

and did not have ongoing substance misuse issues. Olfactory examination revealed normosmia in 20 participants and various degrees of deficit in 18 (11=mild; 4=moderate; and 3=severe). The groups did not differ in demographics, post-injury interval, or current clinical (non-psychiatric) conditions. Participants with hyposmia frequently reported being exposed to a higher number of blasts and being positioned closer to the nearest primary blast, and more often endorsed a period of loss of consciousness after the most serious mTBI. In addition, they more often reported tympanic membrane perforation, extracranial injuries, and histories of both blast and blunt force mTBI. Comorbid diagnoses of posttraumatic stress disorder (PTSD), depression, chronic headaches, and pain were more common among these participants as well.

Conclusions: Several blast exposure and specific injury-related characteristics increase the likelihood of long-term olfactory impairments, comorbid psychiatric conditions, and chronic pain among veterans with a history of deployment-related mTBI. Notably, none of the participants with hyposmia had a clinical diagnosis of olfactory dysfunction or were receiving service-connected disability for a loss of sense of smell at the time of their assessment. Multidisciplinary rehabilitation care provided to combat veterans with history of mTBI and/or PTSD should include olfactory examination using both quantitative and qualitative smell tests, education regarding the adversities related to loss of smell, management of current psychiatric symptoms, and follow-up assessments. The lack of a comparison group without a history of mTBI and the small sample size were the main limitations of this investigation.

Categories: Concussion/Mild TBI (Adult)

Keyword 1: olfaction

Keyword 2: concussion/ mild traumatic brain injury

Keyword 3: post-traumatic stress disorder

Correspondence: Maya Troyanskaya. 1) H. Ben Taub Department of Physical Medicine and Rehabilitation, Baylor College of Medicine. Houston, TX. USA; 2) Michael E. DeBakey Veterans Affairs Medical Center Houston, TX. USA, mayat@bcm.edu

58 Sex Differences in the Relationship Between Sleep Disruption and Depressive Symptoms During Acute and Chronic Stages of Mild Traumatic Brain Injury (mTBI)

Melissa J Reich-Fuehrer, Lindsey Hildebrand, Shivani Desai, Kymberly Henderson-Arredondo, William D.S. Killgore
SCAN Lab, University of Arizona, Tucson, AZ, USA

Objective: mTBI is trauma to the brain due to a blow or other mechanical force affecting the head. Prior research has established that common symptoms of mTBI include decreased sleep quality and onset/worsening of emotional dysregulation. However, there is little published research investigating how sleep disruption and depressive symptoms are experienced at varying stages of mTBI. We hypothesized that sleep disruption would change with differing time since injury, and that depressive symptoms should accordingly. Additionally, since females tend to have higher rates of depression, we predicted that there would be a significant difference between the sexes at different stages post-mTBI.

Participants and Methods: This study included 145 healthy adults, split into six groups, comparing healthy controls consisting of 15 males ($Mage=23.67$, $SD=5.066$) and 17 females ($Mage=25.35$, $SD=7.035$) to individuals who had mTBI, 41 males ($Mage=26.88$, $SD=8.509$) and 72 females ($Mage=23.79$, $SD=6.898$) at five points post-mTBI: 2 weeks and 1, 3, 6, and 12 months. The Pittsburgh Sleep Quality Index (PSQI) global score was used to assess individual sleep quality and disturbances; higher scores indicated poorer sleep quality. The Beck Depression Index (BDI-II) was used to assess characteristics and symptoms of depression. We adjusted the score to exclude item 16, which measures changes in sleep. Higher scores indicate more severe depressive symptoms. We conducted a multivariate analysis of variance and Pearson correlation to examine whether there were significant differences in sleep and depression at different stages of mTBI for each sex.

