Participants and Methods: Seventeen concussed participants completed a diffusion tensor imaging (DTI) scan 3-4 weeks after receiving a concussion and again 10 months after injury. Nineteen control participants completed a single DTI scan. DTI data were analyzed using the automated fiber quantification (AFQ) pipeline, which extracts fractional anisotropy (FA) values from 100 nodes in eight tracts of the corpus callosum (listed anterior to posterior): orbital frontal, anterior frontal, superior frontal, motor, superior parietal, posterior parietal, occipital, and temporal. Given the non-linearity, high multicollinearity, and large number of data points, a cubic smoothing spline was used to fit a penalized regression to the FA values in each tract, allowing us to compare the FA values of each node in each tract between groups and across time. To assess acute damage, a spline model for the concussed participants at 3-4 weeks was compared to a spline model for the control participants in each tract. To assess longitudinal damage, a spline model of the FA difference value (10-month minus acute visit) in concussed participants was compared to a spline model of the FA difference value for controls (zero, representative of a theoretical no change in FA values). Significant nodes were defined as p-values less than 0.006 (alpha of .05/8, given 8 tracts).

Results: Acutely following injury, concussed participants showed lower FA values than controls in the anterior frontal, posterior parietal, occipital, and temporal tracts. In the orbital frontal tract, concussed participants had higher FA values on the left, but decreased FA values compared to controls in the middle. Longitudinally, concussed participants showed continued decreased white matter integrity in the orbital frontal, superior parietal, and occipital tracts, but improved white matter integrity in the anterior frontal and superior frontal tracts. The motor, posterior parietal, and temporal tracts showed mixed longitudinal results of decreased or improved white matter integrity within each tract.

Conclusions: Concussed individuals show decreased white matter integrity across the corpus callosum acutely after injury. Longitudinally, the most anterior and posterior portions of the corpus callosum (i.e., genu and splenium) show continued damaged while the more medial sections of the corpus callosum may show some recovery. Results suggest the corpus callosum displays differential patterns of damage acutely and longitudinally following concussion, with some tracts improving while others continue to deteriorate.

Categories: Concussion/Mild TBI (Adult)
Keyword 1: concussion/ mild traumatic brain injury
Keyword 2: traumatic brain injury
Keyword 3: brain injury
Correspondence: Jennifer Aldana ,Department of Psychology, California State University Dominguez Hills, Jaldana5@toromail.csudh.edu; Kaylie A. Carbine, Department of Psychology California State University Dominguez Hills kcarbine@csudh.edu; Alexandra M. Muir, Department of Psychology, Brigham Young University, alexandrammuir@gmail.com; Ariana Hedges-Muncy, Department of Psychology, Brigham Young University ,ariana.hedges@gmail.com; Erin D. Bigler, Department of Psychology, Brigham Young University and Neuroscience Center, Brigham Young University, erin_bigler@byu.edu; Michael J. Larson, Department of Psychology, Brigham Young University and Neuroscience Center, Brigham Young University, michael_larson@byu.edu

---

54 Individuals Employing Extreme Coping Behaviors Correlated with Increased Severity of Symptoms Following mTBI

Jessica Bove, Jacob A Fiala, Jordan Milano, Adriana Sandino, Breton M Asken, Russell M Bauer
University of Florida, Gainesville, FL, USA

Objective: Approximately 10-15% of patients with mild traumatic brain injury (mTBI) report persistent, chronic symptoms more than one month later. Coping behaviors after mTBI can range from fear avoidance (FA), or a reluctance to return to activity because of the fear of symptom exaggeration, to endurance (END), or an overly aggressive return to activity. We evaluated how coping strategy relates to self-reported symptoms in patients with prolonged recovery from mTBI.
Participants and Methods: Participants were 72 individuals (age 37.8 + 18.4, 65% female) who sustained a mTBI at least one month prior

to assessment (median (IQR) = 5.5 (2.0-11.3) months). Participants completed the Brain Injury Recovery Disposition Scale (BIRDS) to assess FA and END behaviors, and Sport Concussion Assessment Tool (SCAT5) Symptom Inventory. A BIRDS spectrum score was calculated as the difference between FA and END scores to determine individual coping behavior on a spectrum from extreme FA (more negative) to extreme END (more positive). SCAT5 symptoms were separated into four domain scores: somatic, cognitive, sleep, and emotion. Regressions were performed for each outcome examining their potential linear and quadratic associations to coping behavior (i.e., BIRDS spectrum score). Follow-up regressions were performed covarying for age and sex to explore the potential influence of these variables on each outcome.

Results: The linear and quadratic components of the BIRDS spectrum score were not significantly related to total number of persisting concussive symptoms. For overall total symptom severity, the quadratic component of the relationship was significant (B = .24, p = 0.04). Visualization of the overall trend line suggested that symptom severity was highest on the extreme FA side of the BIRDS spectrum (highly negative BIRDS spectrum score), decreased as coping behavior become more balanced (BIRDS spectrum score surrounding "0"), plateaued, then increased abruptly on the extreme END side (highly positive BIRDS spectrum score). For cognitive symptoms, the linear component of the BIRDS spectrum score was significant (B = -.28, p = 0.02) and the quadratic component was marginally significant (B = .22, p = 0.06). The quadratic (but not linear) component was significantly related to both the severity of sleep (B = .31, p = 0.01) and emotion symptoms (B = .25, p = 0.03). Finally, neither the linear nor quadratic components were significantly related to the somatic symptom severity. After covarying for age and sex, the quadratic component remained significant for total symptom severity (p = 0.05) as well as the linear component for cognitive severity (p = 0.02).

Conclusions: Both extreme "fear avoidance" and "endurance" coping styles may be related to more severe chronic mTBI symptoms, especially in domains of sleep and emotion symptoms. Patients with balance of both fear avoidance and endurance behaviors may be more likely to experience less severe symptoms even among mTBI patients with persistent complaints. Identifying coping behavior styles early after

mTBI could improve prognostication and help with developing personalized treatment plans to improve patient recovery. Future research with larger sample sizes should further examine the influence of age and sex on the relationship between coping behavior and symptom severity.

---

55 The Association of Prior Concussion and Subjective Sleep Quality in Young Adult Athletes

Kearnin M Van Bortel, Benjamin L Brett, Timothy B Meier
Medical College of Wisconsin, Milwaukee, WI, USA

Objective: There is rising concern over the potential cumulative and long-lasting effects of prior concussions in active and retired athletes. Previous studies suggest that there is an inverse relationship between concussion (or mild traumatic brain injury) and sleep, with increasing evidence of individuals reporting chronically disrupted sleep following remote concussion. The extent to which these effects are cumulative across repeat concussions is unknown. This project aimed to investigate the association between the number of prior concussions and subjective sleep quality in otherwise healthy collegiate-aged athletes. Furthermore, we investigated which aspects of sleep are most associated with prior concussion.

Participants and Methods: A total of 176 collegiate-aged athletes (M_{age} = 21.19, SD = 1.63; 65.9% men) completed off-season clinical visits, at least 6 months since their most recent concussion. Semi-structured interviews captured detailed sport and head injury history across the lifespan. The number of prior concussions for each participant was retrospectively assessed based on American Congress of Rehabilitation Medicine criteria. Subjective sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI). A general linear model tested the relationship between number of prior concussions and global PSQI score (i.e., overall