

Wired for Wellness: The Power of Neurofeedback

Identifying Information:

Client, A.C., is a female in her mid-30s who began neurofeedback treatment with MindGym in March 2025.

Presenting Concerns:

At intake, client reported symptoms of anxiety, complex PTSD (CPTSD), depression, disrupted sleep, and ongoing struggles with alcohol use. She described difficulty with emotional regulation, low energy, and chronic internal stress. These issues had persisted for several years and had not been fully resolved through previous therapeutic interventions.

Brief History:

The client shared a long history of emotional trauma contributing to anxiety, depression, and sleep disturbances. Alcohol had become a coping mechanism for emotional pain, which created additional layers of dysregulation. At the time of starting treatment, the client was seeking a sustainable solution that would help her rebuild emotional balance, self-trust, and long-term behavioral change.

Psychiatric and Medical History:

Client presented with a complex clinical background marked by chronic emotional dysregulation, unresolved trauma, and long-standing patterns of alcohol misuse. She reported symptoms consistent with complex PTSD (CPTSD), generalized anxiety, and persistent depressive episodes. These conditions were compounded by disrupted sleep patterns and difficulty with emotional self-regulation.

The client's drinking behavior was identified as both a coping mechanism and a significant barrier to emotional stability and daily functioning. While not under psychiatric care at intake, her history reflected multiple attempts to self-manage symptoms without sustained success.

Client's clinical presentation highlighted the need for an integrative approach to treatment—one that addressed trauma-related dysregulation at a neurological level while supporting behavioral and emotional recovery.

Quantitative EEG (qEEG) Assessment – Baseline

Key Findings:

1. **Cortical Hyperarousal:** Elevated high-beta activity (23–38 Hz) was observed across central and posterior regions, consistent with chronic stress, anxiety, and overarousal.
2. **Low-Frequency Suppression:** Reduced delta and theta power was noted in the posterior cortex, suggesting difficulties with restorative sleep and impaired cognitive recovery.
3. **Alpha Dysregulation:** Disorganized and inconsistent alpha activity indicated challenges in relaxation and self-regulation, with posterior alpha lower than expected.
4. **Alpha/Beta Imbalance:** A skewed alpha/beta ratio was observed, especially at Pz,

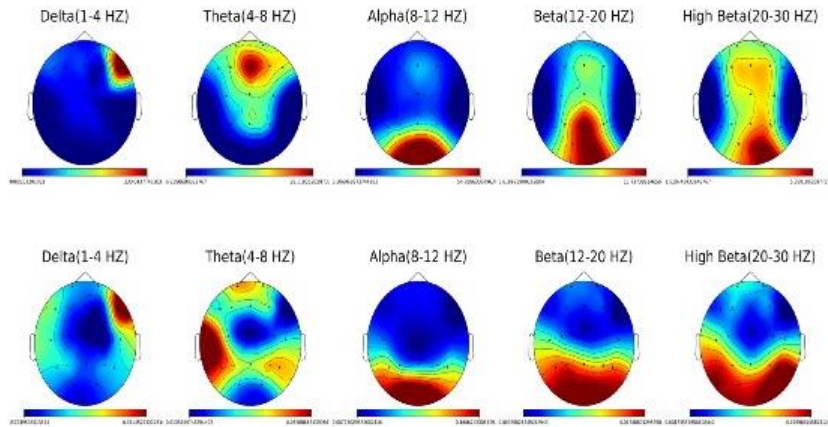
reflective of low mood, mental fatigue, and cognitive rigidity.

5. **Frontal Asymmetry:** Left frontal hypoactivation (F3 < F4) was present, a pattern often associated with depressive affect and low motivation.

