

between the functional brain connectome with cognitive outcomes and symptom severity.

Participants and Methods: $N = 181$ Iraq and Afghanistan combat veterans completed structured clinical interviews, cognitive testing, self-report questionnaires, and magnetoencephalography (MEG). MEG data were acquired in the resting-state with eyes open. MEG data were beamformed to identify brain regions active at rest. Functional brain connectomes representing the unique network present for a given individual were created using active brain regions identified for each participant. Network metrics describing these connectomes were calculated at the participant level. Cognitive tests included the WAIS-IV, Trail Making Test Parts A&B, and the Controlled Oral Word Association test. Due to differences in normative data across tests, raw scores were used in analyses. Symptom measures included the PTSD Checklist – 5 (PCL-5), Patient Health Questionnaire (PHQ-9), Neurobehavioral Symptoms Inventory (NSI), Quality of Life After Brain Injury (QOLIBRI), Pittsburgh Sleep Quality Index (PSQI), the Distress Tolerance Scale (DTS), and the PROMIS Pain Interference Scale (PROMIS-PI).

Results: Hierarchical linear regression analyses revealed that several network metrics were significantly related to both cognitive outcomes and symptom severity after adjusting for demographic covariates and clinical characteristics.

The relationship between Global Efficiency (GE) and cognitive outcomes was moderated by deployment TBI on the WAIS-IV Full Scale Index (FSI), Perceptual Reasoning Index (PRI), and General Ability Index (GAI). In all cases, when deployment TBI was absent, greater GE was associated with poorer cognitive scores.

The relationship between GE and symptom severity was moderated by the severity of blast exposure. Greater GE was associated with lower symptom severity at lower blast severities for the PHQ-9 and QOLIBRI A (thinking) and E (negative emotions). Moderation effects were also observed for the PSQI. In the absence of deployment TBI, greater GE was associated with better sleep quality; however, in the presence of deployment TBI, greater GE was associated with poorer sleep quality. Other connectome-outcome relationships were not consistently moderated by Deployment TBI or blast history.

Conclusions: Results demonstrated relationships between several aspects the

functional connectome of the brain with both cognitive outcomes and symptom severity beyond effects of common demographic and clinical variables. Moderation analyses revealed that the relationship between GE of the connectome and outcomes is frequently disrupted by deployment TBI and blast. GE is a measure of the ease of information transfer through the network. These results identified consistent relationships between GE and outcomes in the absence of deployment TBI or blast, but these relationships disappear when deployment TBI or blast are present. Participants in this study were on average 11 years post-TBI or blast exposure, suggesting these are chronic rather than acute effects. GE was significantly correlated with most symptom severity measures as well as the WAIS-IV PRI, GAI, VCI, and FSI. Future efforts to normalize the relationship between GE and outcomes following TBI may improve rehabilitation outcomes and directly affect areas of concern commonly reported by service members following TBI or blast exposure.

Categories: Acquired Brain Injury (TBI/Cerebrovascular Injury & Disease - Adult)

Keyword 1: brain injury

Keyword 2: brain function

Keyword 3: cognitive functioning

Correspondence: Jared A. Rowland, Ph.D.
Salisbury VA Healthcare System & MA-MIRECC
Wake Forest School of Medicine
Jared.Rowland@va.gov

Paper Session 14: Aging topics: section 2

3:30 - 4:55pm

Friday, 3rd February, 2023

Town & Country Ballroom C

Moderated by: Katherine Gifford

1 Detection of Cognitive Subtypes Within Cognitively Normal Older Adults Using Hierarchical Community Detection

Jessica Pommy, Lisa Conant, Alissa Butts, Yang Wang, Andrew Nencka, Malrgozata Franczak, Laura Glass Umfleet
Medical College of Wisconsin, Milwaukee, WI, USA

Objective: Identifying individuals at the earliest stages of Alzheimer's Disease (AD) would enable development and study of interventions prior to onset of symptoms. However, differentiating age-related cognitive changes from subtle pathological changes remains a challenge in the field. Methods that would enable earlier detection of AD in elders with no subjective or objective cognitive concerns (i.e., individuals in the preclinical stage) would be of great interest. Community detection, a metric founded in graph theory, offers an alternative approach for characterizing subtle heterogeneity within aging samples and has the potential to inform cognitive variability in aging.

Participants and Methods: Using a hierarchical community detection, we examined whether cognitive subtypes could be identified in 226 cognitively normal older adults (from the Alzheimer's Disease Neuroimaging Initiative [ADNI] study). Cognitive profiles of each community were characterized first using MANOVAs to examine the relationship between community membership and 12 age-, gender-, and education-corrected neuropsychological variables. Pair-wise comparisons were examined for significant main effects. We then examined whether these subtypes were related to biomarkers (cortical volumes, fluorodeoxyglucose (FDG)-positron emission tomography (PET) hypometabolism) or clinical progression. All *p* values were corrected for multiple comparisons.

Results: Three communities (i.e., cognitive subtypes) were identified within the healthy aging sample. The first and largest community identified (*N* = 106) was characterized by a relative weakness on a single measure visuospatial executive function. Both the second (*N* = 76) and third community (*N* = 44) scored significantly lower on immediate, delayed, and recognition memory relative to the first community. The third community was characterized by a relative weakness in category fluency and speeded visual sequencing as well (*p* < .000). The three communities did not differ on age, gender, education, race, or ethnicity. Community membership was associated with entorhinal volume (with the second and third

communities having significantly smaller entorhinal volumes than the first community), though community membership was not significantly associated with other biomarkers examined. Conversion rate reached trend level significance at 12 month follow up (more converters in the third community).

Conclusions: Hierarchical community detection is an alternative method for characterizing neuropsychological variation and it appears sensitive to relatively small differences that may be observed in a normal aging sample. While the sample size was relatively small, this approach shows promise for potentially leading to earlier detection of cognitive decline among individuals classified to be aging normally (e.g., community 3).

Categories: Aging

Keyword 1: aging (normal)

Keyword 2: aging disorders

Keyword 3: mild cognitive impairment

Correspondence: Jessica Pommy, Medical College of Wisconsin, jpommy@mcw.edu

2 Higher White Matter Hyperintensity Load Adversely Affects Pre-Post Proximal Cognitive Training Performance in Healthy Older Adults

Emanuel M Boutzoukas¹, Andrew O'Shea¹, Jessica N Kraft¹, Cheshire Hardcastle¹, Nicole D Evangelista¹, Hanna K Hausman¹, Alejandro Albizu¹, Emily J Van Etten², Pradyumna K Bharadwaj², Samantha G Smith², Hyun Song², Eric C Porges¹, Alex Hishaw², Steven T DeKosky¹, Samuel S Wu¹, Michael Marsiske¹, Gene E Alexander², Ronald Cohen¹, Adam J Woods¹

¹University of Florida, Gainesville, FL, USA.

²University of Arizona, Tucson, AZ, USA

Objective: Cognitive training has shown promise for improving cognition in older adults. Aging involves a variety of neuroanatomical changes that may affect response to cognitive training. White matter hyperintensities (WMH) are one common age-related brain change, as evidenced by T2-weighted and Fluid Attenuated Inversion Recovery (FLAIR) MRI. WMH are associated with older age, suggestive of cerebral small vessel disease, and reflect