



Processing Speed in Traumatic Brain Injured Post-war Veterans.



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INTRODUCTION

During the wars in Afghanistan and Iraq, the use of the IED (Improvised Explosive Device) resulted in an increasing number of head injuries, mainly traumatic brain injuries (TBI). Studies have found that information processing speed appeared to be the most impacted of neuropsychological variables (Clement, 2003). However, the relationship of TBI characteristics and processing speed is poorly understood.

OBJECTIVE

Our study involved 1,266 verified active duty military personnel who received a traumatic brain injury while being stationed in Iraq, Afghanistan, and other military locations. These soldiers received a "Blast" battery which included 3 hours of clinical interview and 7 hours of neuropsychological tests. However, only the processing speed performance variables were evaluated during this study. 822 of these were included in this study due to highly restrictive inclusion limitations (e.g. age, repeated evals, etc.).

The purpose of this study was to measure processing speed performance in our sample by focusing on three demographic variables;

- Mechanism of injury** (blast TBI vs. non-blast TBI)
- Number of blasts** (single blast vs. multiple blast)
- Blast exposure** (mounted or closed-spaced blast vs. dismounted or open-spaced blast)

It was hypothesized that blast exposure and number of blasts would predict statistical significance of correlation in processing speed performance. A second hypothesis proposed that mechanism of injury would not predict any statistical significance of correlation in processing speed outcome.

An IRB was obtained to complete this retrospective analysis.

METHOD

This assessment was composed of 13 different types of neuropsychological tests that measured a variety of cognitive functions.

However, only 4 out of the 12 tests were used to measure processing speed.

Inclusion criteria for the study consisted of the following:

- Data that did not lie within ± 2.0 standard deviations from the mean were excluded from the study.
- Participants must have included subtest scores that measured processing speed:

- The Processing Speed Indexes of the WAIS III and/or IV
- Halstead-Reitan (Trails A & B Test)
- Grooved Pegboard (Dominant & Non-Dominant Time)
- Stroop Test (Color-Work Task)

