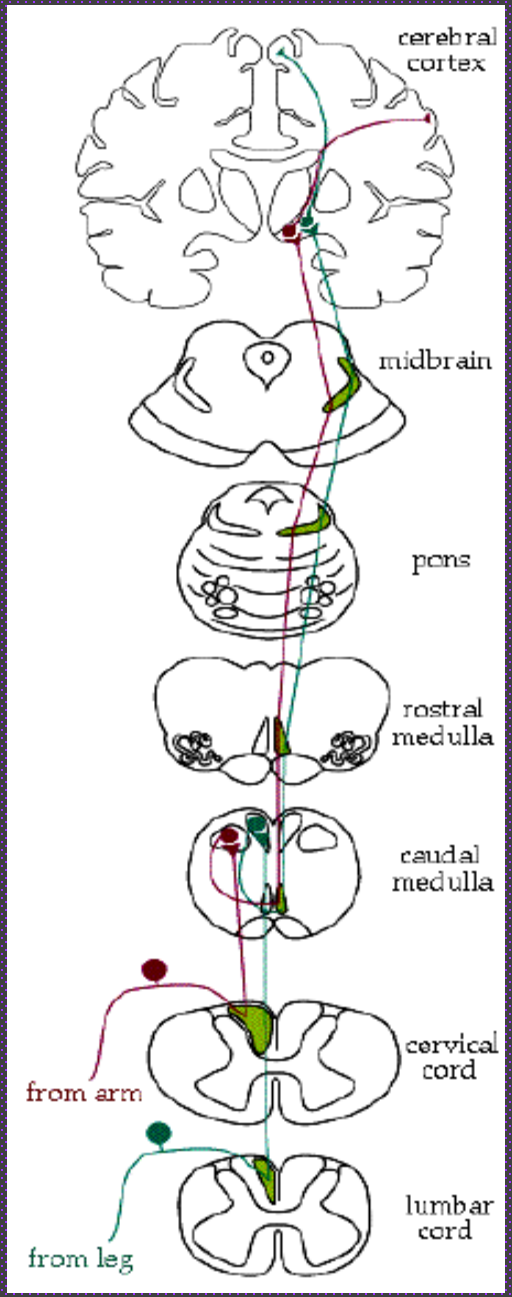
In 1972, G.M. Goodwin, Ian McCloskey, and Peter Matthews at Oxford carried out careful behavorial studies that demonstrated that *muscle afferents have access to mechanisms of perception*, and implied that there must be projections of the muscle afferent pathways to the cortex for this to occur. Recent studies have confirmed the presence of these pathways.

