

Introduction

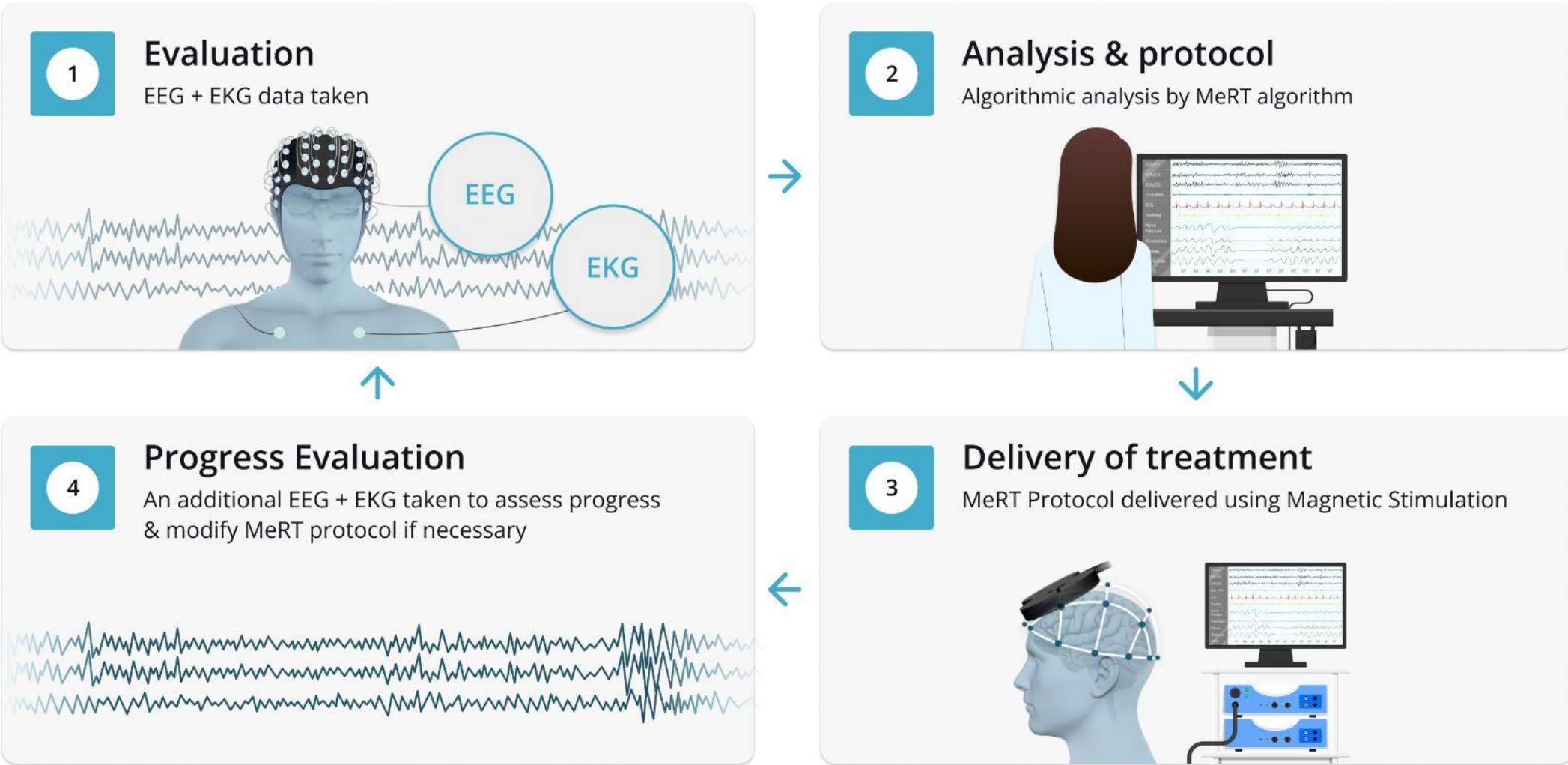
- Nearly 25% of military personnel will be diagnosed with post-traumatic stress disorder (PTSD) and/or traumatic brain injuries (TBI) during their lifetime^[1]. Special operations forces (SOF) suffer disproportionately high rates of PTSD & TBI^[2] with symptoms persisting for months to years.
- PTSD & TBI are often resistant to standard treatments, highlighting the need for new treatment options^[3].
- Electroencephalogram (EEG) alpha-guided transcranial magnetic stimulation (TMS), known as MeRT (Magnetic EEG-guided Resonance Therapy), provides a precision, targeted form of neuromodulation (see Figure 1). MeRT addresses the disruptions of the Default Mode Network (DMN) and alpha dysrhythmias that are hypothesized to be present in PTSD and TBI^[4-6].
- This retrospective chart review examined relationships between MeRT and PTSD/TBI clinical scales in SOF veterans participating in a Wellness Program (funded by The Special Operations Care Fund).

