particularly important. However, past research has been limited by varying definitions of these terms and methodological challenges. Further, limited studies have employed longitudinal designs. The objective of the present study was to 1) compare sex similarities and differences in WM microstructure, and 2) investigate longitudinal changes in WM in healthy older adults. The Parkinson's Progression Markers Initiative (PPMI) is an ongoing observational longitudinal study designed to investigate biomarkers related to Parkinson's disease. For up-to-date information, please see: https://www.ppmi-info.org/. The PPMI study presents a convenient opportunity to investigate the expected aging trajectory among healthy older adults by using data from its healthy control cohort.
Participants and Methods: Participants (N=40) included 16 females (mean age = 60.50 + 5.99) and 24 males (mean age = 65.50 + 7.53) from the healthy control cohort of the PPMI. Diffusion tensor imaging (DTI) data from two time points (baseline and approximately one year later) were analyzed using tract-based spatial statistics from the FMRIB Software Library (FSL). Diffusion weighted images were acquired with a Siemens 3T TIM Trio scanner with a 12 channel Matrix head coil. All images were acquired with a spin echo, echo planar imaging sequence with 64 gradient directions and a b-value of 1000s/mm2 with a voxel size of 2 mm3. Two analyses were conducted: 1) between-groups, comparing differences in WM microstructure between males and females at baseline while controlling for age and total brain volume (TBV), and 2) within-subject, examining longitudinal changes in WM from baseline to one year later. DTI metrics included fractional anisotropy (FA) and mean diffusivity (MD).
Results: Males were significantly older than females and had significantly larger TBVs. Results of voxelwise comparisons revealed no statistically significant differences in FA or MD between males and females when controlling for age and TBV. Longitudinally over one year, decreases in MD ($p<.05$, corrected) were found in the right superior and inferior longitudinal fasciculus, the right corticospinal tract, and the right inferior fronto-occipital fasciculus. Stability in FA was observed over one year. There was also an average of a one-point decline on the Montreal Cognitive Assessment during the study period of one year.
Conclusions: No significant sex differences in WM microstructure were found, which agrees with a published review of the literature that men and women show very similar brain structure after accounting for brain size differences. Across the entire sample, longitudinal changes in WM were captured via neuroimaging across a one-year time frame. Follow-up exploration of these data suggests great intraindividual variability in trajectories over time, which may have affected the overall group trajectory. Continued research of factors that contribute to the identifying individual healthy aging trajectories is warranted.

Categories: Neuroimaging
Keyword 1: aging (normal)
Keyword 2: neuroimaging: structural
Keyword 3: brain structure
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49 Locus Coeruleus MR Signal Interacts with CSF p-tau/AB42 to Predict Attention, Executive Function, and Verbal Memory

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Objective: The locus coeruleus (LC) plays a key role in cognitive processes such as attention, executive function, and memory. The LC has been identified as an early site of tau accumulation in Alzheimer's disease (AD). LC neurons are thought to survive, albeit with limited functionality, until later stages of the disease, though how exactly this limited functionality impacts cognition through the course of AD is still poorly understood. We investigated the interactive effects of an imaging biomarker of the LC and AD-related cerebrospinal fluid (CSF) biomarkers on attention, executive function, and memory.
Participants and Methods: We recruited 67 older adults from the San Diego community (mean age=74.52 years; 38 cognitively normal, 23 with mild cognitive impairment, and 6 with probable AD). Participants had LC-sensitive magnetic resonance imaging (MRI) used to obtain a measure of LC signal relative to surrounding tissue, with lower LC signal possibly

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indicating limited functionality. Participants also underwent a lumbar puncture to obtain CSF measurements of amyloid-beta 42 (Ab42) and phosphorylated tau (p-tau). We calculated the p-tau/Ab42 ratio, which is positively correlated with AD progression. Finally, participants were administered a comprehensive neuropsychological battery, and cognitive composites were created for attention (Digit Symbol, Digit Span Forward, Trails A), executive function (Digit Span Backward, Trails B, Color-Word Inhibition Switching), and two measures of verbal memory [learning (CVLT List A 1-5, Logical Memory Immediate Recall) and delay (CVLT Long Free Recall, Logical Memory Delayed Recall)]. Four multiple linear regressions modeled the relationship between each composite with age, gender, education, p-tau/Ab42, average LC contrast, and interactions between average LC contrast and p-tau/Ab42. For models that were statistically significant, additional regressions were assessed to determine which segment of the LC (caudal, middle, rostral) contributed to the relationship. **Results:** Our model predicted attention (p=.001, R^2=.298) with main effects of average LC signal, p-tau/Ab42, and LC by p-tau/Ab42 interaction. Follow-up regressions revealed that each LC segment contributes to this relationship. Our model predicted executive function (p=.006, R^2=.262) with a main effect of average LC signal and LC by p-tau/Ab42 interaction. Follow-up regressions revealed that this relationship was limited to the caudal and middle LC. Our models predicted both verbal learning (p<.001, R^2=.512) and delayed memory (p<.001, R^2=.364); both with main effects of gender and education. Follow-up regressions revealed that the rostral LC signal interacts with p-tau/Ab42 to predict both verbal learning and delayed memory. For all interactions, those with low p-tau/Ab42 exhibited a positive relationship between LC signal and cognition, whereas those with higher p-tau/Ab42 showed a negative relationship. **Conclusions:** MR-assessed LC signal relates to attention, executive function, and verbal learning and memory in a manner that depends on CSF levels of p-tau and Ab42. The relationship between LC signal and cognition is positive at low levels and negative at higher levels of p-tau/Ab42. If lower LC signal indicates reduced integrity, these findings imply that MR-assessed LC signal may be a more meaningful marker of AD progression in earlier stages of the disease. Alternatively, this measure may capture a different underlying mechanism depending on tau and amyloid biomarker status.

Categories: Neuroimaging
Keyword 1: dementia - Alzheimer's disease
Keyword 2: neuroimaging: structural
Keyword 3: cognitive functioning
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50 Neuropsychological Functioning in Depression, Borderline Personality Disorder, and Suicidality

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Objective: Depression and borderline personality disorder (BPD) are frequently comorbid psychiatric disorders that reliably share deficits in executive functioning (EF). In addition to EF, meta-analytic evidence indicates that processing speed and verbal memory are also affected in depression and BPD, but the impact of BPD further spans the domains of attention, nonverbal memory, and visuospatial abilities. Suicidality is a notable phenotypic commonality in depression and BPD. Neuropsychologically, there are consistent discrepancies between individuals who have and have not thought about suicide in global cognitive functioning, as well as between those who have attempted suicide and those who have just thought about suicide in EF. This study aims to replicate the effect size differences between these groups and explore whether neuropsychological functioning relates to dimensional measures of psychopathology. **Participants and Methods:** Right-handed women between the ages of 18 and 55 were recruited into one of three diagnostic groups: a) current major depressive episode (MDD; n=22); b) current major depressive episode with comorbid BPD (MDD+BPD; n=19); and c) absence of current major depressive episode and BPD (controls; n=20). Groups were also classified based on historical suicide attempt and on the presence or absence of historical suicidal ideation. Exclusions included bipolar disorder, neurodevelopmental disorder,

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