Effect of tobacco smoking on frontal cortical thickness development: A longitudinal study in a mixed cohort of ADHD-affected and -unaffected youth.

Akkermans SEA, van Rooij D, Rommelse N, Hartman CA, Hoekstra PJ, Franke B, Mennes M, Buitelaar JK.


Abstract

Smoking rates are particularly high during adolescence and young adulthood, when the brain is still undergoing significant developmental changes. Cross-sectional studies have revealed altered brain structure in smokers, such as thinner frontal cortical areas. Attention-deficit/hyperactivity disorder (ADHD) increases the risk of becoming nicotine-dependent, and has also been associated with abnormalities in frontal gray matter structure. The present study examines the relationships between smoking, cortical thickness and ADHD symptoms in a longitudinal design that compares adolescent and young adult smokers (n=44; 35 ADHD-affected) and non-smokers (n=45; 32 ADHD-affected) on frontal cortical thickness. Average frontal cortical thickness was estimated through structural magnetic resonance imaging (MRI) at two time points (mean ages 17.7 and 21.1 years), on average 3.4 years apart. Smokers had a 2.6% thinner frontal cortex than non-smokers and this difference was not explained by ADHD or other confounding factors. The rate of cortical thinning across the 3.4-year MRI measurement interval was similar in the total group of smokers compared to non-smokers. However, speeded thinning did occur in smokers who had started regular smoking more recently, in between the two measurements. These novel regular smokers did not differ significantly from the non-smokers at baseline. This suggests that the thinner frontal cortex was not a predisposing factor but rather a consequence of smoking. Although smokers had more ADHD symptoms overall, smoking did not influence the developmental course of ADHD symptoms.