

# The neuroscience of Positive Mental Health and Yoga

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New England (HHS Region 1)

**MHTTC**

Mental Health Technology Transfer Center Network

Funded by Substance Abuse and Mental Health Services Administration

# What is positive mental health?

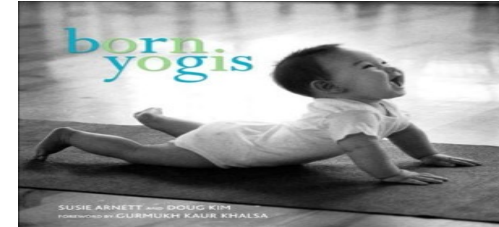
- 'Happiness'
- 'Well-being'
- Feeling 'satisfied'
- Feeling 'positive'
- Finding 'meaning' in life
- Leading to achievement of 'full personal potential'

# Why is positive mental health important?

- *'Mens sana in corpore sano'* Thales of Miletus
- Research has clearly shown that mental state has major impact on physical health & immunity; and vice-versa
- *'Life is what happens to you when you are busy making other plans'* John Lennon
- *'Men are troubled not by things, but how they see them'*  
Epictetus

# Who can achieve positive mental health and **When** ?

- A child?



- An adult?



- A senior citizen?



# Where and when can we find positive mental health?

- At home?



- At school/ college/ office?



- On the sports field/ stage?



- In a restaurant/ bar?





**HOW** can we achieve  
positive mental health?

# Peak experiences

## Mihaly Csikszentmihalyi – ‘*Flow*’



- ‘People are happiest when they are in a state of *flow*—a state of concentration or complete absorption with the activity at hand and the situation. It is a state in which people are so involved in an activity that nothing else seems to matter.
- Also called being *in the zone* or *in the groove*.
- The flow state is an optimal state of *intrinsic motivation*, where the person is fully immersed in what they are doing for its own sake

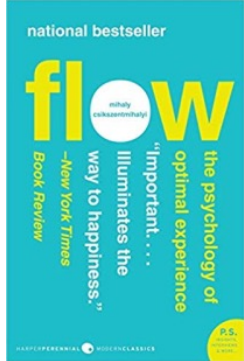
Csikszentmihalyi M. *Flow: The Psychology of Optimal Experience*; 1990

# Optimal experiences

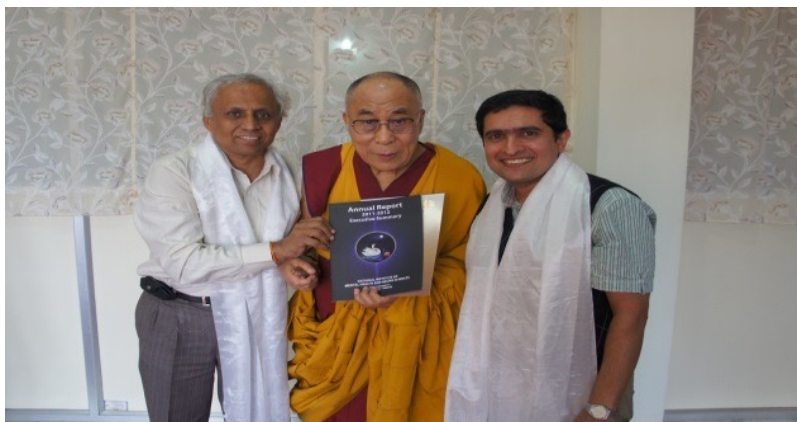
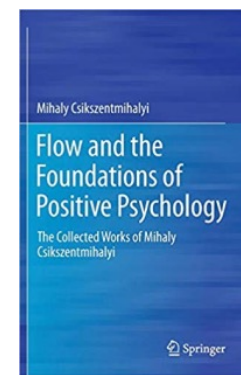
- There is a ***merging of action and awareness***
- Optimal experiences or **flow states** occur when the person's ***skills and challenges are evenly matched***
- Most commonly reported in ***sports, creative arts,*** and surprisingly, ***at work !***
- ***Yoga is one of the oldest and most systematic methods of producing the flow experience***