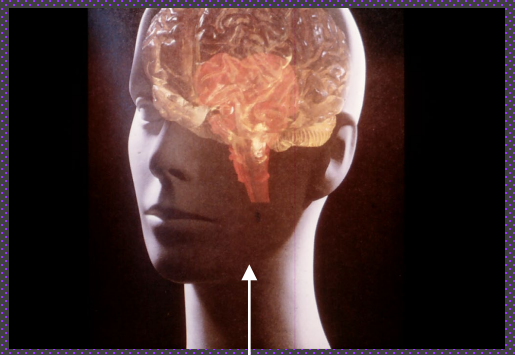
Body-Mind

Muscle spindles

Golgi tendon organs

Joint afferents



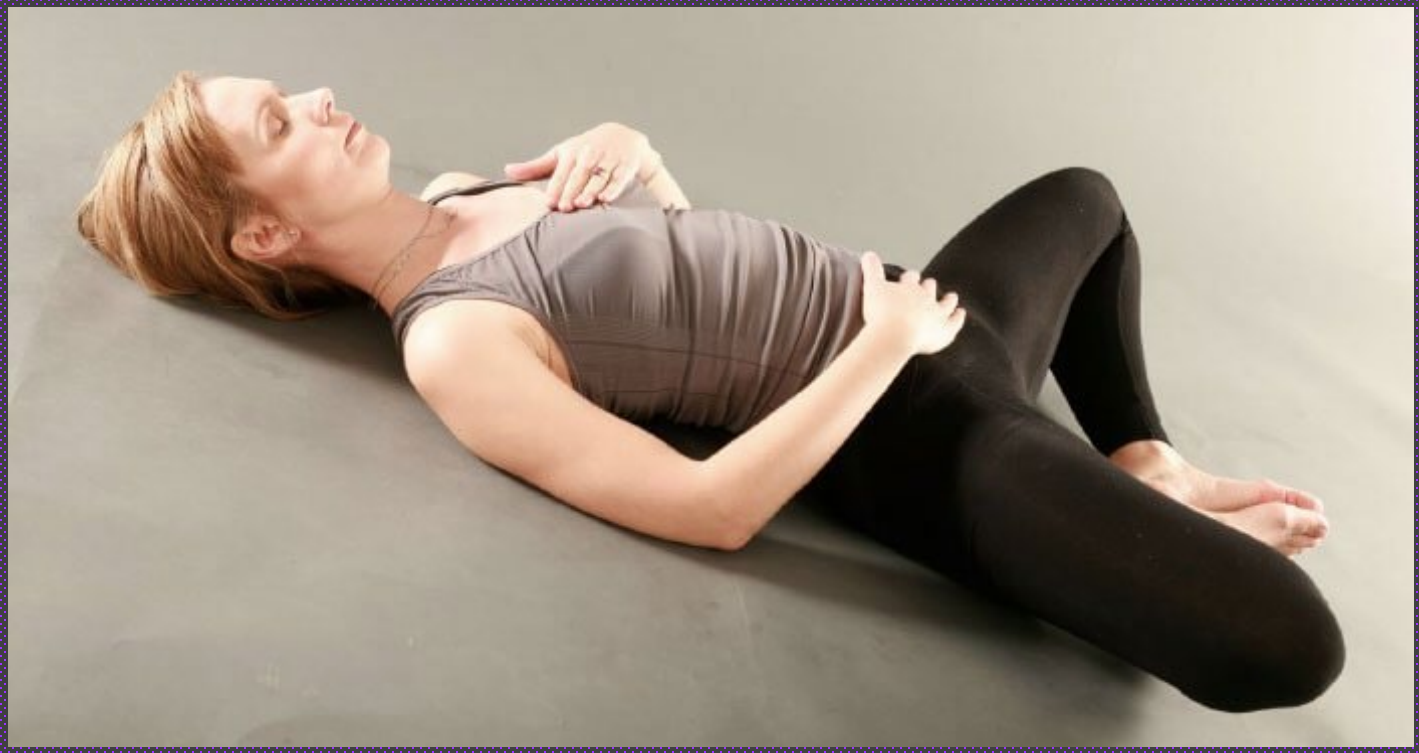


Ascending pathways carry sensory information from the muscles and joints to a variety of thalamic and cortical structures of the brain

