**COMPARISON OF SUBJECTS WITH mTBI AND HEALTHY CONTROL GROUP IN THE DEVELOPMENT OF THE POWAR-TOTAL: A TEST OF RETURN TO DUTY READINESS FOLLOWING mTBI**

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**Introduction:** Return-to-duty (RTD) readiness assessments for servicemembers following mTBI requires complex clinical considerations of a myriad of impairments.1–6 Following a concussive event, many servicemembers present with deficits in dual-tasking activities that prevent an individual servicemember’s deployability and overall task-force readiness particularly in combat situations which require cognitive clarity and motor agility.4,5 At this time, there are limited validated or clinically feasible measures to assess dual-task changes in the military population, who have unique cognitive and physical demands in typical military duty tasks.3,5,7 The Portable Warrior Test of Tactical Agility (POWAR-TOTAL) is a performance-based, dual-task assessment which requires less time, space, and technology than previous laboratory-based RTD assessments. Pulling from components of the previously validated Assessment of Military Multitask Performance (AMMP) conducted by Radomski et al, the POWAR-TOTAL combines two of the most sensitive elements of the AMMP, specifically the run-roll-aim motor/agility task and grid coordinate memorization/cognitive task.7,8 The POWAR-TOTAL also demonstrates high external validity, as it is comprised of familiar components to the military population.2 In order to determine the sensitivity of the POWAR-TOTAL to identify dual-task deficits in servicemembers following a mTBI, we compared performances between subjects with mTBI and healthy controls.

**Objective:** Compare preliminary results of healthy control group vs. mTBI group on the POWAR-TOTAL task to determine differences in performance of motor vs. cognitive components of dual-task assessment.

**Subjects:** 23 Active-Duty Servicemembers (ADSM) with mTBI and 50 ADSM Health Controls

**Methods:** The POWAR-TOTAL includes a physical and cognitive component. The physical component includes handling a simulated weapon, and begins with the service member in prone, with a rapid transition to standing, diagonal 10m run, transition to a combat roll, rapid transition back to standing, and back pedaling to the starting position. The task is then repeated with a diagonal run and combat roll in the opposite direction. The cognitive component consists of a working memory task, with the servicemember retaining grid coordinates and then repeating them back to the researcher after 15-seconds. In the Dual-Task activity, the ADSM is read coordinates, then completes the agility activity, and is then required to repeat the grid coordinates in the proper order. The Single-Task Motor, Single Task Cognitive, and Dual-Task were repeated over multiple trials to compare performance and prioritization of cognitive vs. motor task. Each ADSM’s results of the POWAR-TOTAL were recorded, with components consisting of a Single-Task Motor (ST-motor) activity, Single-Task Cognitive (ST-cognitive) activity, and a Dual-Task (DT) activity.

**Results:** 4 out of the 23 mTBI participants could not complete the POWAR-TOTAL due to becoming symptomatic after the first trial (i.e., dizzy, nauseous, etc.) and were not included in the final analysis, while 50 out of 50 healthy controls completed the full task. During the motor component of the assessment, mTBI participants (Mean=15.48-seconds, SD=3.26) were significantly slower than healthy controls (Mean=13.73-seconds, SD=1.96) during the single task condition (p=0.023). mTBI participants (Mean=5.61coordinates, SD=1.53) also performed significantly worse in the single cognitive task when compared to the healthy controls (Mean=6.94 coordinates, SD=1.39) (p=0.001). During the dual task conditions, mTBI participants were slower (Mean=15.27-seconds, SD=3.31, p=0.044) and remembered less (Mean=4.92 coordinates, SD=2.04, p=0.008) when compared to healthy controls (Mean=13.66-seconds, SD=2.09; Mean=6.29 coordinates, SD=1.48). There were no significant differences between groups on dual tasks costs.

**Conclusions:** The POWAR-TOTAL was sensitive to detect differences between the mTBI and healthy controls. Ability to complete the POWAR-TOTAL was significantly lower in the mTBI group. Individuals in the mTBI group also performed worse on the single task physical and cognitive components and dual-task physical and cognitive components. These findings are in agreement with previous studies noting changes in dual-task motor or cognitive performance following a concussion, such as decreased gait speed, increased center-of-mass sway, and worsened cognition beyond typical return-to-activity parameters.1,9–13 While there were no dual task cost differences between the groups, the POWAR-TOTAL observational components can still detect group differences. This preliminary analysis supports the need for performance-based measures in RTD assessments.3 Furthermore, the findings also support the need for implementing interventions addressing dual-task needs specific to military occupational demands in preparing for return-to-duty.14 Further assessment of findings in this on-going study is imperative in further validating the POWAR-TOTAL in identifying dual-task deficits in the military population and supporting its utilization in RTD assessment.

**Learning Objectives for Poster Presentation:**

* Attendee will be able to describe group differences in performance of cognitive component and physical/agility component of POWAR-TOTAL
* Attendee will be able to analyze differences in dual-task costs for ADSM with mTBI as compared to healthy control.
* Attendee will be able to examine impact of dual-task deficits on soldier readiness for RTD following mTBI.

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