Czikszenmihalyi M. *Flow: The Psychology of Optimal Experience*; 1990





# 'Flow'

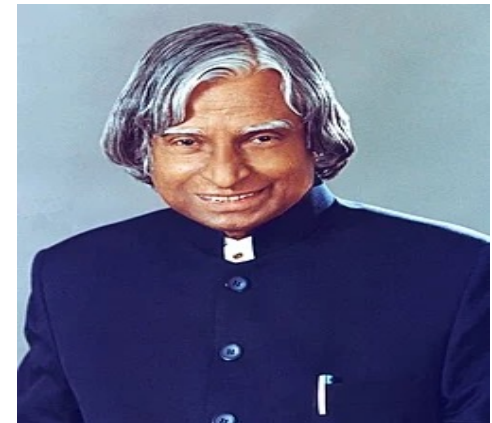
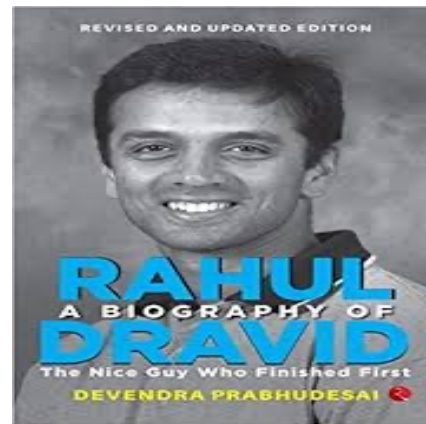


# Pleasure VS Enjoyment

- ***Pleasure*** is a homeostatic experience when ***physiological needs*** are ***satisfied***
- ***Enjoyment*** occurs when ***skills*** are used to match increasingly complex **challenges**
- ***Pleasure*** leads to ***contentment***, whereas ***enjoyment*** leads to ***change and growth***

# How to achieve positive mental health...

- A healthy and 'trained' **body** and **brain** are the basis of a **sustained** positive mental state
- Both respond remarkably well to training



# How to **train the brain?**

- Past **Vs** current understanding of brain functioning
- Specific brain areas **Vs** brain circuits and networks
- Human brain **Vs** computer

# Neuro – ‘plasticity’

- **Donald Olding Hebb** – Father of neuropsychology and neural networks
- **Hebb’s Law – ‘Neurons that fire together wire together, and neurons that are out of sync lose their link’.** ‘Organization of Behavior’ – 1949
- This is the basis of our ability to rewire our brains, behaviours, moods and thoughts.

# How to **train the brain...**

- 'Practice makes perfect'
- 10000 hour rule
- Implicit **Vs** Explicit memory/ skills
  
- **System 1 Vs System 2**  
Thinking fast and slow - Daniel Kahneman

# Ways to 'train' the brain

- Yoga (includes meditation!)
- Intermittent fasting
- Having novel experiences
- Learning a new skill
- Reading

# What is Yoga?

योगस्थः कुरु कर्मणि  
सङ्गं त्यक्त्वा धनञ्जय ।  
सिद्धिं असिद्ध्योः समः भूत्वा  
समत्वं योग उच्यते ॥

Perform action, O Dhananjaya,  
being fixed in yoga, renouncing attachments,  
and even-minded in success and failure;  
**equilibrium is verily yoga**

(Bhagavad Gita Chapter 2 - Samkhya Yoga - Sloka 48)



*If you can meet with Triumph and Disaster; And treat those two impostors just the same*

*If: Rudyard Kipling 1910*



# ***Ashtanga Yoga (Patanjali)***

- 1. Yama***
- 2. Niyama***
- 3. Asanas***
- 4. Pranayama***
- 5. Pratyahara***
- 6. Dharana***
- 7. Dhyana***
- 8. Samadhi***



