

# New study on vapes challenges belief that adolescents experience less severe withdrawal symptoms

December 7 2023, by Prabhjot Sohal

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While vaping has become popular, researchers say methods to study the effects of inhaling vapor are limited. Credit: Pexels/Olena Bohovyk

Vapes or e-cigarettes were introduced as a potentially safer alternative to traditional smoking to curb tobacco use. However, the popularity of vapes has risen among an age group they weren't intended for: adolescents.

While the entire breadth of the health effects of [vaping](#) is still being unveiled, previous research has shown one in four [high school students](#) in Canada have reported vaping in the preceding 30 days, with almost 12 percent having reported exclusively using nicotine vapes.

A new study, [published](#) in the journal *Neuropsychopharmacology*, examined the effects of nicotine vapor exposure in rat models to understand nicotine-induced reward and withdrawal behavior, [brain connectivity](#) and how the body processes nicotine.

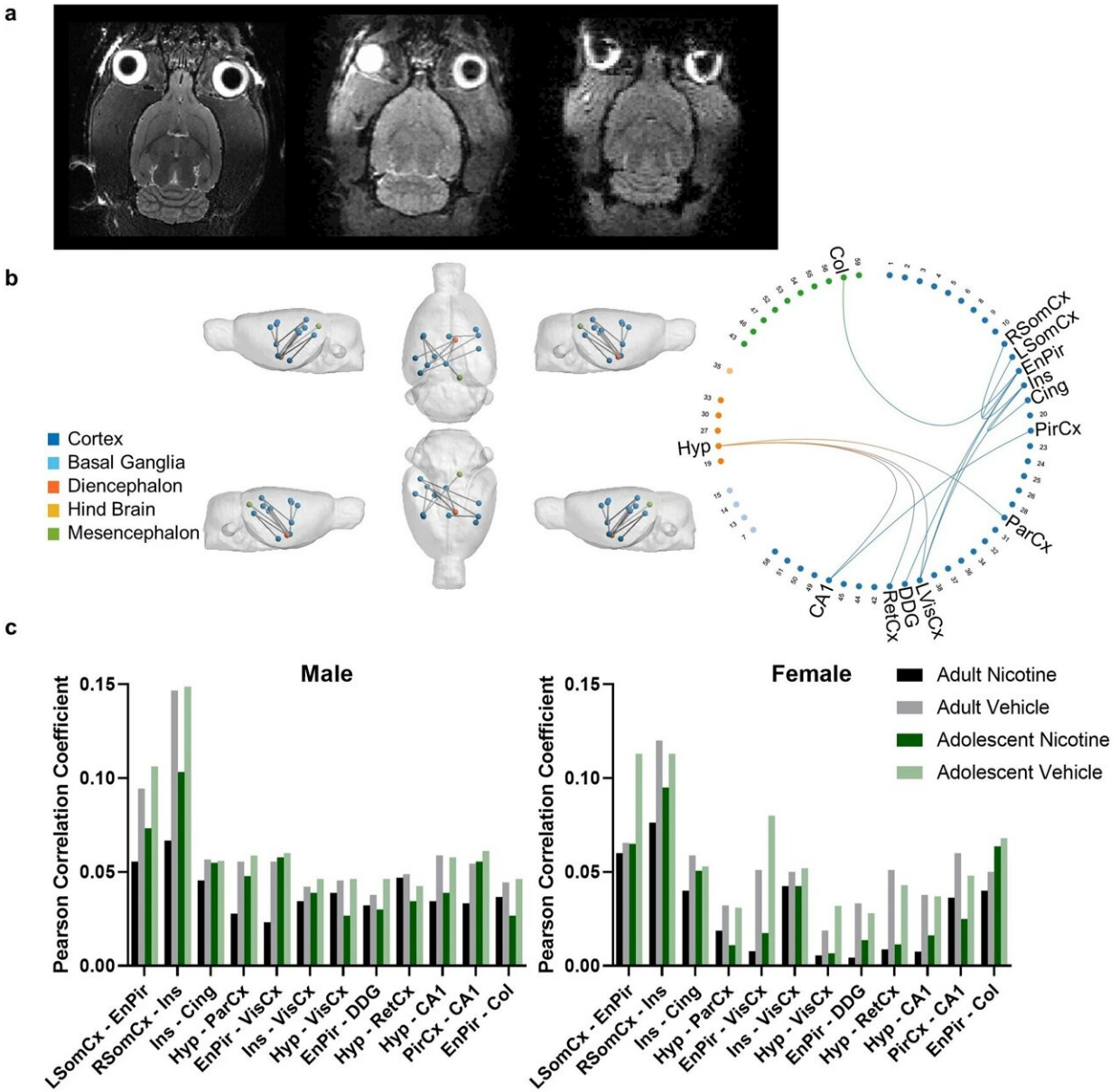
The study, led by Western professor Jibrán Khokhar and graduate student and Vanier scholarship winner Jude Frie, has shown that factors of sex and age influence the body's response to nicotine vapor.

"By using the route of exposure and [brain](#) circuit assessment methods akin to those used in humans, the findings here can hopefully demystify the effects of nicotine vaping on the adolescent and the adult human brain, and the important role that sex plays in these effects," said Khokhar, Canada Research Chair in Translational Neuropsychopharmacology and professor at Western's Schulich School of Medicine & Dentistry.

The study has shown adult female rats were more likely to acquire a liking for longer exposures to nicotine vapor, while female adolescent rats, as well as male adult and adolescent rats, did not show the same level of preference.

Additionally, adult and adolescent male rats experienced symptoms of withdrawal and increased activity due to nicotine vapor exposure, while female rats did not exhibit these symptoms.

The study also revealed that [adult females](#) had higher nicotine levels in their bodies and brains compared to adult males and adolescent females.



Reduced functional connectivity was observed in nicotine vapor-exposed rats, with greater reductions observed in female rats. **a** Representative single subject T2 anatomical image (left), diffusion  $b = 0$  image (middle), and the first volume of an fMRI dataset (right). **b** NBS statistics confirmed reduced functional connectivity in the Nicotine group ( $n = 34$ ) compared to the Vehicle group ( $n = 36$ ) when controlling for age and sex ( $p = 0.013$ , 12 edges, 13 nodes). Significant edges have anatomical regions labeled. All other regions are labeled with their numerical SIGMA atlas reference. **c** Average Pearson Correlation Coefficients

in edges identified by NBS statistics to have reduced functional connectivity in the Nicotine group when controlling for age and sex ( $p = 0.013$ , 12 edges, 13 nodes). Post-hoc analysis confirmed a statistically significant group by sex interaction effect ( $p$

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