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Areas of the Brain Affected by Trauma:

- 1. Vagus Nerve:** Stephen Porges and his Polyvagal Theory have done much to bring attention to the role of the vagus nerve in trauma and trauma release. The vagus nerve plays an important role in the expression and management of emotions. When the mind is triggered into an arousal state, the body is alerted through stored connections and this information is relayed by the vagus nerve.
- 2. Amygdala:** The amygdala is the brain's alert center. It consists of 2 almond sized bundles of neurons that sit on top of the right and left hippocampus. It is primed to be sensitive to fear, danger and anxiety, regardless to whether or not the perceived danger is due to an attachment issue or a mugging in a dark alley. The amygdala communicated with the hypothalamus, cingulate gyrus, brain stem, hippocampus, orbital frontal cortex, and septal nuclei- evaluating information from each of these regions regarding the welfare of the person.
- 3. Insula:** Plays an important role in internal body awareness (interoception), emotion and consciousness. Other functions include self-awareness, interpersonal experience, cognitive functioning, perception, and motor control.
- 4. Anterior Cingulate Gyrus:** Located in the front of the brain it is a cortical region that often influences cognition. This region is responsible for distinguishing between safe and dangerous, past from present, and relevant from non-relevant. "Talk therapy" cannot access this part of the brain. This is where trauma release modalities such as Brainspotting, EMDR, and mindfulness are therapeutic.
- 5. Brain Stem:** The brain stem controls the basic functions of heart rate, breathing, blood pressure, as well as sleeping and arousal, and assimilation of nutrition and elimination. We must make sure we "stabilize the fort" and regulate these core functions before doing any trauma release. Non of these functions are responsive to talk therapy. We cannot argue our way out of hyper-arousal or talk ourselves into better digestions or tell ourselves to go to sleep.
- 6. Limbic System:** Known as the emotional system of the brain, the limbic regions process information from so many sources that are coming and going in so many directions, that is can influence much of our thinking and action. These structures of the limbic system are responsible for processing emotions, motivation, survival states and feelings about relationships. Early

- attachment experiences that lead to either feelings of security or feelings of anxiety in the developing child are processed here.
7. **Hippocampus:** The hippocampus is responsible for the ability to store and retrieve memories. Along with other limbic structures, the hippocampus also plays a role in a person's ability to overcome fear responses.
 8. **Hypothalamus:** Links the endocrine system and the brain via the pituitary gland. It receives alerts from the amygdala when there is a perceived or real threat of danger. It then activates the Fight/Flight/Freeze responses via the brain stem and spinal cord. It also sends messages to the pituitary which in turn stimulates the adrenal glands to release stress and sex hormones.
 9. **Orbital Frontal Cortex (OFC):** OFC abnormalities or reduction in volume have been reported in mood disorders, anxiety disorders, personality disorders, drug addiction, schizophrenia, and Post-Traumatic Stress Disorder.
 10. **Thalamus and Prefrontal Cortex:** When we undergo a traumatic event our thalamus, which weaves temporal and sensory information into a story that can clarify who we are, where we are, and what we are doing, disconnects. Additionally, the prefrontal cortex, which integrates past, present and future and is the home of our working memory, also goes off line. This is the mechanism of flashbacks and getting "stuck" in a rumination loop of negative thoughts.

Mindfulness-Based Stress Reduction Techniques and other Neurotherapies have been the only therapeutic intervention shown to heal these parts of the brain, returning them to their normal, healthy size and functioning.