The breath

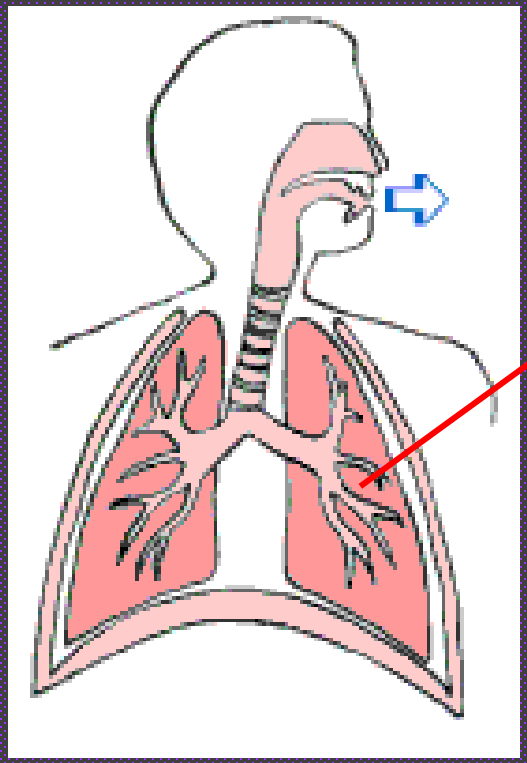
Yogic Breathing

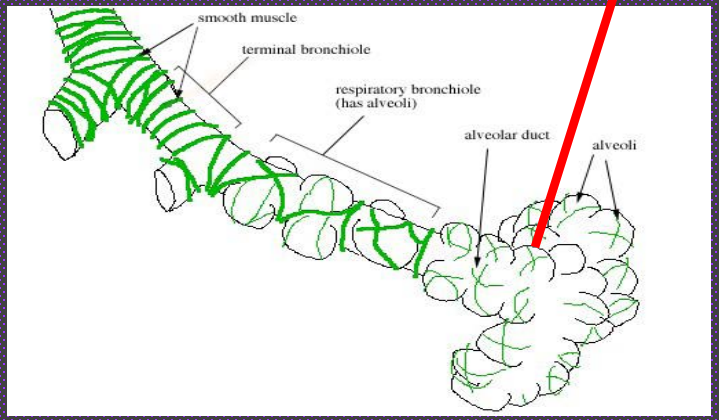
Breathwork - Pranayama



To sustain relaxed attention of the flow and sound of the breath

Yogic Breathing (con't)



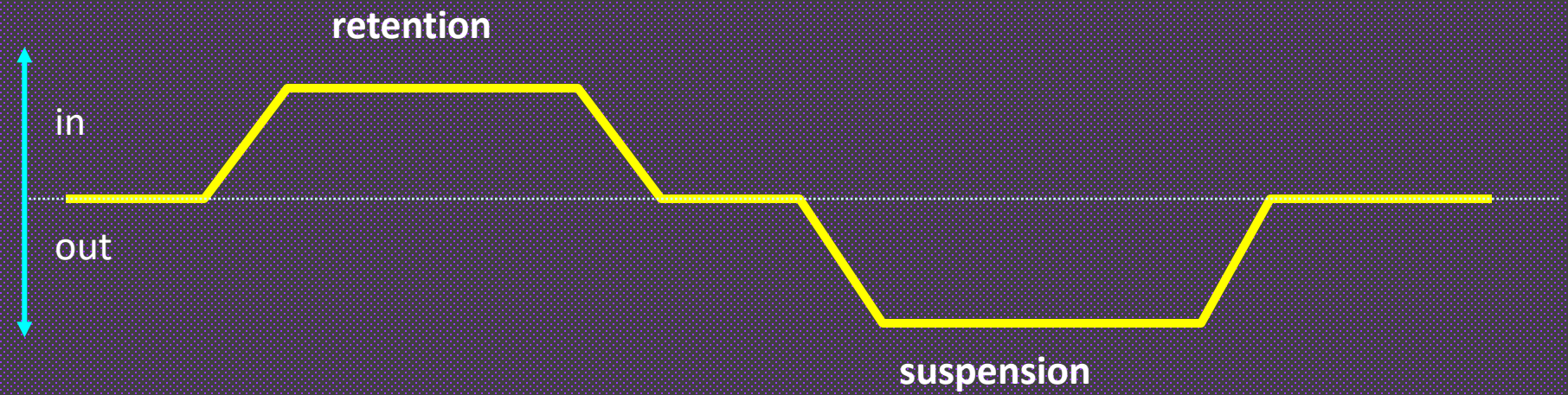


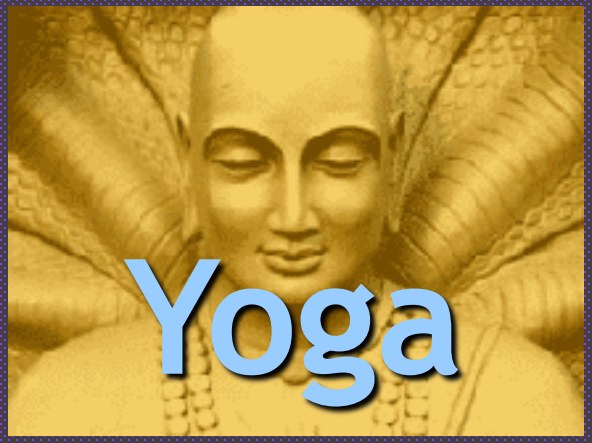
Inhalation & expiration: stretch receptors in pulmonary tissue stimulate vagus nerve (parasympathetic)

Prolonged expiratory phase: further enhancement of inhibitory tone

eg. chanting, singing, pranayama, diaphragmatic breathing.

