

Rewiring Resilience: A Case Study in Healing Through Neurofeedback

Identifying Information:

Client, S.H., was a 24 year old female who presented for evaluation and treatment planning in February of 2022.

Presenting Concerns:

At intake, the client endorsed persistent depressive symptoms characterized by low mood, hopelessness, anhedonia, and tearfulness. She reported daily passive suicidal ideation without plan or intent, as well as generalized anxiety, panic episodes, and fear-based thinking. Additional concerns included low motivation, difficulty engaging in life goals, social withdrawal, and poor self-esteem. The client described chronic sleep disturbances, headaches, and episodes of dizziness that negatively impact daily functioning.

Family & Social Context:

The client was in residence in a sober living environment. Family psychiatric history is positive for depression and anxiety on both maternal and paternal sides.

Psychiatric and Medical History

The client had an extensive mental health history, including:

- **Multiple psychiatric hospitalizations** (2018–2020) for suicidal ideation and suicide attempts (overdose in September 2018 and October 2019; attempted hanging in May 2020).
- Ongoing care from both a therapist and psychiatrist for the last four years.
- Previous enrollment in multiple in-patient mental health treatment centers.
- Past concussions in 2016 and 2018.
- Pathological maladaptive eating disorder.

The client was prescribed a complex regimen of psychotropic medications, including:

- **Latuda:** 120 mg daily
- **Effexor (Venlafaxine):** 375 mg daily
- **Propranolol:** 20 mg twice daily
- **Prazosin:** 8 mg total daily (1 mg + 7 mg dosing schedule)
- **Gabapentin:** 900 mg four times daily
- **Trazodone:** 50 mg daily
- **Naltrexone:** 50 mg daily

She denied the use of alcohol or recreational drugs. The client's presentation reflects a chronic and complex clinical profile with overlapping depressive, anxious, and disordered eating symptomatology.

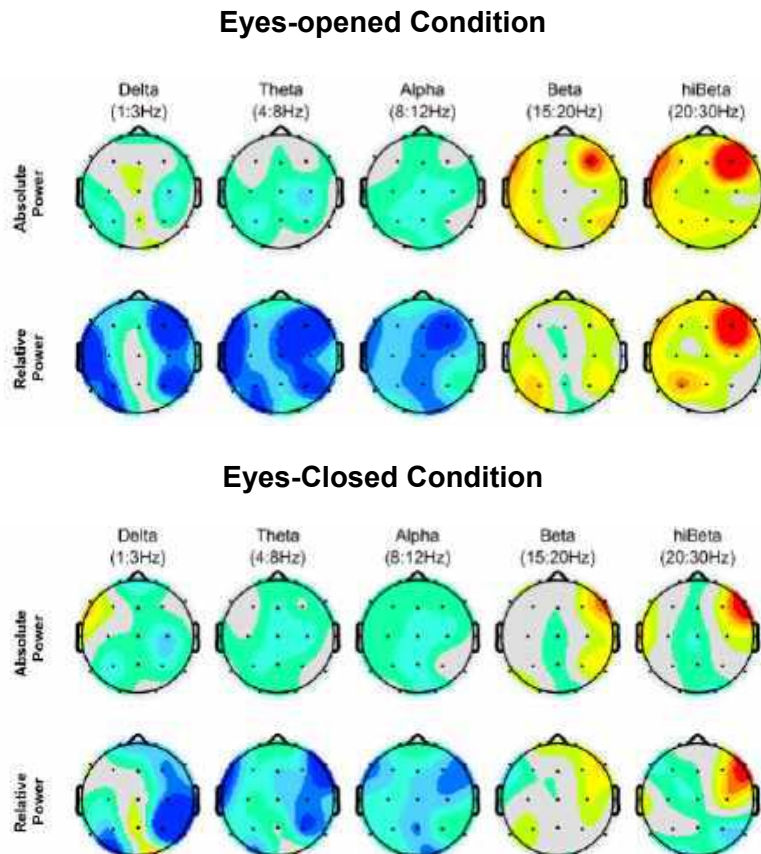
Quantitative EEG (qEEG) Assessment – Baseline

Key Findings:

1. **Cortical Hyperarousal:** Excessive beta (15–30 Hz) and high-beta (22–30 Hz) activity across frontal and temporal regions consistent with hypervigilance, insomnia, and chronic anxiety.
2. **Low-Frequency Underarousal:** Suppressed delta and theta power posteriorly, indicating fatigue, non-restorative sleep, and impaired self-regulation.
3. **Alpha/Beta Ratio Dysregulation:** Elevated alpha/beta ratio (3.1 at Pz) consistent with depressive rumination and cognitive inflexibility.
4. **Frontal & Posterior Alpha Asymmetry:** F3>F4 and P4>P3, typical of mood dysregulation and negative self-referential thought patterns.
5. **Mu Rhythm Presence:** Detected at C3/C4, suggestive of deficits in executive and social processing.

