Neurofeedback Evidence Base

What EEG neurofeedback (NF) has been studied to treat, organized by **strength of evidence** — not by hope. Neurofeedback reduces symptoms and improves self-regulation; it is not a guaranteed "cure," and effect sizes vary with protocol, dose, and study rigor. This sheet is written to survive a skeptical reviewer.

■ Tier 1 — Best-Established (replicated, randomized/meta-analytic support)

Epilepsy / Seizures	Sensorimotor-rhythm (SMR) training reduces seizure frequency in drug-resistant epilepsy — the oldest and most replicated NF finding. *Sterman & Friar (1972); Sterman (2010), Cleveland Clinic J. Med. 77(S3):S60.*
ADHD largest literature	Large effect sizes for inattention & impulsivity; medium for hyperactivity. Rated "Efficacious & Specific (Level 5)." Effect shrinks in the most tightly blinded trials — cite honestly. *Arns et al. (2009), Clin. EEG & Neuroscience 40(3):180, meta-analysis.*

■ Tier 2 — Good / Promising (controlled trials, TAHS core territory)

PTSD & Complex Trauma TAHS core	Reduced PTSD symptoms and improved affect regulation in treatment-resistant adults. The one modern RCT in this space. *van der Kolk et al. (2016), PLOS ONE 11(12):e0166752.*
Combat PTSD	Alpha-theta protocol reduced flashbacks/nightmares and psychotropic medication use in Vietnam veterans. Foundational, small sample. *Peniston & Kulkosky (1991), Medical Psychotherapy 4:47.*
Alcoholism & Substance Addiction	Alpha-theta ("Peniston protocol") linked to sustained relapse reduction and normalized stress hormones. Older, small studies — historical basis, not definitive proof. *Peniston & Kulkosky (1989), Alcoholism: Clin. & Exp. Research 13(2):271.*
Insomnia / Sleep	SMR training improves sleep quality, spindle activity, and overnight memory consolidation. Ties directly to Theta Data + Alpha-Theta Twilight. *Hauri (1981), Arch. Gen. Psychiatry; Schabus et al. (2013), Sleep Medicine.*
Anxiety & Depression	Moderate, growing support for symptom reduction via alpha/alpha-theta and frontal-asymmetry protocols. *Reviewed in multiple meta-analyses; quality varies.*

■ Tier 3 — Emerging / Mixed (preliminary; present as "needs more study")

Migraine & Chronic Pain	Small studies report reduced frequency/intensity.
Autism Spectrum	Improved self-regulation and attention in some trials — regulation support, not a cure.
TBI / Concussion	Preliminary gains in attention and cognitive recovery post-injury.
Stroke / Motor Rehab	BCI-based NF used to support motor recovery; active research area.

Tinnitus, OCD, Eating Disorders	Early exploratory work; evidence thin.
Peak Performance	Athletes, musicians, executives — calm/focus optimization in healthy people (not treatment). Where the TAHS games fit a general audience.

How TAHS uses this: the pilot leans on Tier 1–2 conditions (PTSD/trauma, addiction, ADHD, sleep) where controlled evidence exists, and frames everything else as promising-but-unproven. **Caveats to state up front:** (1) results are symptom reduction and improved self-regulation, not cures; (2) some of the ADHD effect may reflect practice/placebo; (3) the historical trauma/addiction studies are small — van der Kolk's 2016 RCT is the anchor. TAHS's own contribution is the *developmental/prevention* hypothesis: intervening in trauma-arrested youth while the prefrontal window is open should outperform the same protocol in adults — a claim the pilot is designed to test.