

# Differences between combined, isolated use of cannabis, nicotine on brain networks

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Researchers at the Center for BrainHealth at the University of Texas at Dallas investigated the effects on the brain of concurrent cannabis and nicotine use, versus the use of solely cannabis and solely nicotine.

The results, recently published in the journal *Brain Structure and Function*, show that not only were the effects in these three categories different, but also that the group using both nicotine and cannabis more closely resembled the control (non-user) group in brain connectivity. The isolated nicotine and isolated cannabis users showed equally less connectivity in general.

Previous research in rats has suggested that nicotine may be a "gateway drug" leading to cannabis and other drug use. Studies performed with rats exposed to THC—the main psychoactive compound found in marijuana—demonstrated an increased likelihood to self-administer nicotine that was not observed with rats exposed to heroin or cocaine, suggesting that there is something unique about the cannabis-nicotine interaction.

"Most of the literature to date has focused on

associations of isolated cannabis and nicotine use, even though concurrent cannabis and nicotine use is more prevalent in society than cannabis use alone," said the study's lead author, Dr. Francesca M. Filbey, the Bert Moore Chair in BrainHealth at UT Dallas. "Our findings confirm the limitations of existing research."

While the outcome of the study could be, in part, due to the opposing effects nicotine and cannabis have on the brain, the difference in the brains of concurrent users versus isolated users of each product begs for further research in functional connectivity metrics in these populations, Filbey said.

MRI scans were used to evaluate resting state functions in 12 different regions of the brain among four groups of participants: 28 nicotine users, 53 cannabis users, 26 nicotine and cannabis users, and 30 non-users in a control group. These scans revealed that the control group displayed greater connectivity in almost all of the networks compared to the nicotine and cannabis groups, while the combined nicotine plus cannabis group had greater connectivity than the only-nicotine and only-cannabis groups. Notably, this study did not demonstrate a correlation between substance use severity and functional connectivity.

Differences in brain network connectivity suggest alterations in the underlying neural architecture of the brain that support brain function. Overall, Filbey said the study suggests unique and combined contributions of cannabis and [nicotine](#) on [brain](#) network connectivity, which could be helpful knowledge for intervention programs.

**More information:** Francesca M. Filbey et al, Differential associations of combined vs. isolated cannabis and nicotine on brain resting state networks, *Brain Structure and Function* (2018). [DOI: 10.1007/s00429-018-1690-5](https://doi.org/10.1007/s00429-018-1690-5)

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