

A Prescription for Change

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Amidst the ongoing opioid epidemic in the United States, the assertion that “addiction is a disease” continues to dominate the public discourse surrounding substance use and drug policy. While the brain disease model of addiction is often credited with clearing the way for a more empathetic approach to treating and policing drug use, the work of many psychological scientists suggests that addiction may arise from the same basic psychological mechanisms that allow us to discover a passion for jogging, adapt to our environment, and feel loved.

When studies conducted in the 1960s indicated that lab rats would self-administer drugs even until death, many researchers took it as evidence of the inexorable appeal of substances like morphine and heroin. A decade later, Bruce Alexander’s series of “rat park” experiments at Simon Fraser University in British Columbia, Canada would turn this claim on its head.

Alexander’s rats, which were kept isolated in small metal cages with little else to do beyond sleep, eat, and wait, also filled their time by consuming large quantities of drugs. Not so for rats raised in a less traditional lab environment, however. Free to roam within the walls of a large plywood box painted with a forest scene and filled with others of their kind, more often than not the rats chose running in an exercise wheel, climbing wooden towers and tin cans, mating, and bonding with offspring over the temptation of a morphine drip. And when they did choose to partake, the social rats consumed far less than their isolated counterparts.

“They forgot to tell us the importance of the environment,” behavioral neuroscientist Carl Hart, chair of the Department of Psychology at Columbia University, said of earlier addiction studies. “They forgot to tell us that the rats or primates only had that lever leading to the drug administration, and if that’s the only thing they have in that cage, why are we surprised that’s the activity in which they engaged?”

Since learning about the findings of these early addiction studies as an undergraduate student at the University of Maryland in the 80s, Hart — an advocate for science-based drug policy who’s appeared everywhere from “Real Time with Bill Maher” to “The O’Reilly Factor” — has extended Alexander’s

rat park findings to human participants. When offered a choice between \$5 at the end of a study and a hit of crack cocaine worth more than \$5 right then and there, only half of people known to be addicted to cocaine chose the drug, Hart said. In a similar study of 13 recreational methamphetamine users, participants abstained at even higher rates, choosing \$5 over self-administering drugs 59% of the time over the course of five 2-day trials. When the incentive was raised to \$20, they chose the substance over cash in just 17% of trials.

These findings, while observed in a small pool of participants, suggest that providing people with attractive alternatives removes much of the incentive to use, Hart said. Extrapolated to the real world, alternatives might not only increase access to meaningful employment and mental healthcare for individuals with substance use issues, but could also change the way society conceives of drug use.

The Learning Model of Addiction

Changing the way society conceives of drug use requires dismantling the popular notion of addiction as a disease, Hart said. And Marc Lewis, professor emeritus of developmental psychology at the University of Toronto, agrees.

The moral model of addiction, which depicts addiction as a self-indulgent character flaw, dominated Western society's conceptualization of addiction throughout much of the 1900s, Lewis explains in his book, *The Biology of Desire: Why Addiction Is Not a Disease*. When Alcoholics Anonymous was founded in 1935, a comparatively compassionate framework began to take root: "addiction was a malady rather than a personal failing."

Contemporary supporters of the disease model of addiction — including neuroscientist Nora Volkow, director of the National Institute on Drug Abuse — suggest that addiction is not so different from other medical conditions, such as heart disease and lung cancer. All of these conditions have physiological manifestations that can, at least in part, be addressed by adopting a healthier lifestyle.

Addictive substances hijack the reward system of the brain, Volkow said during a 2018 debate with Lewis at the University of Amsterdam, by artificially increasing the supply of dopamine to the nucleus accumbens and related regions, creating the pattern of conditioned responses that we know as addiction. This causes neurobiological changes in brain circuits involved in processing reward value and emotion, just as heart disease results in physiological changes to patients' cardiovascular systems, she continued.

