

Motivation and the brain in refraining from drug use

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## Motivation and the Brain in Refraining From Drug Use

Neuroscience and psychology have been working hand in hand for some time now to determine why and how behaviors occur in human personality, and what motivates individuals to do what they do. Perhaps one of the most studied phenomena that affects motivation, the thought processes, and social interactivity, is the study of drug addiction. The study of drug addiction has benefited greatly from advances in scanning and imaging technology such as positron emission tomography (PET) and functional magnetic resonance imaging (fMRI) (Volkow, Fowler, and Wang, 2003). Through the course of this paper, we shall look at brain structures and functions most affected in drug addicted individuals, extrinsic and intrinsic motivators to refrain from drug use, as well as biological and environmental factors relating to recovery.

Physical changes in the brain are associated with chronic substance abuse, having a large impact on brain functioning and emotional states. An exceptionally large body of neuroimaging studies have shown that the brain is dramatically changed in structure over medium to long-term drug use, which affects cravings, tolerance, withdrawal, and cue reactivity even after treatment and long periods of abstinence (Dennis & Scott, 2007). Drug use causes rather sudden and large increases in dopamine within the brain causing sudden feelings of euphoria, which is the main reinforcer of drug use. However, neurochemical studies have shown that chronic drug abuse causes a decrease in overall dopamine production. This effect is even more pronounced during any period of withdrawal, and is most pronounced during complete detoxification. Frontal regions of the brain, primarily the orbitofrontal cortex and cingulate gyrus, are most affected by these decreases, causing a dysfunction in brain activity in these areas (Volkow, et al, 2003).

According to Volkow, et al,

“Functional imaging studies have shown that during drug intoxication, or during craving, these frontal regions become activated as part of a complex pattern that includes brain circuits involved with reward (nucleus accumbens), motivation (orbitofrontal cortex), memory (amygdala and hippocampus), and cognitive control (prefrontal cortex and cingulate gyrus)” (Volkow, Fowler, and Wang, 2003).

Although drug use is normally a voluntary act in the beginning, chronic use permanently alters the brain causing it to function differently from a normal individual. Extrinsic motivation is almost always required to get an addict to desire to quit the use of drugs, and is almost always necessary to get the addict into initial and ongoing treatment programs (Leshner, 2007). External motivators to begin treatment for drug abuse often include intervention from a loved one.

Whether or not an addict seeks treatment due to an intervention, often the extrinsic motivators are the same. These motivators are sometimes hypothetical ones based on the current trend in an addicts' life during drug use, or are based on events that have happened and are currently happening. These motivators often include loss of employment, loss of a meaningful relationship, spousal abuse, financial difficulties, and physical deterioration (Westreich, 2007).

Strong intrinsic motivators are generally associated with a higher success rate of long-term abstinence for addicts in recovery. Promotion and encouragement of personal responsibility is an effective internal motivator to an addict in recovery (DiClemente, Bellino, & Neavins, 1999 ). It is interesting to note that “patients with more severe alcohol problems generally had greater internal motivation for treatment. The severity of the patient’s alcohol problems enhances internal motivation, presumably because the problem severity increases distress and thus influences decisionmaking [SIC]” (DiClemente, et al, 1999).

Addiction is both biological and behavioral in nature, although some would debate that these two views are opposing views and thus the explanation of addiction must come from one or the other. However, drug addiction is the ultimate example of a biobehavioral disorder comprising of both biological and behavioral components. Research is quickly finding a plethora of cellular and molecular changes in brain structure caused by drug abuse and that many of these are common to all chemical addictions, including non-drug addictions such as pathological overeating (Leshner, 2007).

Environment plays a key factor in an addicts recovery. Dennis and Scott found that patients who experienced higher levels of substance use and also had environmental obstacles in recovery, such as other individuals using drugs in the home of the addict, were far less likely to succeed in recovery. Further, an addict who has just begun recovery is far more likely to relapse early in the recovery period due to reintroduction to an environment that may include friends and individuals that continue to use or deal drugs (Dennis & Scott, 2007).

Environmental cues that occurred during periods of drug use become paired in time with the drug use itself, and become difficult for the addict to differentiate. During recovery, these cues are still associated via classical conditioning with drug use and therefore elicit the anticipation of a drug experience based on past experience. This can generate tremendous cravings for the drug experience even after years of abstinence. Cue-induced cravings is the environmental factor that most commonly causes a relapse, even if drugs are not available during the cue-inducing experience (Leshner, 2007). Thus, it becomes more apparent that an addict should change their social habits to reduce the occurrence of these environmental cues and promote recovery.

Drug addiction is a fascinating area of study for neuroscience and psychology alike. In review, it is interesting to note that physical changes in the brain are associated with chronic substance abuse, having a large impact on brain functioning and emotional states. This most notably causes cellular and molecular changes in the frontal area of the brain impairing motivation, memory and cognitive control (Dennis & Scott, 2007). Extrinsic motivators are almost always necessary to get the addict into initial and ongoing treatment programs (Leshner, 2007) and can include loss of employment, loss of a meaningful relationship, spousal abuse, financial difficulties, physical deterioration, or any combination of the above (Westreich, 2007). Although promotion and encouragement of personal responsibility is an effective internal motivator to an addict in recovery (DiClemente, et al, 1999), biological factors play a major part in recovery from drug addiction as cellular and molecular changes in brain structure caused by drug abuse are common to all chemical addictions and can impair an addicts ability to recover successfully from addiction (Leshner, 2007). Environmental obstacles, such as social cues, can easily cause an addict to relapse, and thus it is important for an addict to change their social habits to promote recovery (Leshner, 2007).

## References

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