

# Heavy alcohol use changes adolescents' brains

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Heavy alcohol use during adolescence alters the development of brain, according to a recent study from the University of Eastern Finland and Kuopio University Hospital. Cortical thinning was observable in young people who had been heavy drinkers throughout their adolescence. The findings were published in *Addiction*.

The study performed [magnetic resonance imaging](#) of the brain structure on young and healthy, but heavy-drinking adults who had been [heavy drinkers](#) throughout their adolescence, as well as on age-matched light-drinking control participants. They participated in three cross-sectional studies conducted over the course of ten years, in 2005, 2010 and 2015. The participants were 13 to 18 years old at the onset of the study.

All participants were academically successful, and the prevalence of [mental health problems](#) did not differ between the two groups. Although the heavy-drinking participants had used [alcohol](#) regularly for ten years, approximately 6-9 units roughly once a week, none of them had a diagnosed alcohol use disorder.

Magnetic resonance imaging of the brain revealed statistically significant differences between the groups. Among the heavy-drinking participants, grey matter volume was decreased in the [anterior cingulate cortex](#) bilaterally as well as in the right insula.

"The maturation of the brain is still ongoing in adolescence, and especially the frontal areas and the cingulate cortex develop until the

twenties. Our findings strongly indicate that heavy alcohol use may disrupt this maturation process," says PhD Student Noora Heikkinen, the first author of the study.

Cingulate cortex has an important role in impulse control, and volumetric changes in this area may play an important role in the development of a substance use disorder later in life. Structural changes in the insula, on the other hand, may reflect a reduced sensitivity to alcohol's negative subjective effects, and in this way contribute to the development of a substance use disorder.

"The exact mechanism behind these structural changes is not known. However, it has been suggested that some of the volumetric changes may be reversible if [alcohol consumption](#) is reduced significantly. As risk limits of alcohol consumption have not been defined for adolescents, it would be important to screen and record adolescent substance use, and intervene if necessary."

**More information:** Noora Heikkinen et al. Alcohol consumption during adolescence is associated with reduced grey matter volumes, *Addiction* (2016). [DOI: 10.1111/add.13697](https://doi.org/10.1111/add.13697)

Provided by University of Eastern Finland

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