Results: We discovered that sleep quality was worse at chronic stages of mTBI (i.e., 12M, $p<.001$), than at acute stages (2W, $p=.049$), and compared to healthy controls. There were also significant differences in depression scores

compared to healthy controls at 2W, $p=.008$, 3M, $p<.001$, and 6M, $p=.012$, but not 12M, $p=.313$, suggesting that depressive symptoms resolved by 12M in those with mTBI. To explain this, we investigated sex differences, as males tend to experience fewer depressive disorders than females. However, females reported fewer depressive symptoms than males at chronic stages of mTBI. This finding was not statistically significant as females had a $M_{bdi_total}=6.84$, $SD=7.98$ and males had a $M_{bdi_total}=5.38$, $SD=6.078$; still, this could be due to the low statistical power of the study, and with a larger sample size, could produce statistically significant differences between the sexes. Despite this, there is a statistically significant difference in the depression score for females between 2W and 12M post-mTBI ($p=.046$; effect size of $d=.99$). Comparatively, males showed no significant divergence between depression and sleep scores.

Conclusions: Sleep disruption and depressive symptoms were correlated in individuals with mTBI in both acute and chronic stages; however, at 12M, there was a decrease in this correlation due to females exhibiting fewer depressive symptoms in combination with greater sleep disruption in the chronic phase of mTBI. Further research investigating the relationship between depression and sleep quality by looking at females with a much larger sample size would be helpful in clarifying these associations.

Categories: Concussion/Mild TBI (Adult)

Keyword 1: concussion/ mild traumatic brain injury

Keyword 2: depression

Keyword 3: sleep

Correspondence: Melissa J. Reich-Fuehrer, SCAN Lab, University of Arizona, mreich@arizona.edu

59 Neuropsychiatric Clustering of Veterans with TBI: The Link Between Neuropsychological Test Validity and Somatic Post-Concussive Symptoms

Nathalie Dugas^{1,2}, Morgan Caudle^{1,2}, Amber Keller³, Jessica Bomyea^{4,1}, Amy Jak^{5,1}

¹University of California, San Diego, San Diego, CA, USA. ²Veterans Medical Research Foundation, San Diego, CA, USA. ³SDSU/UCSD

Joint Doctoral Program, San Diego, CA, USA.

⁴VASDHS Center of Excellence for Stress and Mental Health, San Diego, CA, USA. ⁵VA San Diego Healthcare System, San Diego, CA, USA

Objective: There is a wide variability in the neuropsychiatric presentation of mild traumatic brain injury (mTBI), and accurate diagnosis and treatment is complicated by within-condition heterogeneity and overlapping symptoms of common comorbidities (e.g., PTSD). Such diagnostic complexities can obfuscate clinical decision-making and lead to suboptimal treatment response. In contrast to traditional diagnostic categories, person-centered analysis methods create data-derived groupings wherein individuals within a cluster are similar and individuals across clusters are different. The current study sought to apply clustering to dimensional emotional and neuropsychological features in treatment-seeking Veterans with mTBI, with the goal of identifying more precise, homogeneous clinical profiles.

Participants and Methods: Study participants were 190 Veterans with mTBI history participating in a clinical neuropsychological assessment of cognitive complaints (Mean age: 34.38, 89.6% male, average years of education: 13.14). Participants completed a diagnostic interview, neuropsychological tests, and symptom questionnaires (NBSI, PCL, BDI, BAI, AUDIT, PSQI). To identify clusters of similar neuropsychiatric presentations, we first conducted dimension reduction on data from the cognitive tests and self-report measures using principal components analysis. Second, cluster analysis and cluster validation was performed on the resultant principal components (R: kmeans, clusterboot, clusterValid) to find homogeneous subgroups of participants.

Results: The clinical data was best represented by principal components reflecting anxious arousal, depressive cognitions, somatic post-concussive symptoms, reexperiencing and avoidance symptoms, and objective cognitive deficits. Cluster analysis using bootstrapping and cluster validity indices (e.g., Silhouette width, Dunn index) indicated that a 6-subgroup solution was optimal (subgroups were labeled Group A-Group F). Group A was characterized by moderate levels across all dimension scores. Group B was characterized by elevated somatic post-concussive symptoms and cognitive deficits. Group C was characterized by intact cognitive performance and low somatic post-