

## RETHINKING TRAUMA

How researchers are redefining PTSD for individuals with complex trauma histories

Since the publication of the complex posttraumatic stress disorder diagnostic category by the ICD-11, there has been a boom in research on non-traditional trauma disorders. Unlike its sibling diagnosis PTSD, Complex PTSD (C-PTSD) recognizes that trauma disorders may not be the result of a single traumatic event. Instead, the C-PTSD diagnosis attempts to capture the experience of developmental trauma: multiple stressful events that occur repeatedly and cumulatively (Courtois, 2004). These events can include repeated traumatization from childhood abuse, neglect, or poor caretaking. Regardless of how the child’s trauma was experienced, C-PTSD disrupts the brain’s fear regulation system, triggering a “fight, flight, or fawn” response and generating lasting changes in the brain. Therefore, those that struggle with C-PTSD show symptoms that are multifaceted and maladaptive in a wide range of contexts – not just in response to a single traumatic memory.

As research around C-PTSD continues to expand, so too has interest in establishing new and effective treatment options. Thus far, there has been limited evidence that C-PTSD can be predictably treated, leaving researchers urgently searching for new and innovative interventions (Rogel et al., 2020). In this issue of Neuroconnection News, we will be taking a look into the budding research surrounding neurofeedback training for the treatment of C-PTSD, answering some big questions around neurofeedback’s efficacy in alleviating the symptoms of developmental trauma. We will also dig deep into how C-PTSD differs from traditional PTSD, learn about some of C-PTSD’s associated symptoms, dive in to new research into trauma’s impact on brain connectivity, and investigate how PTSD and other disorders are being treated right here in our office at The Neuroconnection.



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### Special points of interest

- How does developmental trauma differ from PTSD?
- Can repeated exposure to trauma alter the structure of our brains?
- What role can neurofeedback play in treating developmental trauma disorders?

About **1 in 7**

children experienced child abuse and neglect in the past year, according to the CDC.

## New Horizons for PTSD

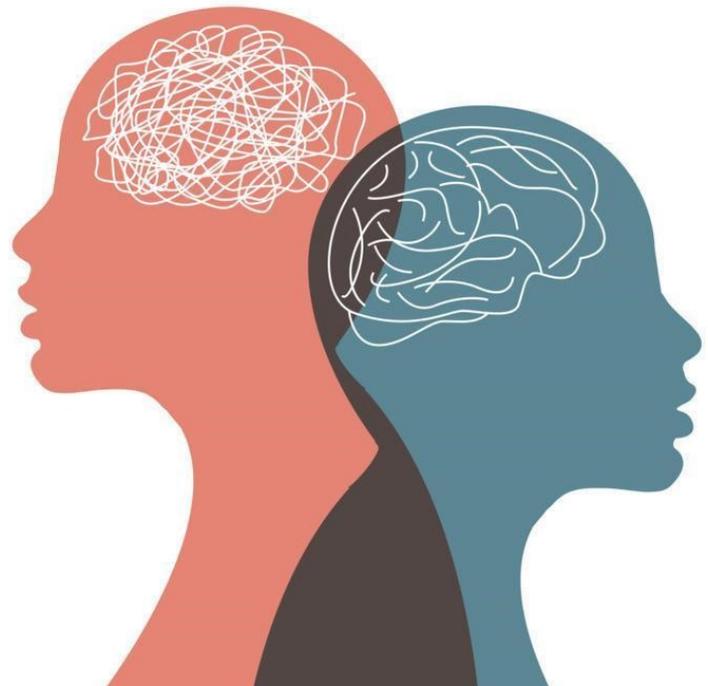
Since the addition of posttraumatic stress disorder (PTSD) into the DSM-III in 1980, clinical and public awareness of trauma-related disorders has blossomed. Research into developing new testing and treatment protocols for PTSD has radically altered how we think about our relationships to trauma and healing. Despite these important changes in both clinical techniques and the public dialogue surrounding PTSD, there have remained some questions as to if the current system for the classification of PTSD is optimal for diagnosis (Cloitre, 2020). Trauma, after all, is uniquely experienced by each individual person and has a wide range of emotional and behavioral expressions.

