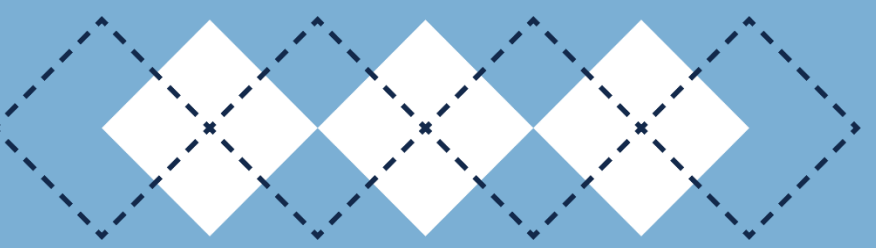




Psychometric Validation of the Patrol Exertion Task: Reaction Time Responses in Service Members with Mild Traumatic Brain Injury

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Background

The Patrol Exertion Task (PET), part of the Complex Assessment of Military Performance test battery¹, challenges physical and cognitive function, including reaction time in a 10 minute simulated foot patrol. A virtual scenario that depicts walking through a village is projected on a large monitor while the service member (SM) repeatedly steps on and off a 12" step and carries a simulated weapon (see example right). The SM identifies visual markers throughout the scene and responds to 12 auditory cues by pressing a button that is mounted on the weapon.

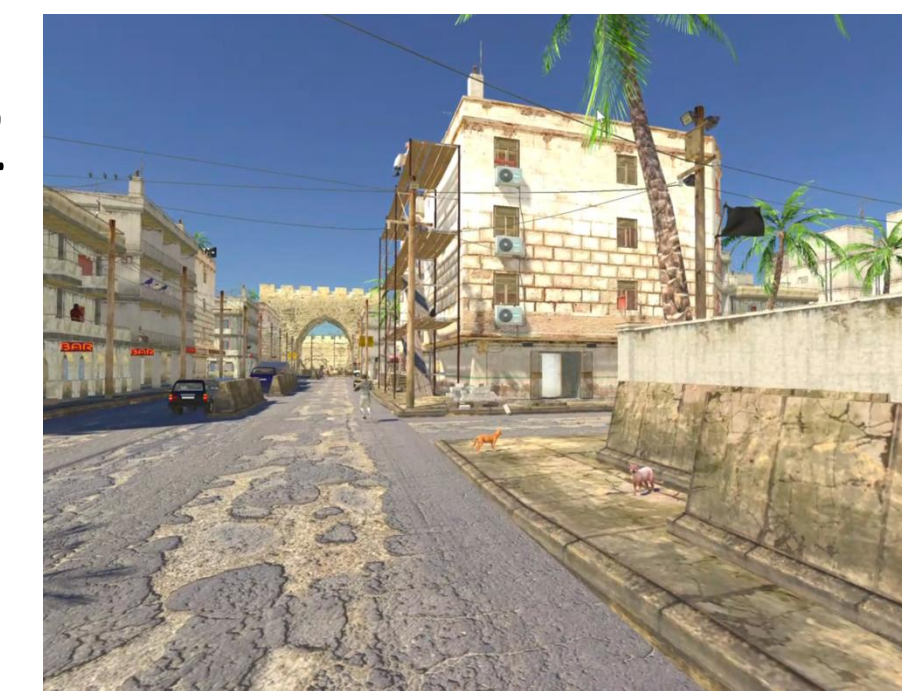


A healthy control participant performing the PET, stepping onto the 12-inch step, holding the simulated weapon, while viewing the video.

The mTBI group was older than the HC group with more years of military service, greater percentage of deployment, greater lifetime history of concussion (before recent injury), and much higher Neurobehavioral Symptom Inventory scores, ratings of pain, and ratings on the PCL-5 (all $p < .001$).

Methods

Reaction time was measured for 2 trials in standing, 2 trials with stepping, and then 12 trials during the virtual scene video (screen shot right).



HC participants in the test-retest group were tested 4 weeks after the first test using a comparable but different video scenario. mTBI participants were tested during their first week of therapy and then again when they completed their course of therapy. Interventions varied and were not controlled as part of the study.

