

International Journal of Innovative Research in Science, Engineering and Technology

(A Monthly Peer Reviewed Journal)

Vol. 2, Issue 12, December 2013

Rise of Habit Forming Drugs

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ABSTRACT: This is an important topic in addiction research, since drug addiction consider the motivational or reinforcing aspects of drugs to be the central drive for drug use . However, motivational models alone do not seem to fully cover the complexity of addictive behaviors observed in humans, especially in relation to the more chronic, highly relapsing patterns of addiction. In recent years, habit formation theory has become more prominent for explaining the persistent pattern of addiction despite decreasing reinforcing properties of the drug and increasing negative consequences of continued drug use . Moreover, motivations and habits could be more intertwined than previously assumed. Therefore, some questions rise considering the construct of habits: is habitual behavior completely devoid of motivational underpinnings (i.e., goal-directedness) or is it possible that motivation still plays a role in habitual behavior. Moreover, is habit a unitary construct or are there different types of habituation. In this article, we present considerations in the context of human addiction and motivation in order to open the discussion toward a more careful consideration of the concept of habit and its role in drug addiction.

KEYWORDS: drug addiction, habit, forming drugs, habitual behavior, habituation, motivation

I.INTRODUCTION

Long-term opioid use increases the danger of misuse, addiction and even overdose, fueling what public health experts have called a national epidemic of opioid overuse. In 2011, more than 15,000 people in the United States died from an overdose involving prescription opioids, according to the Centers for Disease Control and Prevention.¹ The findings, the researchers add, underscore an acute need to educate clinicians on judicious prescribing practices and reduce wide variation in prescribing patterns for similar patients. “These are sobering results,” said lead study author Michael Barnett, assistant professor of health policy and management at the Harvard Chan School and an HMS instructor of medicine at Brigham and Women’s Hospital. “Our analysis suggests that one out of every 48 people newly prescribed an opioid will become a long-term user. That’s a big risk for such a common therapy.”² Specifically, the study found that patients who saw frequent, or so-called high-intensity, opioid prescribers were three times as likely to receive a prescription for opioids as patients seen by infrequent, or low-intensity, prescribers in the same hospital. Individuals treated by the most frequent prescribers were 30 percent more likely to become long-term opioid users—defined as receiving six months worth of pills in the 12 months following the initial encounter³—and were also more likely to have an adverse outcome related to the drugs, such as a fall, a fracture, respiratory failure or constipation. The study also showed that patients treated by low-frequency prescribers were no more likely to return to the hospital overall or with the same complaints—findings that suggest these people were not under-treated for their symptoms.⁴

“Who treats you matters. ⁵Our findings lend support to the narrative that we often hear—a patient happened to be prescribed an opioid by a dentist or in the emergency room and unwittingly became a long-term user,” said study author Anupam Jena, the Ruth L. Newhouse Associate Professor of Health Care Policy at HMS and an HMS associate professor of medicine and physician at Massachusetts General Hospital. ⁶“A physician who prescribes an opioid needs to be conscious that there is a significant risk that the patient could continue to be on an opioid for the long term, even from a single, short, initial prescription.⁸” In their analysis, the researchers compared opioid use during 12 months following an initial emergency department encounter among more than 375,000 Medicare beneficiaries treated by more than 14,000 physicians between 2008 and 2011.⁷ Although the physicians saw patients with similar complaints, they treated them differently. On the low end of the spectrum, one quarter of providers gave opioid prescriptions to just 7 percent of the patients they saw. At the other extreme, the top quarter of prescribers gave opioids to 24 percent of their patients.⁹

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"That's an enormous amount of variation just from walking through a door and getting assigned to one doctor instead of another," said Barnett. Opioids produce a euphoric effect. They're often prescribed for pain. Signs and symptoms of opioid misuse may include:¹⁰Euphoria, lethargy, drowsiness, confusion, dizziness, changes in vision, headache, seizures, difficulty breathing, nausea, vomiting, constipation, changes in behavior or personality¹¹

