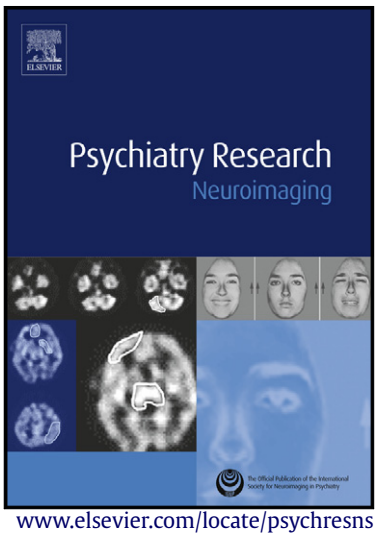

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PII: S0925-4927(14)00101-2
DOI: http://dx.doi.org/10.1016/j.pscychresns.2014.04.014
Reference: PSYN10201

To appear in: *Psychiatry Research: Neuroimaging*

Received date: 2 August 2013
Revised date: 25 February 2014
Accepted date: 27 April 2014

Cite this article as: Jennifer L. Stewart, Colm G. Connolly, April C. May, Susan F. Tapert, Marc Wittmann, Martin P. Paulus, Cocaine dependent individuals with attenuated striatal activation during reinforcement learning are more susceptible to relapse, *Psychiatry Research: Neuroimaging,* http://dx.doi.org/10.1016/j.pscychresns.2014.04.014

Cocaine dependent individuals with attenuated striatal activation during reinforcement learning are more susceptible to relapse

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Abstract

Cocaine-dependent individuals show altered brain activation during decision making. It is unclear, however, whether these activation differences are related to relapse vulnerability. This study tested the hypothesis that brain-activation patterns during reinforcement learning are linked to relapse 1 year later in individuals entering treatment for cocaine dependence. Subjects performed a Paper-Scissors-Rock task during functional magnetic resonance imaging (fMRI). A year later, we examined whether subjects had remained abstinent (n=15) or relapsed (n=15). Although the groups did not differ on demographic characteristics, behavioral performance, or lifetime substance use, abstinent patients reported greater motivation to win than relapsed patients. The fMRI results indicated that compared with abstinent individuals, relapsed users exhibited lower activation in (1) bilateral inferior frontal gyrus and striatum during decision making more generally; and (2) bilateral middle frontal gyrus and anterior insula during reward contingency learning in particular. Moreover, whereas abstinent patients exhibited greater left middle frontal and striatal activation to wins than losses, relapsed users did not demonstrate modulation in these regions as a function of outcome valence. Thus, individuals at high risk for