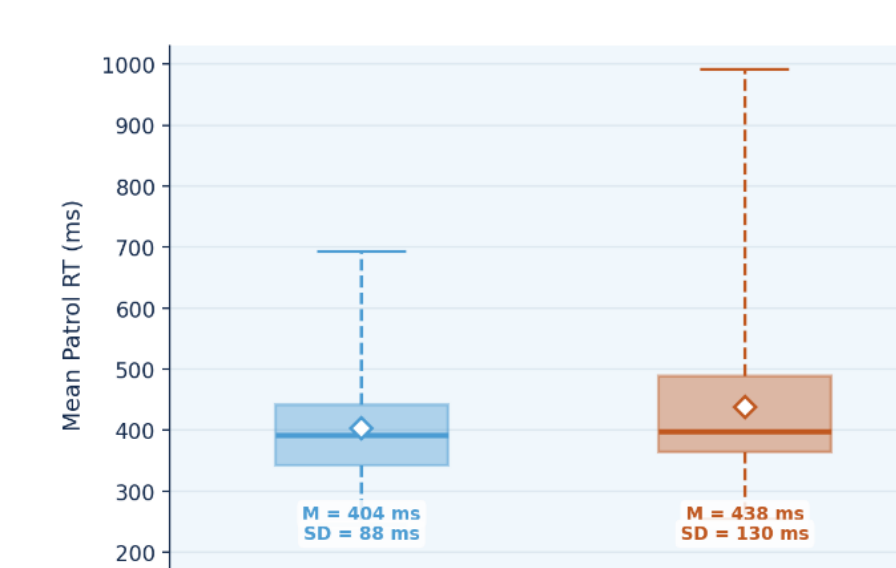
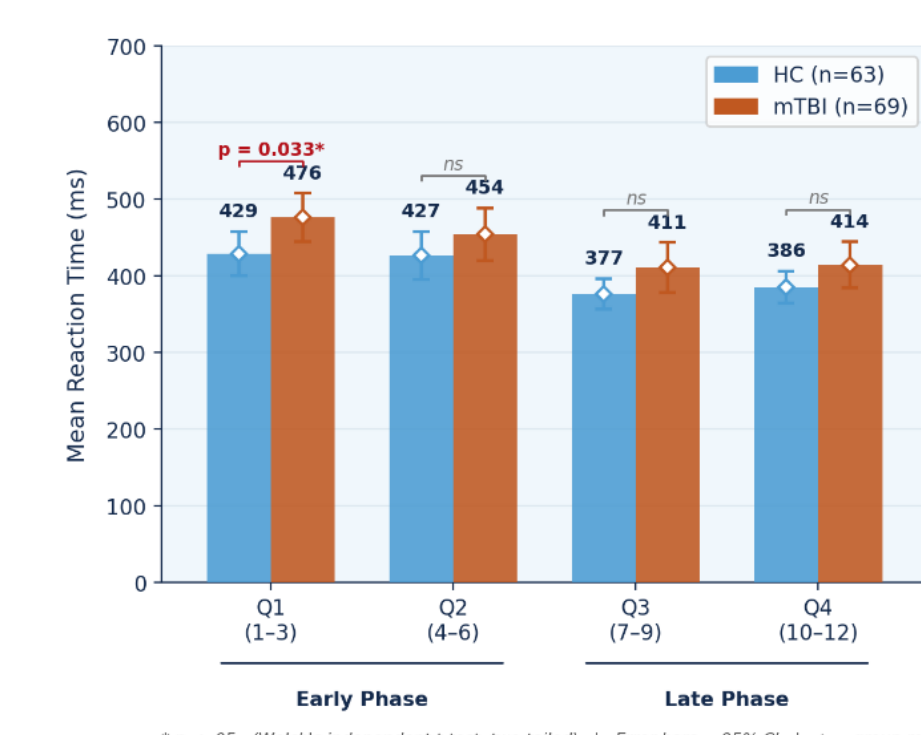
Data Analyses

Reliability was examined using ICC(2,1) for the reaction time trials. **Between groups comparison** was conducted with t tests (Welch's correction) + Mann-Whitney U considering overall mean RT and considering RT responses by quarters (early vs. later in task). Pre- to post-intervention responses to self-report measures and reaction time performance on PET were analyzed with paired t-tests.

