Title: Anterior hippocampus and temporal pole volumes are associated with episodic autobiographical memory in healthy older adults

Supplementary Material

Methods

Cognitive Battery

259 of the 263 participants completed additional cognitive assessments of episodic memory and semantic memory. Two younger and two older adults were excluded for having more than 50% missing data. Measures of episodic memory included Verbal Paired Associates from the Wechsler Memory Scale-IV (Wechsler, 2009), Associative Recall Paradigm (Brainerd et al., 2014), and NIH Cognition measures of Auditory Verbal Learning (Rey) and Picture Sequence Memory (Gershon et al., 2013). Semantic Memory measures included Shipley-2 Vocabulary (Shipley et al., 2009) and NIH Cognition measures of Picture Vocabulary and Oral Reading Recognition. Composite scores were created by taking the average of Z-scores within each cognitive domain. Two additional younger adults were excluded for outlying episodic index scores, leaving a final sample of 257.

Composite scores were included in the Generalized Estimating Equations (GEE) reported on in text to determine whether effects of AM on the regional volumes could be explained beyond general cognitive abilities. Separate GEE models were conducted to examine age group effects of each cognitive domain on regional volumes alone (see Results below).

Results

Posterior Hippocampal Volumes Are Smaller Early into Older Age

To determine whether posterior hippocampal volumes were reduced only in later stages of older adulthood, we binned the older adult cohort into younger (60-69 years, N=66) and older (70+, N=39) groups for a total of three age categories. The ANCOVA on hippocampal volume was then repeated (Supplementary Figure 2).

We observed main effects of age group ($F(2,257)=3.48$, $p < .05$, $\eta_p^2=.01$), segment ($F(1,779)=27.57$, $p < .001$, $\eta_p^2=.03$), and hemisphere ($F(1,779)=16.13$, $p < .001$, $\eta_p^2=.02$). Several interactions qualified these effects. First, a segment by hemisphere interaction ($F(1,779)=59.01$, $p < .001$, $\eta_p^2=.07$) indicated that right anterior volumes were larger than left anterior volumes ($t(779)=7.04$, $p < .001$, Cohen's d =.50), right posterior volumes ($t(779)=9.26$, $p < .001$, Cohen's d=.66), and left posterior volumes ($t(779)=7.16$, $p < .001$, Cohen's d=.51). A segment by sex interaction ($F(1,779)=11.87$, $p < .001$, $\eta_p^2=.01$) showed that anterior volumes were larger than posterior in both males ($t(779)=6.81$, $p < .001$, Cohen's d=.49) and females ($t(779)=3.06$, $p < .05$, Cohen's d=.22), but more so in males. Critically, a segment by age group interaction ($F(2,779)=8.54$, $p < .001$, $\eta_p^2=.02$) demonstrated that both groups of older adults had smaller posterior hippocampus volumes compared to younger adults (younger older: $t(257)=2.88$, $p < .05$, Cohen's d=.36 ; older older: $t(257)=3.45$, $p < .005$, Cohen's d=.43). There were no differences between younger older and older older adults. No differences were observed for anterior hippocampus volumes. As with the main results, education and site were included as covariates.

Episodic Memory is Not Associated with Hippocampal Segment Volumes
A GEE was modeled to test for relationships between composite episodic memory scores and different hippocampal segment volumes across age groups. Although an age group by episodic memory interaction was observed in the full sample (Wald χ^2 (1)=4.12, $p < .05$; Supplementary Figure 3), episodic memory was not a significant predictor of volume within each age group alone. A sex by episodic memory interaction term was included due to a sex effect observed in an ANCOVA on episodic memory scores (F(1,252)= 19.03, $p < .001$, η_p^2=.07).

Semantic, but Not Episodic, Memory is Associated with Temporal Pole Volumes in Younger Adults
GEEs were also modeled to separately examine relationships between episodic and semantic memory with temporal pole volumes across age groups. No association was observed between episodic memory and temporal pole volumes. Results from the GEE with semantic memory also revealed no effect of semantic memory on volume. However, product-moment correlations demonstrated a significant association between temporal pole volumes and semantic memory in younger adults (Table S8), which suggested that a weaker association in the older group was likely dampening effects in the full GEE. We ran a post-hoc GEE in younger adults, which demonstrated a significant main effect of semantic memory (Wald χ^2 (1)=10.34, b=.05, SE=.02, $p < .005$) and a marginal hemisphere by semantic memory interaction (Wald χ^2 (1)=3.81, $p = .05$; Supplemenatry Figure 6). Follow-up GLMs confirmed that semantic memory was positively related to the left temporal pole volume (b=.05, SE=.02, $p < .01$) and not the right. Models included sex as well as site, education, and eWBV as effects of no interest.

Associations with Volume Ratio of Posterior to Anterior Hippocampus
Prior work has shown that the proportion of posterior to anterior hippocampus volumes contributes to episodic memory (Poppenk & Moscovitch, 2011), spatial navigation (Maguire et al., 2000), and cognitive mapping (Brunec et al., 2019) beyond either volume alone. All analyses conducted on hippocampal segment volumes were repeated using a ratio of posterior to anterior volumes as the dependent variable. The aim was to determine whether the proportion of segments provides unique information about hippocampal volume relationships to AM.