Oxycodone (OxyContin): Oxycodone is commonly sold under the brand name OxyContin. It's also sold in combination with acetaminophen as Percocet. It changes how your central nervous system (CNS) responds to pain. Like heroin, it creates a euphoric, sedative effect. According to the Drug Enforcement Administration (DEA), 58.8 million prescriptions for oxycodone were dispensed in the United States in 2012.¹²

Codeine: Codeine is typically prescribed to treat mild to moderate pain. It's also combined with other medications to treat cold and flu symptoms. For example, it's commonly found in prescription-strength cough syrup. When consumed in high quantities, codeine-based cough syrup has a sedative effect. It can also cause altered levels of consciousness. It provides the base for an illicit drug concoction known as "purple drank," "sizzurp," or "lean." This concoction also contains soda and sometimes candy.¹³

Fentanyl: Fentanyl is a synthetic opioid. It's prescribed for acute and chronic pain, typically in people with cancer. According to the Centers for Disease Control and Prevention (CDC) Trusted Source, it's 50 to 100 times stronger than morphine. It creates feelings of euphoria and relaxation. Fentanyl is also illegally manufactured and sold as an illicit recreational drug. In many cases, it's mixed with heroin, cocaine, or both. In October 2010, the CDC Trusted Source reported that fentanyl is involved in over half of opioid-related overdose deaths across 10 states. In addition to the common signs and symptoms associated with opioid misuse, fentanyl misuse may also lead to hallucinations and bad dreams.¹⁴

Meperidine (Demerol): Meperidine is a synthetic opioid. It's often sold under the brand name Demerol. It's typically used to treat moderate to severe pain. Like other opioids, it produces feelings of euphoria. According to the CDC Trusted Source,¹⁵ 2,666 Americans died in 2011 from drug poisoning that involved opioid painkillers other than methadone, such as meperidine or fentanyl.¹⁶

Opioid withdrawal: If you're addicted to opioids, you'll likely develop withdrawal symptoms when you stop using them. Withdrawal symptoms may include: drug cravings, agitation or irritability, runny nose, trouble sleeping, excessive sweating, chills, digestive problems¹⁷

Central nervous system (CNS) depressants: CNS depressants include barbiturates and benzodiazepines. They're also called tranquilizers and have a calming effect. Signs and symptoms of misuse include: drowsiness, lethargy, irritability, confusion, memory problems, dizziness, headache, changes in vision, loss of coordination, slurred speech, nausea, vomiting, changes in behavior or personality¹⁸

Alprazolam (Xanax): Alprazolam is a benzodiazepine. It's commonly sold under the brand name Xanax. It's prescribed to treat anxiety and panic disorders. It depresses your CNS, which has a calming effect. Some people misuse it for its fast-acting sedating effects. According to the CDC Trusted Source, more than four times as many Americans died in 2011 than 2002 from overdoses that involved benzodiazepines. In many of those cases, people died after combining benzodiazepines with opioids. Additional signs and symptoms of alprazolam misuse include trouble sleeping, swelling of the hands or feet, and tremors.¹⁹

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Clonazepam (Klonopin) and diazepam (Valium): Clonazepam and diazepam are benzodiazepines. They're used to treat anxiety and panic disorders. They're also used to treat seizures. Clonazepam is commonly sold under the brand name Klonopin. Diazepam is commonly sold as Valium. Like Xanax, these drugs are often misused for their sedative effects. They produce "highs" that can feel similar to the effects of alcohol. For example, they can cause feelings of drunkenness, talkativeness, and relaxation. It's not uncommon for people to recreationally misuse Xanax, Klonopin, or Valium in combination with other drugs. According to the CDC Trusted Source, the number of overdose deaths that involved both benzodiazepines and opioids more than quadrupled between 2002 and 2011. Potential signs and symptoms of clonazepam or diazepam misuse may also include: paranoia, hallucinations, constipation²⁰

