

## 2017 AAN SPORTS CONCUSSION CONFERENCE ABSTRACT

Media Contacts:

Renee Tessman, [rtessman@aan.com](mailto:rtessman@aan.com), (612) 928-6137

Michelle Uher, [muher@aan.com](mailto:muher@aan.com), (612) 928-6120

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**Abstract Title:** Co-morbid PTSD with mTBI is associated with increased amygdala volume compared to mTBI alone in military-trained individuals

**Press Release Title:** PTSD May Be Physical and Not Only Psychological  
*Brain's Emotional Control Center Shown to be Physically Larger*

**Authors:** Joel Pieper, Sarah Mahasin, Dewleen Baker, Sharon Nichols, Roland Lee, Anne Marie Angeles Quinto, Ashely Robb Swan, Douglas G. Chang, Mingxiong Huang

**Background:** Post-traumatic stress disorder (PTSD) and mild traumatic brain injury (mTBI) are common conditions seen among military personnel, often co-morbid in the same individual. To our knowledge, the volumetric differences of the amygdala in individuals with PTSD and co-morbid mTBI have been investigated, but there are disparities in the literature. The aim of this study is to identify amygdala volumetric differences associated with partial or full PTSD in individuals with comorbid mTBI compared to those with mTBI only.

**Methods:** This is a case-control study from a cohort of military-trained individuals with mTBI (n= 89). Using symptom scale ratings, 29 participants were identified with significant PTSD in addition to mTBI. The remaining 60 participants formed the mTBI only, control group. Structural images of the subjects' brains were obtained with a 1.5T MRI scanner using a T1-weighted 3D-IR-FSPGR pulse sequence. Automatic segmentation and intracranial volume estimation (ICV) was performed in Freesurfer (version 3.0.3).

**Design/Results:** The results showed no significant group differences for age, education, or gender. Individuals with mTBI and PTSD had 6% overall larger amygdala volumes when normalized to ICV compared to those with mTBI-only. Non-normalized amygdala volumes showed no significant difference between groups. The comorbid mTBI with PTSD group had significantly smaller ICV than the mTBI only control group. The ICV was also found to correlate significantly with age (-0.28,  $p = 0.02$ ) when all subjects were compared but not in either group alone.

**Conclusions:** The results show that the amygdala in the mTBI and PTSD group is significantly larger and more prominent on the right side. The normalization analysis we performed may explain previous discrepancies in the literature. This is an intriguing structure-function relationship, given the known role of the amygdala, and challenging neuro-emotive symptoms witnessed in sufferers of mTBI and PTSD. This study was conducted in a military mTBI population so it remains to be seen how applicable it is to sports related concussions. Further investigation is needed to determine whether amygdala size could be used to screen individuals at risk for PTSD, or whether it could be used to track treatment interventions.

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