One notable pattern that has emerged throughout the past 35 years of trauma research has shown a marked difference between how adults and children are exposed to trauma. Adults tend to follow the model outlined by the current PTSD diagnostic criteria: their trauma results from a single, extremely stressful event or isolated events. Children, on the other hand, are often more complicated. Childhood traumas are frequently the results of inadequate caregiving. Children therefore are more likely to experience chronic examples of interpersonal violence in the form of abusive or neglectful families. Because of these two varying experiences of trauma result in differentiable patterns of behavior, in 2018 the ICD-11 highlighted two distinct categories of trauma-related disorders: PTSD and Complex PTSD (van der Kolk et al., 2009).

## PTSD vs C-PTSD: What's the Difference?

Complex PTSD, often referred to as C-PTSD or Developmental Trauma, acknowledges that some individuals that have experienced chronic, repeated, or prolonged periods of trauma tend to show more complex symptoms than those typically observed under a traditional PTSD diagnosis. C-PTSD therefore includes the core criteria for PTSD in addition to three new elements: **emotional regulation difficulties, negative self-concept, and relationship issues.**

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# Symptoms of Developmental Trauma

A Complex PTSD diagnosis includes the core criteria of PTSD plus three new elements:



## Negative Self-Concept:

- Persistent beliefs about the self as diminished, defeated, worthless, or helpless
- Feelings of deep shame or guilt
- Self-abandonment



## Emotional Dysregulation:

- Heightened emotional sensitivity
- Prone to violent outbursts
- Giving in to reckless or self-destructive impulses
- Disassociation under stress



## Relational Problems:

- Persistent difficulties in sustaining relationships
- Tendency to avoid, self-sabotage, or become codependent in relationships
- Reluctance to place trust in others

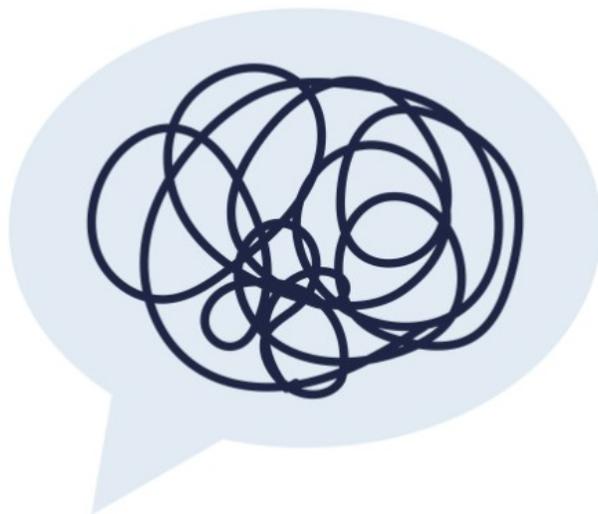


## Overcoming Methodological Challenges

Historically, teasing out the brain structures and networks affected specifically by chronic childhood maltreatment has been difficult. Developmental traumas are associated with countless outside variables that also affect adversity, including financial insecurity, discriminatory social factors, and developing disordered reactions to new traumatic experiences as an adult. Delineating the role of maltreatment itself from these other factors has left researchers with categorically small sample sizes, thereby limiting the reliability of their results. Furthermore, researchers in developmental trauma were previously limited by their access to neuroimaging technologies. The technological innovation in the field of neuroimaging has greatly improved over the past decade, making technologies and techniques that were previously untenable now easily accessible and cost-effective for researchers. As a result, scientists studying complex trauma now have the capacity to move forward into exciting new directions in structural research (Price et al., 2021).