Withdrawal from CNS depressants: If you're addicted to CNS depressants, you'll likely develop withdrawal symptoms when you stop using them. Withdrawal symptoms may include: drug cravings, anxiety, panic, excessive sweating, headache, trouble sleeping, muscle pain, nausea²¹

II. DISCUSSION

Stimulants: Stimulants increase your brain activity. This helps boost your alertness and energy levels. Signs and symptoms of misuse include: euphoria, aggressiveness or hostility, paranoia, hallucinations, reduced appetite, weight loss, rapid heart rate, dilated pupils, changes in vision, headache, nausea, vomiting, changes in behavior or personality²²

Amphetamine (Adderall): Amphetamine is commonly known as "speed." It's a CNS stimulant. It's used to treat attention deficit hyperactivity disorder (ADHD) and narcolepsy. Products that contain amphetamine are often misused for their energizing effects. For example, Adderall is a product that combines amphetamine and dextroamphetamine. It's often misused by people who are sleep-deprived, such as truck drivers, shift workers, and college students working on deadlines. According to a study from the University of Michigan, 9 percent of college students in 2012 reported misusing Adderall. In addition to the typical signs of stimulant misuse, amphetamine misuse may also be characterized by:²³

- increased energy and alertness
- increased body temperature
- increased blood pressure
- rapid breathing

Methylphenidate (Ritalin): Similar to Adderall, methylphenidate is a stimulant that affects your CNS. It's commonly sold under the brand name Ritalin. It increases levels of dopamine in the brain, which helps improve attention. It's used to treat ADHD and narcolepsy. Like other stimulants, it can be habit-forming. One reason that Ritalin and other prescription stimulants are commonly misused is their availability. According to the DEA, more than 13 million prescriptions for methylphenidate were filled in 2012. Methylphenidate misuse may also lead to agitation or trouble sleeping.²⁴

Withdrawal from stimulants: If you're addicted to stimulants, you may develop withdrawal symptoms when you stop using them. Withdrawal symptoms may include:

- drug cravings

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- anxiety
- depression
- extreme fatigue

Helping loved ones with prescription drug addictions: Prescription drug addiction can negatively affect your health. It can also put you at risk of a fatal overdose. Drug addiction can also put a strain on your finances and relationships. Do you suspect that someone you love is misusing prescription medications? It's important for them to get professional help. Their doctor or mental health specialist might recommend counseling. They might also refer your loved one to an intensive rehabilitation program. In some cases, they might prescribe medications to help curb drug cravings or relieve symptoms of withdrawal. If you take Adderall, you likely know that it's a stimulant medication often used to treat attention deficit hyperactivity disorder (ADHD).²⁵ It can help you pay attention, stay alert, and concentrate. It can also help you avoid impulsive and hyperactive behaviors.

Xanax, on the other hand, is a drug called a benzodiazepine. It's used to treat generalized anxiety disorder and panic disorder. Xanax can make you feel calmer, more relaxed, and even drowsy. If you're wondering if you can take these two drugs together, you're right to do some research. These drugs can have dangerous effects when taken together.²⁶ Dangers of combining Adderall and Xanax: In general, you should not take Adderall and Xanax together. There are two main reasons. Increased risk of addiction—Both Adderall (amphetamine-dextroamphetamine) and Xanax (alprazolam) are controlled substances. This means the government monitors their use. Your doctor would also closely monitor your use of either of these drugs. In general, using controlled substances can lead to misuse or dependence and addiction.²⁷ Taking two controlled substances at the same time raises your risk of misuse or addiction from either drug. Decreased effectiveness of both drugs—The use of these medications together can make both drugs less effective. This means that each drug may not work well to treat the condition it's prescribed for. Because Adderall is a stimulant, it can make you feel more focused and awake. It can decrease the effects of Xanax. For example, if you have anxiety, Adderall can make you feel more anxious. And if you have panic disorder, it can increase the number of panic attacks you have. Adderall can also cause trouble sleeping. On the other hand, Xanax works as a sedative. It reduces anxiety, stress, and excitement levels. It can also cause drowsiness. These effects can counteract the effects of Adderall. Xanax can make you sleepy and make it harder for you to concentrate.²⁸