The ANCOVA on volume ratio revealed three main effects. A main effect of hemisphere (F (1,261)=159.06, $p < .001$, η_p^2= .35) showed that left ratios were larger than right. A main effect of sex (F(1,258)=4.02, $p < .05$, η_p^2=.01) demonstrated that females had a larger ratio compared to males. Lastly, a main effect of age group (F(1, 258)=5.74, $p < .05$, η_p^2= .02) indicated that older adults had smaller ratios compared to younger adults. Site and education were included as covariates.

Next, GEEs were modeled separately for internal and external density. Terms included age group, hemisphere, internal density, and the three-way interaction. Consistent with models from the main text, a sex by internal density interaction term was also included, along with site, education, and eWBV as effects of no interest. Follow-up GEEs were conducted to break down marginal and significant interactions. GLMs were then performed on each hemisphere to inspect simple effects.

Results from the GEE with internal density were qualitatively similar to those from the GEE on hippocampal segment volumes. Full results are listed in Table S7 for completeness. Notably, we observed an age group by hemisphere by internal density interaction (Wald χ^2 (1)=7.45, $p < .01$). The follow-up GEE in younger adults showed a marginal hemisphere by internal density interaction (Wald χ^2 (1)=3.35, $p = .067$), but internal density showed no significant relationship to either left or right volume ratios.

In older adults, interactions were observed between hemisphere and internal density (Wald χ^2 (1)=4.23, $p < .05$) as well as between sex and internal density (Wald χ^2 (1)=6.53, $p < .05$). To break down these interactions, a GLM was first performed on volume ratios in each hemisphere. As depicted in Supplementary Figure 3 (left), internal density was negatively related to the left volume ratio in all older adults (b=-.188, SE=.86, $p < .05$). In the right hemisphere, a main effect of internal density (b=-1.78, SE=.79, $p < .05$) was accompanied by an interaction with sex (Wald χ^2 (1)= 11.52, $p < .001$; Supplementary Figure 3, right). A final set of GLMs performed within each sex on the right volume ratio revealed that internal density positively predicted volume ratios for older men (b=2.18, SE=1.03, $p < .05$), and negatively predicted volume ratios for older women (b=-1.80, SE = .63, $p < .005$).

The GEE with external density showed no effect of density on volume ratio. This complemented results reported in the main text, where females showed a negative relationship to external density across both anterior and posterior volumes.

As in the main text, this result highlights the interindividual variability in brain-behavior associations in older age. While the left proportion of hippocampal segment volume similarly impacts internal density in older adults, sex differences arose in the right hemisphere: the proportion of right hippocampal segment volumes contributed to internal density in older males, whereas in older females the volume of anterior hippocampus alone aided internally dense recollections. Sex differences in older age may reflect an exacerbation of effects seen in the full group: diminished volume ratio in the right hemisphere, males, and older adults.

GEEs were also modeled to examine the effects of laboratory episodic and semantic composite scores on volume ratio. Neither variable was a significant predictor. The episodic GEE was repeated in older adults alone based on an observed association between volume ratio and episodic memory scores (Table S8), but episodic memory remained a nonsignificant predictor.

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Table S1

Hippocampal and Temporal Pole Volumes Adjusted for eTIV

Age Group	Region	Males		Females		Full Sample		
		Mean	SD	Mean	SD	Mean	SD	Range
Younger Adults								
	Whole hippocampus	8334.37	660.8	8213.88	580.48	8264.98	616.68	6773.63 - 10109.43
	L anterior hippocampus	1763.99	251.87	1699.83	210.43	1727.04	230.36	1189.42 - 2380.27
	R anterior hippocampus	1862.58	255.38	1817.99	217.47	1836.9	234.56	1253.79 - 2483.07
	L posterior hippocampus	1768.57	163.29	1795.5	164.59	1784.08	164.06	1368.89 - 2156.48
	R posterior hippocampus	1749	181.07	1743.6	163.99	1745.89	170.9	1293.34 - 2148.77
	L temporal pole	2487.16	442.96	2456.12	385.71	2469.28	409.89	1226.94 - 3461.54
	R temporal pole	2482.4	378.6	2452.79	302.46	2465.35	336.02	1468.71 - 3357.31
Older Adults								
	Whole hippocampus	7708.13	615.88	7586.78	631.32	7641.1	624.42	6376.61 - 9332.13
	L anterior hippocampus	1734.07	212.46	1713.08	210.86	1722.48	210.82	1190.53 - 2194.75
	R anterior hippocampus	1845.88	242.96	1814.34	219.62	1828.46	229.76	1321.54 - 2331.98
	L posterior hippocampus	1678.37	165.83	1704.9	142.09	1693.03	152.99	1372.68 - 2221.62
	R posterior hippocampus	1644.19	154.43	1682.72	131.65	1665.47	142.89	1327.94 - 2014.26
	L temporal pole	2500.18	367.74	2303.27	337.11	2391.41	363.02	1363.9 - 3304.13
	R temporal pole	2489.88	250.9	2388.47	314.89	2433.86	291.13	1542.04 - 3005.56

Note. Volumes shown in mm^3 after adjustment for estimated total intracranial volume (eTIV).