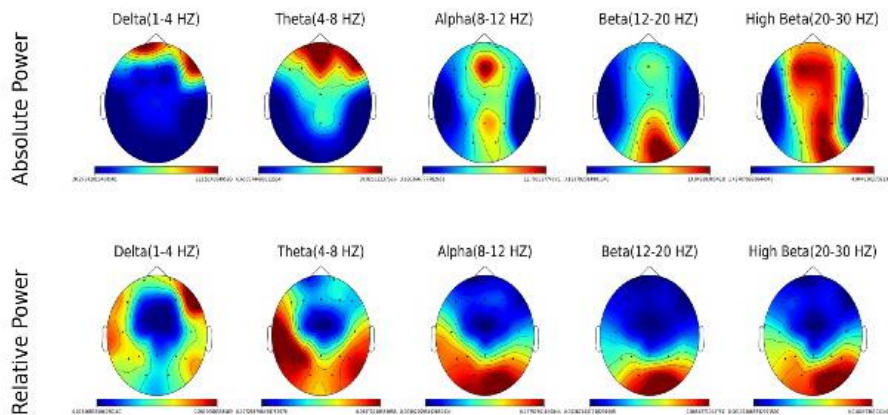
Coherence & Connectivity: Elevated coherence in posterior regions and underconnectivity in frontal areas suggested disrupted communication between networks responsible for executive function and emotional regulation.

Theta/Beta Ratio: At Cz, the ratio was below expected norms (<2.3), further supporting a pattern of cortical overactivation.

Eyes-opened Condition



Eyes-Closed Condition



Eyes-closed condition

Impression: Low delta and theta activity in posterior regions, with excess high-beta in frontal and central regions, indicating chronic overarousal and poor sleep quality.

Relative Power: Suppressed delta and theta; elevated beta and high-beta, especially in frontal and central areas.

Theta/beta Ratio (At Cz, Expected < 3.0): 2.1

Asymmetry present at F3>F4: Yes

Asymmetry present at F7>F8: No

Asymmetry present at P4>P3: Yes

Alpha/beta Ratio (At Pz, Expected 8-12): 3.3

Posterior Dominant Rhythm (At Pz): 9.8

Peak Alpha Site: Pz

Notes: Dysregulated coherence observed in posterior and frontal networks; frontal alpha suppression suggests emotional dysregulation and cognitive fatigue

Eyes-opened condition

Impression: Elevated beta and high-beta across frontal and temporal lobes; suppressed slow-wave activity persists, indicating continued hypervigilance and reduced resting-state regulation.

Relative Power: Low delta and theta; high beta remains excessive in frontal regions.