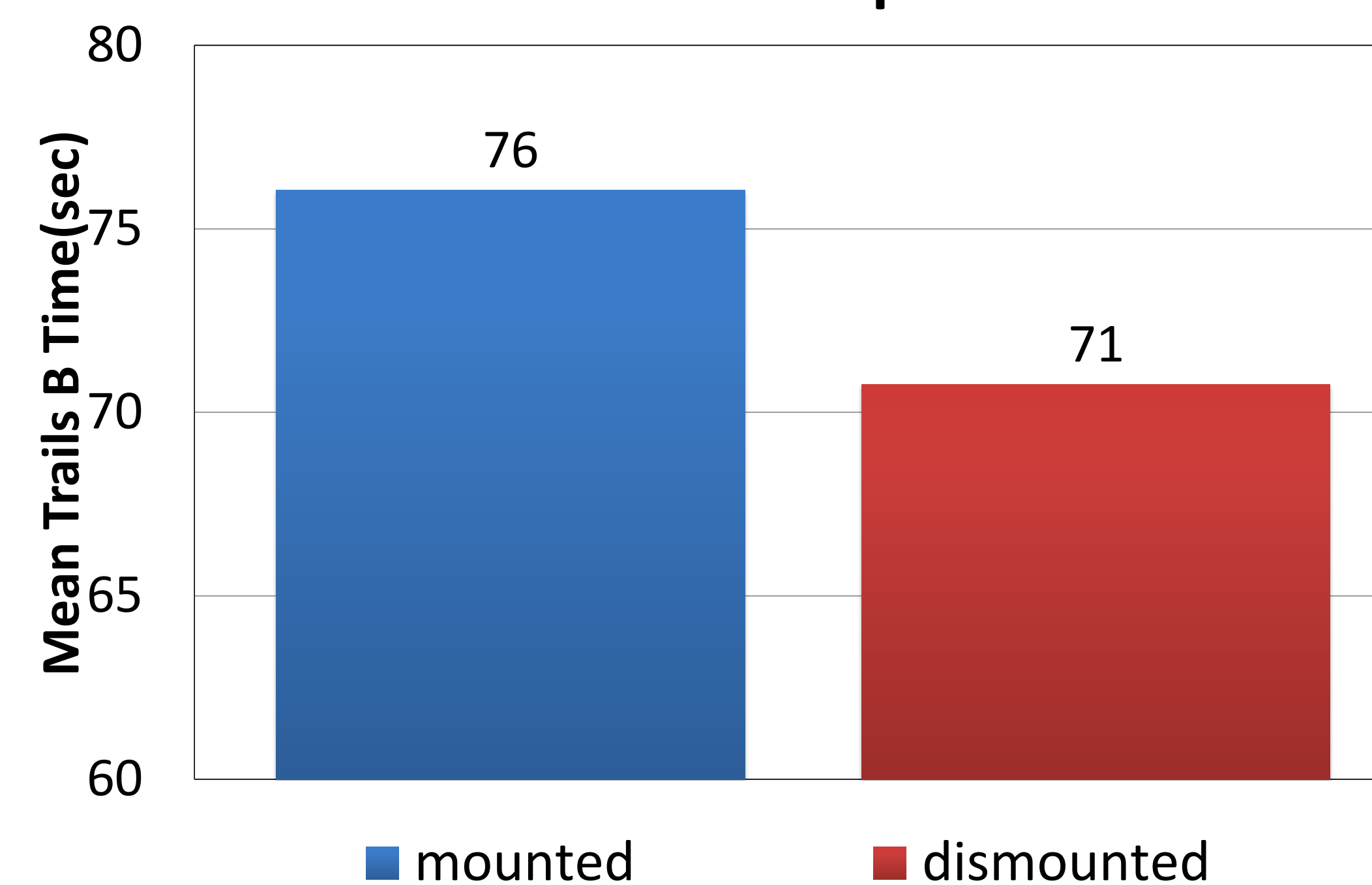
- Reported the following demographic information;
 - Mechanism of injury (blast injury versus non-blast injury)
 - Blast exposure (mounted versus dismounted)
 - Number of blasts (single versus multiple blasts)
- All subjects who did not complete at minimum sixty-percent of the neuropsychological assessment were excluded.

- All participants who were included in the study experienced Traumatic Brain Injury and possessed a variety of co-morbid symptoms (loss of consciousness, headache, sleep problems, and substance misuse).

RESULTS

Blast Exposure and Number of Blasts Predicting Statistical Significance of Correlations in Participant Processing Speed Performance