Graduated but brief breath retentions and suspensions induce a relaxation response





Branches

- Bhakti
- Guru
- Hatha
- Jnana
- Karma
- Mantra
- Raja
- Tantra

Moral observances
Breath control
Concentration
Meditation
Posture
Spiritual integration

Yoga historically refers to the complex system of physical and spiritual disciplines that is fundamental to Buddhist, Jain and Hindu religious practice throughout Asia.

We must differentiate the use of the word **yoga** from participation in **hatha yoga** classes such as that experienced in yoga studios and fitness centers in the United States.

Hatha yoga participation may or may not include spiritual, mindful, and related yogic lifestyle behaviors.

What is Hatha and Vinyasa Yoga?

Hatha yoga is practiced at a slow pace, with focus on the breath, controlled movements, and stretching.

Vinyasa on connecting the breath to your movements, which tend to be set at a faster pace. In a vinyasa practice, you can expect to stay in a constant flow of movements.

Hatha Yoga

- Viniyoga
- Iyengar
- Restorative
- Ashtanga
- Kripalu
- Integral
- Somatic
- Sivananda
- Ananda
- Bikram
- Kundalini
- Tibetan

etc.

Muscle work during yoga asanas

Isotonic force generation as muscle length changes

Isometric force is generated without muscle length changes *(e.g. static yoga asanas)*

Eccentric force is generated but with a lengthening contraction

Research supported benefits of hatha yoga practice

NIH NCCIM

Improves strength, balance and flexibility
Pain management (neck, back, spine)
Decreases arthritis symptoms
Benefits heart health
Helps manage chronic disease(cancer, asthma, MS, and parkinsons disease)
Reduces anxiety and depression symptoms
Increases relaxation and better sleep
Increased energy and brighter moods. ...
Helps manage stress.

•. 2018 Nov;28

Yoga as a Complementary Therapy for Adults with Type 2 Diabetes: Design and Rationale of the Healthy, Active, and in Control (HA1C) Study

Thind H, Bock B et.al. Int J Yoga Therap. 2018 Nov;28 U Mass

The first randomized controlled trial being conducted in the United States to examine the feasibility of yoga in comparison to an exercise group among adults with type 2 diabetes.

12 wks Iyengar yoga vs std ex (2X/wk @ 60min)

Results of HA1c Study

n=48 (30 women)

Yoga produced significant reductions in HbA1c.

Median HbA1c at 6 months was 1.25 units lower for Yoga compared to SE (p .04).

Study completion rate was 92% • Over half of those given yoga continued practice through 6-month follow up

Brock et.al. Complement Ther Med. 2019 February ; 42: 125–131

Recent meta-analysis on Yoga (2023)

1. Verzili B, Valério de Arruda M, Herrmann F, Reyes MB, Galduróz RF. A systematic review with meta-analysis of Yoga's contributions to neuropsychiatric aspects of aging. Behav Brain Res. 2023 Oct 2;454:114636.

2. Price J, Sharma S, Brunet J. Women's experiences with yoga after a cancer diagnosis: a qualitative meta-synthesis-part I. Syst Rev. 2023 Sep 26;12(1):176.

3. Dutta A, Mooventhan A, Nivethitha L. Yoga as Adjunct Therapy for Chronic Heart Failure: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. Avicenna J Med. 2023 Sep 22;13(3):151-162.

4. Miao C, Gao Y, Li X, Zhou Y, Chung JW, Smith GD. The effectiveness of mindfulness yoga on patients with major depressive disorder: a systematic review and meta-analysis of randomized controlled trials. BMC Complement Med Ther. 2023 Sep 8;23(1):313.

5. Asiah ASS, Norhayati MN, Muhammad J, Muhamad R. Effect of yoga on anthropometry, quality of life, and lipid profile in patients with obesity and central obesity: A systematic review and meta-analysis. Complement Ther Med. 2023 Sep;76:102959.