III. RESULTS

There are several reasons why you may be interested in taking Xanax while you're taking Adderall. You may feel anxious or you may have trouble sleeping. You may also have been diagnosed with generalized anxiety disorder or panic disorder. No matter the reason, the best thing for you to do is to talk with your doctor. Adderall interacts with many drugs. You should get your doctor's approval before mixing it with any other drugs. These include prescription and over-the-counter medications. Your doctor will help you find a treatment for your anxiety, sleeping trouble, or other reason for your interest in Xanax.²⁹ If Adderall is causing you sleep problems, keep in mind that you shouldn't take it later than 10 a.m. If taking it before 10 a.m. doesn't resolve your sleep problems, talk with your doctor. They may change your Adderall dosage or make further changes to your treatment schedule. Xanax is not approved to treat sleep problems. Although it can cause drowsiness, it's not a good solution to sleep problems caused by Adderall. Probably the most important distinction between habit vs. addiction is how choice, to an extent, is still possible with habit-forming behaviors. When it comes to addiction, people generally have a harder time making decisions because of their dependence on a substance or behavior. Typically, these factors are linked to the rewards systems in the brain, which helps explain their overarching power in stripping people from the ability to make rational decisions.³⁰ The debate between habit vs. addiction has become more intense for mental health experts. Adi Jaffe, Ph.D., of Psychology Today analyzed the ability for people to choose their habits or addictions. Mental health professionals fiercely debate this topic, but he found that both camps are right; habit formation is more choice-based while addictive behaviors can be

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more neurologically and biologically bound. "In the end, it comes down to training," Jaffe said. "If we want to end up with a different set of behaviors, we have to understand the mechanisms and processes that got us there and make a change." Although this certainly isn't a definitive end to the debate, it does add a layer of understanding to the difference between addiction vs. habit. Developmental neuroscientist Marc Lewis, writing for the New York Times, explored how addictions and habits might not be as different as they seem at first. This controversial opinion is comes from the idea that as brain functions change, so do habits. He found that "addiction is brought about by the repeated pursuit of highly attractive goals and corresponding inattention to alternative goals." This definition frames addictive behaviors as being similar to habit-based ones. Alternatively,³¹ the research Barry J. Everitt, writing for the European Journal of Neuroscience, compared the starker difference between habit vs. addiction. He focused primarily on the treatment side of drug addiction, but he made a point to discuss how habits can lead to acute addictions. He wrote, addiction to drugs is "the endpoint of a series of transitions from initial voluntary, or recreational, drug taking through progressive loss of control over drug use." In this context, a habit can be seen as the precursor to addiction. Not all habits will lead to addictive behaviors in the end, but it's still important to recognize the dependent nature of some substances and practices. It's not often that people begin with full-blown addictions; instead, addictions develop over the course of time.³² During the early stages of habit formation, people may still have the power to mold their behaviors and practices. If you think you're developing an addiction, or if you think you know someone who is, please contact the Substance Abuse and Mental Health Services Administration's national helpline. It's confidential, free and open 24-hours-a-day.³³

IV. CONCLUSIONS

Drug addiction can take control of the brain and behavior, activating behavioral patterns that are directed excessively and compulsively toward drug usage. Such patterns often involve the development of repetitive and nearly automatic behaviors that we call habits. The striatum, a subcortical brain region important for proper motor function as well as for the formation of behavioral habits,³⁴ is a major target for drugs of abuse. Here, we review recent studies of long-term synaptic plasticity in the striatum, emphasizing that drugs of abuse can exert pronounced influences on these processes, both in the striatum and in the dopaminergic midbrain. Synaptic plasticity in the ventral striatum appears to play a prominent role in early stages of drug use, whereas dopamine- and endocannabinoid-dependent synaptic plasticity in the dorsal striatum could contribute to the formation of persistent drug-related habits when casual drug use progresses towards compulsive drug use and addiction.³⁵

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