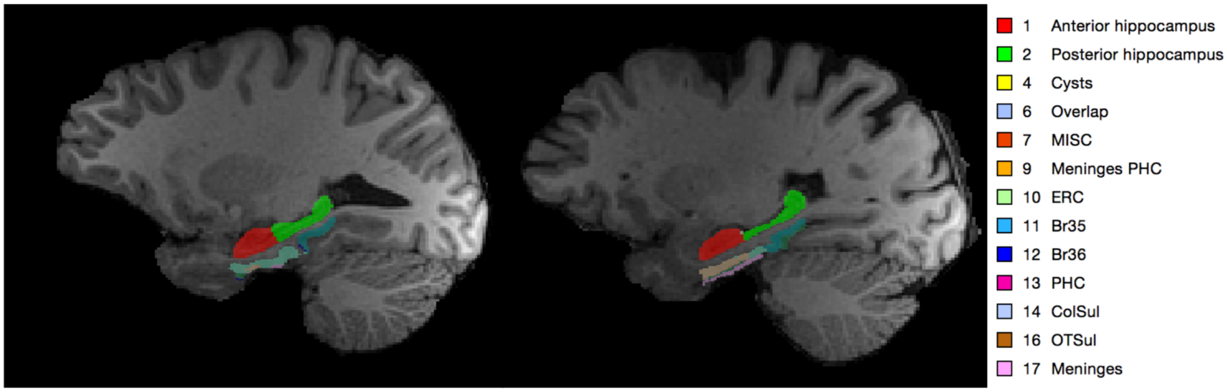
Table S2

Raw Hippcampal, Temporal Pole, and Whole Brain Volumes

Age Group	Region	Males		Females		Full Sample		
		Mean	SD	Mean	SD	Mean	SD	Range
Younger Adults								
	Whole hippocampus	8545.45	778.66	8071.34	649.63	8272.39	743	6579.1 - 10486.0
	L anterior hippocampus	1830.4	289.15	1654.98	233.29	1729.37	271.86	1092.0 - 2498.75
	R anterior hippocampus	1933.68	296.1	1769.97	247.5	1839.39	280.29	1149.5 - 2591.25
	L posterior hippocampus	1815.4	178.72	1763.88	182.56	1785.72	182.17	1296.75 - 2217.25
	R posterior hippocampus	1800.94	189.17	1708.53	180.19	1747.72	189.09	1324.75 - 2241.0
	L temporal pole	2541.66	451.06	2419.32	382.24	2471.2	415.89	1331.0 - 3514.0
	R temporal pole	2541.37	376.46	2412.97	303.17	2467.42	341.05	1363.0 - 3366.0
	eWBV	0.73	0.04	0.74	0.05	0.74	0.05	0.68 - 1.00
	eTIV	1664021.32	167252.79	1491213.98	147177.6	1564493.04	177529.27	1083364.68 - 1983058.78
Older Adults								
	Whole hippocampus	7927.23	601.02	7379.46	673.64	7624.65	695.26	6172.1 - 9439.0
	L anterior hippocampus	1803.01	203.1	1647.85	214.6	1717.3	222.47	1127.25 - 2264.0
	R anterior hippocampus	1919.68	242.94	1744.51	219.04	1822.92	245.07	1214.5 - 2401.25
	L posterior hippocampus	1726.98	184.25	1658.91	167.41	1689.38	177.58	1340.25 - 2299.75
	R posterior hippocampus	1698.1	183.05	1631.7	168.15	1661.42	177.25	1319.0 - 2149.25
	L temporal pole	2556.74	365.6	2249.74	337.4	2387.16	380.84	1326.0 - 3395.0
	R temporal pole	2551.09	270.85	2330.55	327.54	2429.27	321.54	1526.0 - 3113.0
	eWBV	0.67	0.04	0.69	0.06	0.68	0.05	0.56 - 0.93
	eTIV	1667937.91	150562.56	1459558.62	152213.7	1552833.16	183206.68	1094149.66 - 2042058.21

