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People with low risk for cocaine dependence have differently shaped brain to those with addiction

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People who take cocaine over many years without becoming addicted have a brain structure which is significantly different from those individuals who developed cocaine-dependence, researchers have discovered. New research from the University of Cambridge has found that recreational drug users who have not developed a dependence have an abnormally large frontal lobe, the section of the brain implicated in self-control. Their research was published in the journal *Biological Psychiatry*.

For the study, led by Dr Karen Ersche, individuals who use cocaine on a regular basis underwent a brain scan and completed a series of personality tests. The majority of the cocaine users were addicted to the drug but some were not (despite having used it for several years).

The scientists discovered that a region in the frontal lobes of the brain, known to be critically implicated in decision-making and self-control, was abnormally bigger in the recreational cocaine users. The Cambridge researchers suggest that this abnormal increase in grey matter volume, which they believe predates drug use, might reflect resilience to the effects of cocaine, and even possibly helps these recreational cocaine users to exert self-control and to make advantageous decisions which minimize the risk of them becoming addicted.

They found that this same region in the frontal lobes of the brain was

significantly reduced in size in people with cocaine dependence, confirming earlier research that had found similar results. They believe that at least some of these changes are the result of drug use, which causes drug users to lose grey matter.

They also found that people who use illicit drugs like cocaine exhibit high levels of sensation-seeking personality traits, but only those developing dependence show personality traits of impulsivity and compulsivity.

Dr Ersche, of the Behavioural and Clinical Neuroscience Institute (BCNI) at the University of Cambridge, said: "These findings are important because they show that the use of cocaine does not inevitably lead to addiction in people with good self-control and no familial risk.

"Our findings indicate that preventative strategies might be more effective if they were tailored more closely to those individuals at risk according to their personality profile and brain structure."

The researchers will next explore the basis of the recreational users' apparent resilience to drug dependence.

Dr Ersche added: "Their high level of education, less troubled family background or the beginning of drug-taking only after puberty may all play a role."

More information: The paper 'Distinctive Personality Traits and Neural Correlates Associated with Stimulant Drug Use Versus Familial Risk of Stimulant Dependence' was published in *Biological Psychiatry*.

Provided by University of Cambridge

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