

## Caryn McAllister, DPT



- Owner High Quality Home Therapy
- 22 years clinical experience as PT
- 10 years of research experience
- Treats variety of diagnosis but specializes primarily in complex medical conditions
- Strongly believes in mind / body connection
- Loves collaborating with OTs ☺

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## After this course, attendees will:

- Understand the neurological changes associated with mindfulness (neuroplasticity)
- Identify the benefits of mindfulness with activities of daily living
- Be equipped with specific strategies / techniques that can be immediately incorporated into daily practice

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## Mindfulness Quiz

1. What is mindfulness?
2. What are 4 benefits of mindfulness?
3. Which area of the brain has been shown through fMRI studies to change most after 8 weeks MBSR?
4. List 3 strategies you can incorporate into practice with your patients.

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## What is Mindfulness?

“The state, process, and practice of remembering to observe moment-to-moment experiences with openness and without automatic patterns of previously conditioned thoughts, emotions, or behaviors.”

American Mindfulness Research Association  
<https://goamra.org>

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## Mindfulness

- involves **acceptance**, that we pay attention to our thoughts and feelings **without judging** them—without believing, for instance, that there’s a “right” or “wrong” way to think or feel in a given moment.
- is the practice bringing one’s attention to the internal and external experiences occurring in the present moment, which can be developed through the practice of **meditation**. The term “**mindfulness**” is a translation of the Pali-term *sati*, which is a significant element of some Buddhist traditions.

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With roots in Buddhist meditation, a secular practice of mindfulness has entered the American mainstream, in part through the work of Jon Kabat-Zinn and his Mindfulness-Based Stress Reduction (MBSR) program, which he launched at the University of Massachusetts Medical School in 1979.

 <ul style="list-style-type: none"> <li>Enhanced neuromuscular coordination &amp; strength</li> <li>Increased flexibility &amp; balance</li> <li>Improved respiratory function &amp; stabilized breathing patterns</li> <li>Bettered sleep &amp; reduced fatigue</li> <li>Greater kinesthetic awareness</li> <li>Decreased cortisol concentrations</li> <li>Improved heart rate variability</li> </ul>	 <ul style="list-style-type: none"> <li>Improved stress management</li> <li>Higher yield cognitive efficiency</li> <li>Improved concentration &amp; ability to function under pressure</li> <li>Decreased anxiety &amp; negative thought patterns</li> <li>Positive effect on student grades</li> </ul>
<p><b>physical</b></p> <ul style="list-style-type: none"> <li>More positive sense of self &amp; higher self esteem</li> <li>Lessened feelings of depression</li> <li>Greater emotional regulation</li> <li>Increased capacity to cope</li> <li>Improved sense of calm</li> <li>Balanced mood state</li> <li>Strengthened resilience</li> </ul>	<p><b>mental</b></p> <ul style="list-style-type: none"> <li>Lessened reactivity, aggression, hostility, negative behavior &amp; general distress</li> <li>Increased ability to focus &amp; control behavior under stress</li> <li>Reduced social problems</li> <li>Greater self awareness &amp; ability to self regulate</li> <li>Improved attention, adaptive skills, behavioral symptoms, &amp; social skills</li> </ul>
<p><b>emotional</b></p> 	<p><b>relational</b></p> 

**Benefits of Mindfulness**

Thousands of studies have documented the physical and mental health benefits of mindfulness in general and MBSR in particular, inspiring countless programs to adapt the MBSR model for schools, prisons, hospitals, veterans centers, and beyond.

Studies have documented the benefits of mindfulness of practitioners on their patients (show more empathy and compassion, decreased anxiety and better counseling skills) (Shapiro, Schwartz & Bonner; 1998, 2005, 2009, Aiken, 2006; Wang 2007)

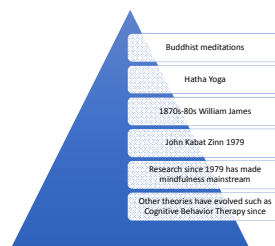
<http://www.apa.org/monitor/2012/07-08/ce-corner.aspx>

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**History of Mindfulness**



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### John Kabat-Zinn and Mindfulness Stress Reduction (MSBR)



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### Cognitive Therapy vs Mindfulness: a subtle distinction

**Traditional cognitive therapy** teaches us to challenge the *content* of our distorted thoughts. **Change is focus.**

**Mindfulness** challenges our *perspective* towards these thoughts. From a mindfulness perspective, the essential problem is our distorted belief that unwanted thoughts, feelings, sensations and urges are somehow automatically important and deserving of a strong behavioral response. But with **mindfulness**, the goal is to **better recognize and accept** that these transitory internal events, though uncomfortable, are merely a normal, predictable part of the human experience.