6. Ko KY, Kwok ZCM, Chan HY. Effects of yoga on physical and psychological health among community-dwelling older adults: A systematic review and meta-analysis. Int J Older People Nurs. 2023 Sep;18(5):e12562.

7. Verzili B, Valério de Arruda M, Herrmann F, Reyes MB, Galduróz RF. A systematic review with meta-analysis of Yoga's contributions to neuropsychiatric aspects of aging. Behav Brain Res. 2023 Oct 2;454:114636.

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11. Zhang L, Wang S. The Efficacy of Prenatal Yoga on Labor Pain: A Systematic Review and Meta-analysis. Altern Ther Health Med. 2023 Jul;29(5):121-125.

12. Santino TA, Chaves GS, Mendonça KM. Letter to the editor: The effect of yoga on pulmonary function in patients with asthma: A meta-analysis. Complement Ther Clin Pract. 2023 Aug;52:101778.


Qigong
dynamic meditation

Tai Chi & Qigong exercise

Because of their slow, intentional, internally-directed, nonjudgmental movements can reduce real-time HPA activation and state anxiety

frontiers | Frontiers in Public Health

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Tai Chi for fall prevention and balance improvement in older adults: a systematic review and meta-analysis of randomized controlled trials

Weidong Chen[1,2†], Min Li[3†], Hai Li[2], Yanzhao Lin[2*] and Zhoushan Feng[4,5*]

Total of 24 RCTs were included for meta-analysis, and the results showed that Tai Chi can effectively reduce the risk of falls in older adults (RR: 24%) and decrease the number of falls. Tai Chi can also improve the balance ability of older adults.

Exercise for preventing falls in older people living in the community: an abridged Cochrane systematic review

Cathie Sherrington ,[1] Nicola Fairhall,[1] Geraldine Wallbank,[1] Anne Tiedemann,[1] Zoe A Michaleff,[1] Kirsten Howard,[2] Lindy Clemson,[3] Sally Hopewell ,[4] Sarah Lamb[4]

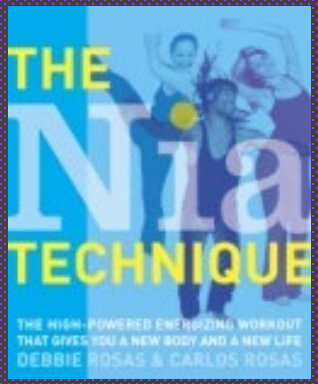
Br J Sports Med 2020;54:885–891 Aus

Balance Exercise, e.g., tai chi, qigong, reduces the number of falls over time by around one quarter (23% reduction). If there were 850 falls in 1000 people followed over 1 year, exercise would result in 195 fewer falls

N=59 studies 12,981 subjects

Pilates

Focuses on strengthening the core muscles and improving flexibility and posture. It involves a series of controlled movements that require concentration and coordination.



The Nia Technique (an amalgam of yoga, qigong, meditation) is based on The Body's Way and incorporates 9 movement energies, 13 primary principles, and 52 basic moves