## Embracing New Techniques

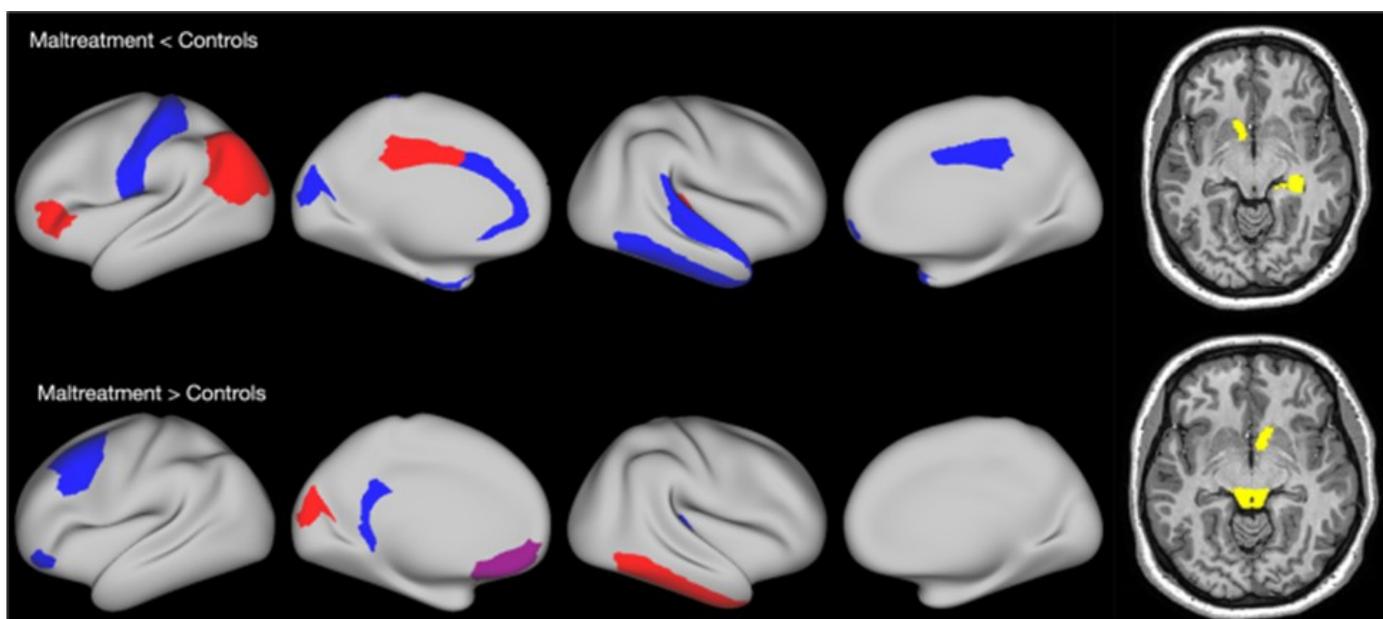
One new study, published in the journal *Neuropsychopharmacology* in 2021, sought to do just that. In their piece titled *Examination of the association between exposure to childhood maltreatment and brain structure in young adults: a machine learning analysis*, Matthew Price and his team of researchers at the University of Vermont utilize the latest trends in neuroimaging and machine learning modelling to perform a comprehensive examination of the structural differences in the brains of adults with maltreatment histories against a cohort of non-traumatized adults. Using a large sample size of 384 young adults aged 18-21, Price and his team moved past the limited scope of region-of-interest (ROI) studies on particular brain structures, instead opting for a powerful whole-brain-based comparison drawn from structural MRI images. These images were then used to train a machine learning regression model called an elastic net, which could then be used to define the relationship between variability in brain structure and an individual's developmental trauma diagnosis.



**In the end, this new technique was a major success. The results of the study were among the first to show that multivariate structural data from whole-brain images can accurately classify young adults with and without a history of maltreatment. The elastic net model was able to show marked differences in the cortical thickness, surface area, and subcortical volumes in key brain regions for the adults with trauma histories.**

## C-PTSD Creates Lasting Change in the Brain

The elastic net model used in this study had been trained to analyze four variables of brain structure between the control and developmental trauma groups: brain region, cortical thickness, cortical surface area, and subcortical volume. Overall, the features identified by the elastic net model spanned each structural domain with significant differences found in 7 cortical thickness ROIs, 15 cortical surface area ROIs, and 5 subcortical volume ROIs. Most notably, the study showed that those with a history of developmental trauma had reduced cortical thickness in the left IPC. Prior research on the IPC had posited that reduced cortical thickness correlates with hypervigilance toward perceived threat (Akiki et al., 2017). Additionally, regions associated with the default mode network (DMN) were found to have reduced cortical thickness (PCC, IFG) as well as surface area (rACC, dACC, OFC, STG, and entorhinal) in those with a complex trauma history. These regions are thought to regulate emotional reactivity as well as modulate the reexperiencing symptoms that are often observed among those with a trauma disorder (Sripada et al, 2012). The results more generally are summarized in the figure below:



*Red regions represent cortical thickness, blue regions denote surface areas, purple regions are those showing both cortical thickness and surface area effects, and yellow regions mark areas of differentiable subcortical volumes.*

These results, as well as the results of studies like it, lend credence to the presence of a complex posttraumatic stress disorder with a presentation distinct from that of traditional PTSD. With those suffering from C-PTSD showing marked alterations across the brain, neurofeedback practitioners can be better informed on the brain regions that can and should be targeted for neurofeedback training. While there is still much to learn, studies like these ultimately help to inform treatment options and improve outcomes for those with developmental trauma.