Theta/beta Ratio (At Cz, Expected < or = EC): 2.0

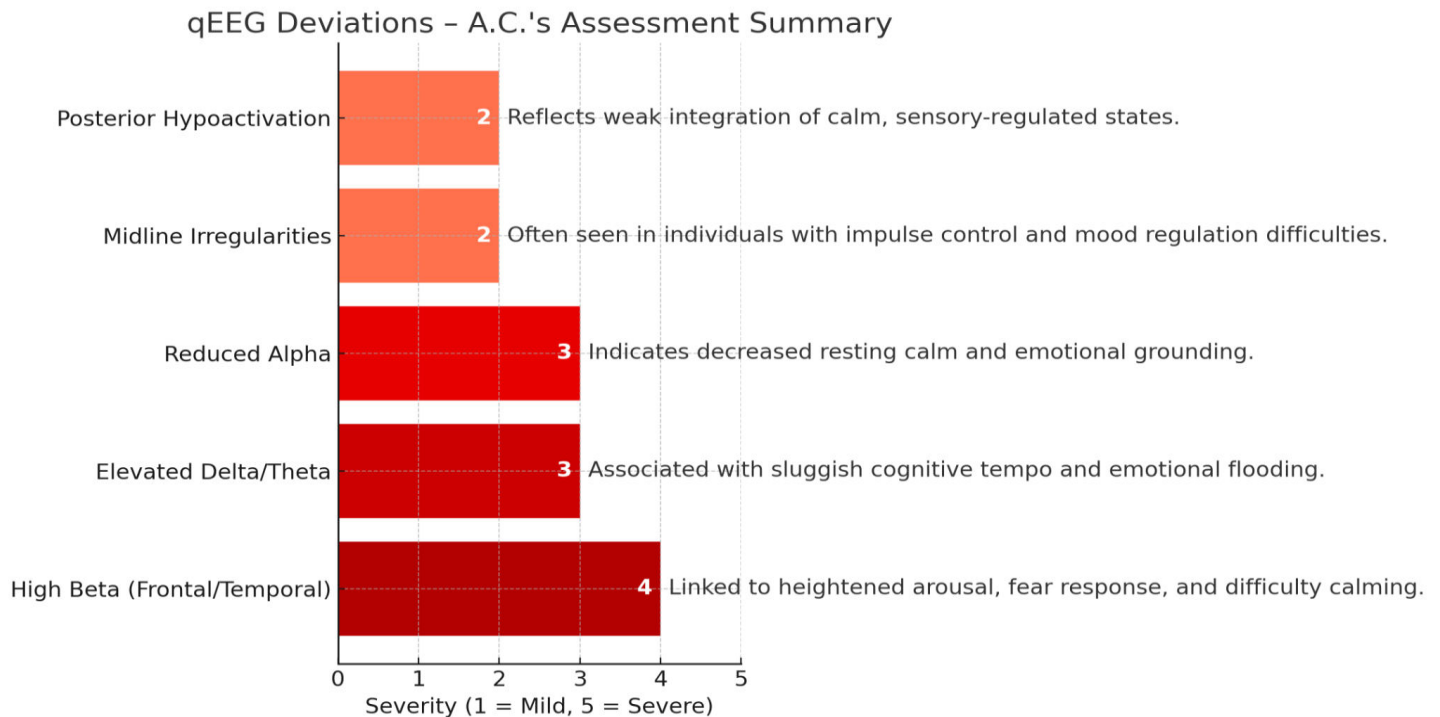
Asymmetry present at F3>F4: Yes

Asymmetry present at F7>F8: No

Asymmetry present at P4>P3: Yes

Notes: High-beta activity extends to temporal regions, contributing to chronic anxious arousal; coherence irregularities reflect impaired connectivity between self-regulation and executive systems.

Baseline Brainwave Deviations – Prior to Neurofeedback



Neurofeedback Intervention

Total Sessions: 40

Protocol Selection: qEEG-guided and individualized to normalize dysregulated brain networks.

Phase 1 – Emotional Regulation & Posterior Rebalancing (20 sessions)

- **Sites:** Pz, O1, O2 (3-channel)
 - **Inhibit:** 2–9 Hz (Delta/Theta) and 22–40 Hz (High Beta)
 - **Reward:** 9–12 Hz (Alpha)
- Objective:** Normalize dysregulated low and high-frequency activity to improve sleep stability and emotional self-regulation.

Reported Subjective Changes:

- Improved quality and depth of sleep
 - Reduced intensity of emotional flooding
 - Decreased intrusive trauma-related thoughts
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Phase 2 – Frontal Stability & Impulse Regulation (20 sessions)

- **Site:** Fz, Cz (2-channel alternating)
 - **Inhibit:** 2–7 Hz (Delta/Theta) and 22–38 Hz (High Beta)
 - **Reward:** 12–15 Hz (SMR)
- Objective:** Strengthen executive control and reduce impulsive reactivity by enhancing midline stability.