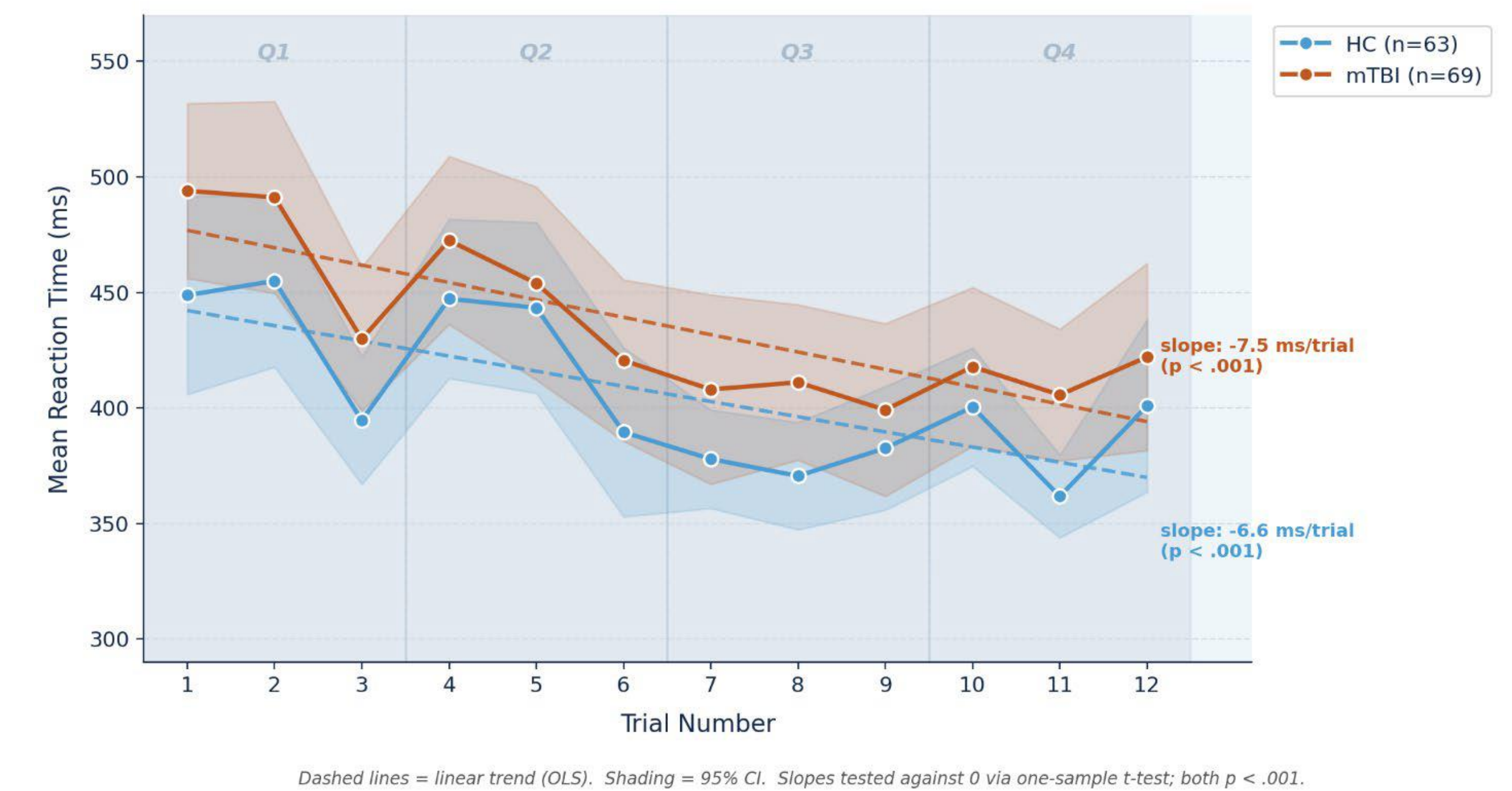
Results

TEST-RETEST RELIABILITY: ICCs for reaction time for the preparatory trials (2 each standing, stepping) were poor; these trials were designed to orient SMs to the task. **ICC=.78 for mean of 12 reaction time trials was good during the video simulation, with MDC value of 110.5ms.** Small to medium practice effects observed during first half of the task (faster responses during second test).

BETWEEN GROUP DIFFERENCES: Figure below shows comparable mean RT (12 trials) but significantly slower RT for mTBI group in the