# Asana – Yogic Concept

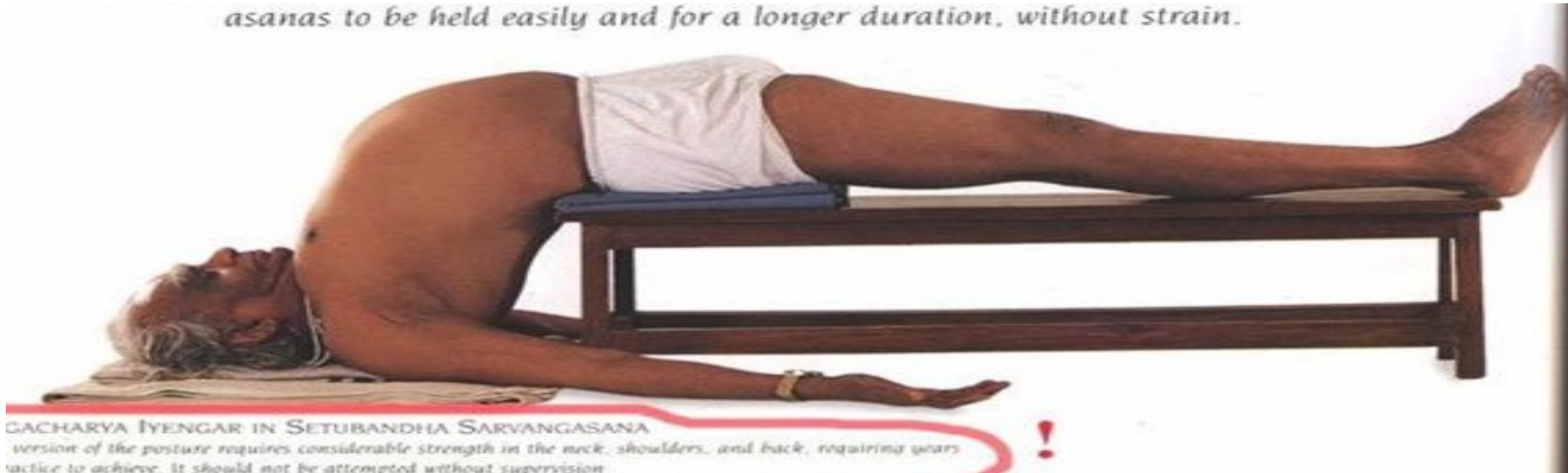
Yoga Asana is not exercise

<u>Action /Asana</u>	<u>Exercise</u>	<u>Yoga</u>
Movements	Dynamic	Steady
Movements	Speedy	Slow
Movements	Isotonic	Isometric
Heart Rate	Increases	Decreases
Respiratory Rate	Increases	Decreases
Blood Pressure	Increases	Decreases
B.M.R	Increases	Decreases



