



# Is Alcohol Use Disorder Without Major Depression Associated With Reduced Hippocampal Volume?

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## Background

- The hippocampus is part of the limbic system and helps regulate emotion, learning, memory and motivation (Frodl et al., 2006).
- Studies have shown reduced hippocampal volume in individuals with major depressive disorder (MDD) (see Campbell et al., 2004) and alcohol use disorder (AUD) (DeBellis et al., 2000).
- The majority of studies examining hippocampal volume and MDD have controlled for alcohol use and comorbid AUD, while studies examining hippocampal volume and AUD have not consistently controlled for comorbid MDD.
- The reduction in hippocampal volume found in those with AUD could thus be because of comorbid MDD.

## Purpose

The purpose of this study was to investigate if AUD is independently associated with reduced hippocampal volume without the presence of comorbid MDD.

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## Methods

- 102 24-year-old female twin participants from the Minnesota Center for Twin and Family Research
- Structural neuroimaging data collected using magnetic resonance imaging (MRI) scans
- Hippocampal volumes obtained using FreeSurfer software
- MDD diagnoses assessed at ages 11, 14, 17, and 24 using the Structured Clinical Interview for DSM-IV-TR (SCID-I; First et al., 2002)
- AUD diagnoses assessed at ages 11, 14, 17, and 24 using the Substance Abuse Module of the Composite International Diagnostic Interview (CIDI-SAM; Cottler, 2000)
- Individuals classified into four groups based on lifetime (through age 24) diagnoses: MDD only ( $n = 26$ ), AUD only ( $n = 10$ ), comorbid MDD/AUD ( $n = 9$ ), and neither MDD nor AUD ("control" group;  $n = 55$ )
- Group comparisons of hippocampal volume conducted using multilevel modeling analyses that accounted for the interdependence of the twin sample

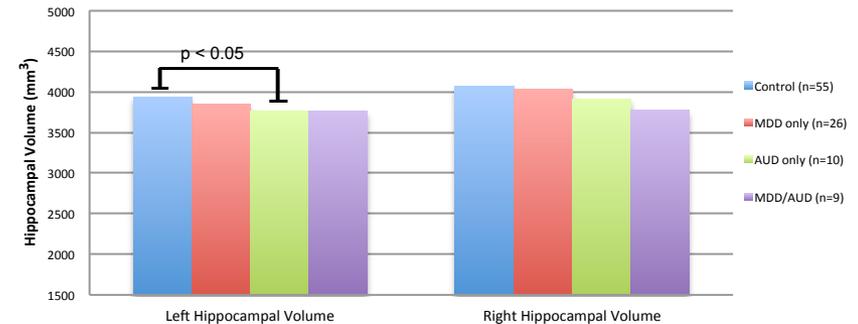
## Results

### Multilevel Modeling Analyses Comparing Hippocampal Volumes Between Groups

Group Comparisons	Left Hippocampal Volume	Right Hippocampal Volume	Total Hippocampal Volume
	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)
AUD vs. Control	-155.81 (65.50) *	-136.86 (95.26)	-292.93 (111.65) *
MDD vs. Control	-85.92 (63.22)	-26.33 (66.81)	-109.93 (102.29)
MDD/AUD vs. Control	-154.89 (99.98)	-197.44 (124.58)	-309.61 (172.85)
MDD vs. AUD	61.03 (102.70)	78.87 (151.26)	197.21 (225.04)
MDD/AUD vs. AUD	-21.58 (128.48)	-176.53 (177.09)	-91.14 (258.83)
MDD vs. MDD/AUD	82.62 (124.52)	255.40 (147.74)	288.35 (251.84)

Note: Group comparison models test whether the groups in the comparison differ; these models include a dummy code representing the four groups (1 = the first group in the comparison, 0 = the second group). All values are volumes in millimeters cubed. \*  $p < 0.05$ .

### Mean Left and Right Hippocampal Volumes by Groups



## Conclusions

- Only the AUD group's left and total hippocampal volumes were found to be significantly less than the control group's hippocampal volumes.
- These findings are in contrast with previous studies showing reduced hippocampal volume in those with MDD.
- AUD is independently associated with reduced hippocampal volume without the presence of comorbid MDD.