

research is necessary to replicate and extend this study in larger samples. Moreover, future work should incorporate neuroimaging variables to better interrogate structural and functional correlates of these observed genetic polymorphism associations in Veterans with mTBI histories.

Categories: Concussion/Mild TBI (Adult)

Keyword 1: concussion/ mild traumatic brain injury

Keyword 2: cognitive functioning

Keyword 3: genetics

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41 Predictors of Cognitive Symptoms Following Adult Civilian Mild Traumatic Brain Injury

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Objective: Mild traumatic brain injury (mTBI) is an important public health problem, due to its high incidence and the failure of at least 20% of patients to successfully recover from injury. Cognitive symptoms, in particular, are an important area of research in mTBI, due to their association with return to work and referral to neuropsychological services. Understanding the predictors of cognitive symptoms may help to improve outcomes after mTBI. This study explored female sex, psychological distress, coping style and illness perceptions as potential predictors of cognitive symptoms following adult civilian mTBI.

Participants and Methods: Sixty-nine pre-morbidly healthy adults with mTBI (mean age = 36.7, SD = 14.7, range = 18-60; 15 females) were recruited from trauma wards at two public hospitals in Australia and assessed 6-12 weeks following injury. Cognitive complaint was measured using a comprehensive 30-item scale (CCAMCHI) assessing mTBI-specific symptoms in the domains of processing speed, attention, memory and executive function. Participants

additionally completed the following measures: Brief-COPE, Illness Perceptions Questionnaire-Revised, Inventory of Depressive Symptomatology, Beck Anxiety Inventory, and PTSD Checklist for DSM-5. The latter three measures were combined to create an index of psychological distress.

Results: Bivariate nonparametric correlational analyses indicated that female sex ($r[67] = .26$, 95% CI [.14, .55], $p = .03$) and psychological distress ($r[66] = .54$, 95% CI [.40, .72], $p < .001$) were each significantly associated with cognitive symptom reporting following mTBI. Additionally, while none of the three coping style factors were associated with cognitive symptom reporting, seven of the eight dimensions of illness perceptions were associated with symptom reporting ($|r| = .25 - .58$, $p < 0.05$). In a linear regression model assessing the combined effects of each variable, female sex, greater psychological distress, and overall negative illness perceptions were each significant independent predictors of increased cognitive complaint (adj. $R^2 = .47$, $F[4,63] = 15.59$, $p < .001$).

Conclusions: These findings implicate female sex, psychological distress, and illness perceptions as key factors associated with cognitive symptom reporting after mTBI. This research suggests that these factors may be useful in clinical practice when considering early identification of individuals at risk of poor recovery. Specifically, this research implicates females, individuals with high psychological distress, and individuals with negative illness perceptions as important to subgroups to consider for potential intervention after mTBI. Additionally, as psychological distress and illness perceptions are both potentially modifiable, this research suggests that these factors may be useful targets for intervention.

Categories: Concussion/Mild TBI (Adult)

Keyword 1: concussion/ mild traumatic brain injury

Keyword 2: self-report

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42 Associations Between Mild Traumatic Brain Injury, Executive Function, and

Criminal Justice Involvement among Veterans and Service Members: a LIMBIC-CENC study

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Objective: To examine relationships between history of mild traumatic brain injury (mTBI), neuropsychological measures of executive function, and lifetime history of criminal justice (CJ) involvement among combat-exposed Veterans and Service Members (V/SM).

Participants and Methods: Participants were combat-exposed V/SM who completed a baseline assessment for the multicenter Long-term Impact of Military-Relevant Brain Injury Consortium - Chronic Effects of Neurotrauma Consortium study (N=1,341) and had adequate engagement/symptom reporting on measures of performance and symptom validity (i.e., Medical Symptom Validity Test and Mild Brain Injury Atypical Symptoms Scale). Neuropsychological battery included the Trail Making Test (A and B), Wechsler Adult Intelligence Scale-IV (WAIS-IV) Digit Span subtest, and the National Institute of Health (NIH) Toolbox Flanker subtest. Lifetime history of brain injury, criminal justice involvement, and demographics were collected. Participants were 87% male, 72% white, with a

mean age of 40 years (SD=9.67). Eighty-one percent had at least some college education. Nineteen percent were active duty. Eighty percent of Veterans and 86% of Service Members reported a history of ≥ 1 mTBI, and of these 31% and 47% respectively experienced 3+ mTBIs.

Results: Three groups were composed based on level of involvement with the CJ system: 1.) No history of arrests or incarcerations (3+ mTBIs: 64%), 2.) A lifetime history of arrest but no felony incarceration (3+ mTBIs: 34%), and 3.) A lifetime history of felony incarceration (3+ mTBIs: 2%). Ordinal regression analyses revealed that performance on a working memory task (Digit Span; $b = 0.024$, $p = .041$; $OR = 1.024$) was significantly associated with increased CJ involvement after adjusting for age, education, service status, and mTBIs. Performance on measures of processing speed (Trails A), set-shifting (Trails B), and inhibition (Flanker) were not significantly associated with CJ involvement. Number of mTBIs was significantly and positively associated with level of CJ involvement in all four models; Digit Span ($p = .016$), Trails A ($p = .016$), Trails B ($p = .020$), and Flanker ($p = .008$).