Materials + Methods

- Medical charts were reviewed from 33 Special Operations Forces (SOF) veterans suffering from symptoms of PTSD and/or TBI who were enrolled in the Wellness Program.
- Charts included data from the Post-Traumatic Checklist for DSM-5 (PCL-5) and the Rivermead Post-Concussion Questionnaire (RPQ-16), which survey PTSD and TBI symptoms, respectively.
- MeRT was provided 5 days/week for 6 weeks. Clinical scales were administered at the beginning and end of the program (baseline and follow up).
- 19 lead EEGs (+electrocardiogram channel) were acquired at baseline and bi-weekly throughout treatment to derive the participants’ individual alpha frequency (IAF) used to set MeRT stimulation parameters.
- The occurrence of side effects were also examined in charts.
- Change in scales from baseline to follow up were analyzed using paired-samples *t*-tests, with significance set at *p*<.05, and Cohen’s *d* effect sizes were calculated.
- This chart review was conducted under IRB approval, no. 1286978.

Figure 1. Visualization of MeRT analysis and treatment flow.

MeRT™ Process



Results

Table 1. Sample Characteristics (**p*<.001, ***p*<.0001)

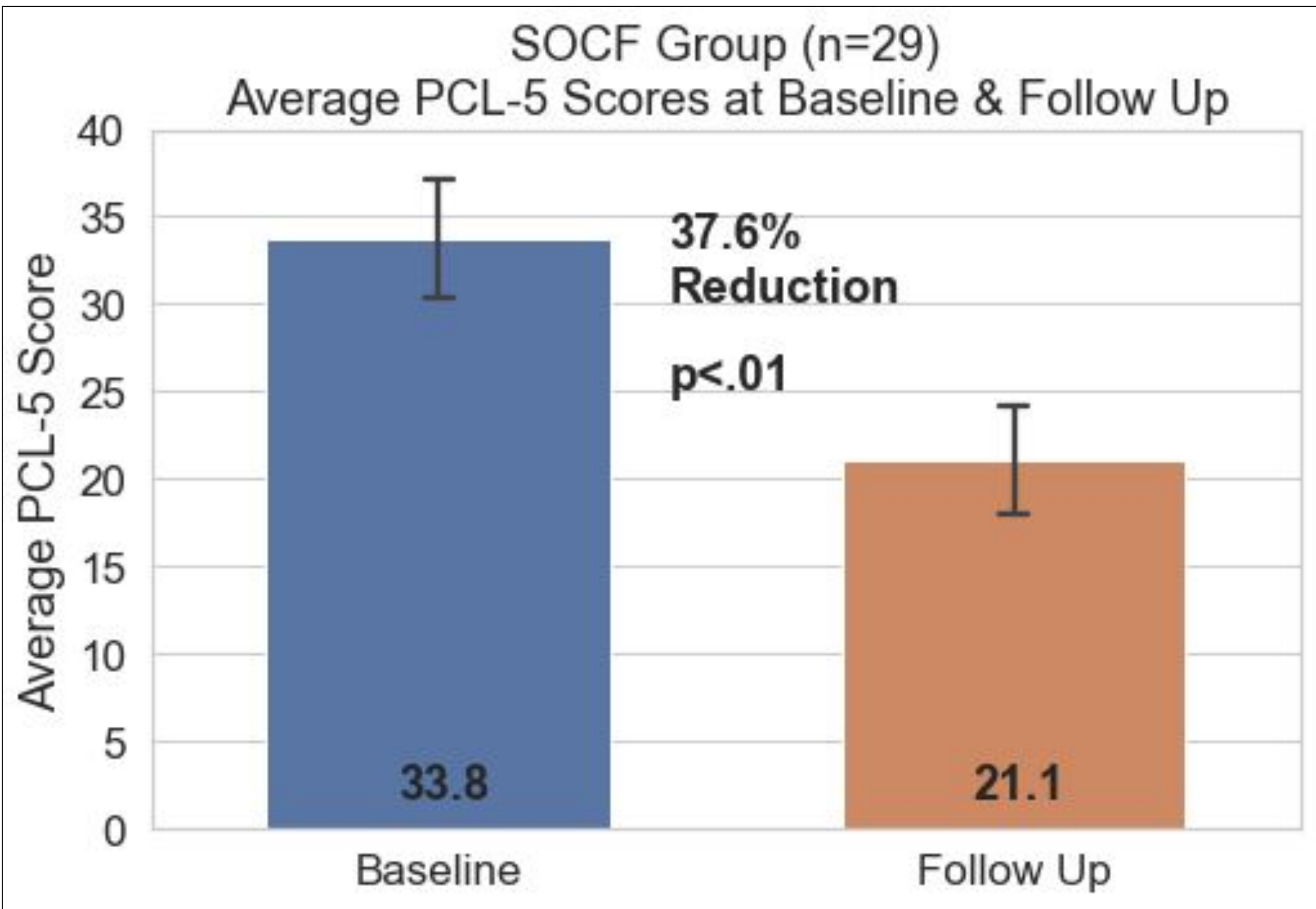
Feature	Baseline (N=33)	Follow up
Age (M, SD)	43.5 (8.2)	-
Service Years (M, SD)	16 (8.2)	-
Primary Outcomes		
PCL-5 (M, SD)	33.8 (18.5)	21.1* (16.6)
RPQ-16 (M, SD)	33.2 (10.3)	15.3** (12.3)

- 33 participants were available for analyses. 32 had complete RPQ-16 data, 28 also had PCL-5 data, and one participant had PCL-5 data alone.
- Side effects were found to be mild and consistent with those reported in the literature, with the most common being mild headaches. Side effects generally resolved within two weeks. No serious adverse events were noted and no patients discontinued MeRT due to side effects.

PCL-5 Results

- There was a 37.6% reduction in mean PCL-5 scores from baseline to follow up.
- Significant differences were found between scores at baseline vs. follow up (*t*=-3.6 *p*<.001, *d*=0.72) (See Figure 2)
- At baseline, there were 16 participants with PCL-5 scores above clinical threshold (scores >33).
- At follow up, 11 of these 16 participants achieved scores below threshold (PTSD scores <33), or 69%.