# What Yoga is and what it is not!...

*asanas to be held easily and for a longer duration, without strain.*



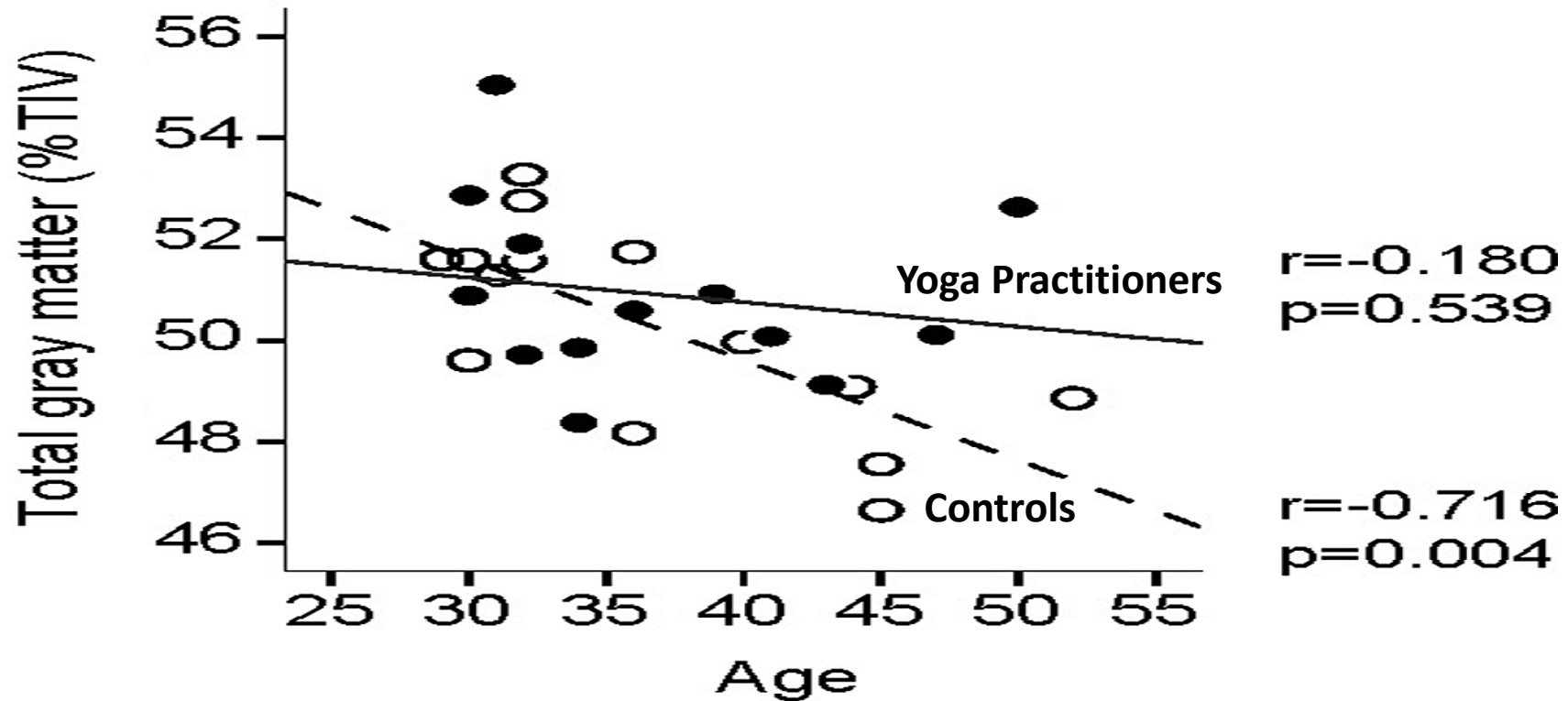
# Effects of Yoga



- Physical – Flexibility, coordination, and strength.
- **Mental – Stabilization of the mind**  
*‘Yoga chitta vritti nirodah’*  
  
*‘Samatvam Yoga Uchyate’*

# Neuroprotection from Yoga

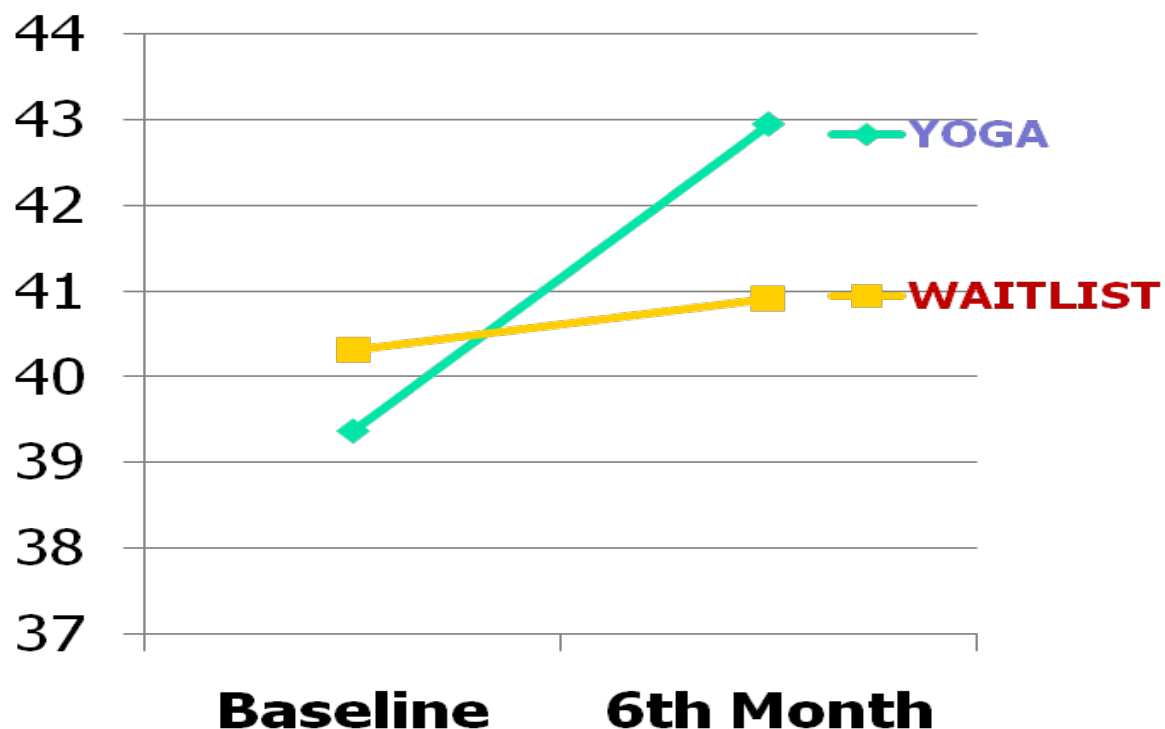
*Frontiers in Human Neuroscience, May 2015*