Conclusions: Performance on most measures of executive functioning was not significantly associated with CJ involvement in this large, representative sample of V/SM who served in combat. Although performance on a working memory task was significantly associated with CJ involvement, the size of the effect was small and the association was in the opposite direction as expected. Number of mTBIs was significantly associated with level of CJ involvement, indicating that sustaining multiple mTBI may be linked to greater risk of CJ involvement. These findings suggest that social and psychological factors beyond executive dysfunction may better explain the relationship between history mTBIs and CJ involvement. Some aspects of military service and veteran status, such as interdisciplinary treatment for brain injury and physical, mental, and psychosocial health needs, may be protective against previously identified risk factors for arrest (e.g., deficits in executive functioning). Contextualizing mTBI within the larger behavioral health profile of V/SM, with emphasis placed on intervention for related co-morbidities, may reduce the impact of previous arrest on wellbeing and/or reduce the risk of future CJ involvement.

Categories: Concussion/Mild TBI (Adult)

Keyword 1: traumatic brain injury

Keyword 2: executive functions

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43 Chronic Neurobehavioral and Cognitive Symptoms in Combat Deployed Military Service Personnel With and Without History of Blast-Related Mild Traumatic Brain Injury

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Objective: Investigate the relationship of chronic neurobehavioral and cognitive symptoms in military personnel with history of blast-related mild TBI and compare to a well-matched group of combat-deployed controls.

Participants and Methods: 274 participants (mean age=34 years; mean education=14.75 years; 91.2% male) enrolled in the EVOLVE longitudinal study of combat-deployed military personnel were subdivided into those with history of blast TBI (n=165) and controls without history of blast exposure and TBI (n=109). As part of a larger study, we conducted a sub-analysis of 5-year follow up data. We focused on group differences (Mann-Whitney U) and correlational relationships between self-report neurobehavioral symptoms via the Frontal Systems Behavior Scale (FrSBE) and cognitive performances on measures of attention, working memory, processing speed, and executive functioning including D-KEFS Color Word Interference (CWI), Trailmaking A and B, and the Conners Continuous Performance Test (CPT).

Results: The Blast TBI group reported higher levels of neurobehavioral symptoms on the FrSBE ($p<.001$), including domains of apathy ($p<.001$), disinhibition ($p<.001$), and executive

dysfunction ($p<.001$), compared to Controls. On cognitive measures, group differences were observed on CWI Inhibition/Switching ($p=.008$), Trails B time ($p=.010$), and CPT commission errors ($p=.014$), such that the Blast TBI group performed worse than Controls. No significant group differences were observed for CPT omission errors or CPT hit rate ($p's>.05$). After adjustment for multiple comparisons, greater FrSBE apathy correlated with slower performance on Trails A for Blast TBI ($r=0.22$, $p=.014$) but not Controls. Apathy endorsement was not significantly related to CPT omission errors for either group ($p's>.05$). Higher endorsement of disinhibition symptoms was associated with worse performance on CWI Inhibition (Blast TBI: $r=-0.19$, $p=.036$; Controls: $r=-0.28$, $p=.012$) and Inhibition/Switching (Blast TBI: $r=-0.23$, $p=.010$; Controls: $r=-0.29$, $p=.010$) conditions for both groups, whereas only the Blast TBI group showed significant relationships between disinhibition symptoms and Trails B-A time ($r=0.20$, $p=.025$) and CPT commission errors ($r=.18$, $p=.038$). Higher endorsement of executive dysfunction correlated with poorer performance for Trails B-A for both groups (Blast TBI: $r=.24$, $p=.009$; Controls: $r=.24$, $p=.030$).

Conclusions: Our findings reveal that at 5-year follow up, military personnel with history of blast-related mild TBI reported significantly greater neurobehavioral symptoms and performed lower on standardized measures of executive functioning, relative to combat-deployed controls without TBI or blast exposure. Significant relationships between neurobehavioral symptoms and cognitive performance were present in both groups. However, these relationships were more pronounced in the Blast TBI group, including greater apathy associated with slower visual tracking as well as greater endorsement of disinhibition associated with set-switching. Objective measures of response inhibition were related to disinhibition endorsement for both groups, though impulsive errors were more pronounced for the Blast TBI group. Our results suggest chronic cognitive and neurobehavioral symptoms are present in military personnel with history of blast TBI exposure, and also discrepant from a well-matched control group of combat deployed military personnel. Future studies of this population should explore models to predict cognitive performance from neurobehavioral symptoms in military personnel, as this could inform treatment approaches for those at greatest risk of cognitive change.