

FREEDIVING AS A TOOL FOR PTSD TREATMENT AND ENHANCED WARFIGHTER PERFORMANCE

Carabajal, J., Cisneros, C.

Background

Post Traumatic Stress Disorder (PTSD) is a psychiatric condition with an approximate lifetime prevalence of **6% in the US population and 29% in the veterans of Operations Enduring Freedom and Iraqi Freedom (OEF/OIF)** [1]. The relatively high prevalence in the veteran population is associated with disproportionate rates of suicide [2]



Figure 2. Image rendered using DALL-E-3

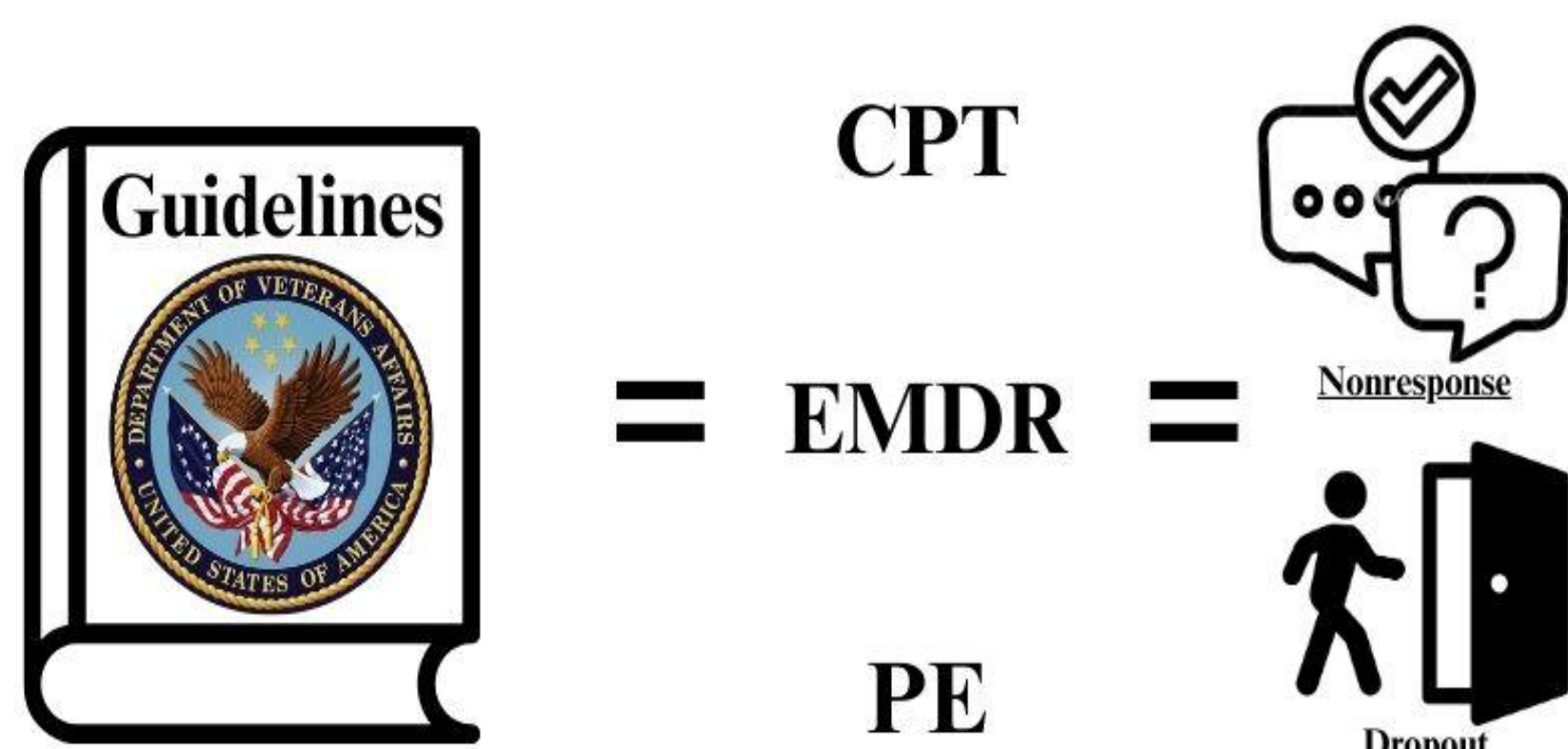


Figure 3. Psychotherapies endorsed under current VA guidelines have high rates of dropout and nonresponse.