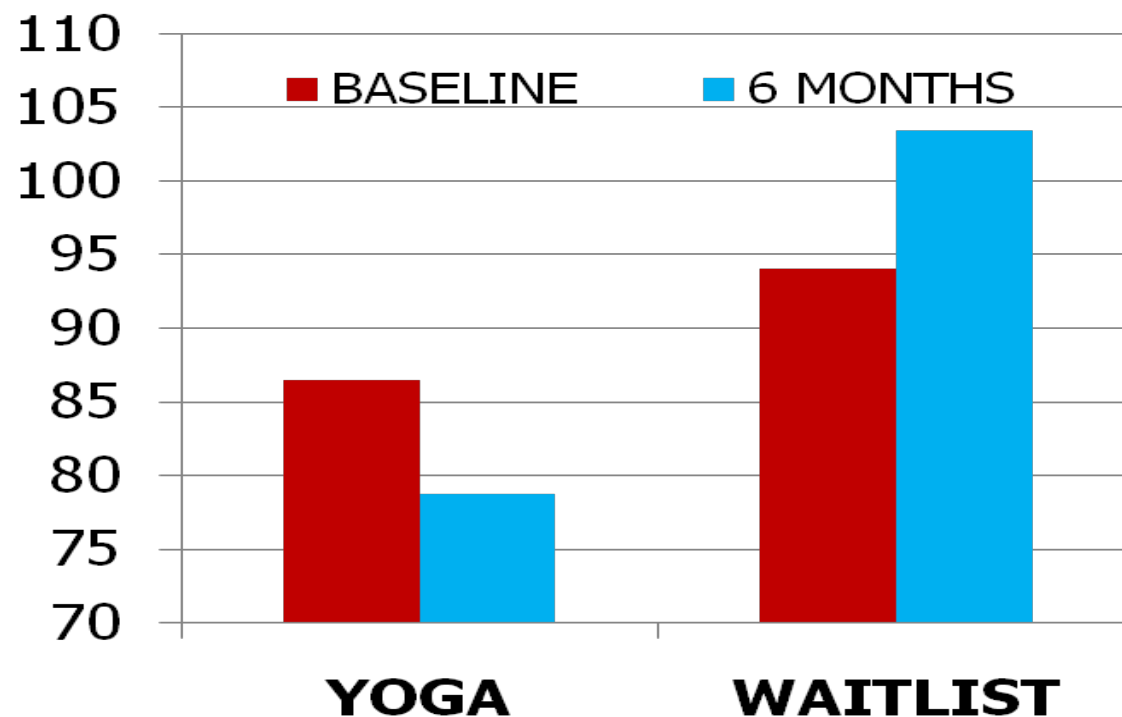
# Yoga and Cognition in the elderly

N= 120, Intent-to-treat analysis

## Memory: RAVLT



## Non-Memory : Trail Making - A



*Hariprasad et al Ind J Psychiatry 2013*

# Yoga in mental health - Major research findings from NIMHANS

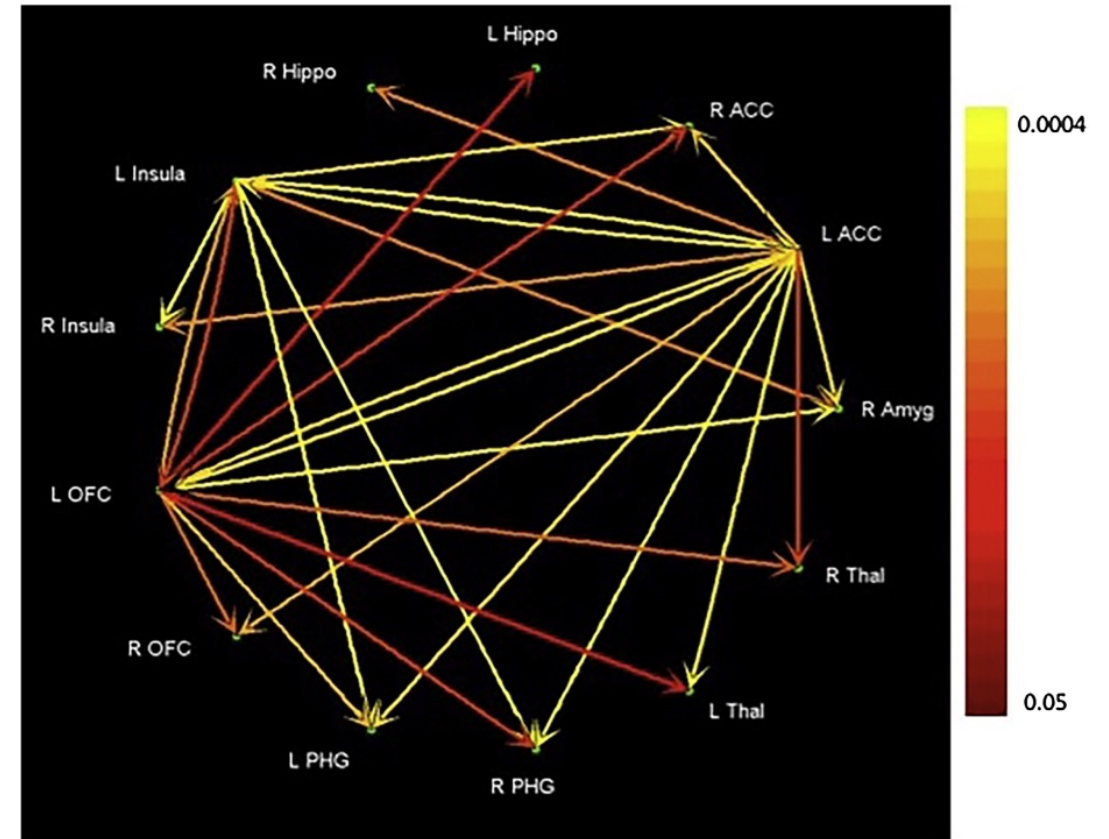
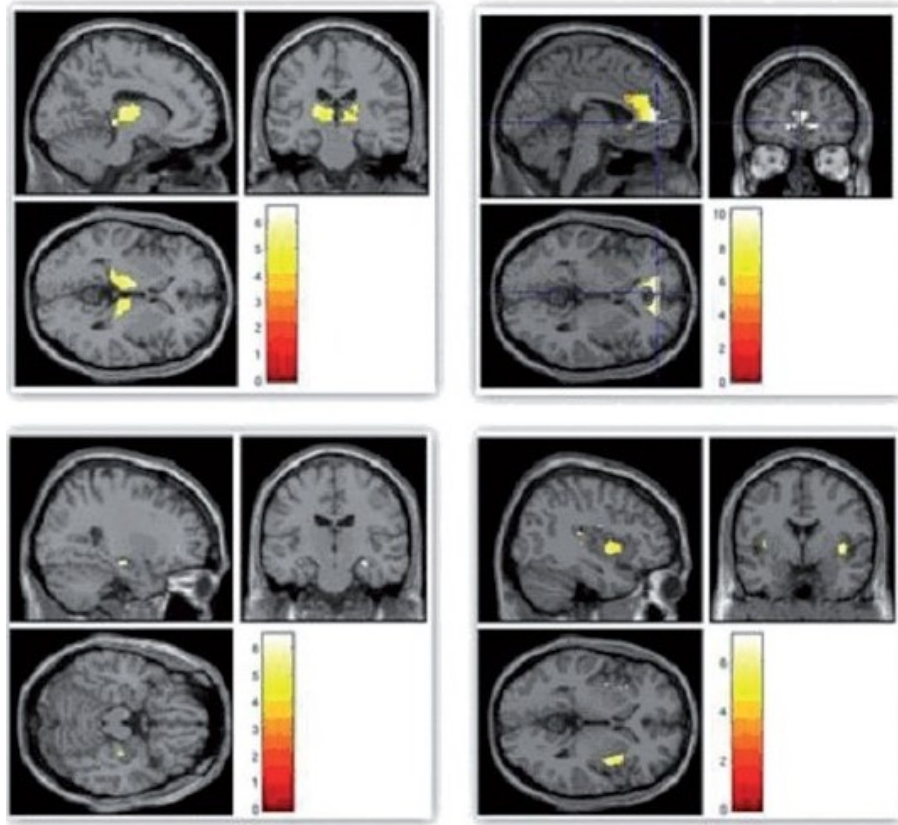
Disorder	Clinical finding	Biological correlate
Depression	Improvement in symptoms and cognitive functions	Decrease in Serum Cortisol & Increase in plasma BDNF
Schizophrenia	Improvement in symptoms as well as functioning and social cognition	Increased oxytocin & Mirror Neuron Activity, improved 'connectivity' of brain networks
Cognitive impairment in the elderly	Improvement in cognitive function, sleep, quality of life	Increase in hippocampal gray matter volume
Alcohol Dependence	Reduction in depressive symptoms and improvement in sleep	Decrease in cortisol and ACTH
Other psychiatric disorders	Improvement in symptoms	To be investigated

