

Diathesis Stress Model of Addiction: Etiology of Substance-Related and Addictive Disorders

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I thought that a drug like cocaine does not mimic or create dopamine but changes neurotransmission function? Can you speak more about its effect and how that fits into the diathesis stress model?

A: There are many different ways that phytochemicals (plant produced) psychoactive substances affect brain cell synapses and the natural endochemicals (neurotransmitters) they disrupt. Cocaine induces its brain influences in a variety of ways but the two major ways it does so is by first causing certain brain cell axons to release their catecholamines (epi-, nor-epinephrine, dopamine, serotonin and acetyl choline) when there is no environmental need for them to be released. The catecholamines are naturally released when one needs to be in an excited and active state of being. The second major synaptic action results by cocaine blocking the reuptake and transporter mechanism of the axon that prevents the recycling and partial termination of catecholamine actions. This was demonstrated in the brain PET scan study I showed that imaged the brain becoming hyperactive in response to cocaine but overall becoming hypoactive when the catecholamines it released are quickly (within 30-40 minutes) metabolized and broken down by body enzymes resulting in actually less activity and functionality than before it was exposed to the cocaine. You are therefore correct that cocaine primarily disrupts neurotransmitter functioning and I hope I did not make any statement to the contrary during the webinar.

The Diathesis-Stress Model of addictions is comprised of three interactive processes: Genetics, Environment and Pharmacological Influences of Drugs or Addictive Behaviors. Cocaine and other drugs of addiction force the brain to adapt to its altering the natural balance of endogenous neurotransmitters. Abuse of addictive stimulants results in overall decreased amount, activity and effectiveness of brain catecholamines like dopamine making the brain rely on external catecholamine modifying substances (i.e. cocaine) just to function. Reliance of brain cells on external chemicals to function is called *allostasis*, a major feature of an addicted brain and definitely part of the Diathesis-Stress Model of addiction.

Do you subscribe to the term Chronic Dopamine Reward Deficiency Syndrome (CDRDS) to describe the illness?

A: Most researcher and many professional definitions of addiction describe this disorder to be a CDRDS as you have suggested. I agree with the research findings and documentation of difference between those who struggle with addictive disorders from the “normie” or non-addictive drug use. But, I do not personally like the terminology as it being the “reward” process as such continues to imply that addicts use drugs merely for their euphoric effects. As noted in my webinar, the drug that has the greatest degree of conversion from experimentation to full scale addiction is nicotine. I argue that most nicotine addicts do not experience dramatic or powerful euphoric or reinforcing reward effects from their nicotine exposure. Most actually have negative experiences the first time they try a nicotine product yet more who try it get addicted to it than those who try heroin.

Alternate to Reward Deficiency I prefer to describe addiction as a **Chronic Neurotransmitter** (dopamine, endorphine, GABA, glutamate, nor epinephrine, serotonin, et al.) **Deficiency** that results in **Impairment of the Survival Reinforcement Pathway of the Brain**. The brain’s instinctive survival motivations are “hijacked” in Individuals with addictive disorders that compels them to maintain exposure to a substance or a behavior that is actually anti survival.

This is absolutely fascinating. Are there any further resources that we can follow up with to continue this education process?

A: Indeed! The continued evolution of addiction science is one of the most fascinating and engaging field of study one can pursue. There are now several dozen scientific journals specifically devoted to the topic and thousands of research findings published every year on different aspects of addiction. Though I try to keep up with all of it by publication of my text, *Uppers, Downers, All Arounders*, my videos, and by reviewing studies for *The Journal of Psychoactive Drugs*, it is impossible to cover everything. Dr. Kevin McCauley does a great job with his Videos: *Pleasure Unwoven* and *Memo to Self*. Two documentaries I find very valuable to understanding addiction are *Anonymous People* and *Prescription for Changes*. There are so many more learning resources to discover at various levels of understanding, interest and specific aspects of substance related and addicted disorders that I am not sure how to best address your inquiry. If you are interested I can send you a link to my powerpoint of my webinar that cites several references for the data I presented in the comment section of the slide when not viewed as a slide show presentation. Some of those slides have specific photos or graphs that are copyrighted and should never therefore be posted on the net or used for anything other than just self education unless the original creator of the picture or graph is contacted and specific permission to do so is obtained. If interested, please send me* your name and email address with a request for the powerpoint and I will get a link to you via drop box as the size of the file is much too large to send via email attachment.

