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Cannabis abuse alters activity of brain regions linked to negative emotion

New study in Biological Psychiatry: Cognitive Neuroscience and Neuroimaging looks at the effects of heavy cannabis use on brain function and behavior

Philadelphia, January 16, 2018 – Young people with cannabis dependence have altered brain function that may be the source of emotional disturbances and increased psychosis risk that are associated with cannabis abuse, according to a [new study](#) published in [Biological Psychiatry: Cognitive Neuroscience and Neuroimaging](#). The alterations were most pronounced in people who started using cannabis at a young age. The findings reveal potential negative long-term effects of heavy cannabis use on brain function and behavior, which remain largely unknown despite the drug's wide use and efforts to legalize the substance.

The study, by Drs. Peter Manza, Dardo Tomasi, and Nora Volkow of the National Institute on Alcohol Abuse and Alcoholism, Bethesda, Maryland, assessed resting brain activity data from the Human Connectome Project of 441 young adults, and compared a smaller set of 30 people who met criteria for cannabis abuse with 30 controls. People with heavy cannabis use had abnormally high connectivity in brain regions important for reward processing and habit formation. The same regions have also been pegged in the development of psychosis in previous research.

“These brain imaging data provide a link between changes in brain systems involved in reward and psychopathology and chronic cannabis abuse, suggesting a mechanism by which heavy use of this popular drug may lead to depression and other even more severe forms of mental illness,” said Dr. Cameron Carter, Editor of *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*.

The brain alterations were also associated with heightened feelings of negative emotionality, especially alienation, where one feels a sense of hostility or rejection from others. The link points to a potential biological mechanism for why feelings of alienation are often profoundly increased in people with cannabis dependence.

“Interestingly, the hyperconnectivity was strongest in the individuals who began using cannabis in early adolescence,” said Dr. Manza, which lines up with reports of a higher risk of psychiatric problems when cannabis use begins early in life. Adolescence is a critical period of brain development, making early use of cannabis particularly detrimental. According to Dr. Manza, the measurement of resting brain activity is a relatively easy and non-invasive procedure, so the approach could be a useful measure for tracking the development of psychiatric symptoms with cannabis use.

Notes for editors

The article is "Subcortical local functional hyperconnectivity in cannabis dependence," by Peter Manza, Dardo Tomasi, and Nora D. Volkow (<http://dx.doi.org/10.1016/j.bpsc.2017.11.004>). It appears in *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, published by Elsevier.

Copies of this paper are available to credentialed journalists upon request; please contact Rhiannon Bugno at BPCNNI@UTSouthwestern.edu or +1 214 648 0880. Journalists wishing to interview the authors may contact Peter Manza, Ph.D., at peter.manza@nih.gov.

The authors' affiliations and disclosures of financial and conflicts of interests are available in the article.

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