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13 Reduced Left Orbitofrontal Volume Correlates with Semantic Verbal Fluency Performance Among Veterans with TBI

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Objective: Semantic verbal fluency (SVF) has traditionally been correlated with activity in the left anterior temporal lobe. Damage to the anterior temporal lobe, such as from a traumatic brain injury (TBI) or neurodegenerative disease, can result in impairments in semantic fluency and language expression. Although the orbitofrontal cortex (OFC) is not well studied as being correlated to this process, its functional connectivity to language-related brain regions, such as the inferior frontal gyrus (Broca's area), suggests it may also play a role in SVF. In fact, preliminary research has shown that lesions in the OFC are associated with semantic fluency deficits (Almairac et al. 2015). As such, the goal of this study was to investigate whether OFC volume correlates with SVF in a population of Veterans with a prior TBI.
Participants and Methods: Thirty-five Veterans who sustained TBIs were included in this study (11% female, age M = 41.77, SD = 11.27; years of education M =14.94, SD = 1.62). All participants underwent a magnetic resonance imaging (MRI) and regional normative volumes were standardized to account for differences in brain size (volume of brain area/total brain volume). Participants were given the Delis Kaplan Executive Function System (D-KEFS) verbal fluency subtest to measure verbal generativity. A Pearson correlation was conducted to investigate the relationship between OFC volume and SVF performance. Post hoc analysis was conducted with Veterans who met the criteria for a TBI sustained by a blast to the head (n = 25).
Results: A significant positive correlation emerged between left OFC volume and semantic fluency (category subtest; p = .03, r =

.35). Additional analyses with Veterans with blast-related TBIs indicated a significant correlation between the volume of the OFC and performance on the category (p = .02, r = .45), and switching (p = .02, r = .43) subtests of the D-KEFS verbal fluency test.
Conclusions: These findings demonstrate a correlation between the volume of the left OFC and SVF performance. Specifically, Veterans with TBIs had decreased volume of the OFC which correlated with deficits on a SVF task. Among Veterans with blast-related TBIs, both category and category switching subtests correlated with OFC volume. Given the functional connectivity between the OFC and language areas of the brain, this study highlights the importance of analyzing associated cortical regions beyond the anterior temporal lobe when studying SVF performance.

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14 FMRI Investigation of Metacognitive Processing in Moderate to Severe Traumatic Brain Injury

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Objective: Metacognition refers to one's ability to make online, in-the-moment judgments regarding their own cognitive performance, and has significant implications for one's abilities to function in daily life. It has been documented that individuals with TBI often present with metacognitive deficits, and are slower than neurotypical peers in making such judgments. Preliminary attempts have been made to determine how neural contributions to metacognitive functioning differ after injury. Studies thus far have found unique roles of prefrontal gray matter volume and inter-network connectivity in metacognitive functioning after

injury, but functional activation directly associated with metacognitive processing has yet to be investigated. This event-related functional magnetic resonance imaging (fMRI) study aimed to document differences in functional activation between adults with TBI and neurotypical peers when completing metacognitive confidence judgments.
Participants and Methods: 16 adults with moderate to severe TBI and 10 healthy adults (HCs) completed a metacognitive task while in the fMRI scanner. All participants were exposed to target slides with polygons arranged in various positions, then asked to identify the target slide from a group including 3 other distractor slides. Following each response, participants provided a metacognitive retrospective confidence judgment (RCJ) by rating their confidence that the answer they provided was correct. *Meta d'*, a signal-detection based metric of metacognitive accuracy, was calculated. FSL FEAT was used for processing and analysis of the imaging data. Contrasts were created to model activation that was greater when RCJs were made compared to target recognition, mixed effects modeling was then used to investigate group differences. Cluster based thresholding set to z>2.3, $p<0.01$ was used for multiple comparisons correction.
Results: Healthy controls performed significantly better on the target identification task ($p<0.01$), and were faster at making RCJs ($p=0.03$). Individuals with TBI had greater *meta d'* scores ($p=0.03$). Significant activation beyond what was present during target recognition (RCJ>recognition) was found in left supramarginal gyrus, left posterior cingulate, and left cerebellum when individuals with TBI made RCJs, while HCs showed significant activation in the left precuneus, and bilateral superior temporal gyri. Individuals with TBI demonstrated more activation in the lateral occipital cortex bilaterally and the left cerebellum than HCs when completing RCJs. HCs presented with more activation in the left supramarginal gyrus than the TBI group when making RCJs.
Conclusions: The areas of activation present in both the TBI and HC groups are consistent with previous imaging findings from studies of healthy samples. Interestingly, two structures previously implicated in self-directed cognition and consciousness, the posterior cingulate and precuneus, were differentially activated by the groups. The lack of a common network between the two groups suggests that survivors may rely

on separate neural substrates to facilitate metacognition after injury. The TBI group was found to recruit more functional areas when completing the RCJs. These findings, paired with the behavioral data indicating metacognitive performance differences, suggests that neural recruitment may occur after injury to allow for survivors to engage in making metacognitive judgments. Future qualitative investigations of the metacognitive judgments are needed to determine the compensatory nature of this post-injury recruitment.

Categories: Acquired Brain Injury (TBI/Cerebrovascular Injury & Disease - Adult)
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Keyword 2: neuroimaging: functional
Keyword 3: traumatic brain injury
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15 Examining Unmet Needs in a Brain Injury Sample, Consisting of Various Races/Ethnicities, Referred to Resource Facilitation

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Objective: To investigate differences of the perceived unmet needs in a post-acute brain injury sample when referred to Resource Facilitation (RF) among various race/ethnic groups.
Participants and Methods: The methodology utilizied within this study consisted of a retrospective chart review, which was sourced from a clinical database serving chronic outpatients in the Midwest region. The main outcome measure was the Service of Unmet Needs & Service Use (SUNSU). The sample consisted of N = 455 subjects, which included a small sample size of Hispanics (N=7). Therefore, African American and Hispanic groups were combined for a total minority sample (N=84). Clinical disorders included within the study was an ABI from either stroke, anoxic injury, ruptured