Freediving, defined as underwater immersion without the assistance of a breathing apparatus, has an established **reductive effect on the core biomarkers of stress and anxiety**, such as tachycardia and hypertension, and is anecdotally reported by many participants to promote stress management and emotional wellbeing.



Figure 4. Two freedivers underwater. Image courtesy of the author.

Objective

The objective of this study was to explore how freediving supports both symptomatic relief in PTSD and enhanced warfighter performance by examining its physiological effects reported in the current literature.

Methods

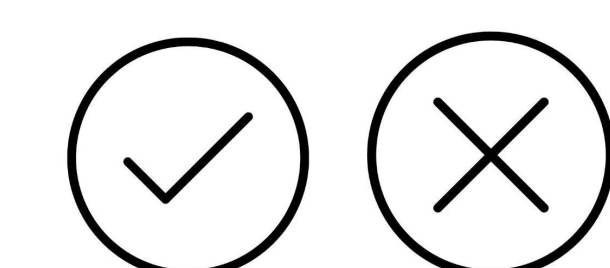
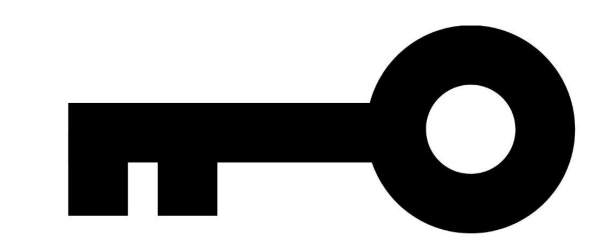


Figure 5. Research methodology. Graphics courtesy of Canva.

The **PubMed** literature database was searched for publications made in English between **2010 and 2025** with the keywords “**Freediving**” and “**breath-hold diving**.” Only papers which examined physiological biomarkers and presented unique data were included. Case studies were excluded. A **narrative synthesis** approach was utilized to assess key findings.

