Strategy Central

Mindfulness Impacts on the Brain, Executive Functions, and Emotions.

Science, Activities and Resources

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Objectives

- Participants will be exposed to a variety of resources and practice strategies
- Participants will gain a big picture understanding of mindfulness, neuroscience and intervention relevance
- Participants will learn about the top-down and bottom-up stages of mindfulness
- Participants will be provided with an overview of mindfulness program options with practice / strategy examples
Belly Breathe with Elmo

- https://www.youtube.com/watch?v=_mZbzDOpyIA
Books!

- *Visiting Feelings*
- *Anh’s Anger*
**Picture of Pediatric Center Bookmarks**

**Just Breathe**

The Brain and Mindfulness
When you breathe in, you stimulate neurons. That leads to positive brain changes. It's like a workout for your brain!

Deep breathing increases the supply of oxygen to your brain and promotes a state of calmness.

Paying attention to sensations in the body can lead to:
- improved attention
- decreased impulsivity
- learning and practicing skills in self-regulation
- increased awareness of emotions
- decreased anxiety
- a better sense of interpersonal connectedness, compassion, and empathy within a safe social setting
- increased happiness

**Breathing Benefits in School**
When kids practice meditation:
- More kindness
- Better math scores
- Fewer ADHD symptoms
- More self-control
- Less depression
- Improved focus

Try "Teddy Bear Breathing"
- Lie on your back. Place one hand on your chest and place your favorite teddy bear on your belly button.
- Close your eyes and relax your whole body.
- Breathe in slowly through your nose. Your teddy bear should slowly rise, but your chest should not.
- When you have taken a full deep breath, hold it, count to three, then slowly breathe out.

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Try "Square Breathing"
- Hold your breath
- Breathe in
- Hold your breath

**Did you know?**

- Exercise has known emotional, brain, and physical health benefits.
- Exercise improves several thinking skills including attention, concentration, impulse control, and memory.
- Exercise may help ease symptoms in those with:
  - ADHD
  - Anxiety disorders
  - PTSD
  - Depression

Exercise and the brain

Exercise causes release of endorphins, dopamine, serotonin, and other neurochemicals which help regulate mood. Sometimes health care providers prescribe exercise instead of medication.

Exercise causes more blood flow to the brain which can cause heightened alertness, focus, and satisfaction.

Research has shown sustained aerobic exercise, such as 20 minutes of bike riding, jogging, or vigorous walking, performed several times each week, has the best results.

Organized exercise has the added benefit of socialization and relationship development, pursuit of individual and team goals (important for executive functions), the opportunity to learn to follow guidance offered by a supportive adult, and acquiring self-control skills.

**Benefits of Exercise**

Studies show one hour of exercise daily in children can lead to:
- Improved mood
- Increased alertness
- Improved sleep
- Better academic performance
- Relieved tension and stress
- Increased motivation

Edmund N. Ervin
Pediatric Center
TWO BRAINS
but it’s not what you think
The Second Brain

The Gut Brain (The enteric nervous system)
Language expressions

- A gut feeling
- Knots in my stomach
- Heart in my stomach
- The way to a (man’s) heart is through his stomach
- Butterflies in my stomach
- I can’t stomach that
- Difficult to stomach
- A volcano in my tummy
- Trust your gut
Stimulating the abdomen: Voo!

- Anchor of tummy
- Sitting or standing
- Bringing breath in
- Letting VOO out until the breath is done

- Paying attention to what is happening in the stomach

- Image: Sound like a lighthouse to bring your attention home and focus on what is important. The sound will bring you back and your lighthouse light will be brighter.

The gut has a lot to say to the brain. Let’s help it out!
● Peter Levine introduced the Voo.

● About What Porges says:

  ○ The afferent feedback from the viscera provides a major mediator of the accessibility of prosocial circuits associated with social engagement behaviors.
Meditation and Neuroplasticity

A new wave
Your brain as a muscle

Soft, not hardwired
● Right anterior insula
  ○ Biggest change was in this area

● Right middle and superior frontal sulcus (Brodmann areas 9 and 10)

● Why right hemisphere. Essential for sustaining attention.

● Meditation may slow age related thinning of the frontal cortex.
Frontal lobe plasticity

- Inhibition of emotional responses
- Decision making

Important because ...

- Self Regulation
- Impulse Control
- Self Monitoring
Insular lobe plasticity

- **Focused Attention Meditation**
  - Prevents attentional drifts away from the task at hand.
  - Initiates a switch back to the object of attention.

- **Compassion Meditation**
  - "in touch" with the sensations of the body
  - Interoceptive awareness

- The right anterior insula may be involved in signaling the need for attentional investment.

