

Neurocognitive Performance in EOD Special Operators: Gender Comparison at Baseline in the BLAST EMFASIS Study

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ABSTRACT

Background: Women comprise nearly 20% of the military and are taking roles with greater susceptibility to blast exposure. There is evidence suggesting gender differences in brain responses to injury or exposure, but studies of blast exposure to date have been exclusively in males, leaving a critical gap in the current body of evidence regarding the brain impact of subconcussive blast exposure. Baseline and Longitudinal Assessment Study of EOD Males and Females for Alterations in Symptoms, Intellectual and Sensory function (BLAST EMFASIS) utilized The Hopkins Verbal Learning Test-Revised (HVLTR) to test participants' baseline verbal learning and memory performance. Brain Gauge™ (Cortical Metrics, LLC) to identify gender-based differences in somatosensory function.

Methods: The HVLTR and Brain Gauge™ dataset represents the average baseline cognitive function, reaction time, and reaction time variability in female and male participants with no prior blast overpressure exposure in the past 3 months. The HVLTR had participants complete 3 immediate recall trials, 1 delayed recall trial, and 1 delayed recognition trial to test the following outcome measures: Total Recall, Delayed Recall, Retention %, and Recognition Discrimination Index. The Brain Gauge™ presents to the participant-controlled vibrations using a handheld two-point stimulator while corresponding reaction-based assessments are administered through their ProTools software application. The assessment collected the following performance measures: Accuracy, Plasticity, Focus, Speed, and Corticalmetric, which is a composite score summarizing overall cognitive and sensory processing function.

STUDY POPULATION

- 50 Male and 50 Female EOD Technicians
- Representing all 4 major military services: Army, Navy, Air Force, Marine Corps



HVLT-R and BRAIN GAUGE™ ASSESSMENTS



Hopkins Verbal Learning Test-Revised

- 6 different word lists
- 12 words each, in categories such as musical instruments, types of liquor, cooking utensils
- Immediate recall: words repeated 3 times
- Delayed recall: no cues
- Discrimination: 24 words, half on original list



Brain Gauge

Brain Gauge™ Device schematic. The participant holds the device similarly to a computer mouse and presses each button when prompted.