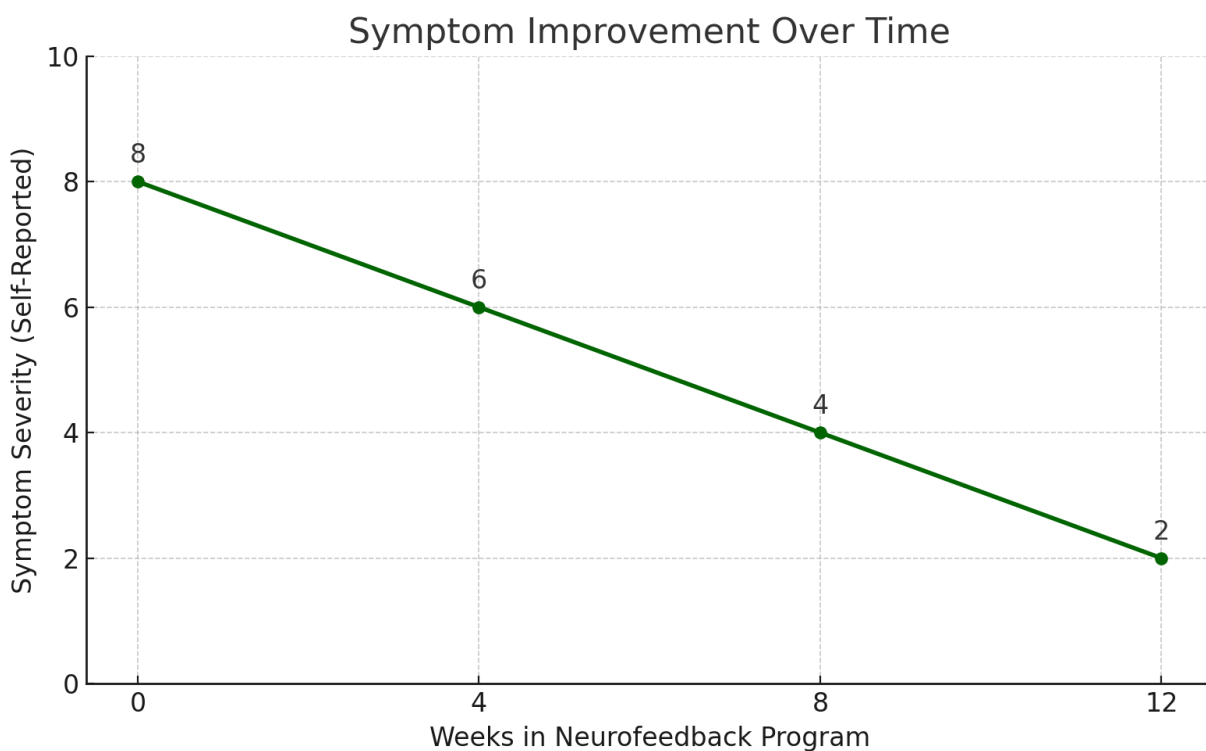
Reported Subjective Changes:

- Increased frustration tolerance
- Better control over alcohol-related urges
- Enhanced ability to self-soothe during emotionally charged moments

Post-Intervention qEEG Findings

Observed Clinical Changes:

- Decreased high-beta activity in frontal and temporal regions
- Normalized alpha and SMR activity in posterior and midline areas
- Improved theta/beta ratios consistent with reduced hypervigilance
- Reduced alpha asymmetry and improved network coherence
- Strengthened regulation of emotional and arousal systems



Clinical Outcomes

At program completion, client demonstrated:

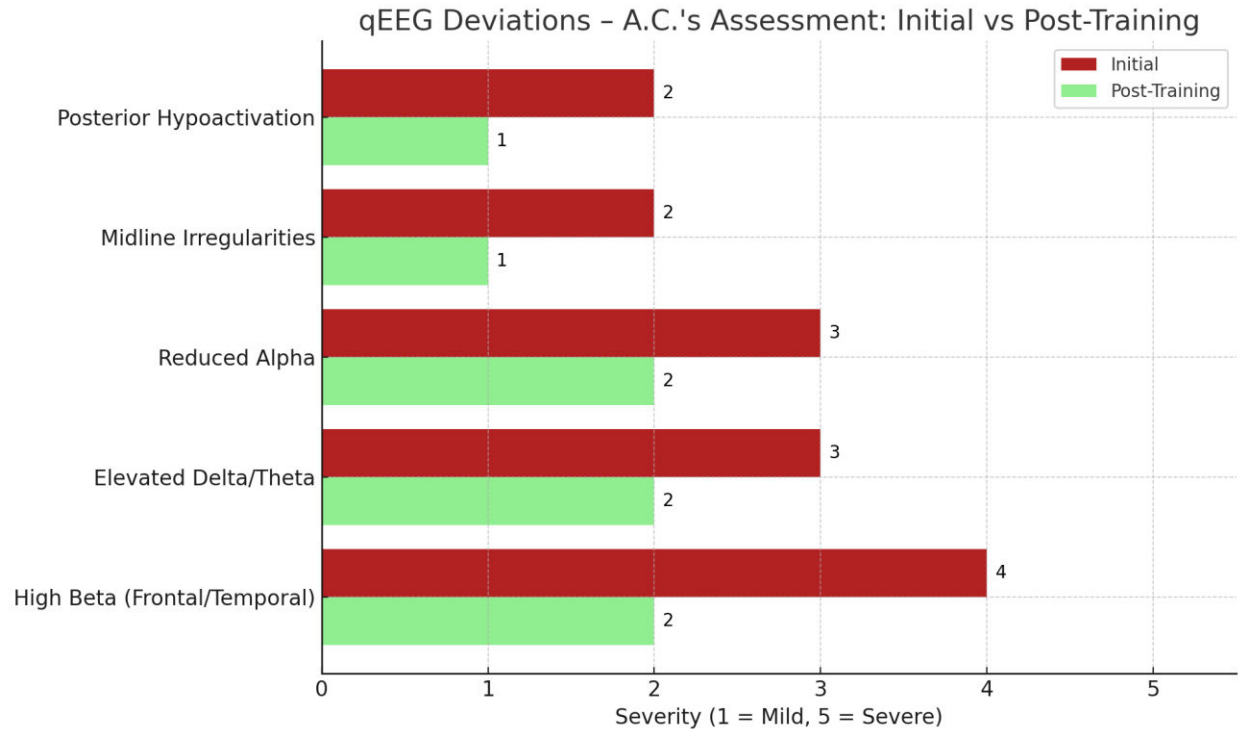
- Significant reduction in anxiety, depression, and emotional reactivity
- Marked improvements in sleep quality, energy regulation, and mood stability
- Noticeable gains in impulse control, communication, and emotional self-awareness
- Increased ability to tolerate distress without resorting to alcohol or emotional shutdown
- Renewed engagement in personal relationships and future-oriented thinking

The client reported sustained improvements in day-to-day functioning and quality of life, which

aligned with objective qEEG changes observed during and after neurofeedback treatment.

Baseline Brainwave Deviations – Post Neurofeedback

This chart shows the reduction in key brainwave deviations from the start to the end of A.C.'s neurofeedback program. Each pair of bars reflects baseline severity (red) and post-training improvement (green) in specific brainwave markers. The changes indicate better emotional regulation, calmer resting states, improved sensory integration, and overall stabilization of brain activity linked to recovery from chronic stress.



Conclusion

This case study highlights the effectiveness of qEEG-guided neurofeedback in addressing the complex neurophysiological patterns underlying chronic anxiety, CPTSD, disrupted sleep, and alcohol misuse. Through targeted protocols tailored to A.C.'s unique brainwave profile, neurofeedback training led to clinically significant improvements in emotional stability, mood regulation, and sleep restoration.

The observed reductions in high beta overarousal and enhancements in alpha and theta regulation translated into meaningful behavioral and psychological outcomes, including improved self-awareness, greater emotional balance, and a reduction in maladaptive coping patterns.

This case reinforces the value of neurofeedback as a non-invasive, individualized, and evidence-based approach for clients with trauma histories and co-occurring mood and

substance use challenges. As of July 2025, A.C. continues to maintain her gains with greater daily functioning and improved quality of life.