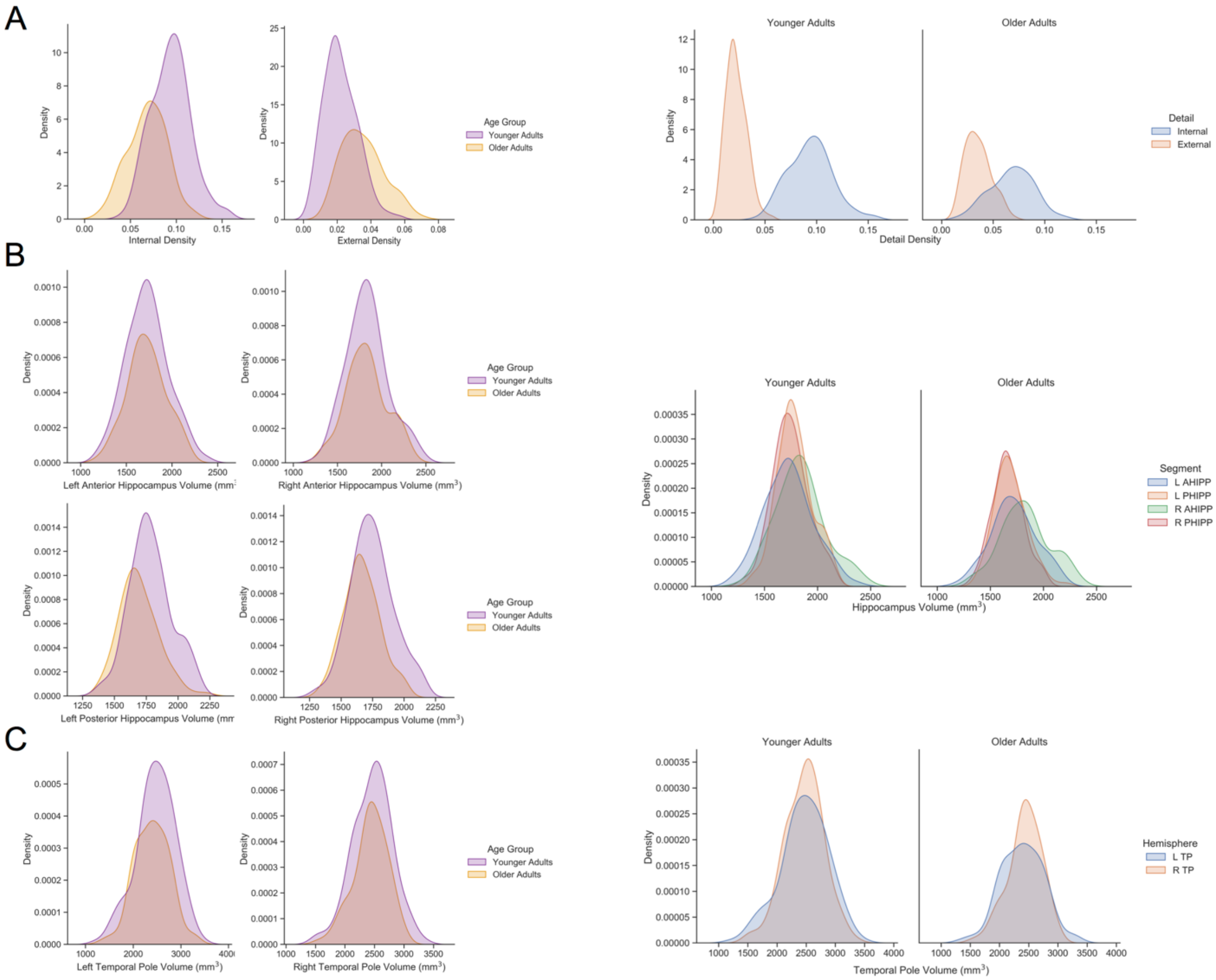
Note. ROI values represent volumes measurements in mm^3 prior to adjusting for eTIV. Hippocampal segment volumes were extracted from ASHS. Whole hippocampus, temporal pole, estimated total intracranial, grey matter, and white matter volumes were extracted from FreeSurfer. eWBV = (grey matter + white matter)/eTIV. eTIV = estimated total intracranial volume; eWBV = estimated whole brain volume.

Supplementary Figure 1



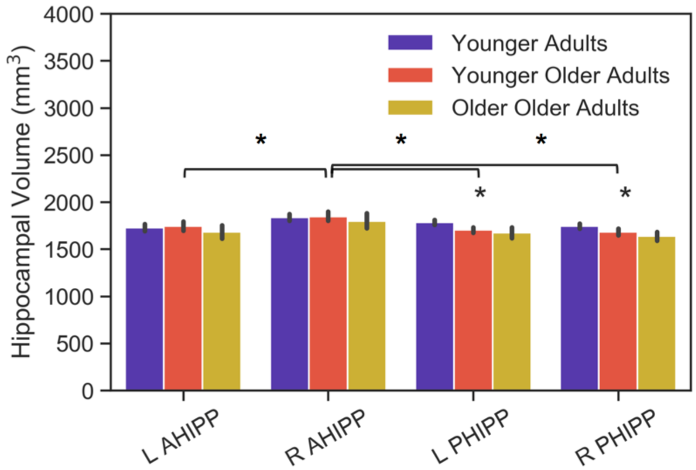
Supplementary Figure 1. ASHS Output. Representative left hemisphere segmentations from the T1 ASHS pipeline in one younger (left) and one older (right) adult in native space. Outputs included segmentations and volume measurements of the anterior and posterior hippocampus, entorhinal cortex, BA35, BA36, parahippocampal cortex, meninges, and other regions (see legend). The present study limited its examination to the longitudinal axis of the hippocampus. Anterior hippocampus = head. Posterior hippocampus = body + tail.

Supplementary Figure 2



Supplementary Figure 2. Distributions of Hippocampus and Temporal Pole Volumes by Age Group. (A) Distributions of detail density on the AI for internal and external details colored by age group (left) and distributions for density scores colored by detail category. (B) Hippocampal volume distributions for each segment colored by age group (left) and distributions for each age group colored by segment (right). (C) Temporal pole volume distributions for each hemisphere colored by age group (left) and distributions for each age group colored by hemisphere (right). Volumes were adjusted for eTIV. L AHIPP. = left anterior; R AHIPP. = right anterior; L PHIPP = left posterior; R PHIPP= right posterior. L TP = left temporal pole; R TP = right temporal pole.

Supplementary Figure 3



Supplementary Figure 3. Age by Hippocampal Volume Interaction Present at Early Stage of Older Adulthood. Mean volumes of anterior and posterior hippocampal segments plotted by hemisphere and expanded age group categories. Both groups of older adults had smaller posterior, but not anterior, hippocampus volumes than younger adults. Volumes were adjusted for eTIV. Sex was included in the model. Site and education were included as covariates. * denote significant effects. L ant. = left anterior; R ant. = right anterior; L post. = left posterior; R post. = right posterior.

