Using Neuroscience to Create a Paradigm Shift in Addiction Theory and Treatment

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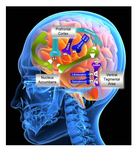
Current Models of Addiction

There are three primary models that form the foundation of our views on addiction:

1.The Moral Model[1]
- This model focuses on a 'weakness of will' and was the commonly held view towards addicts until the 1980s. It is why many solutions to addiction are punitive rather than therapeutic. The inference is that addiction and associated behaviors are the result of a moral failing and, therefore, an individual has the capacity to stop the addictive behavior but chooses to continue.

2.The Lack of Control Model[2,3]
- This model, best-known for its crucial role in Alcoholics Anonymous, posits that addiction is the result of complete loss of control. The addict has lost all freedom of will and must accept this and give up any remaining control in order to be 'cured'.

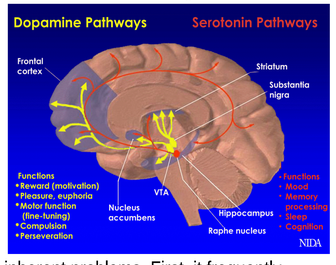


3.The Disease Model[3,4]
- The Disease Model views addiction as an entirely physiological issue resulting from an imbalance of certain chemicals caused by the use of addictive substances. In order for an addict to be cured the addictive substance intake must cease and be replaced by an alternative substance that blocks the pathways that result in addiction.

Problems with Current Models

Current models provide a black-and-white approach to addiction etiology. A person is either weak-willed or has no control; neither of these explanations is particularly helpful when examining addiction further.

Addiction is not just about drugs and alcohol, nor is it limited to the wider definitions which include addictions of sex and gambling. Addiction is found in many more disorders and behaviors that are dubbed "mental illnesses" and treated as such. Mental illnesses and disorder symptoms such as eating disorders, self-harm, and obsessive compulsive disorder (OCD) all rely on many of the same underlying brain mechanisms found in drug and alcohol addicts. Research has shown that the same pathways affected by addictive drugs are also activated by food,[5] supporting the idea that addictive patterns such as Binge Eating Disorder are closely related to drug addiction both causally and in the resulting neural patterns.



The Disease Model contains its own inherent problems. First, it frequently separates addiction from mental illness, treating it like a physiological condition: with medication. The disease model goes beyond the punitive responses to addiction used in the Moral Model. Unlike the Lack of Control Model (which requires a total removal of control and alienates numerous addicts), the Disease Model has the beneficial aspect of viewing addicts as though they were humans who possess some degree of agency. However, the treatment of addiction with pharmacological interventions ignores any underlying psychiatric dysfunction associated with the addiction. It is no secret that addiction is usually comorbid with other mental illnesses; nearly three quarters of drug addicts having a diagnosable psychiatric disorder.[6]

Main Ideas

- Current models of addiction are flawed, insufficient, and potentially dangerous.
- Telling an individual that she has no free will is dangerous, even more so when she is struggling with an addiction.
- Moreover, telling a person she is fundamentally flawed, biologically or morally, can have potentially fatal consequences as it provides an excuse to 'give up'.
- Addiction is a symptom of a greater underlying problem, not a disease in and of itself.
- Current models do not account for growing neuroscientific evidence which demonstrates the similarities between drug addiction and other mental illnesses
- New evidence suggests that addiction is a symptom or manifestation.
- This symptom could be a coping mechanism in response to an underlying mental illness.
- Removing the addiction through the use of pharmacological interventions merely removes a coping mechanism, which is frequently replaced by a different, often unhealthy, coping mechanism.
- Treatments for drug addiction should be focused on discovering and fixing the root cause(s) of the problem.
- Drug addiction treatment needs to be aligned with mental health treatment so as to focus on the underlying mental health problems.

What Has the Research Told Us?

Although the mechanisms of action may vary, all drugs of abuse have the same ultimate result: euphoria and reduction in pain and negative emotions.