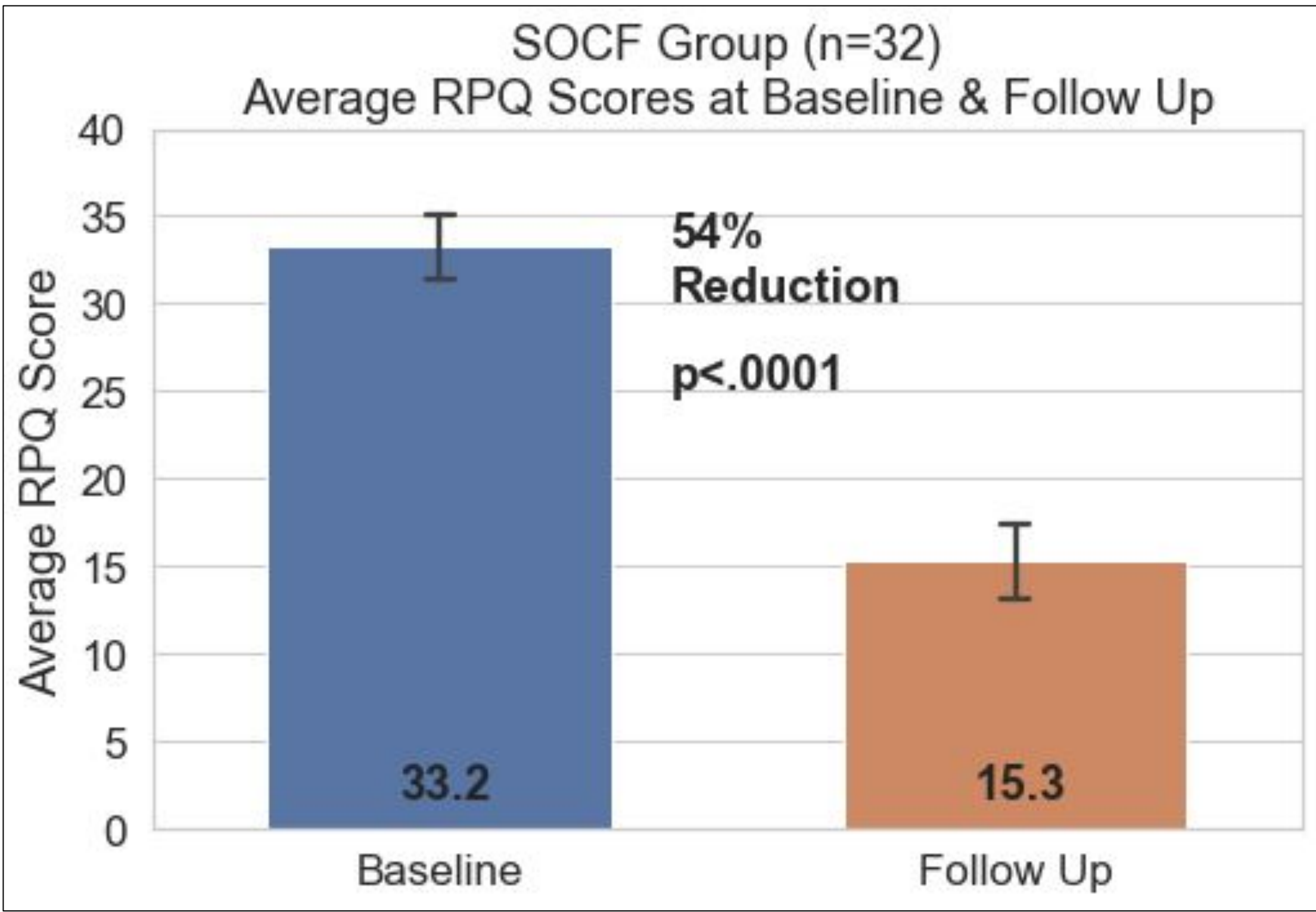
Figure 2: PCL-5 Results



RPQ-16 Results

- There was a 54% reduction in mean RPQ-16 score from baseline to follow up.
- Highly significant differences were found between scores at baseline vs follow up (*t*=-6.6, *p*<.0001, *d*=1.58) (See Figure 3)

Figure 3: RPQ-16 Results



Conclusions & Discussion

- Results from this chart review demonstrated significant decreases in clinical symptoms of PTSD & TBI, potentially reflecting an impact on alpha dysrhythmia and disruptions of the DMN.
- PTSD “remission rate” was found to be 69%, compared to 46.1% reported in the literature with standard rTMS^[7] in military veterans.
- Study limitations of this chart review include low sample size, lack of subject homogeneity with respect to prior diagnoses, and lack of a control group (participants not receiving MeRT).
- MeRT studies are underway using sham-controlled randomized clinical trials, with greater subject numbers, and examination of EEG data to fully evaluate potential clinical response, within SOF and other military and civilian populations.
- Precision TMS is an encouraging approach to help alleviate suffering from neurological and psychiatric problems.
- This study aligns with previous work supporting the likelihood of rTMS therapies being more effective when customized to the patient’s individual alpha frequency^[8] rather than fixed-frequency treatment.

References

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