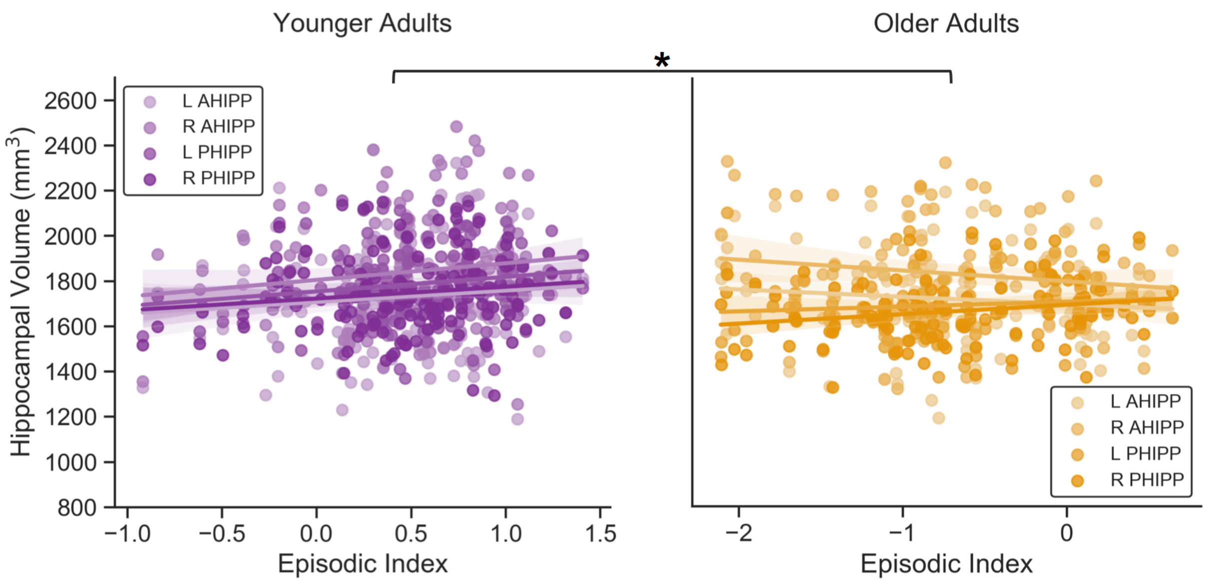
Table S3

Generalized Estimating Equations with Internal Density on Hippocampal Volumes

Model	Effect	Wald χ2	df	*p*
Full Sample				
	age group	1.07	1	0.300
	hemisphere	**17.23**	**1**	**< .001**
	segment	0.46	1	0.496
	sex	**5.66**	**1**	**< .05**
	internal density	0.14	1	0.710
	age group x hemisphere	**8.18**	**1**	**< .005**
	age group x segment	1.79	1	0.181
	hemisphere x segment	**18.28**	**1**	**< .001**
	sex x segment	**4.40**	**1**	**< .05**
	age group x internal density	3.06	1	0.080
	hemisphere x internal density	**5.32**	**1**	**< .05**
	segment x internal density	2.64	1	0.104
	sex x internal density	2.39	1	0.122
	age group x hemisphere x segment	**7.42**	**1**	**< .01**
	age group x hemisphere x internal density	**8.36**	**1**	**< .005**
	age group x segment x internal density	**4.68**	**1**	**< .05**
	hemisphere x segment x internal density	**4.89**	**1**	**< .05**
	age group x hemisphere x segment x internal density	**8.53**	**1**	**< .005**
	education	0.02	1	0.877
	eWBV	**42.95**	**1**	**< .001**
	site	**26.48**	**1**	**<.001**
Younger Adults				
	hemisphere	1.36	1	0.243
	segment	1.33	1	0.248
	sex	1.55	1	0.213
	internal density	1.82	1	0.178
	hemisphere x segment	0.62	1	0.432
	sex x segment	2.29	1	0.13
	hemisphere x internal density	**3.58**	**1**	**0.059**
	segment x internal density	1.98	1	0.159
	sex x internal density	0.53	1	0.468
	hemisphere x segment x internal density	**3.84**	**1**	**0.050**
	education	0.56	1	0.453
	eWBV	**19.09**	**1**	**< .001**
	site	**11.93**	**1**	**<.005**
Older Adults				
	hemisphere	**17.21**	**1**	**< .001**
	segment	0.44	1	0.509
	sex	**6.56**	**1**	**< .05**
	internal density	0.13	1	0.721
	hemisphere x segment	**18.27**	**1**	**< .001**
	sex x segment	2.15	1	0.143
	hemisphere x internal density	**5.36**	**1**	**< .05**
	segment x internal density	2.58	1	0.108
	sex x internal density	**4.89**	**1**	**< .05**
	hemisphere x segment x internal density	**4.94**	**1**	**< .05**
	education	0.03	1	0.856
	eWBV	**22.19**	**1**	**< .001**
	site	**16.61**	**1**	**<.001**

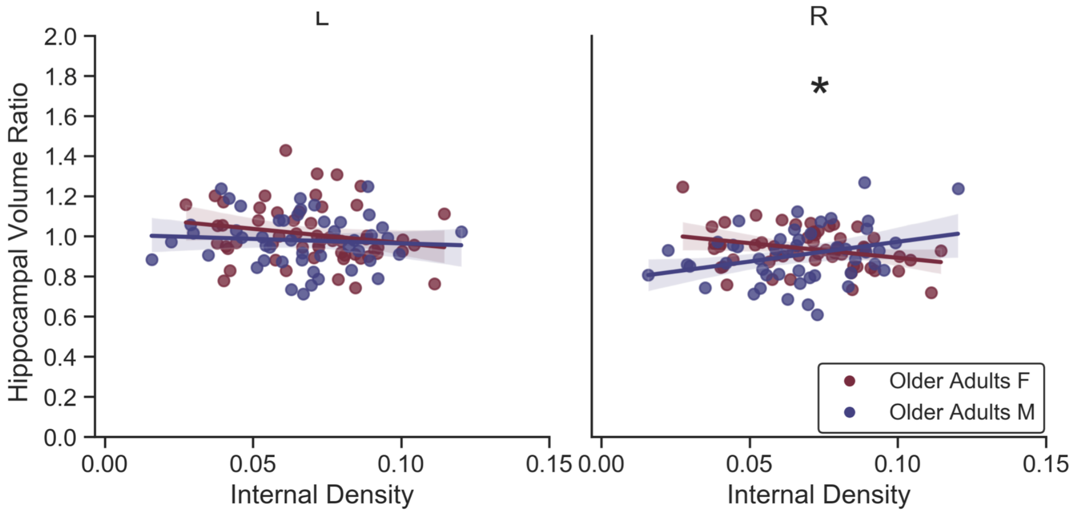
Note. Marginal and significant predictors are bolded.

