

A lot of people started taking addictive substances by practicing with cigarettes either at their school gate or tasting a beer without thinking of the repercussions. However; for others, illicit drugs like cocaine or opiates might be too much for them

Honestly, whether the drug is illegal or not, they all affect the brain set up. If you do not know what the drug works for or how your brain operates, it is possible to find yourself very addicted to it.

We will explain how the brain works shortly. The reason why drugs feel so good will be explained as well as why it often causes addiction and destruction.

Addiction is caused by the brain's nucleus accumbens and how it reacts to drugs.

The Canadian psychologists James Olds and Peter Milner were the ones that opened our understanding of addiction in 1954, this happened when they were experimenting on rats to understand how the brain reacts to stimuli.

They started by anesthetizing a rat by inserting an electrode in its brain. After the rat regained its consciousness, an electrical current was used to stimulate its nucleus accumbens which is a region of the brain that is found at the lower part of the frontal lobe. This electrical current wasn't switched on and off randomly; instead, they provided a small zap when the rat was at a particular corner of the cage. Afterward, the rat kept returning to this corner of the cage just to get the electric stimulation.

From there, it was concluded that the nucleus accumbens is certainly the brain's reward center. This experiment might sound so easy and simple. However, Olds and Milner's experiment led to the discovery and a better understanding of drugs and addiction.

Their research was further developed and it was shown by the research that drugs do the same thing the zaps did to the brain of the rat to human brains. Which is, drugs stimulate the nucleus accumbens.

Therefore, this triggers the production of dopamine which is a neurotransmitter that generates pleasurable feelings. The outcome is that of those lab rats, humans also keep going back for more.

The way the brain is wired is only part of the reasons why drugs are very addictive. As the person that takes drug slowly gets addicted another action called habituation is at work which is what makes life tough for drug addicts.

The brain does not only produce dopamine during drug use, but it also produces hormones and neurotransmitters that work in contrary to that induced by the drug. The body tries to balance its internal systems and retain equilibrium. If you are a person that drinks coffee in the morning, you might be familiar with this habituation process. The first cup of coffee you take will increase your brain activity and this initial increase will gradually lead to a decrease in that activity.

Therefore, if you regularly drink coffee; the baseline activity in your brain is gradually reduced which makes it difficult for you to wake yourself up unless you take your daily cup of coffee.

Habituation is a crucial feature in addiction: once the body's get used to a specific drug, it becomes very hard to do without it.

Although coffee's not so strong, so look at some other drugs that are.

THC stimulates all parts of the brain and gives us a feeling that everything is a little special.

Every one of us is unique. We are all special in a type of way. No, every one of us is precisely chemically unique. This means that all of us chemically react to drugs differently. This is the reason why certain people love alcohol and others hate alcohol.

The author of this book favorite drug is marijuana. She said if she was on a desert island, stranded and has the opportunity to choose one stimulant, she would take marijuana.

The uniqueness of marijuana is due to its active ingredient, THC. THC alone has the potential of stimulating regions across the whole brain. This is why the effect of weed is not only wildly but it is also entertaining.

Other drugs like cocaine do not function that way. They only stimulate one particular part of the brain or one type of the brain receptor, so only small outcomes are possible. For instance; with cocaine, you may feel happy all of a sudden, but nothing more.

On the contrary, THC increases all environmental inputs. This means that; music, jokes, and food will be intensified. You might just find yourself laughing in an unexplainable manner or having strong emotions about all the things around you.

In 1990, the American neuroscientist Miles Herkenham examined the effects of THC on the brain

THC attaches and triggers the receptors that are normally stimulated by the neurotransmitters anandamide and 2-arachidonoylglycerol, which are naturally produced by the brain.

This explains THC's diverse effect.

Although, there is still a need for research on the actual function of neurotransmitters like anandamide. Usually, anandamide seems to show us what is vital in our environment.

It is understandable when we are in the world and we need an approach to differentiate between sensory inputs. We concentrate on things that are necessary for survival which can be the food we eat, friends or a potential mate.

So, it seems that anandamide and related neurotransmitters stimulate regions across the brain for us to observe as well as notice unique and positive experiences.

Anandamide's actions are mimicked by THC, which attaches itself to the same receptors. Therefore, the brain believes that all the things even the most boring stimulus is amazing.

This is the issue with marijuana and other drugs. They change the dull and mundane situations into lyrical poetry. Therefore, leading to continuous usage consumption and addiction.

Opiates operate like the body's painkillers, but their usage can be extremely dangerous.

Think about tragedy and what comes to your mind might either be Romeo and Juliet or Oedipus Rex. However; in real life, we are surrounded by tragic events and opiates is part of the drugs that causes tragic effects.