# Yoga Mechanisms

- **One learns Yoga from a teacher**
- **Postures have to be imitated**
- **Performing them with mindfulness**
- **Attention to synchronizing breathing with movements**
- **Remain physically relaxed except the posture**
- **Focus on the experiences with each posture**
- **Specific breathing practices (Pranayama)**

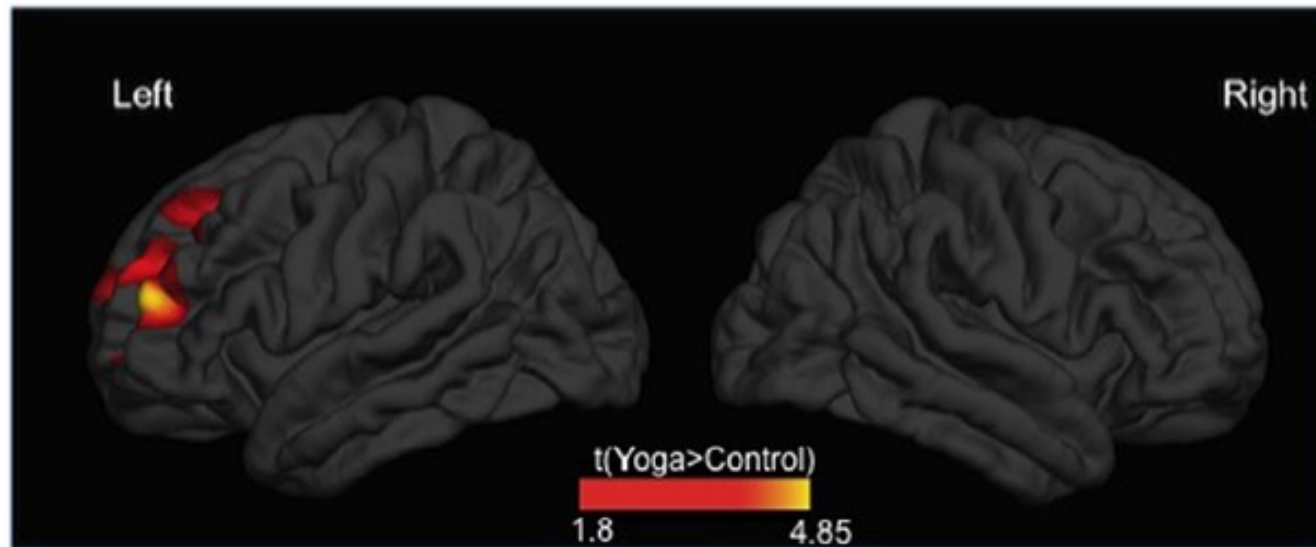






# OM chanting – limbic deactivation

(Kalyani et al. 2011; Rao et al. 2018)