The disease model of addiction has played an essential role in the creation and passage of public policies such as the Mental Health Parity and Addiction Equity Act of 2008, Volkow and colleagues wrote in *The New England Journal of Medicine*.

While the disease model may help reduce the stigma surrounding substance abuse and lower the barriers to treatment, the concept that addiction arises from pathological dysfunction in the brain remains problematic, Lewis wrote recently, also in *The New England Journal of Medicine*.

According to the learning model of addiction, Lewis explained, addiction is an unintended consequence of normal, adaptive brain processes.

Difficult circumstances such as living in poverty, experiencing childhood neglect, and going through unemployment or a painful divorce — all correlated with addiction — can make people vulnerable to taking substances that offer immediate rewards and intense emotional experiences, he continued. Over time, this bias toward short-term rewards outweighs the perceived value of more abstract long-term rewards.

“It’s this kind of closing in to the immediate space, what’s right here and right now,” Lewis said.

Drug Use as Motivated Behavior

Two years into retirement, Lewis — who quit using opioids himself over 30 years ago — continues to hear from people who have stopped using drugs or alcohol. Instead of viewing themselves as in remission from the lifelong disease of addiction, a label that carries its own stigma, many former addicts tell Lewis they would rather think of themselves as being free, often through their own efforts and empowerment. Addiction is no longer a prominent feature of their identity, and they do not see themselves as having to work to control it.

Subjective experience has a meaningful role to play in informing the psychological and neurobiological understanding of addiction, he said.

Cristina Köpetz, a professor of psychology at Wayne State University who began studying addiction as an extension of her basic research on self-regulation, agrees.

“My greatest inspiration came from talking to people, real addicts with real problems. Drugs were rarely their problem,” she said.

One interesting aspect of behavior is that, over time, activities that are initiated because they serve a goal might become goals themselves. If someone starts running with the goal of losing weight, for example, the act of running itself can become and remain a desirable end state even after the original goal of losing weight has been achieved. Similarly, one might start smoking or using drugs to fit in with a social group or to alleviate negative affect. If the behavior is perceived as instrumental to achieving a goal, the person will continue to engage in it every time the goal is active and important. Over time, the behavior becomes associated with positive affect and can drive the behavior in the absence of the original goal.

Although the pharmacological properties of many drugs may cause this transfer of properties from means to goals to happen more quickly, Köpetz explained, addictive behavior is generated the same way.

“Other than that, I don’t see any difference between drug use and other motivated behavior,” Köpetz said.

In a study of 66 people with symptoms of depression who wanted to quit smoking, Köpetz and colleagues investigated how individuals addicted to nicotine could find alternative means for satisfying the goal of improving their mood. Participants in all conditions viewed 200 images and phrases that were either related to smoking, contained neutral content, or represented alternative activities (such as playing with a child).

In the experimental condition, participants learned to “avoid” smoking related images by pushing a joystick away from themselves and to “approach” images of alternative activities by pulling the joystick toward them. For those in the control group, the direction in which they moved the joystick was not contingent on the type of activity.

At the end of the study, the researchers asked the participants to quit smoking. At a follow-up appointment 30 days later, smokers who were trained to activate alternative means of coping with negative affect were 12% less likely to have relapsed; those who did relapse reported smoking fewer cigarettes and a longer cessation period.

Addictive substances, as Lewis said, may lead to a closing in on the “neural now” of instant gratification, but Köpetz’s participants were able to achieve observable, if modest, success at cutting back on smoking by weakening the function that smoking was presumably serving and replacing it with alternative activities.

Understanding *why* people use drugs — identifying the function they serve for a specific person in a given moment — is central to creating more effective prevention and intervention strategies, Köpetz said.

“In my experience, people use drugs to achieve fundamental goals: to fit in, to alleviate social and physical pain,” Köpetz said. “What we need to do is to help people find other ways to achieve these goals by establishing meaningful social connections or by engaging in activities that would provide a meaning in life, a way to feel significant and appreciated so that they don’t end up resorting to drug use.”

