Science and Practice of Mindfulness and Compassion

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Goal

Reduce Suffering
Optimize Performance

Mindfulness
Compassion
CBT
Aerobic Exercise

Brain-Behavioral Mechanisms

Stress, Depression
Anxiety, Pain

Regulatory Cortical System
Emotion Limbic System
Mental States
Meditation

Bhavna (Sanskrit)

- cultivate positive qualities
- develop intimacy and insight into mental processes
Developmental Trajectory of Contemplative Training

• **Concentration**
  – Focused attention
  – Open monitoring
  – Image (visualization)
  – Sound (mantra)

• **Analytic-Conceptual-Reasoning**
  – Impermanence & Death
  – Loving-kindness, empathy, compassion

• **Non-duality, emptiness (shunyata), interconnectedness**

• Dissolving distorted view of nature of self
Components of Mindfulness

Tang et al., 2015, Nature Reviews Neuroscience
Brain Regions Implicated in Mindfulness Meditation

Tang et al., 2015 NatureReviewsNeuroscience
Attention Control, Emotion Regulation, Self-Awareness

Tang et al., 2015 NatureReviewsNeuroscience
Emotion Reactivity
Reacting to Negative Self-Beliefs

Self-Focused Brain Network

Thresholded at $t \geq 3.69$, voxel $p < .005$, cluster volume $\geq 163$ mm$^3$, cluster $p < .01$.

Goldin et al., Emotion 2009
MBSR
Mindful Attention

Goldin et al., Emotion 2009
Self Across Time
Meta-Analysis of Self-Focused Processing

Cortical midline structures: ventromedial prefrontal, dorsomedial prefrontal, posterior cingulate/precuneus

Statistical analysis based on 27 PET and fMRI studies on self-related tasks published between 2000 and 2004

Northoff et al. 2006, NeuroImage
Psychological Functions Embedded in Brain Networks

- Inhibitory
- Salience
- Self
- Language
- Sensory
- Reward
- Emotion
- Cognitive & Attention Regulation
- Empathy
Process Model of Attention Training

- Follow Breath
- Distraction
- Notice Distraction
- Reorientation of Attention
Mind Wandering

Distraction Awareness

Sustaining Attention

Reorientation of Attention

Ricard et al. Scientific American (2014) 311:38-45
A Wandering Mind Is An Unhappy Mind

Killingsworth and Gilbert, Science 2010

47% of 2,250 adults
High mind-wandering tendency is associated with shorter telomere length.

Fig. 1. Leukocyte telomere length by mind-wandering groups.

Epel et al., 2013, Clin Psych Sci
Attention Practices

Focused Attention
Focusing attention with gentle intensity on an object in a sustained manner

Open Monitoring
Monitoring the stream of thoughts, emotions, images, and sensation from moment to moment
FA & OM
Bodily sensation topography of emotions associated with words

Nummenmaa et al, 2014, PNAS
Bodily awareness $\rightarrow$ Emotional Awareness $\rightarrow$ Empathy $\rightarrow$ Compassion

Singer, Science, 2004
"I feel the capacity to care is the thing which gives life its deepest significance." – Pablo Casals
Compassion: Multidimensional & Complex

**Cognitive**: an awareness of suffering (cognitive/attentional component)

**Affective**: sympathetic concern related to being emotionally moved by suffering

**Intention**: a wish to see the relief of that suffering

**Motivation to act**: a readiness to help relieve that suffering

(Jinpa, 2010; Goldin & Jazaieri, 2016)
Frontoparietal “Mirror” Neuron System for Imitation


Neural Bases of Understanding Others’ Pain

- **Cognitive perspective taking**
  - mental representation of other; social cognition

- **Empathy**
  - in responses to pain, disgust, taste, and touch
  - emotion, sensation

Hein, Singer, Current Opinion in Neurobiology. 2008
Just like me
Compassion Cultivation Training (CCT)

• Stabilizing the mind
• Compassion
• Shared Humanity
• Active compassion
  – giving and taking (tong-len)
• Integrated Practice

Class structure: practice, pedagogy, experiential exercise, moistening the heart

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Have you done anything kind or caring today for:

- **Yourself**
  - No
  - Yes

- **Another**
  - No
  - Yes
Have you completed a formal practice today?

No

Yes, In the last hour

Yes, more than an hour ago

Formal practices are the guided meditations, and can be competed with or without the guiding audio.
Self-caring behavior is 6.5 times more likely if a person meditated (p<.01)
Other-caring behavior is 3.5 times more likely if a person meditated (p<.01)
Loving-Kindness Meditation Enhances Telomere Length in Women

Hoge et al., 2013, Brain, Behavior, and Immunity
SEARCH INSIDE YOURSELF

Mindfulness-Based Emotional Intelligence & Leadership Training

Google
“Love and compassion are necessities, not luxuries. Without them humanity cannot survive.”

– His Holiness the Dalai Lama
A human being is part of a whole, called by us the ‘Universe,’ a part limited in time and space. He experiences himself, his thoughts and feelings, as something separated from the rest - a kind of optical delusion of his consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few persons nearest us. Our task must be to free ourselves from this prison by widening our circles of compassion to embrace all living creatures and the whole of nature in its beauty." ~ Albert Einstein
Thank you for your attention
YouTube talks:

Neuroscience of Mindfulness Meditation

Neuroscience of Emotion

Wisdom 2.0

Science Café SF

NerdNite SF