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### Cognitive Behavioral Therapy & Mindfulness

- Both a cognitive and a behavioral process.
- Better together than apart!
- Seen through the prism of traditional cognitive theory, the role of mindfulness is to help us learn to challenge and change our distorted beliefs about the importance of uncomfortable experiences. Likewise, from the perspective of traditional behavioral theory, the most mindful and effective long-term response to OCD and anxiety is to not perform the compulsive and avoidant behaviors commonly seen in these conditions, for doing so provides only a short-term reduction in our discomfort.

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### Mindfulness Based Cognitive Behavior Therapy

- Mindfulness plus behavioral change (MCBT)
- Incorporates understanding the association between thoughts and feelings
- Example of replacing ruminating obsessive thoughts with positive thoughts "I can't do this, I'm overwhelmed." vs "I feel anxious but that's my worry brain. I'm going to do the best I can."

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### More on Mindfulness & CBT

- There is also a behavioral therapy component to mindfulness, which can be simply described as this: when faced with unwanted thoughts, feelings, sensations, and urges, it is best to make no effort whatsoever to avoid or control them.
- With mindfulness, the goal is to accept the presence of these unwanted experiences, and to act in a manner that is appropriate to the situation and in keeping with what we would actually like to do, rather than acting with the simple goal of short-term reduction of discomfort.

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### Physical Therapy and Mindfulness

In order to help people across the lifespan optimize their participation in functional mobility, physical therapists must help their patients:

**LEARN  
ADAPT  
ENGAGE  
MANAGE PAIN  
CHANGE PATTERNS**

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### How do we learn?



- Actively doing
- Making mistakes
- Receiving feedback
- Remembering
- Repeating

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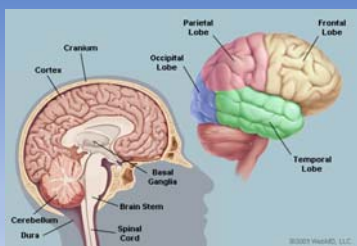
### Wiring, Firing and Brain Loops



Studies indicate that emotions influence learning, adapting, engaging, managing pain and changing motor patterns. Stress, physical and emotional, can be driving forces of emotions and behaviors.

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### Neuroanatomy 101



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### Frontal Lobe

- The **frontal lobes** are involved in motor function, problem solving, spontaneity, memory, language, initiation, judgement, impulse control, and social and sexual behavior.
- Houses the motor cortex and prefrontal cortex.
- Integrates memories and emotions and modifies them to generally fit socially acceptable norms.
- Responsible for executive functioning.

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### Functions

The Frontal lobe is considered the emotional control center and the home of our personality.

The frontal lobe controls

higher level thinking:

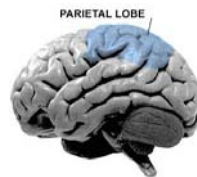
- Reasoning
- Planning
- Language
- Long-term Memory
- Impulse control
- Problem Solving
- Emotions
- Judgment
- Motor Function
- Initiation
- Social/ Sexual Behavior



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### Parietal Lobe

processes and integrates sensory information

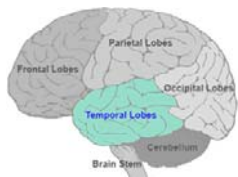


- Pain
- Proprioception
- Spatial Sense
- Taste
- Temperature
- Vision

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### Temporal Lobe

Responsible for processing sensory information that give meanings to:



- Emotions
- Auditory Simulation
- Language Comprehension
- Perception incl. ability to recognize faces
- Visual Memory

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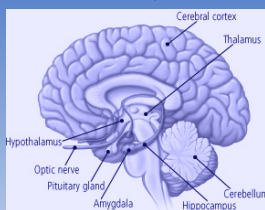
### Deep to the temporal lobe...



- Amygdala (fear, emotions, motivation)
- Hippocampus (long term memory, and spatial orientation, memory and emotions related to memory, motivation)
- Thalamus (processing center for all inputs coming into the brain and going to the cortex)
- Elizabeth Phelps article "Human Emotion and Memory: Interactions of the amygdala and hippocampal complex" explains relationship between amygdala and hippocampus and memory (2004) - Psychology department at NYU

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### Limbic System



Most studies on mindfulness are associated with fMRI changes in the limbic system, specifically in the amygdala and hippocampus. fMRI shows blood flow so with decreased activity in those areas, emotions, fears and memories associated with fears are diminished.