Coherence & Connectivity: Aberrant coherence patterns were observed, indicating dysregulation across frontal-limbic and posterior networks.

Theta/Beta Ratio: 2.3 at Cz (low, consistent with overarousal).



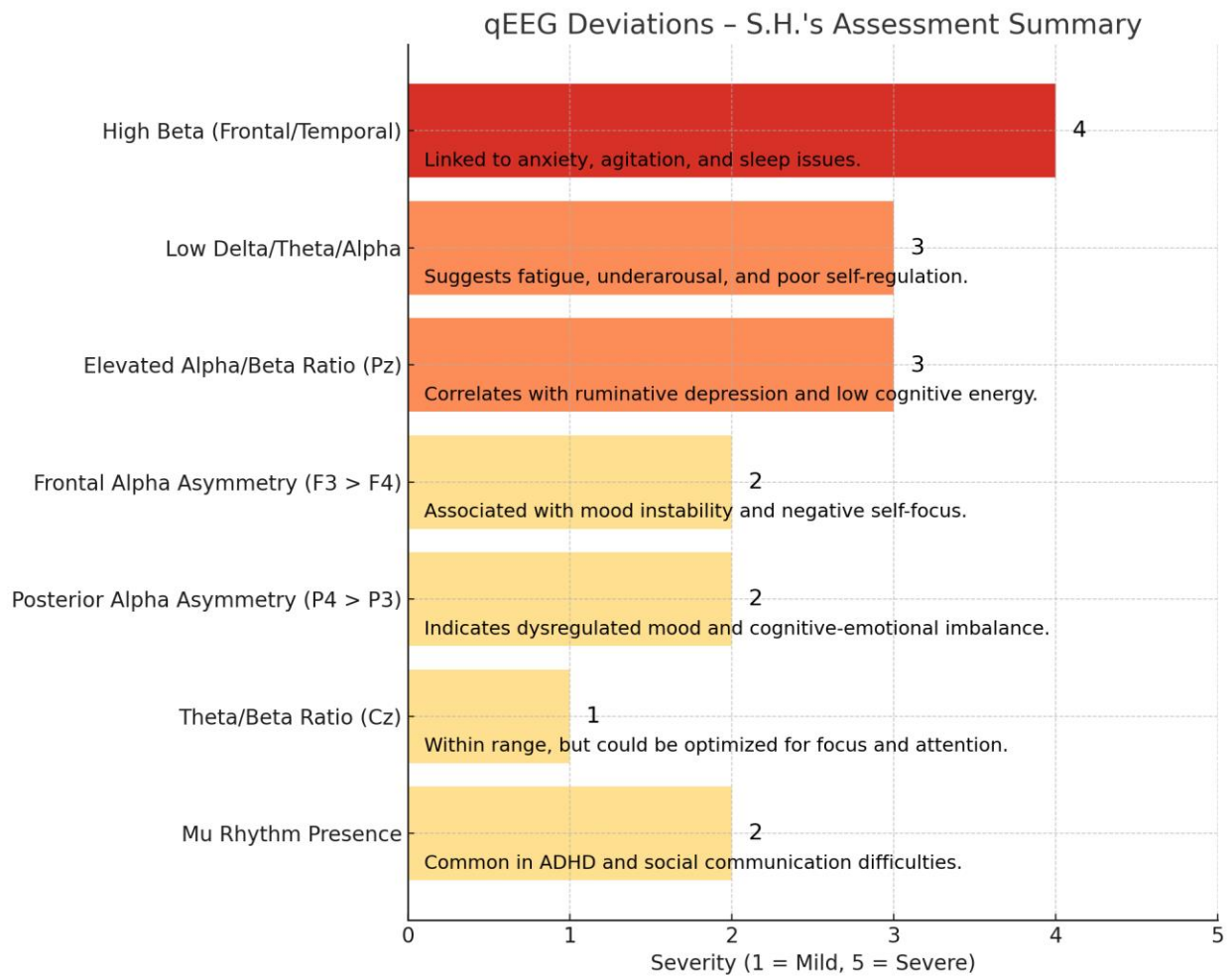
Eyes-closed condition
Impression: low delta, theta, and alpha,

excess temporal beta and high beta

Relative Power: low delta, theta, and alpha, excess beta and high beta
Theta/beta Ratio (At Cz, Expected < 3.0): 2.3
Asymmetry present at F3>F4: Yes
Asymmetry present at F7>F8: Yes
Asymmetry present at P4>P3: Yes
Alpha/beta Ratio (At Pz, Expected 8-12): 3.1
Posterior Dominant Rhythm (At Pz): 10.4
Peak Alpha Site: 10.5 (P3)
Notes: aberrant coherence, mu rhythm

excess temporal beta and high beta extending frontal and central
Relative Power: low delta, theta, and alpha, excess beta and high beta
Theta/beta Ratio (At Cz, Expected < or = EC): 2.3
Asymmetry present at F3>F4: No
Asymmetry present at F7>F8: Yes
Asymmetry present at P4>P3: Yes
Notes: aberrant coherence, mu rhythm