Cognitive Flexibility

Also, larger gray matter concentration in the right insula confirmed in 2008 study by Holzel and colleagues.
**Structural MRI:**  Gray Matter Density

**Mindfulness Based Stress Reduction**
- 16 MBSR participants
- 16 control

**Hippocampus Plasticity**
- **Left Hippocampus**
  - Thought to be involved due to
    - modulation of cortical arousal and responsiveness
    - regulation of emotion
    - improved well-being


See Also Luders et al (2012). Global and Regional Alterations Of Hippocampal Anatomy in Long-Term Practitioners
Meditation-Induced Neuroplastic Effects

- Significantly enlarged hippocampal volumes in the right hemisphere
  - Hypothesized to be related to the meditators ability to cultivate positive emotions, retain emotional stability, and engage in mindful behavior
  - Age range between 30 and 71 years (mean age 53.00)
  - Years of meditation practice between five and 46 years (mean 24.18 years)
    - All different types of meditation
    - 59% had a daily practice ranging from 10 to 90 minutes
Diffusion Tension Imaging

- Diffusion Tensor Imaging
  - capable of measuring white matter’s structural plasticity
Anterior Cingulate Cortex Plasticity

- Two week Training (5 hours total)
  - Chinese undergraduates (avg age 20 years)
- Integrated Body Mind Training vs Relaxation
- Before training, no differences

- Meditation Training
- increases the ability to resolve conflict in a cognitive task
- altered neural activity in the ACC
- improved connectivity of the ACC to other brain regions
- improved self regulation may be mediated by the increase of the communication efficiency between the ACC and other brain areas
- Conclusion is after two weeks there was a change in AD (axons) but it was only after four weeks that there was a change in RD (myelinization)

MBSR, Stress and the Amygdala

- 26 participants with high levels of stress. Mean age 35.2 years.
- Significant correlation between Perceived Stress Scale scores and changes in gray matter density. As stress levels decreased, the greater the decrease of gray matter density in the right amygdala. (The change in amygdala density was not a main effect.)
- Change in stress facilitate changes in amygdala, that facilitate change in this structure’s gray matter.
- Why right amygdala? The right amygdala mediates an initial, fast and perhaps automatic stimulus detection, followed by an evaluative and discriminative response by the left amygdala.

This was first study to show morphological changes in a measure of a psychological state.

MBSR = Mindfulness Based Stress Reduction
Mindfulness as an Attention Intervention

How we focus attention helps directly shape the mind.
The faculty of voluntarily bringing back a wandering attention, over and over again, is the very root of judgment, character, and will... An education which should improve this faculty would be the education par excellence.
You can alter your life by altering the state of your mind.

~ William James
Vigilant Attention (VA)

Vigilant attention to unchallenging uninteresting activities.

- Distinct from shifting, or controlling selectivity.
- It is harder to pay attn. in an uninteresting task.
  - Increased stress response
  - higher subjective effort
  - fatigue over time
  - resource depletion.

- Boredom $\rightarrow$ increased absent mindedness and mindwandering.
- Reallocation of resources away from the VA task
- Requires constant self regulation; self regulatory power a limited resource.
- Arousal; sustained attention.

Vigilant Attention Network

● Lateral Aspect
  ○ Primarily Right Lateralized Brain Networks in VA
    ■ Doromedial, mid- and ventrolateral prefrontal cortex
    ■ Anterior insula
    ■ Parietal areas: intraparietal sulcus and temporoparietal sulcus
    ■ Subcortical structures: cerebellar vermis, thalamus, putamen, midbrain

● Dorsal-Ventral Aspect
  ○ Initially requires bottom-up detection of the “perceptual” event (lower level of nervous system involved
  ○ Requires top down attentional control to maintain the cognitive effort
  ○ Anterior-Posterior Aspect: Distributed from front to back

Attention Information Processing

- Organizing principal
  - lateralization decreases with increasing task difficulty.
- The right hemisphere
  - maintains the attentional focus
- The left hemisphere
  - recruited due to increasing cognitive challenges.

Stages of Meditation

Early/Beginning:
Effortful Focus

Middle:
Flexibly bring attention back to object of focus

Advanced:
Effortless noticing
Personal Progression

Mindfulness/Meditation

Attention Control → Emotion Regulation → Self-Awareness

Self-Regulation
Types of Meditation

(Information Processing) Types of Meditation

- **Focused Attention**
  - Top Down
  - Effortful / with Intent
  - Executive Driven
  - Goal Directed
  - Cognitive

- **Open Monitoring**
  - Bottom - Up
  - Effortless
  - Sensation/Feeling Based
  - Noticing
  - Nonjudgemental
Top-Down

- **Holding the balloon**
  - Synchronize your breathing with the balloon
  - Balloon bigger and smaller
  - Rotating the balloon, Swirling the balloon
  - Let the balloon move you, swirl around your core
  - Balloon back to the center of your body
  - Self soothing