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### Occipital lobe

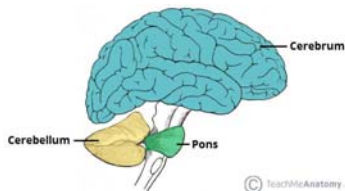
Processes visual information



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### Cerebellum

- Attention
- Balance
- Coordination
- Fine tunes motor function
- Posture
- Language



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### Stress Negatively Impacts the Brain

- Stressful life events could [harm your brain's memory](#) and learning capacity by reducing the volume of gray matter in brain regions associated with emotions, self-control and physiological functions.
- Chronic stress and/or depression can contribute to lost volume in the brain's medial prefrontal cortex, which is associated with emotional and cognitive impairment. Researchers found that this is particularly true of [people with a genetic marker](#) that can disrupt the formation of synaptic connections between brain cells.
- A 2008 study on mice found that even [short-term stress](#) could lead to communication problems among brain cells in regions associated with memory and learning.

[http://www.huffingtonpost.com/2014/11/18/brain-stress\\_n\\_6148470.html](http://www.huffingtonpost.com/2014/11/18/brain-stress_n_6148470.html)

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**Neuroplasticity:** the brain's ability to change as an effect of environmental, behavioral, and neural changes.



### Soft-Wired: How the New Science of Brain Plasticity Can Change Your Life

by Michael Merzenich, MD

- **1. Change is mostly limited to those situations in which the brain is in the mood for it.** If you are alert, on the ball, engaged, motivated, ready for action, the brain releases the neurochemicals necessary to enable brain change. When disengaged, inattentive, distracted, or doing something without thinking that requires no real effort, your neuroplastic switches are "off."
- **2. The harder you try, the more you're motivated, the more alert you are, and the better (or worse) the potential outcome, the bigger the brain change.** If you're intensely focused on the task and really trying to master something for an important reason, the change experienced will be greater.
- **3. What actually changes in the brain are the strengths of the connections of neurons that are engaged together, moment by moment, in time.** The more something is practiced, the more connections are changed and made to include all elements of the experience (sensory info, movement, cognitive patterns). You can think of it like a "master controller" being formed for that particular behavior, which allows it to be performed with remarkable facility and reliability over time.
- **4. Learning-driven changes in connections increase cell-to-cell cooperation, which is crucial for increasing reliability.** Merzenich explains this by asking you to imagine the sound of a football stadium full of fans all clapping at random versus the same people clapping in unison. He explains, "The more powerfully coordinated your [nerve cell] teams are, the more powerful and more reliable their behavioral productions."
- **5. The brain also strengthens its connections between teams of neurons representing separate moments of successive things that reliably occur in serial time.** This allows your brain to predict what happens next and have a continuous "associative flow." Without this ability, your stream of consciousness would be reduced to "a series of separate, stagnating puddles," explains Merzenich.

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- **6. Initial changes are temporary.** Your brain first records the change, then determines whether it should make the change permanent or not. It only becomes permanent if your brain judges the experience to be fascinating or novel enough or if the behavioral outcome is important, good or bad.
- **7. The brain is changed by internal mental rehearsal in the same ways and involving precisely the same processes that control changes achieved through interactions with the external world.** According to Merzenich, "You don't have to move an inch to drive positive plastic change in your brain. Your internal representations of things recalled from memory work just fine for progressive brain plasticity-based learning."
- **8. Memory guides and controls most learning.** As you learn a new skill, your brain takes note of and remembers the good attempts, while discarding the not-so-good tries. Then, it recalls the last good pass, makes incremental adjustments, and progressively improves.
- **9. Every movement of learning provides a moment of opportunity for the brain to stabilize — and reduce the disruptive power of — potentially interfering backgrounds or "noise."** Each time your brain strengthens a connection to advance your mastery of a skill, it also weakens other connections of neurons that weren't used at that precise moment. This negative plastic brain change erases some of the irrelevant or interfering activity in the brain.
- **10. Brain plasticity is a two-way street; it is just as easy to generate negative changes as it is positive ones.** You have a "use it or lose it" brain. It's almost as easy to drive changes that impair memory and physical and mental abilities as it is to improve these things. Merzenich says that older people are absolute masters at encouraging plastic brain change in the wrong direction

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### Research Associated with Mindfulness

- [The Effects of Meditation on Grey Matter Atrophy and Neurodegeneration: A Systematic Review.](#)
- Last N, Tufts E, Auger LE.
- J Alzheimers Dis. 2017;56(1):275-286. doi: 10.3233/JAD-160899.
- <https://www.ncbi.nlm.nih.gov/pubmed/27983555>

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### Mindfulness & Physical Therapy



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### MSBR techniques

1. Body Scan – focus on each part of the body from feet to head, breathing and relaxing
2. Sitting Meditation – mindful attention on breath or rising and falling of abdomen with nonjudgemental awareness of thoughts and distractions flow through the mind
3. Hatha yoga exercises – breathing exercises, simple stretches and posture designed to relax and strengthen the musculoskeletal system