# Treating Complex Trauma at The Neuroconnection: An In-Office Case Study

Given the difficulties in treating the multiple symptom presentations of C-PTSD, many clients with trauma histories seek out the Neuroconnection to aid in the relief of their symptoms. One such client, Susan, initially contact-

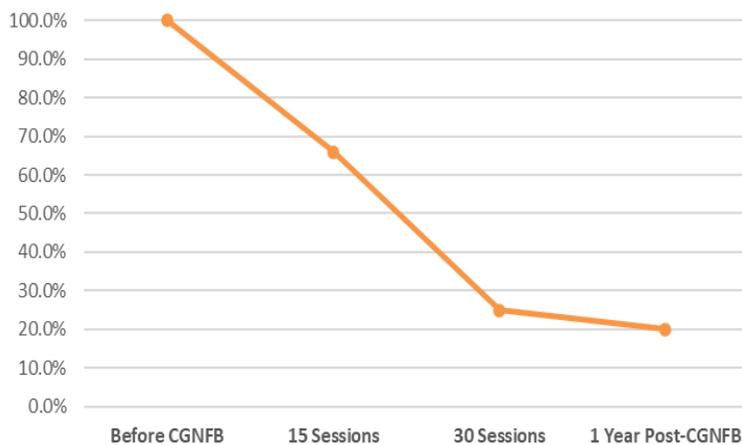
-ed our office due to her struggles with depression and anxiety. Susan had experienced sexual trauma in the past which she reports was influencing her low mood, panic, suicidal ideation, insomnia, reduced motivation, irritability, and issues within her relationship. During her intake, Susan's Becks Anxiety Inventory and Symptom Checklist reflected these issues, with clinically significant distress in anxiety and mood/behavior. Furthermore, Susan was reporting that the antidepressant medication she was using was leaving her feeling apathetic. She wanted to reduce her depression and anxiety symptoms without losing her vibrancy.

## Susan's Neurofeedback Training

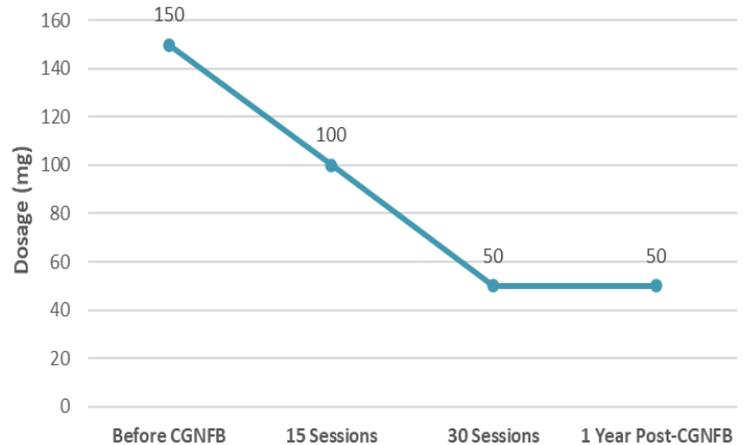
Prior to beginning Connectivity-Guided Neurofeedback training, Susan was first administered a QEEG to identify any neurological irregularities (in connectivity and power) that could be contributing to her trauma-related mood irregularities. She was then given a personalized connectivity guided neurofeedback (CGNFB) training protocol to address her unique constellation of symptoms. Following her first set of 15 neurofeedback sessions, Susan reported a marked reduction in her anxiety, depression, irritability, and fatigue. Her Becks Anxiety Inventory and Symptom Checklist revealed significant changes in the number of symptoms Susan was reporting overall. As a result of her neurophysiological improvements, Susan was able to successfully medication dosage with the guidance of her psychiatrist.

A remap QEEG further confirmed these positive observations, revealing improvements in Susan's connectivity in her regions of concern. While Susan was pleased her progress thus far, she continued neurofeedback training sessions to further reduce the intensity of her remaining symptoms. Susan would go on to complete two additional neurofeedback protocols, amounting to 45 total sessions. She would reduce her antidepressant medication once again while maintaining reduced depression and anxiety symptoms. Upon later assessment, her improvements on the Symptom Checklist and Becks Anxiety Inventory were maintained one year after cessation of neurofeedback sessions, allowing Susan to continue to maintain her newly improved mental health and greater overall functioning.