Supplementary Figure 4



Supplementary Figure 4. Laboratory Episodic Memory Ability is Not Related to Hippocampal Segment Volumes. Scatterplots demonstrating a significant interaction between episodic memory scores and age group on hippocampal volumes. All volumes were corrected for eTIV. Sex was included in the model. Site, estimated whole brain volume, and education were included as effects of non-interest. * denote significant effects. L ant. = left anterior; R ant. = right anterior; L post. = left posterior; R post. = right posterior.

Supplementary Figure 5



Supplementary Figure 5. Interaction Between Sex and Internal Density on Older Adult Volume Ratios. Scatterplots show significant main effect of internal density (left hemisphere) and interaction with sex (right hemisphere) on volume ratio. In the left hemisphere, more internally dense recollections were related to a smaller volume ratio, or difference between posterior and anterior hippocampal volumes. In the right hemisphere, more internally dense recollections were related to higher ratios in older males and lower ratios in older females. All volumes were corrected for eTIV. Site, education, and estimated whole brain volume were included as effects of no interest in the model. Volume ratio = posterior/anterior hippocampus. * denote significant effects. F = female; M = male.

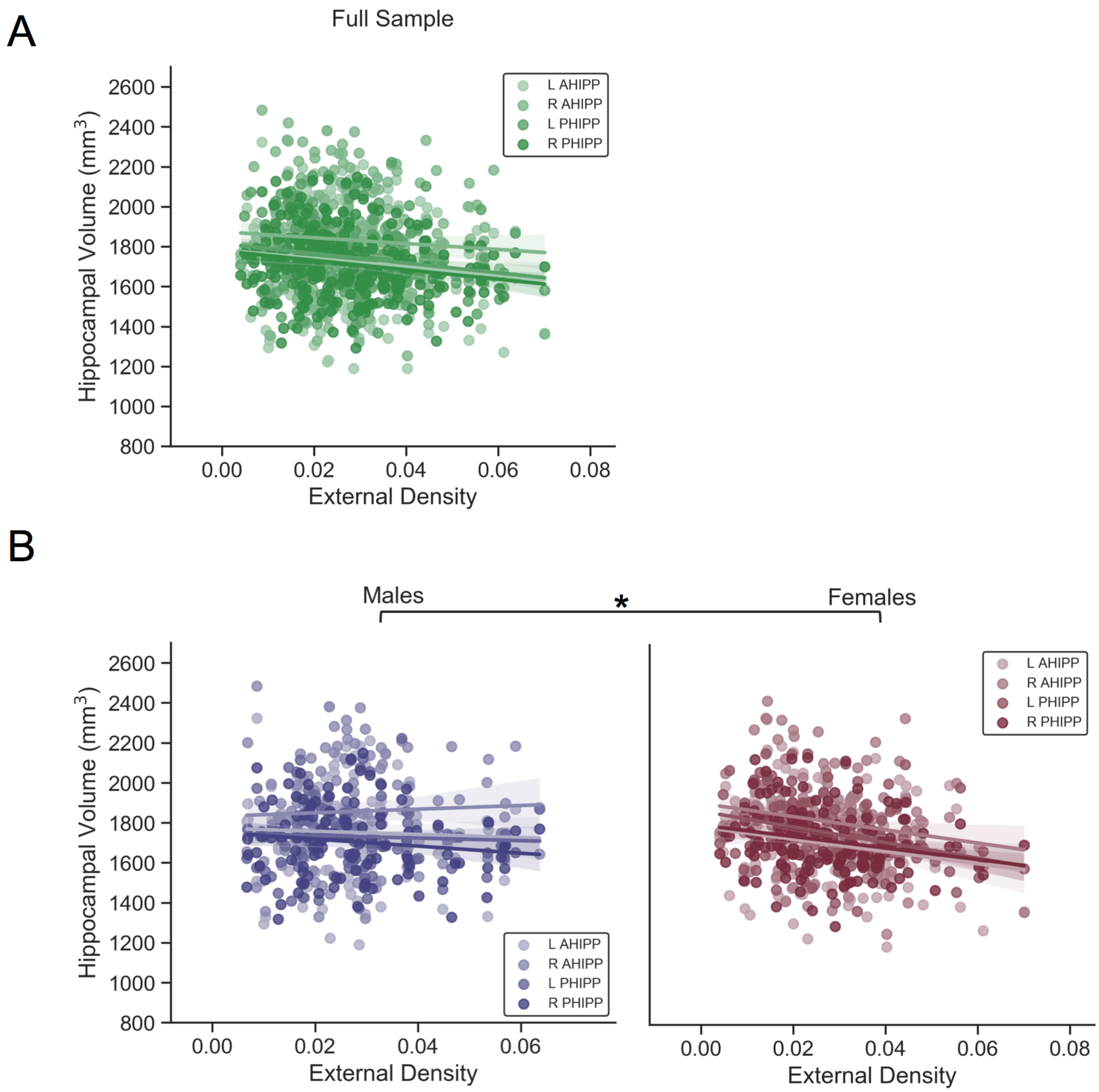
Table S4

Generalized Estimating Equations with External Density on Hippocampal Volumes

Model	Effect	Wald χ2	df	*p*
Full Sample				
	age group	**3.77**	**1**	**0.052**
	hemisphere	1.07	1	0.300
	segment	0.88	1	0.348
	sex	0.08	1	0.771
	external density	**3.77**	**1**	**0.052**
	age group x hemisphere	0.65	1	0.422
	age group x segment	1.75	1	0.185
	hemisphere x segment	1.43	1	0.231
	sex x segment	**4.86**	**1**	**< .05**
	age group x external density	0.62	1	0.433
	hemisphere x external density	1.28	1	0.249
	segment x external density	0.92	1	0.338
	sex x external density	**4.36**	**1**	**< .05**
	age group x hemisphere x segment	**0.74**	1	0.391
	age group x hemisphere x external density	0.29	1	0.590