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Are you saying that all who become addicted must have some genetic influence?

A: My presentation is that everyone, future addicts or not, have genetic influences on their vulnerability for Substance-Related and addictive disorders. I noted the Genome Wide Association Study finding 89 genes definitive and 900 more suspected genes related to addiction. Some of these genes protect individuals from ever developing addiction while others make them more likely to develop addictions to a specific or to many different addictive substances. My Diathesis-Stress Model of addiction notes that genetics contribute 40 to 60% to addiction propensity but must be part of environmental and pharmacological contributions that ultimate result in the brain anomalies of Substance-Related and Addictive disorder. Animal research has confirmed that even those with genes that protect from developing addiction do become addicted if they are exposed to high unavoidable chronic stress environments or forced to chronic, toxic levels exposures to addictive substances. This is what the various research findings I presented in the webinar on DBA genetic alcohol/drug avoiding mice vs. the C57bl genetic alcohol/drug loving mice demonstrated. Unfortunately, this was towards the very end of the webinar and I had to compress my usual discussion to ensure that I was done on time. Genetics are involved in addiction to drugs and behaviors but even those with genes not conducive to addiction can and do develop addictive disorders due to environmental (i.e. stress, trauma, nutrition) and toxicology (allostasis).

Do we have studies where the child's brain has been imaged before any drug use and then imaged after substance use dependence? (i.e. the same child not a control who is a different child)

A: Not that I am aware of. This would be a great study to do though probably very costly and one that may raise several ethical questions to conduct. We do have studies and brain scans that I presented in the webinar that demonstrate dramatic brain differences in adolescents who drink and use drugs as opposed to adolescents who do not. The late Dr. Henri Begleiter of SUNY also did EEG Scans of preadolescents who had not yet been exposed to alcohol or addictive drugs but who were born to parents with an addiction history that demonstrated abnormal P300, M400 brain wave patterns seen with addiction in the children of addicts before they had begun any drug use. There are many identical twin and even conjoint twin studies that strongly suggest that there are brain anomalies of addiction before genetic vulnerable individuals start using addictive substances and of course much greater differences once they become an addict.

Do you think that a history of childhood abuse and neglect does impact how one can recover? Less in terms of her length of treatment and more about the person being trauma responsive, supportive and helping her understand the information that you shared today. Or are they doing the only thing that has worked to help them survive? Felitti notes that what we view as pathology, the person with a hx of childhood trauma views as a solution to their highly active fight, freeze or flight response.

A: I very much agree with Dr. Vincent Felitti in San Diego, and the state of Oregon where I currently work is a Trauma-Informed Care state that requires all addiction treatment providers to become Trauma-Informed Care providers. Dr. George Koob, NIAAA director has dedicated his entire career looking at addiction as a dysfunction in our biological stress hormonal “flight, fright, fight, fear, freeze” cycle. Recovery is a process, not an event. One does not recover; they are in continual recovery and processing as to better manage past and current stress and trauma, especially adverse childhood events that is absolutely necessary to the sustaining one’s recovery. All addiction memories are processed through the brain’s amygdale as emotional memories. When that memory spine on a brain cell dendrite is activated by a sensory input or stress reaction it immediately links up with the other addiction memory spines throughout the brain to trigger a strong physical as well as emotion urge to drink or start using drugs again. Addiction supplants the effectiveness of the hormone cortisol to control the stress cycle. All too often this leads to slips that then lead to full flung relapse. Addicts need to find the tools to help them both avoid stressful experiences and more effectively manage stress without using drugs. Treatment clinicians have to help addicts process their past trauma and current stress triggers as well as arming them with tools (a relapse prevention “tool kit”) to help them avoid reacting to such episodes by reinitiating drug use. Sometime the information of the science of addiction is helpful in getting addicts to better accept their condition and engage in life-styles and practices that are conducive to the prevention of a relapse episode. Many times, knowledge is just not enough and spirituality and/or medication are needed in the treatment process as well as counseling and education.