RESULTS AND FINDINGS

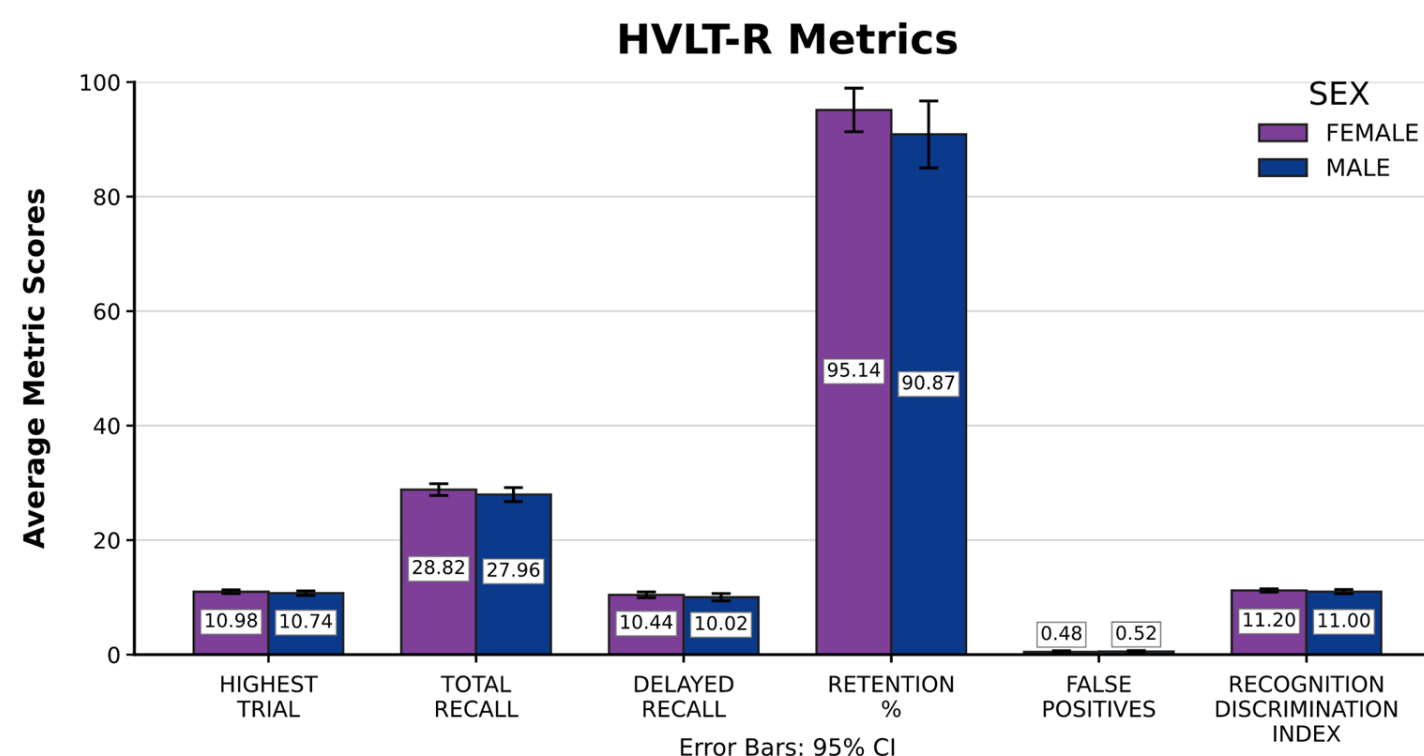


Figure 1. Graphical representation of gender-based differences in baseline verbal learning and memory performance as defined by the HVLTR.

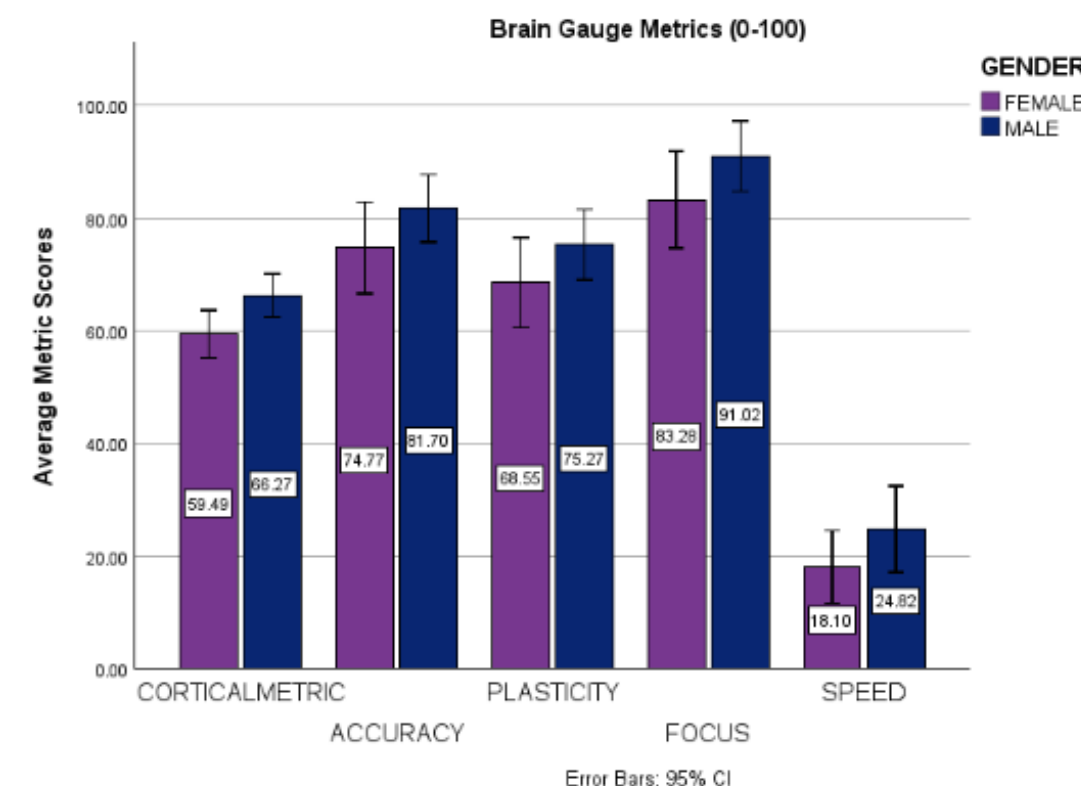


Figure 2. Graphical representation of gender-based differences in baseline cognitive/somatosensory function as defined by the Brain Gauge™

CONCLUSIONS

Both HVLTR and Brain Gauge™ metrics at baseline show no statistically significant differences across assessment defined measures of cognitive function, verbal learning, and memory. While the male population showed slightly better performance on the Brain Gauge™, females performed higher across all assessments in the HVLTR. As the study continues, these gender-based baselines will serve as the primary comparison for post-exposure data. The two-year follow up for non-exposed participants will be essential for differentiating between acute blast effects and general career-related changes over time. These results support the need to consider gender when conducting blast exposure studies to ensure accurate health assessments and operational readiness for the EOD and other military communities.

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