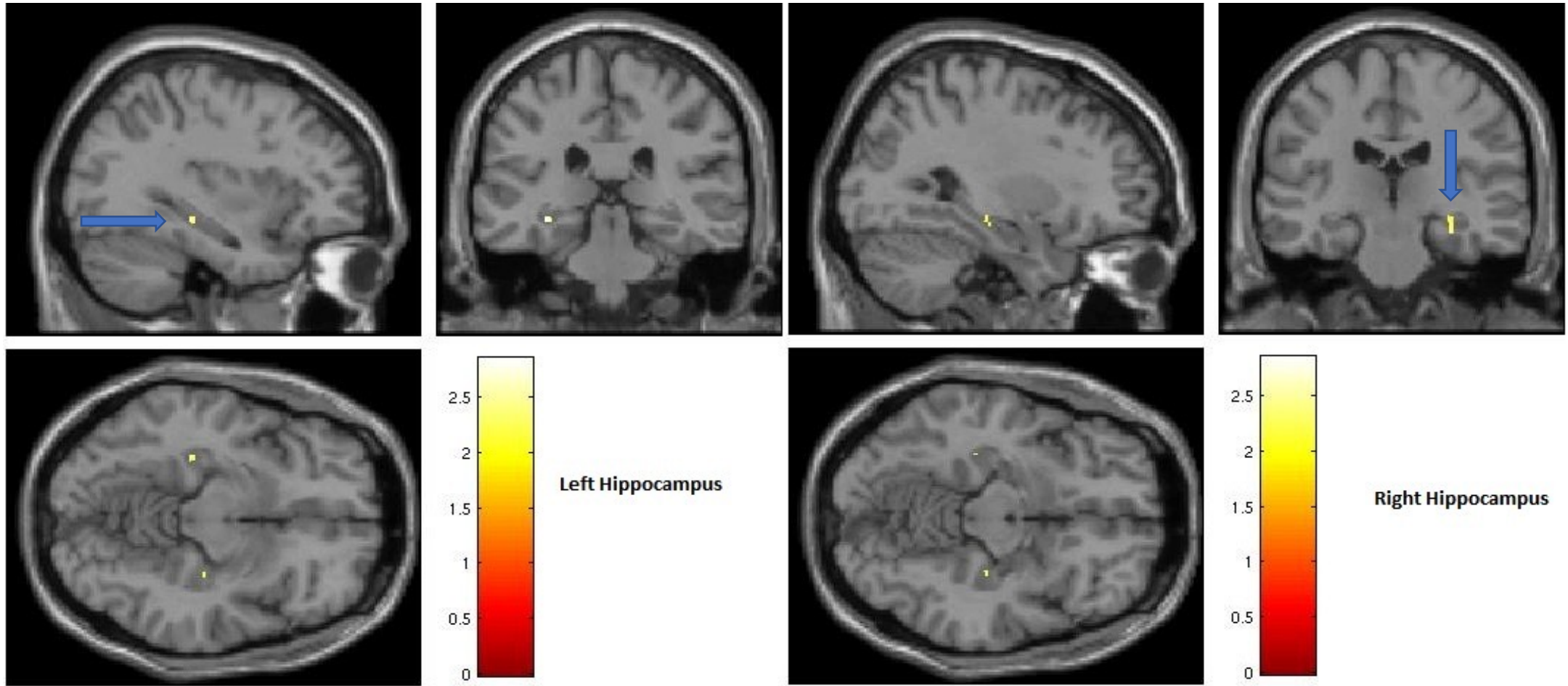
**FIGURE 1** | Differences in cortical thickness (CT) between yoginis and controls ( $P < 0.05$ , cluster corrected). Yoga practitioners showed greater CT in a cluster in the left prefrontal cortex (RTF-based, cluster-corrected,  $p < 0.05$ ).



## Greater Cortical Thickness in Elderly Female Yoga Practitioners—A Cross-Sectional Study

Rui F. Afonso<sup>1</sup>, Joana B. Balardin<sup>1</sup>, Sara Lazar<sup>2</sup>, João R. Sato<sup>3</sup>, Nadja Igarashi<sup>1</sup>, Danilo F. Santaella<sup>1,4</sup>, Shirley S. Lacerda<sup>1</sup>, Edson Amaro Jr.<sup>1</sup> and Ellsa H. Kozasa<sup>1\*</sup>

# Structural neuroplastic effects (increase in grey matter) in the hippocampus after Yoga practice of 6 months in healthy elderly



n=7

Hariprasad et al, Ind J Psy 2013

# Dealing with crisis

Father, give us courage to change what must be altered, serenity to accept what cannot be helped, and the insight to know the one from the other.

*Reinhold Niebuhr 1943*

If there's a remedy when trouble strikes,  
What reason is there for dejection?  
And if there is no help for it,  
What use is there in being glum?

*Shantideva of Nalanda University  
(8<sup>th</sup> Century)*

# Take home messages

- Positive mental health is a matter of ***training and strengthening of selected brain networks***
- The ***brain*** is an excellent ***trainee!***
- ***Neuroplasticity*** is possible in all of us
- ***Enjoyment*** and ***Flow experiences*** lead to change and growth

# Take home messages...

- ***Yoga*** is one of the most systematic methods of training the body and the brain
- ***Intermittent fasting, novel experiences, learning new skills, and involved reading*** are other ways
- ***Challenge*** yourself and ***enjoy*** it!
- Focus on **yourself** and **what you can control**

# Acknowledgements



## **COLLABORATORS**

Art of living, Bangalore

SVYASA Yoga University

MDNIY, New Delhi

AYUSH Department

## **NIMHANS Team**

Prof. B N Gangadhar

Dr. G Venkatasubramanian

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NIMHANS Integrated Centre for  
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Dept. of Integrative Medicine

# THANK YOU



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