As long as scientists, practitioners, and policymakers continue to treat addiction as an aberrant phenomenon by pathologizing it as a disease rather than acknowledging its behavioral functionality, Köpetz said, prevention and intervention strategies will continue to be ineffective.

A Delicate Balance

Designing effective prevention programs is uniquely challenging given legitimate and “off-label” use of opioids such as Vicodin, OxyContin, and Percocet, said Genevieve Dash, clinical psychology researcher at the University of Missouri.

For pediatric patients, opioids are considered approved treatments for sickle cell disease, postoperative pain, and pain due to cancer. A nationally representative survey of 7,374 participants found that almost 20% of high school students had received an opioid prescription by their senior year, Dash and coauthors Anna Wilson, Benjamin Morasco, and Sarah Feldstein Ewing of Oregon Health & Science University note in an article published in *Clinical Psychological Science*.

The survey data, collected by Sean Esteban McCabe (University of Michigan) and colleagues as part of the annual Monitoring the Future study, suggests that nearly one out of four US students surveyed between 2007 and 2009 had used prescription opioids for medical or nonmedical purposes by the time they were ready to graduate from high school. And other data suggest that usage may be much higher in some areas — in a study of the Detroit metropolitan area, for example, 49% of high school students reported medical opioid use in their lifetime.

Initiating opioid use under the assumption that it is safe because the drug is provided by trusted adults (e.g., doctors, parents) and because it is endorsed as a necessary or routine part of medical treatment can create the perception that opioids are low-risk substances, increasing the potential for future misuse even among youth who report strongly disapproving of drug use in general, Dash said.

Older, insured, European-American youths whose parents report them as being in fair to poor health receive the most opioid prescriptions, she continued. In the Monitoring the Future study, about 23% of White students had been prescribed opioids in their lifetime compared with just 7% of African American students and 7% of Hispanic students, with reported rates of misuse mirroring these percentages.

This may be due in part to the erroneous yet persistent perception that African American individuals have a higher pain threshold and have less need for pain relief, as well as implicit bias on the part of healthcare providers, she said.

Providers have to strike a balance between effective pain management and undertreatment of pain, which can lead patients to seek out illicitly obtained opioids and other alternatives for pain relief, such as alcohol, she said. Educating patients (and their parents) about nonpharmacological pain management strategies, as well as how to taper opioid use and the risks of saving leftover medication “just in case,” offer additional avenues for reducing opioid misuse.

“Psychologists working in medical settings are in a unique position to provide input on policies and guidelines that can reduce risk for misuse and abuse,” Dash and colleagues wrote.

When considering treatment options, it’s also important to understand the role that naturally-occurring opioids play in brain function, said Tristen Inagaki, a professor of psychology at the University of Pittsburgh.

In one study highlighted in *Current Directions in Psychological Science*, 31 participants took naltrexone, an opioid inhibitor used to reduce cravings in people recovering from addiction, and placebo. While on each drug, the participants read loving messages from friends and family, and completed daily reports on their feelings of social connection.

Participants reported fewer feelings of connection — in response to the loving messages and in their daily lives — on naltrexone than on the placebo, suggesting that opioid activity in the brain may be at least partially responsible for the pleasurable feelings associated with social bonding, Inagaki explained.

Given that social stressors are among the most common causes of addiction relapse, she said, this may have implications for the clinical use of opioid inhibitors in addiction recovery programs.

“Socially supportive relationships are really important for helping recovery and maintaining abstinence, but if an unintended side effect of pharmacological treatment is also reducing how connected you feel to those people or how supportive you perceive them to be, that’s introducing potentially a significant additional barrier to recovery,” Inagaki said.

It’s not clear if opioid drugs themselves enhance or simply replace those feelings, she continued, but treatment programs that employ pharmacological interventions like naltrexone may need to address how

people in recovery can maintain feelings of social connection while their opioid activity is repressed.

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