### Reported Anxiety Symptoms Over Time



### Medication Dosage Over Time

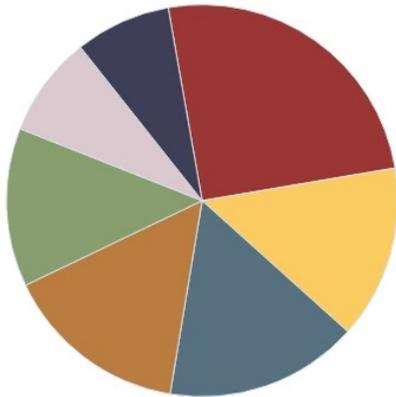


# TNC Results & Symptom Improvements

## With Connectivity Neurofeedback

Since 2001, TNC has empowered over 800 children and adults to reach their fullest potential by helping their brains learn how to self-regulate, thereby reducing or eliminating the need for medication and creating lasting improvement for a wide range of neuropsychological symptoms. Below we have provided a breakdown of the common symptoms addressed at our office, along with examples of the long-term benefits experienced by those who completed at least 10 sessions of CNFB training.

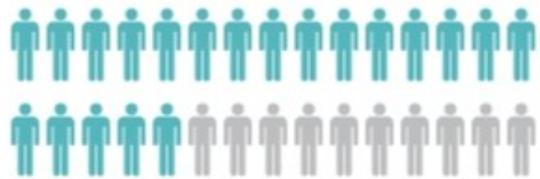
### SYMPTOMS TREATED



- ADD/ADHD 25%
- ASD 14%
- ANXIETY/PTSD 16%
- SEIZURE/ PAROXYSMAL EVENTS 15%
- MOOD DISORDER 13%
- LEARNING DISABILITY 8%
- NO FORMAL DX 8%

### LONG-TERM BENEFITS

**73%** of patients reduced or eliminated the need for medication



average decrease in anxiety symptoms — measured via Beck's Anxiety Inventories



average decrease in depression symptoms — measured via Beck's Depression Inventories



average decrease in symptoms associated with Autism — measured via ATEC

### OTHER COMMON IMPROVEMENTS

- ✓ Executive functioning
- ✓ Processing speed
- ✓ Attention
- ✓ Organization
- ✓ Sleep
- ✓ Obsessive thinking
- ✓ Planning
- ✓ Motivation
- ✓ Motor skills
- ✓ Social skills
- ✓ Test performance
- ✓ Speech & language use
- ✓ Reading comprehension
- ✓ Math concepts
- ✓ Sensory sensitivities



Upon seeing such excellent results in the past 11 years with Connectivity-Neurofeedback (CNFB), our professionals aimed to extend access to training for those outside of our geographic area or inflexible schedules.

As a result, The Neuroconnection designed an @ Home Training pro-

gram to offer CNFB sessions in the convenience of your home. For eight years, we have been able to provide our expertise and therapeutic treatment to families across the world. The opportunity for daily neurofeedback training at home has brought successful results for clients living as far as Russia and India.

*Request more information from The Neuroconnection Website!*  
[www.theneuroconnection.com](http://www.theneuroconnection.com)

## Meet Our Director

Ann L. Rigby, MSW, LCSW, BCN has over 30 years of experience in the mental health field. Ms. Rigby has been providing Neurofeedback services since 2001. She founded “The Neuroconnection”, a Brain Mapping and Neurofeedback clinic that provides an advanced, research-based form of Neurofeedback known as Connectivity Neurofeedback.

Ms. Rigby is a past Board Chair for the Autism Society of Illinois. She is a fellow and Board Certified member of The Biofeedback Certification International Alliance. She is also a field placement instructor for graduate students at Benedictine University and holds memberships with the International Society of Neurofeedback and Research (ISNR), the Biofeedback Certification Institute of America (BCIA), and the National Association of Social Workers (NASW). Ms. Rigby is a frequent speaker and exhibitor at many national and regional conferences throughout the year on topics related to the benefits of Connectivity Neurofeedback.

For more info about upcoming speaking engagements, go to our website [www.theneuroconnection.com](http://www.theneuroconnection.com) and visit our News and Events tab.



**the Neuroconnection**  
Brain Mapping and Neurofeedback

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