- **Hands arced slowly over head**
  - Breath in
- **Hands overlapped**
- **Pressing it down, like a ball.**
  - Breath out

- **Settles the system**
Bottom-Up

- Stand, use the bottom of the feet as an anchor
  - For mindfulness, hands folded on the belly, anchor
  - Your attention goes where your hands are
  - This is self soothing

- Qigong shaking
  - If lots of energy, just bounce on your feet
  - Maybe a noise
  - Stop!
  - Check in with mindfulness…
  - Breathing with body motion
  - The energy shifts
Bottom-Up

Body Scan
Yoga to get a body sense
Attention / Executive Function Training leads to Social/Emotional Learning

So, how do we introduce this to our kids?
Examples of Curriculum’s

● The Mindful Child

● Mindful Schools (Mindful school)
  ● K5 Curriculum -- with workbook
  ● Middle and High School Curriculum -- with workbook

● MindUp (The Hawn Foundation)

● Kindness Curriculum (Richard Davidson, University of Wisconsin)

● Tang: Integrative Mind-Body Training
The Mindful Child

- Clear Mind Jar

- Moody Cow

https://www.susankaisergreenland.com/inner-kids-index
Mindful Schools (https://www.mindfulschools.org/)

Comprehensive curriculum requiring certification

- Mindfulness Fundamentals
- Mindful Educator Essentials
- Yearlong Certification Program

The philosophy is that you can’t teach mindfulness without practicing it.

Through the program, the participant acquires continuing education in mindfulness. Their practice is deepened. A week long opening and closing retreat provides a bonding, educational and practice experience.

The program goes through developmental applications of mindfulness, including with special populations (for example autism and trauma). Much continuing education is provided around these topics.

Every certification participant is required to teach the curriculum. There are weekly internet office hours, and to be certified, you must submit a video of yourself delivering a lesson.
from the Hawn Foundation

- Beginning neuroscience
- Brain Power activity sheet
- “Getting to Know and Love your Brain”
  - Introducing prefrontal cortex, amygdala, and hippocampus
  - Draw a picture of the brain
  - Speech balloon of how the PFC, Amygdala, and HPF react to a scary situation
  - P.34 content

- Mindfulness skills connected with literature with comprehensive suggestions
- The Story of Ferdinand
from the Hawn Foundation

- Mind-Up: Brain Focused Strategies for Learning – and Living
- Pre-K – 2
- Grades 3 – 5
- Grades 6 – 8
- Lessons are also family friendly for the home environment
- 
  https://mindup.org/thethawnfoundation/

- Movement break to engage the PFC
  - Stand, Take slow deep breaths, Lift your left leg
  - Concentrating on a focal point engages the PFC!

Discussion:

- How did you feel when you tried to balance?
- What did you stare at to keep your focus?
- What was the hardest part about balancing?
Kindness from MINDUP

- Broaden children’s thinking with the following questions:
- How long does it take to be kind?
- Think about the feeling you have when someone is kind to you. How long does that feeling last?
- To be kind, do you need to spend any money?
- Who or what in our world should we be kind to?
- How do you feel when you’re kind?
Kindness Curriculum
Center for Healthy Minds
https://centerhealthyminds.org/join-the-movement/sign-up-to-receive-the-kindness-curriculum
WHO should use mindfulness?

- A relatively new field with promising and incomplete results, though several very responsible, ie “mindful” stakeholders
  - Parents
  - Teachers
  - Providers
  - Kids

- For development of brain systems, improved well-being, better understanding of self and others, provide better care, better sense of community, for diagnostic conditions (well established efficacy in anxiety, PTSD, depression, autism ....)
Apps

- Wuf Shanti Yoga Fun Machine
- Breathe, Think, Do with Sesame
- Meditations for Kids
- Breathing Bubbles
- Smiling Mind
- Mindful Powers
- Stop, Breathe & Think Kids: Focus, Calm & Sleep
- Stop, Breathe & Think (Ages 10+)
- Calm
- Three Good Things - A Happiness Journal
- DreamyKid Meditation App Just for Kids

- Headspace: Guided Meditation and Mindfulness
- Zen Bound 2 Universal
- 5 Minute Escapes - Guided meditation & relaxation
- Virtual Hope Box
Hope (https://sesamestreetincommunities.org/topics/traumatic-experiences/)

- Comfy-Cozy Nest
- H is for Hope
- Feeling Safe
- Give yourself a Hug
- Birthday breathing with the count
- I can let my feelings out
- I can calm myself down
- I can do it! (positive language)
- Care, cope connect
Out in the Lobby

- What we practiced
- Resource List
- Zen Coloring Page
- Bookmarks for your clients

Thank You!