Opiates are cruel. They make you feel safe and loved, but when it eventually wears off it leaves you with a feeling of being abandoned on the moon with no oxygen supply. How?

Truthfully, they're not different from the body's natural painkillers.

Opiates like heroin, fentanyl, and oxycodone, all mimic endorphins which are the natural painkilling hormones produced by the brain.

A Scottish explorer called David Livingstone experienced an example of the effect of endorphins in the nineteenth century. During his journey in Africa, he was attacked by a lion which bit him with his sharp teeth in his upper arm and started rolling him around.

It was later written by Livingstone that instead of feeling the pain he was in a dreamlike state. This was due to the endorphins in his body that had stopped the pain and reduced his anxiety. In his calm state, he had a clear head that allowed him to plan an escape.

Although all opiates can minimize one's pain, they also have a dangerous effect in which a person cannot escape from.

This increases any suffering or pain you might feel. Immediately after a happy opiate high, the effects begin to reduce and the body to start releasing anti-opiates.

This makes sense when one looks at it from an evolutionary perspective. Given that you survived an attack and you were able to escape, you need to know the extent to which you have been hurt so that you can find help. That pain will make you careful when next you find yourself in a similar situation.

This is true for opiates: once the effect wears off, the consumer is left with a lot of anti-opiates and a feeling of emptiness. There appears to be one way to relief which is more drugs. This is why opiate addicts will do things that are desperate such as pulling out their teeth just to get another prescription for more opiates.

Some people are at higher risk of developing alcoholism than others.

The most common legal drug that is mostly used around us is alcohol. In most of the societies, drinking is so normal among people. Socializing and a glass or two glasses of alcohol goes together.

It is very easy to ignore the fact that it is these types of drinkers that are at risk of developing alcoholism.

A study that was conducted in 1996 by Christina Gianoulakis of McGill University's revealed the association between social situations, alcoholism and strange hormones known as beta-endorphins.

Beta-endorphins are naturally released by our body. This hormone makes us feel good, calm and makes us get connected to our social circumstances.

One effect of drinking alcohol is an elevation in beta-endorphin levels which leaves drinkers feeling happy in social circumstances as they make connections.

Dr. Gianoulakis showed how people that naturally have low levels of beta-endorphins are at risk to alcoholism. This is because such people use alcohol as a social lubricant during social circumstances

Unfortunately, this act can lead to addiction and serious complications.

Excess alcohol can lead to illnesses such as heart disease, strokes, and high blood pressure. Also, the liver is put under a lot of pressure which can lead to fatty liver disease and cirrhosis. Eventually, there is proof that drinking increases the possibility of developing various type of cancers.

Even if you are a moderate drinker, you cannot escape the effects of alcohol. A study was conducted by Dr. Angela M. Woods in 2018 and it was shown that one drink in a day can

increase the likelihood of getting cancer or heart diseases. The more you drink, the worse the effect. Two drinks in a day can reduce one's life expectancy by two years.

Finally, it is important to remember that alcohol can also lead people to engage in inexcusable actions, such as sexual assault.

An average of 700,000 students between the ages of 18 and 24 are assaulted by other students who've been drinking in the United States every year.

Although the consumption of Alcohol might be socially accepted; however, its dangers shouldn't be undermined.

Cocaine affects neural communications fascinatingly, but it's very addictive.

It has been up to years since the author last had a drink or smoke. However, she still has this urge for the relaxation social drugs give. On the other hand, when the author stopped using cocaine; it was hard for her at first but it was worth it. She has this feeling of relief like someone that left an abusive partner.

The author does not have to tell her experience with cocaine before you know it is a destructive drug. What makes cocaine destructive? Let us examine how cocaine works.

Since cocaine affects neural communication in the body, you feel good when you take it. Naturally, two neuronal cells communicate with each other through the gap between them known as a synaptic connection

Neurotransmitters like dopamine, norepinephrine, and adrenaline are released into this gap through the first cell. They get hooked to the receptors of the next cell, transferring a given message in the process.

For instance, when the released dopamine attaches to neuronal receptors, it gives a message of pleasure or reward through the neural circuit.

In normal situations, once the dopamine has fulfilled its role, it goes back into the first cell so it can be recycled and reused.

But cocaine meddles with this process. It hinders the transporter that takes the dopamine back for recycling.

Instead of going back to the first cell, dopamine stays in the synaptic gap for a long time. This continually stimulates the second cell's pleasure receptors which produce feelings of great pleasure.

These great feelings of pleasure do not last for long which results in addiction.

The pleasure derived from cocaine only lasts for about 30 minutes, this was deduced by pharmacologists. According to the author's experience, she said the highness happens for about three minutes.