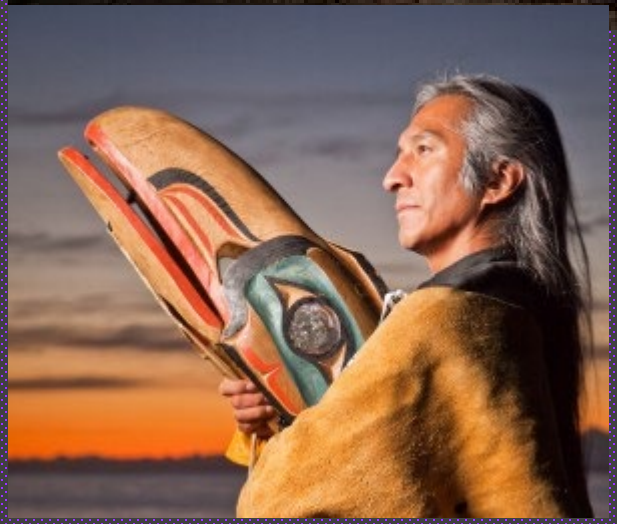

Nia Post heart
transplant

G-I-O

Gibanje - Informacije - Ozavescanje

Movement – Information - Consciousness

American Indian spiritual dance



Cama-i

Bethel AK, 2004

Inuit/Inupiat spiritual dance

Katajjaq

Prolonged mindful exercise

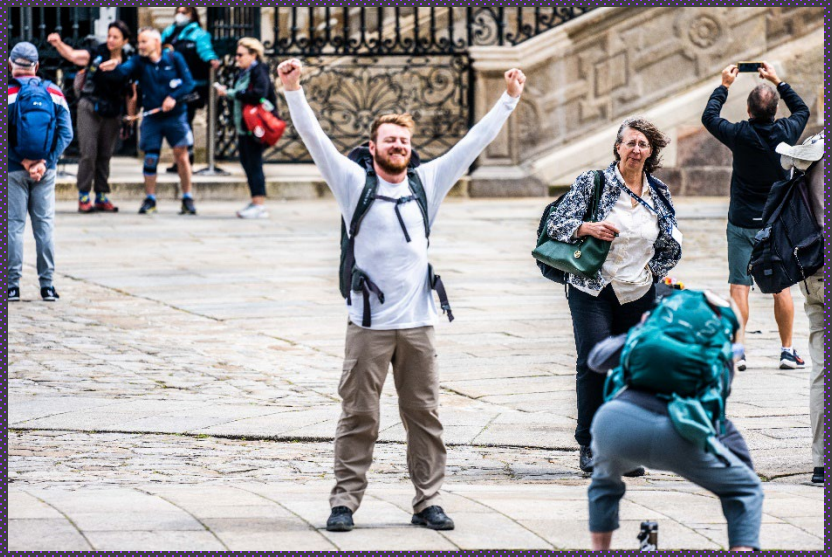
Performed over hours, days, or weeks

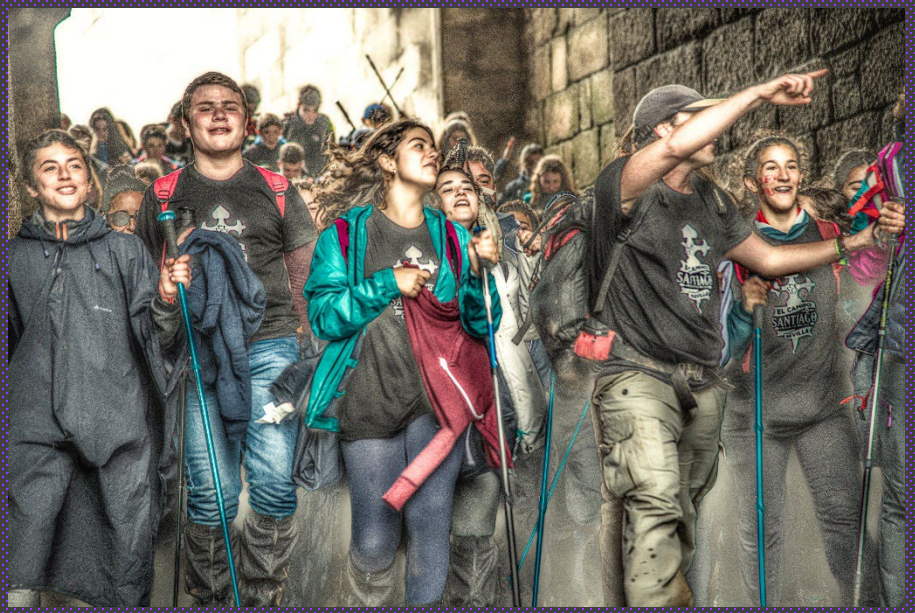
Other mindful practices that employ similar neurophysiologic pathways

Chanting
Singing
Joy
Prayer
Forgiveness
Gratitude

Reciting a mantra reduces respiratory rate

Rosary rescitations





Praza Obradoiro – Santiago de Compostela

Camino de Santiago

Summary

MEx: low level exercise, meditation, and breathwork

Psychobiologic underpinnings support benefits of MEx especially for many chronic diseases

The spectrum of mindful exercise practices include classical and contemporary forms

Other mindful practices employ similar neurophysiologic pathways generating health benefits