These effects result from one of two nervous system changes:

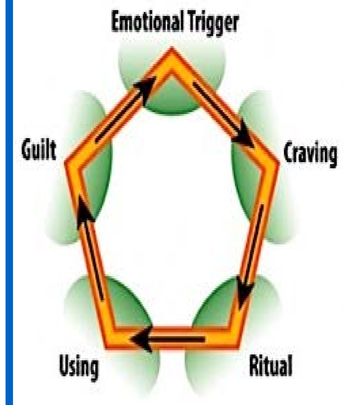
1. Flooding of the reward system with dopamine.[7]
2. Stimulating opioid receptors to enhance to effects of dopamine.[8]

However, the other psychiatric disorders and behaviors discussed also create the same result:

- Sex: Sex is well known to have a potentially euphoric effect, resulting from the release of dopamine in the brain.
- Gambling: Research shows that the same pathways in the brain (ventral striatum and orbitofrontal cortex) are activated for both gambling and cocaine addiction. Additionally, the "win" associated with gambling creates the same dopamine release seen in other addictive behaviors.[9]
- Eating Disorders: Research shows that success in achieving a starvation goal can result in the release of the bodies own endogenous opioids, mimicking the effects of heroin on the brain. Disordered eating behaviors result in highs and dependences similar to those seen in heroin and other drugs.[5]
- Self Injury: When an individual inflicts pain and/or bodily harm on herself, the body releases natural opiates resulting in a heroin-like high.[10]
- OCD: PET studies of individuals with OCD show increased activity in the orbitofrontal cortex as is seen in the other addictive behaviors discussed. Dopamine is a key neurotransmitter in this system.[11]

While no one knows the specific causes for any of these disorders, a comparison of the literature suggests that there are significant similarities and co-morbidities between classical addictions and many other mental illnesses supporting a unifying theory and treatment model:

- Individuals with OCD are shown to behave like gambling addicts on decision-making tests.[10]
- Brain areas and neurotransmitters involved in drug addiction are implicated in all of the other potential addictions discussed herein.[5,10]
- Naltrexone -- used to treat alcohol and heroin addicts by blocking opiate receptors in the brain-- is currently serving as a treatment for sex addiction for the same reasons.[13]
- The types of craving behaviors seen with all of these behaviors are very similar and time-dependent, as with drug addiction. The longer it has been since the last "hit," the more intense the cravings for the behavior become.
- Specific activity in the orbitofrontal cortex has been found to be associated with cravings for cocaine, alcohol, gambling, sex, and OCD.[9,14]
- There has been considerable comorbidity found between eating disorders and substance-related disorders.[5]
- There is also significant comorbidity between eating disorders and self-injurious behavior.[15]



Potential New Model

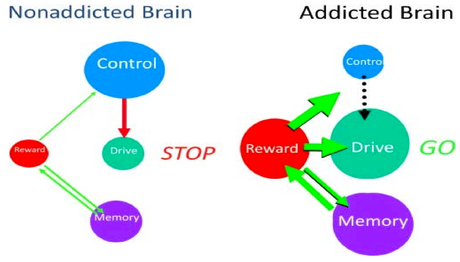
The new model is a variation on the Disease Model, which comes the closest to allowing addicts to have both free will (to the extent that an individual may have free will) and not be viewed as a moral failure. It falls short of what is necessary, however, since it separates drug addiction from many other mental illnesses and conditions showing similar neural patterns. As a result, drug addicts treated using this model would still receive a different set of treatments than individuals with other mental illnesses. These treatments are often more focused on the physical responses to drugs than on the underlying mental health factors associated with addiction.

The evidence overwhelmingly supports the fact that addiction is not just a disease in and of itself; it is most often a symptom of an underlying psychiatric problem. This is the way it should be treated.

Neuroscience has shown that the brain's response pathways to drugs and behaviors of addiction are exceedingly similar and, as such, the treatment responses should be aligned. If an individual with an eating disorder is treated for the medical effects of the eating disorder as well as by mental health professionals to determine the underlying trigger of the disorder, the same approach should be used when treating drug addicts.

Discussion

As our knowledge and understanding of the brain expand, there is growing weight to the argument that humans have no free will. While this may be comforting to those who feel unable to control their own behaviors, it can also create a dangerous safety net that allows struggling individuals to "give up" on attempting to resolve their problems. Ethically, we cannot tell patients who suffer from any sort of mental illness that they have no free will or ability to change their condition. Not only would it be demoralizing and unlikely to result in a positive change,[16-19] but it contradicts research that shows people do have the ability to change these addictive patterns.[19-21] Logically, one could argue that if a person has no control over her addiction to a physically addictive drug then she would never be able to stop using it, which is not the case. More importantly, research has shown that certain mental illnesses and addictive behaviors often stem from a feeling of a lack of control over one's life.[10,23,24] Those affected need to regain this feeling of control to work on their problems, not take it away.



From differing perspectives, three disciplines--neuroscience, psychology, and neuroethics--all show that drug addiction is not an isolated disease, illness, or moral failing. It is a symptom of a much deeper issue. The public and medical and mental health professionals must approach addiction treatment and punishment differently. The current societal impact of treating addiction as an individual failing is extremely significant and results in addicts not receiving adequate treatment or care.

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