

Training the brain to think ahead in addiction

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The growing numbers of new cases of substance abuse disorders are perplexing. After all, the course of drug addiction so often ends badly. The negative consequences of drug abuse appear regularly on TV, from stories of celebrities behaving in socially inappropriate and self-destructive ways while intoxicated to dramatization of the rigors of drug withdrawal on "Intervention" and other reality shows.

Schools now educate students about the risks of addiction. While having a keen awareness of the negative long-term repercussions of substance use protects some people from developing addictions, others remain vulnerable.

One reason that education alone cannot prevent substance abuse is that people who are vulnerable to developing substance abuse disorders tend to exhibit a trait called "delay discounting", which is the tendency to devalue rewards and punishments that occur in the future. Delay discounting may be paralleled by "reward [myopia](#)", a tendency to opt for immediately rewarding stimuli, like drugs.

Thus, people vulnerable to addiction who know that drugs are harmful in the long run tend to devalue this information and to instead be drawn to the immediately rewarding effects of drugs.

Delay discounting is a cognitive function that involves circuits including the [frontal cortex](#). It builds upon working memory, the brain's "scratchpad", i.e., a system for temporarily storing and managing

information reasoning to guide behavior.

In a new article in [Biological Psychiatry](#) that studied this process, Warren Bickel and colleagues used an approach borrowed from the rehabilitation of individuals who have suffered a stroke or a [traumatic brain injury](#). They had stimulant abusers repeatedly perform a working memory task, "exercising" their brains in a way that promoted the functional enhancement of the underlying cognitive circuits.

They found that this type of training improved [working memory](#) and also reduced their discounting of delayed rewards.

"The legal punishments and medical damages associated with the consumption of drugs of abuse may be meaningless to the addict in the moment when they have to choose whether or not to take their drug. Their mind is filled with the imagination of the pleasure to follow," commented Dr. John Krystal, Editor of *Biological Psychiatry*. "We now see evidence that this myopic view of immediate pleasures and delayed punishments is not a fixed feature of addiction. Perhaps cognitive training is one tool that clinicians may employ to end the hijacking of imagination by drugs of abuse."

Dr. Bickel agrees, adding that "although this research will need to be replicated and extended, we hope that it will provide a new target for treatment and a new method to intervene on the problem of addiction."

More information: The article is "Remember the Future: Working Memory Training Decreases Delay Discounting Among Stimulant Addicts" by Warren K. Bickel, Richard Yi, Reid D. Landes, Paul F. Hill, and Carole Baxter. Bickel, Yi, and Hill are affiliated with the Department of Psychiatry, Center for Addiction Research, Little Rock, Arkansas. Landes is with the Department of Biostatistics, University of Arkansas for Medical Sciences, Little Rock, Arkansas. Baxter is from

Recovery Centers of Arkansas, Little Rock, Arkansas. The article appears in *Biological Psychiatry*, Volume 69, Number 3 (February 1, 2011).

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