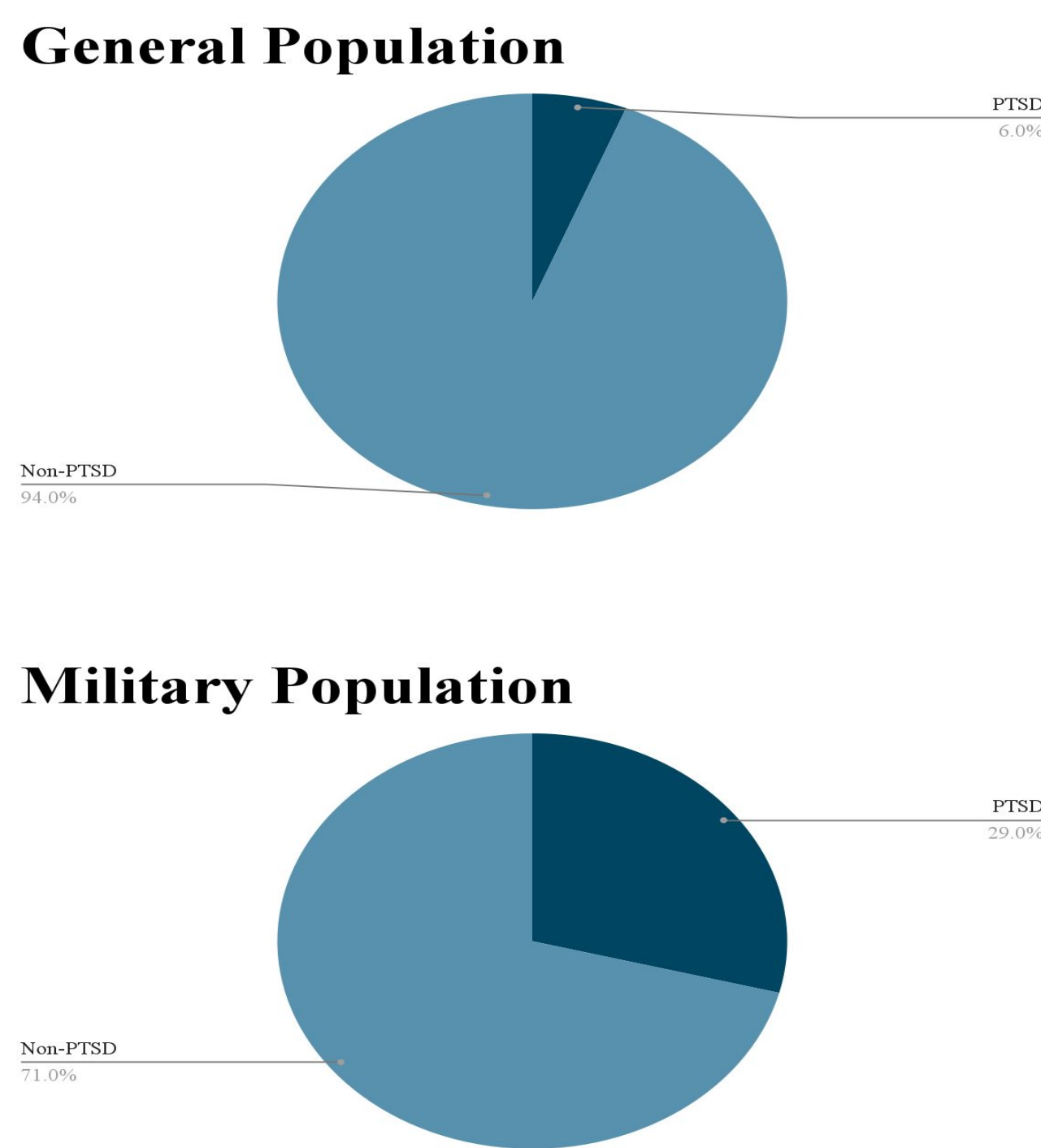


Figure 1. Lifetime prevalence of PTSD in Military vs. General Population

The current **Clinical Practice Guidelines** for the Department of Veterans Affairs (VA) and Department of Defense (DoD) endorses the use of the use of psychotherapy, namely **Cognitive Processing Therapy (CPT), Eye Movement Desensitization and Reprocessing (EMDR), and Prolonged Exposure (PE)** as first-line treatments before pharmaceutical treatment [3]. However, research has found these approaches to be limited by high rates of **nonresponse** [4,5,6] and **patient dropout** [7]

Results

This review synthesized findings from 19 peer-reviewed studies (n = 421 participants) examining the physiological and neuropsychological effects of freediving. Key findings include reductions in resting heart rate, improvements in heart rate variability, increased nitric oxide (NO) levels, enhanced CO₂ tolerance, and preserved cognitive performance under hypoxic stress.

Mammalian Dive Response

Brainwave Activity
Shifts toward slower alpha & theta frequencies, promoting relaxation, focus, and conserving oxygen

Bradycardia
Slows your heart rate to conserve oxygen

Blood Shift
Plasma fills the lungs to prevent collapse, protecting them from pressure at depth

Parasympathetic Activation
Stimulates the vagus nerve, shifting the body out of fight or flight

Peripheral Vasoconstriction
Redirects blood from the extremities to prioritize vital organs like the brain and heart

Spleen Contraction
Releases stored red blood cells to increase oxygen availability