	age group x segment x exteral density	0.00	1	0.944
	hemisphere x segment x external density	1.07	1	0.301
	age group x hemisphere x segment x external density	0.20	1	0.655
	education	0.00	1	0.975
	eWBV	**42.95**	**1**	**< .001**
	site	**23.42**	**1**	**< .001**

Note. Marginal and significant predictors are bolded.

Supplementary Figure 6



Supplementary Figure 6. Negative Relationship Between External Density and Hippocampal Volume. (A) Scatterplots demonstrating a significant relationship between external detail density and hippocampal volumes across all participants. (B) Scatterplots demonstrating a significant interaction between density and sex: larger hippocampal volumes were related to less external density in females only. All volumes were corrected for eTIV. Site, estimated whole brain volume, and education were included as effects of no interest. * denote significant effects. L ant. = left anterior; R ant. = right anterior; L post. = left posterior; R post. = right posterior.

Table S5

Generalized Estimating Equations with Internal Density on Temporal Pole Volumes

Model	Effect	Wald χ2	df	*p*
Full Sample				
	age group	**4.50**	**1**	**< .05**
	hemisphere	0.61	1	0.435
	sex	**5.55**	**1**	**< .05**
	internal density	**6.18**	**1**	**< .05**
	age group x hemisphere	0.38	1	0.537
	age group x internal density	**4.56**	**1**	**< .05**
	hemisphere x internal density	0.17	1	0.680
	sex x internal density	2.73	1	0.098
	age group x hemisphere x internal density	0.15	1	0.703
	education	1.78	1	0.182
	eWBV	**7.78**	**1**	**< .01**
	site	**3.24**	**1**	**0.072**
Younger Adults				
	hemisphere	0.01	1	0.917
	sex	0.09	1	0.767
	internal density	0.16	1	0.685
	hemisphere x internal density	0.01	1	0.938
	sex x internal density	0.01	1	0.923
	education	0.76	1	0.384
	eWBV	**6.22**	**1**	**< .05**
	site	1.55	1	0.214
Older Adults				
	hemisphere	0.59	1	0.442
	sex	**4.16**	**1**	**< .05**
	internal density	**5.54**	**1**	**< .05**
	hemisphere x internal density	0.16	1	0.688
	sex x internal density	1.42	1	0.233
	education	0.81	1	0.367
	eWBV	2.53	1	0.112
	site	1.53	1	0.216

Note. Marginal and significant predictors are bolded.