Eyes-opened condition
Impression: low delta, theta, and alpha,
Baseline Brainwave Deviations – Prior to Neurofeedback



Neurofeedback Intervention

Total Sessions: 60

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

Phase 1 – Posterior Hyperarousal Regulation (20 sessions)

- **Sites:** Pz, Oz, O1, O2 (4-channel)
 - **Inhibit:** 20–40 Hz (High Beta)
 - **Reward:** 8–12 Hz (Alpha)
- Objective:** Reduce excessive high-beta activation in posterior regions and normalize alpha rhythms.

Reported Subjective Changes:

- Improved emotional regulation
 - Reduction in hypervigilance
 - Enhanced restorative sleep quality
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Phase 2 – Midline Stabilization & SMR Enhancement (20 sessions)

- **Site:** Cz (1-channel)
 - **Inhibit:** 4–7 Hz (Theta)
 - **Reward:** 12–15 Hz (SMR)
- Objective:** Improve frontal-limbic integration and sensory-motor regulation through midline stabilization.

Reported Subjective Changes:

- Enhanced sleep continuity and depth
 - Reduced social anxiety and baseline somatic hyperarousal
 - Improved ability to engage in daily activities
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Phase 3 – Right Frontal High-Beta Suppression (20 sessions)

- **Sites:** F4, F8 (2-channel)
 - **Inhibit:** 21–40 Hz (High Beta)
- Objective:** Reduce hyperarousal in right frontal-temporal regions associated with fear-based cognition and perseverative thought patterns.

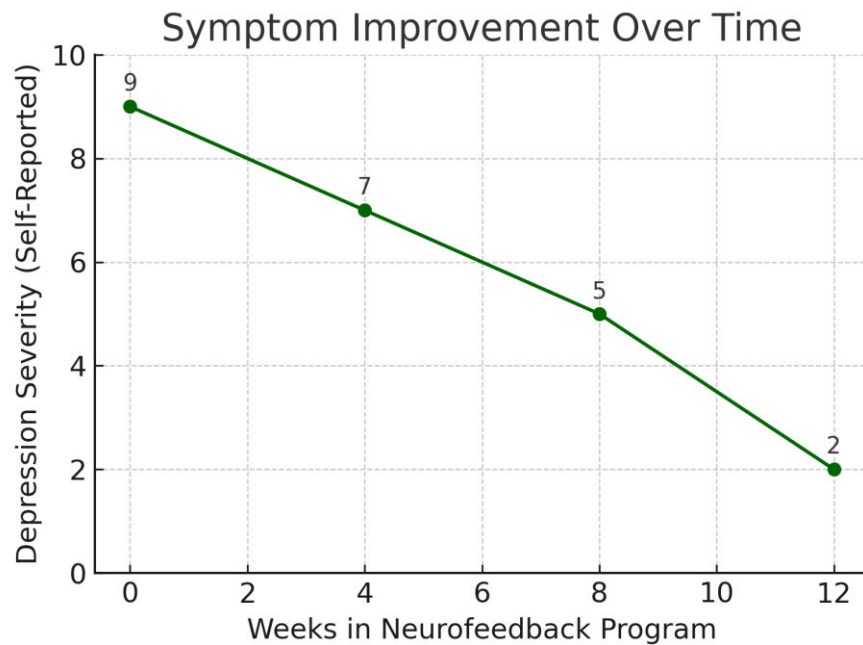
Reported Subjective Changes:

- Reduced rumination and intrusive thoughts
- Improved executive functioning and goal-directed behavior
- Increased resilience and motivation

Post-Intervention qEEG Findings

Observed Clinical Changes:

- Reduction in frontal, temporal, and posterior beta/high-beta activity
- Normalized alpha/beta ratios and posterior dominant rhythm
- Increased delta and theta activity in posterior regions (improved sleep regulation)
- Reduced alpha asymmetry and decreased aberrant coherence