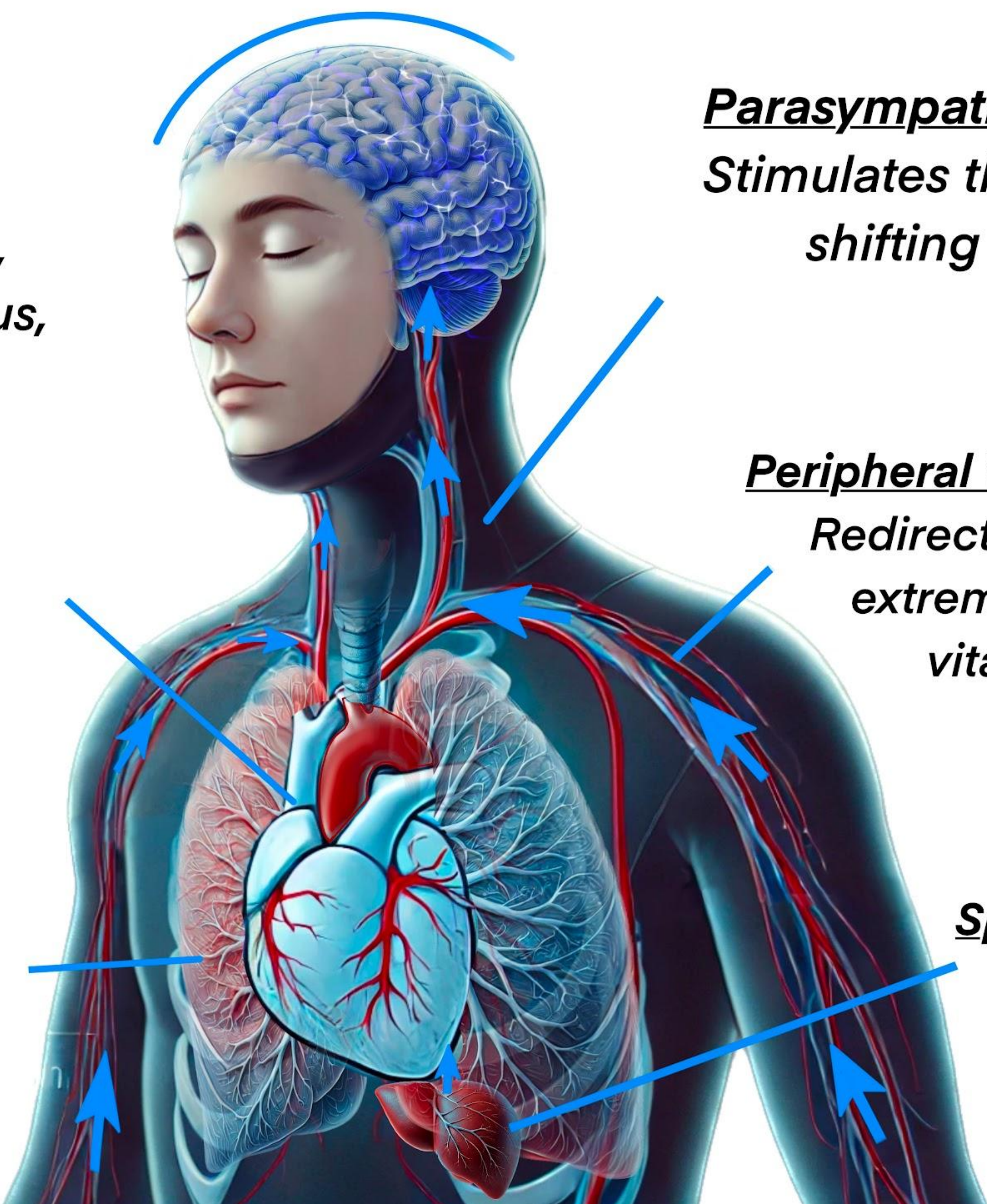


Figure 6. The physiological effect of freediving. Image rendered using DALL-E-3.

Discussion / Conclusion

Future directions include the use of EEG to evaluate whether breath-hold diving induces neurophysiological states associated with trauma processing and emotional regulation, such as theta wave dominance. Given the high cost of training and maintaining a single warfighter, often **exceeding \$500,000 for special operations personnel**, there is a strong **return on investment (ROI)** for implementing cost-effective, integrative methods like freediving that support psychological health, enhance physiological resilience, and strengthen team-based performance. **We propose freediving as both a therapeutic intervention for PTSD and a performance-enhancement modality for modern warfighters.**

Contact



References