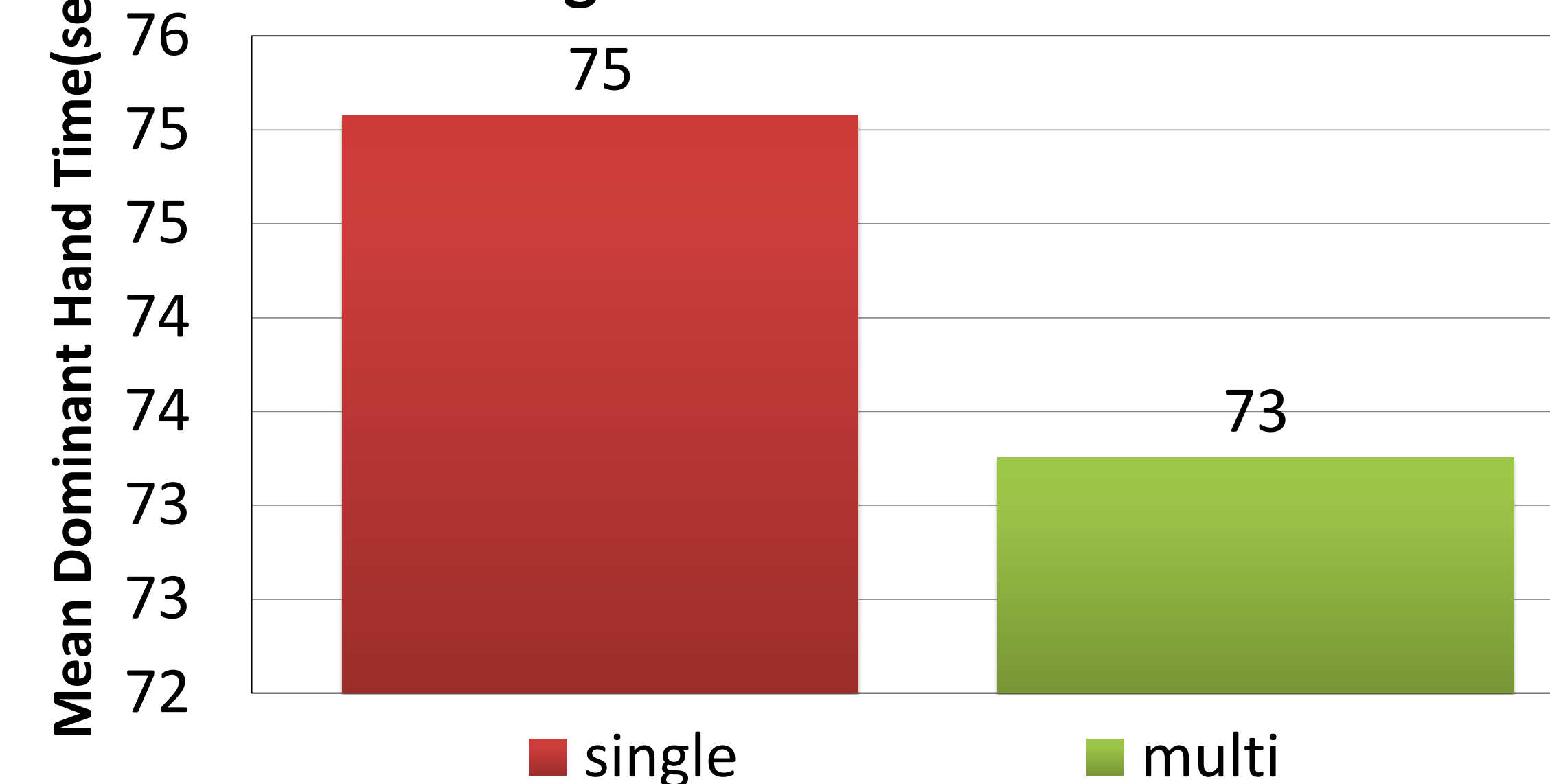
Trails B and Blast Exposure



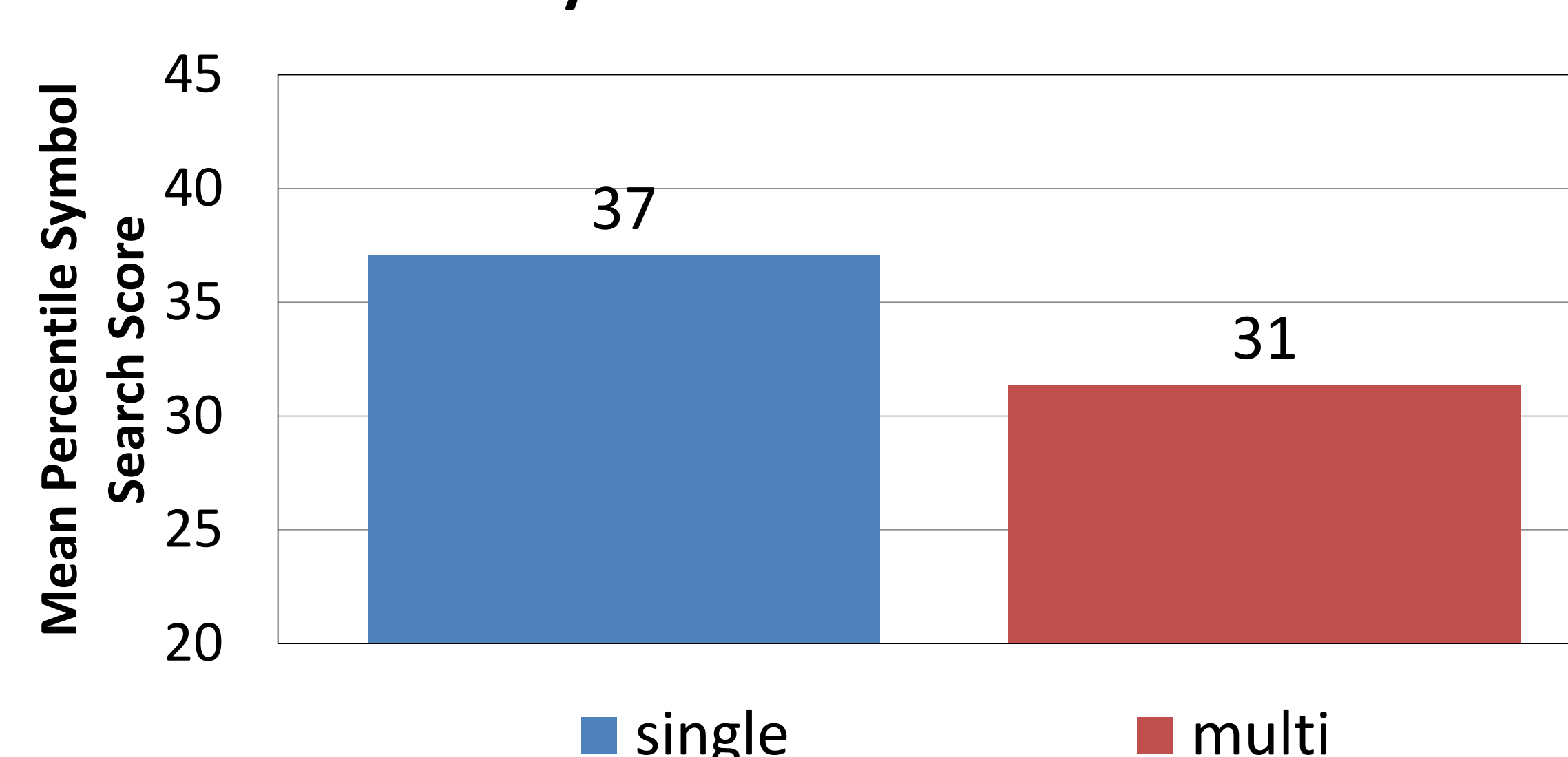
A Pearson correlation was computed to assess the relationship between blast exposure (blast mounted versus dismounted) and the Trails B subtest from the Halstead-Reitan Neuropsychological Battery. There was a significant negative correlation between the two variables ($r=-.127$, $n=295$, $p=.03$).

Another correlation was performed to identify the association between number of blasts and the Dominant Hand Time subtest from the Grooved Pegboard Test. The correlation was found to be a significant negative correlation between the two variables ($r=-.089$, $n=505$, $p=.05$).

Groove Peg Board and Number of Blasts



WAIS-IV Symbol Search and Number of Blasts



A significant positive correlation was found between number of blasts and the Symbol Search subtest from the Weschler Adult Intelligence Scale Fourth Edition ($r=.115$, $n=355$, $p=.03$).

Mechanism of Injury Predicting Statistical Significance of Correlations in Participant Processing Speed Performance

A Pearson correlation was computed to assess the relationship between mechanism of injury and processing speed performance.

No significant correlations were found involving mechanism of injury on any neuropsychological measurements regarding processing speed.

SUMMARY

The overall data from our study revealed few strong and significant relationships between predictor variables and processing speed ability. However, our study did obtain strong and significant relationships involving number of blasts and blast exposure in three processing speed subtests:

- Trails Making Test B** (Halstead-Reitan)
- Dominant Hand Time Test** (Grooved Pegboard)
- Processing Speed Index Symbol Search** subtest (WAIS-IV)

This ultimately supported our initial hypothesis. There are no current studies that support significant differences regarding mechanism of injury (blasts versus non-blasts) and neurocognitive functioning.

No strong correlations or significant differences were discovered in processing speed scores involving blast versus non-blasted military veterans, which ultimately supported our second hypothesis.

FUTURE DIRECTIONS

Several areas of focus following this study include;

- Effects of loss of consciousness on processing speed
- Effects of prior education on recovery of processing speed
- Reducing assessment time for TBI
- Streamlining TBI blast batteries

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