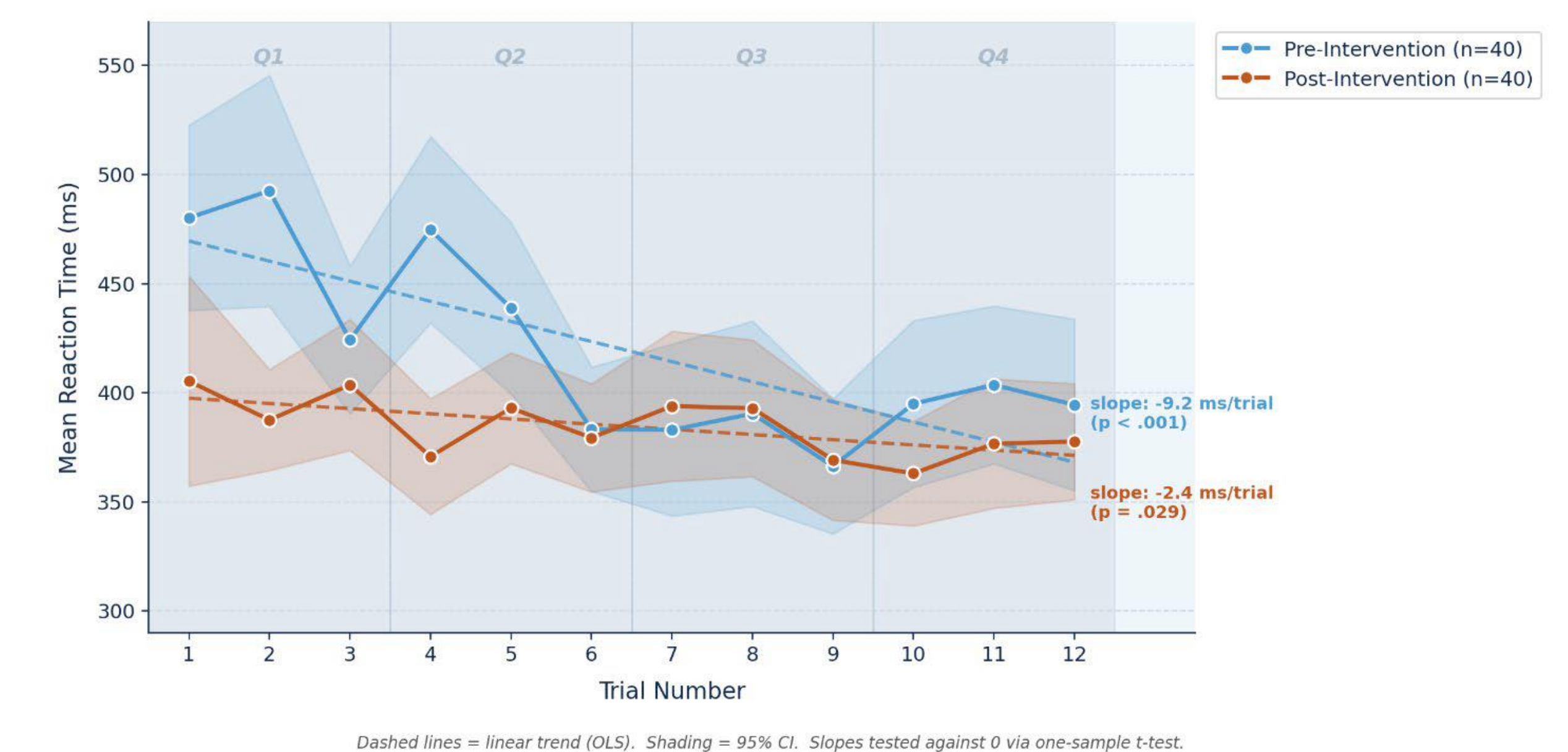


initial phase (trials 1–3), when adjustment to the multiple attentional demands of the task were in process.



The graph above illustrates the trend toward faster reaction times with both groups as the trials progressed, with a mean reduction of 7.5ms per trial in the mTBI group, and 6.6ms in the HC group.

PRE- to POST-INTERVENTION CHANGES (mTBI): Improvement in RT was observed in 80% of the sample, with a reduction of 38ms on average, a significant improvement ($p=.01$) with a small to medium effect size ($d=0.43$). The Figure below illustrates the first test results in blue, and the second test results in red.



Conclusions

- The reaction time components of the Patrol Exertion Task have good reliability and face validity compared to many clinical tests.
- Individuals with mTBI were challenged managing attentional demands early in the task, evidenced by slower RTs.
- Following rehabilitation, improvements in RT approach were significant, with most improving, and approaching RTs of HC SMs.
- The Patrol Exertion Task with integrated reaction time testing may be useful as a rehabilitation outcome measure for SMs seeking to return to active duty.

Objectives

The objective of this study was to examine the reaction time elements of the PET, as a component of test validation that included (1) examination of **test-retest reliability** in an active-duty healthy control (HC) group, (2) evaluation of **group differences** between HCs and SMs with mTBI, and (3) assessment of **pre- to post-intervention changes** after mTBI.

Demographics

Participants were recruited from Fort Bragg, Camp Lejeune, and Joint Base Lewis-McChord. Those with mTBI were recruited via Intrepid Spirit Center outpatient programs for mTBI and included 132 participants:

69 SM with mTBI undergoing intervention for persisting symptoms (> 2 wks and < 2yrs) –mean age 31.9 (7.4) years, 93% male

- 40 SM with mTBI were examined twice with PET for pre-post intervention comparisons. Mean age was 34.0 (6.7) years, 93% male

63 HC SM with no diagnosis of mTBI in the past 2 years, no symptoms associated with a prior injury – mean age 27.3 (6.2) years, 87% male)

- 36 HC SM were tested twice, and served as the basis for the test-retest reliability testing- mean age 27.6 (5.6) years