Clinical Outcomes

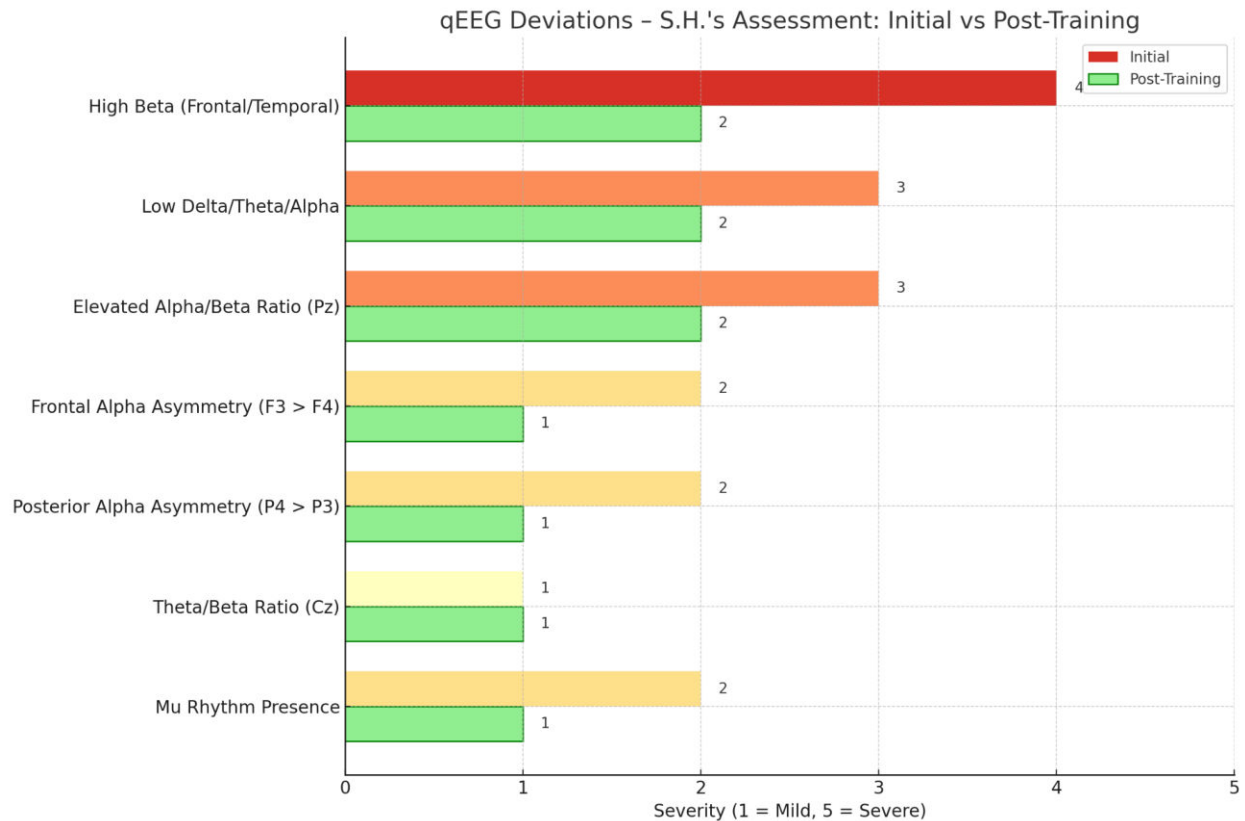
At program completion in September 2022, the client demonstrated:

- Remission of daily suicidal ideation
- Significant reduction in depressive and anxiety symptoms
- Increased emotional resilience and ability to self-regulate
- Improved executive function, goal-setting, and life-planning skills
- Greater adherence to vocational and academic pursuits

The client reported subjective improvements in mood stability, motivation, and quality of life. These gains were supported by objective qEEG improvements.

Baseline Brainwave Deviations – Post Neurofeedback

This chart illustrates the reduction in key brainwave deviations observed in the qEEG assessment before and after neurofeedback training. Each pair of bars shows the initial severity (red/orange/yellow) and post-training improvement (green) for specific neurophysiological markers linked to emotional regulation, cognitive function, and mental health.



Conclusion

This case study highlights the efficacy of **qEEG-guided neurofeedback** for complex, treatment-resistant mood disorders with dysregulated eating patterns. Individualized protocols address underlying brainwave network dysregulation, resulting in clinically meaningful improvements in emotional regulation, cognitive flexibility, sleep quality, and functional capacity.

This case further underscores neurofeedback's potential as a non-invasive, evidence-based intervention with measurable neurophysiological and clinical benefits.

As of July 2025, client had recently graduated with a master's degree in clinical psychology and is employed with one of her former clinical inpatient programs specializing in women's eating disorders.