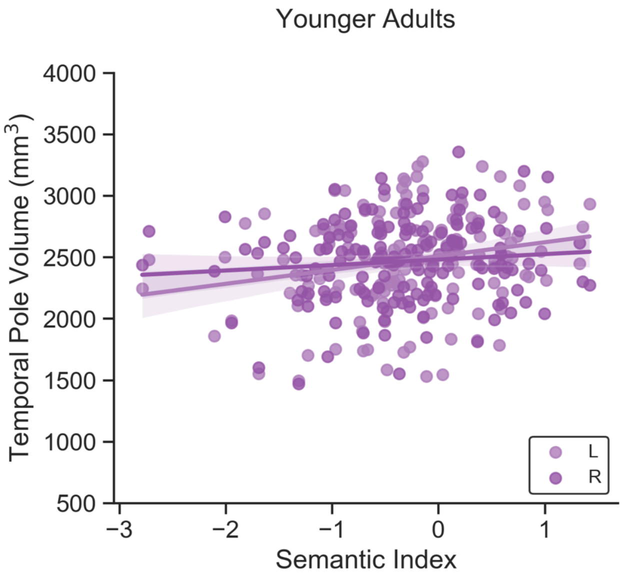
Table S6

Generalized Estimating Equations with External Density on Temporal Pole Volumes

Model	Effect	Wald χ2	df	*p*
Full Sample				
	age group	**4.42**	**1**	**< .05**
	hemisphere	0.03	1	0.860
	sex	0.09	1	0.765
	external density	**3.42**	**1**	**0.065**
	age group x hemisphere	0.93	1	0.334
	age group x external density	**7.91**	**1**	**< .005**
	hemisphere x external density	0.43	1	0.510
	sex x external density	1.85	1	0.174
	age group x hemisphere x external density	2.69	1	0.101
	education	0.96	1	0.328
	eWBV	**7.79**	**1**	**< .01**
	site	1.93	1	0.165
Younger Adults				
	hemisphere	1.85	1	0.174
	sex	0.06	1	0.810
	external density	2.36	1	0.124
	hemisphere x external density	2.65	1	0.103
	sex x external density	0.40	1	0.528
	education	1.05	1	0.305
	eWBV	**6.76**	**1**	**< .01**
	site	0.72	1	0.395
Older Adults				
	hemisphere	0.03	1	0.860
	sex	0.20	1	0.652
	external density	1.51	1	0.219
	hemisphere x external density	0.43	1	0.512
	sex x external density	0.11	1	0.739
	education	0.11	1	0.743
	eWBV	2.06	1	0.151
	site	1.43	1	0.231

Note. Marginal and significant predictors are bolded.

Supplementary Figure 7



Supplementary Figure 7. Laboratory Semantic Memory Ability is Related to Temporal Pole Volumes in Younger Adults. Scatterplot demonstrating relationships between temporal pole volumes and composite semantic memory scores in younger adults. General semantic memory abilities were positively related to left temporal pole volumes in younger adults. Volumes were corrected for eTIV. Sex was included in each model. Site, estimated whole brain volume, and education were included as effects of non-interest. L = left; R = right.

Table S7

Generalized Estimating Equations with Internal Density on Volume Ratio

Model	Effect	Wald $\chi 2$	df	*p*
Full Sample				
	age group	1.24	1	0.265
	hemisphere	**15.75**	**1**	**<. 001**
	sex	**3.76**	**1**	**0.052**
	internal density	**5.00**	**1**	**< .05**
	age group x hemisphere	**6.65**	**1**	**< .05**
	age group x internal density	**5.68**	**1**	**< .05**
	hemisphere x internal density	**4.29**	**1**	**< .05**
	sex x internal density	1.64	1	0.200
	age group x hemisphere x internal density	**7.45**	**1**	**< .01**
	education	0.17	1	0.678
	eWBV	**3.63**	**1**	**0.057**
	site	0.03	1	0.859
Younger Adults				
	hemisphere	0.74	1	0.390
	sex	0.23	1	0.633
	internal density	1.23	1	0.268
	hemisphere x internal density	**3.35**	**1**	**0.067**
	sex x internal density	0.04	1	0.834
	education	0.19	1	0.661
	eWBV	0.26	1	0.611
	site	0.68	1	0.410
Older Adults				
	hemisphere	**15.72**	**1**	**< .001**
	sex	**9.35**	**1**	**< .005**
	internal density	**10.89**	**1**	**< .005**
	hemisphere x internal density	**4.23**	**1**	**< .05**
	sex x internal density	**6.53**	**1**	**< .05**
	education	2.68	1	0.102
	eWBV	**19.1**	**1**	**< .001**
	site	0.67	1	0.412

Note. Marginal and significant predictors are bolded.

Table S8

Correlations Between Grey Matter Volume and Cognition

Age Group	Region	Episodic Memory	Semantic Memory
Younger Adults			
	Whole hippocampus	**.19 (.019)***	.01 (.929)
	L anterior hippocampus	.11 (.178)	.05 (.522)
	R anterior hippocampus	.14 (.081)	.05 (.538)
	L posterior hippocampus	.14 (.090)	.03 (.678)
	R posterior hippocampus	.12 (.151)	-.04 (.661)
	L p/a hippocampus ratio	-.01 (.916)	-.02 (.825)
	R p/a hippocampus ratio	-.04 (.621)	-.06 (.488)
	L temporal pole	.12 (.128)	**.22 (.005)***
	R temporal pole	.17 (.041)	.11 (.186)
Older Adults			
	Whole hippocampus	.00 (.979)	.00 (.975)
	L anterior hippocampus	-.14 (.146)	.15 (.126)
	R anterior hippocampus	-.21 (.033)	.04 (.699)
	L posterior hippocampus	-.03 (.745)	.03 (.773)
	R posterior hippocampus	.09 (.371)	.02 (.836)
	L p/a hippocampus ratio	.07 (.466)	-.13 (.183)
	R p/a hippocampus ratio	**.24 (.017)***	-.01 (.886)
	L temporal pole	.07 (.503)	-.01 (.944)
	R temporal pole	.00 (.991)	.06 (.526)
Full Sample			
	Whole hippocampus	**.19 (.002)***	-.07 (.260)
	L anterior hippocampus	-.12 (.061)	.14 (.025)
	R anterior hippocampus	-.13 (.044)	.09 (.136)
	L posterior hippocampus	.10 (.100)	-.02 (.697)
	R posterior hippocampus	.12 (.059)	-.04 (.485)
	L p/a hippocampus ratio	**.15 (.015)***	-.14 (.030)
	R p/a hippocampus ratio	**.18 (.004)***	-.10 (.099)
	L temporal pole	.10 (.111)	.10 (.106)
	R temporal pole	.05 (.386)	.07 (.268)

Note. Partial product-moment (pr) correlations were conducted between region volumes (adjusted for eTIV) and episodic and semantic memory index scores. Site, sex, education, and eWBV were included as covariates for each set of correlations. * and bold denote significance after Bonferroni correction at $p < .025$ for 2 tests. p values are shown in parentheses. eTIV= estimated total intracranial volume; eWBV= estimated whole brain volume.