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John Smith



48 year old healthy male

- Referred for PT with diagnosis of vestibular dysfunction.
- Presents with “squishy visual sensation similar to feeling like I’m in water whenever I move my head” x 5 years, went to ENT, multiple neurologists, PTs, massage therapists, visual therapists. Symptoms provoked with cervical range of motion, decreased with no movement sitting with trunk and cervical spine in neutral
- Negative MRI, CT Scan, diagnosed with vestibular dysfunction with referrals to OT and psychologist for possible somatic disorder
- Pain “6-8/10” on 0-10 scale in neck and upper shoulders

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## JS Case Example 1



- Range of motion cervical spine limited to ¼ range rotation bilaterally, ½ range flexion, 0 extension, all limbs within functional limits, trunk rom full except for ¾ range right rotation, with limitation at upper thoracic area
- Strength unable to assess - palpation caused symptoms provocation but appears within functional limits, grossly deconditioned due to sedentary lifestyle
- Sensation: hypersensitive to cold, touch
- Neurological vestibular exam: no saccades, no nystagmus present, convergence / divergence – dizziness 7” bilaterally, smooth pursuits within normal limits.
- Balance: normal in sit and stand, able to perform single limb stance for 60 seconds each leg

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## JS Case Study



- Activities of daily living: unable to drive, symptoms provoked with auditory and visual changes so prefers to stay home.
- Support system: wife extremely supportive, has 2 sons and has great relationships but symptoms prevent any out of the home physical activities
- Symptoms have been disabling x 5 years and only time pt. leaves home is for medical appointments
- Prior functional level: active, biked 100 miles weekly, very successful businessman, married x 20 years, 2 teenage children
- Patient is motivated and receptive to any therapy that will help him be able to function

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## Plan of Care and Treatment



- **Patient education regarding mindfulness**
- Tracking of daily symptoms and activity – notebook to log
- Cervical range of motion exercises
- General strengthening exercises
- Endurance exercises
- Manual therapy: graded degrees of soft tissue mobilization, self soft tissue mobilization
- Yoga inspired exercises (warrior 1 & 2 with hands over head, or not dependent on symptom provocation)
- Gradual return to activities outside of home - out to a store, dinner with wife, driving to town market, walking through a large store with various stimulation

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## Mindfulness helped JS most!

- Weekly therapy visits with goals of return to function, decrease symptoms: pain and vestibular-like symptoms, independence in HEP
- Free MBSR program online:  
<http://palousemindfulness.com/meditations/yoga1.htm>
- Incorporated family into therapeutic program – wife present each therapy session

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## Case Example 2: DF



- 32 year old female with diagnoses of chronic migraine and fibromyalgia, recent flare up – “worst it’s been in years”
- Works in a busy medical office
- Mom to 3 active young children
- Goes to bed late due to responsibilities
- Referred to therapy for pain management

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## Case Example 2: DF



- Dee first developed migraine at the age of 12
- Her migraines used to be around the time of her period but in college started acting up anytime she had a test, overslept, didn't get enough sleep or drank alcohol
- After giving birth to baby # 3, DF began feeling pains that wouldn't go away and an increase in migraines. She decided to take care of herself and went to see a neurologist, who treated her for her migraines pharmacologically and diagnosed her with fibromyalgia as she had 14/18 tender points
- DF began drinking more water throughout the day and started taking the prescribed medicines
- Her pain decreased from "7/10" to "4/10" on 0-10 scale

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## DF: Case Example 2



- DF wanted more pain relief
- On her next appointment she inquired about more holistic options to bring her "4/10" daily pain to "0/10"
- Her MD suggested better sleep hygiene, yoga and mindfulness. He referred her to therapy to help with creating a plan to incorporate healthy habits into her daily life and to decrease pain holistically
- Three total visits included patient education and development of exercise schedule, introduction to mindfulness and free website for 8 week course, body scan to perform 3x/day and daily sleep schedule
- Four weeks later DF reported pain "0/10", sleeping 6-8 hours each night, and daily yoga 10 minutes in the morning and 5 minutes each night. 😊

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## Mindfulness Quiz

1. What is mindfulness? **Present moment awareness**
2. What are 4 benefits of mindfulness?
3. Which area of the brain has been shown through fMRI studies to change most after 8 weeks MBSR? (increased grey matter and limbic system)
4. List 3 strategies you can incorporate into practice with your patients.

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## Mindfulness Quiz

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## Mindfulness Quiz

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3. Which area of the brain has been shown through fMRI studies to change most after 8 weeks MBSR? **Limbic system**
4. List 3 strategies you can incorporate into practice with your patients. **breathing exercises, body scan, visualization, sitting meditation, and yoga inspired exercises**

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## References

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## Q-n-A and Thank You!



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