After this, one begins to experience feelings of anxiety and sadness. Cocaine users constantly find themselves taking more and more cocaine. They eventually spend all their energy and money just to get more cocaine.

Tranquilizers make users feel relaxed by affecting specific cell receptors, but tranquilizers are very addictive too.

Marilyn Monroe, Jimi Hendrix and Michael Jackson died from drug overdoses. Their deaths were tragic and greatly shown in the press but they were not seen scandalous. This is because they were using tranquilizers like Nembutal, Vesparax or Propofol.

Tranquilizers are also called sedatives and it has specific respectability that has been attached to them. Tranquilizers are capable of slowing and relaxing the nervous system by copying the neurotransmitter gamma-aminobutyric acid (GABA).

There are two categories of the receptor that reacts to GABA, which are GABA-A and GABA-B.

Tranquilizers mainly target the GABA-A receptor, which is situated in the neuron's membrane and it constitutes five proteins arranged in a ring form. These proteins form a gate that opens and closes.

The neurotransmitter GABA triggers the receptor which leads to the opening of the gate that allows chloride ions to flow into the cell. These chloride ions' negative charge hinders the cells; thereby slowing neural transmission among them which causes a sense of calmness.

Since GABA-A receptors react to tranquilizers the way they would react to GABA. Tranquilizers have what they use them for; for instance, they are used for treating epilepsy, anxiety, and insomnia.

Sadly; just like many other drugs, tranquilizers are very addictive.

This is partly because the body starts to develop a tolerance to them by minimizing the number of GABA-A receptors that are available. Now, since there are lesser positions where the

tranquilizer can attach to; you will have to take more quantity of the sedative given to get the expected effect. This leads to addiction and at worst overdose.

Sedatives make it worse for patients because they are unable to sleep without these drugs. This insomnia the users' experience makes it difficult for users to quit tranquilizers.

One would expect American doctors to be aware of the dangers of prescribing such drugs. However, that is not the case. In a study that was conducted in 2016 by American medical researcher Markus Buchhaber, it was revealed that benzodiazepine prescriptions increased by 67% between the years 1996 and 2013. Due to the negative effect of drugs, this increase in drug prescription is a great concern.

There is a genetic part of addiction, and epigenetics might also play a role.

It is no fun falling into the trap of drug substances. This is why most people wonder and ask why they were the unfortunate ones. It is captivating to think that substance abuse is a matter of one's character and only the stronger people tend to ignore addiction. However, this is not the case.

Some people are more susceptible to becoming addicts than the others because of their characteristics. Therefore, one can say there is a genetic part of addiction.

A group of scientists conducted a study in 1999. The study was on alcoholism and addiction in identical twins. Why did the study use twins? This is because the genetic makeup in twins is almost the same.

It was revealed from the study that twins are twice as likely to both have addictive habits than normal siblings who share up to 50% of their genetic makeup.

This shows the association between genetic makeup and addictive tendencies.

Another research supported this claim; the study showed that children that are born into the families that have histories of addiction are at higher risk of becoming addicts themselves. This is also the case for children that were adopted into the families at birth without histories of addiction.

Thus, it can be deduced that genetics play a role in addiction. What is even more interesting is that; epigenetics also have similar impact genetics has on addiction.

Epigenetics is a new field which studies how individual traits arise as a reaction to certain life situations and how these traits are transferred genetically from one generation to the other.

An example is given below

According to a study that was conducted in 2014 by Elmar W. Tobi, when the parent of a particular generation experiences famine, the metabolism of such people gets adapted to the situation. Meaning, it learns to survive. This environmental adaptation is transferred to the next generation as what is known as an epigenetic marker in the parent generation's DNA. As a result of this, the children of such parents can easily survive on very small food and put on weight.

A study that was conducted by Henrietta Szutorisz in 2015 proposed that the same process might happen with drug use. In her study, parent-generation rats were constantly exposed to THC.

Interestingly, the offspring of the rats were more likely to show mood disorders and self-administer opiates.

Early exposure to drugs is unsafe and adolescents are specifically at risk.

So far, we now know the impact both inherited genetics and epigenetics has on addictive behavior. However, there is still more going on.

It is necessary to think about upbringing and the environment when it comes to drugs because it can make children and teenagers susceptible to drug abuse.

It's early exposure to drugs that is unsafe.

This was shown in a survey that was conducted in 2015 by American medical researcher Moshe Szyf. Embryos, children, and adolescents who had been exposed to drugs like THC became less sensitive to rewarding feelings as adults as well as feelings stimulated by drugs.

The impact this has on such a person is that they are more likely to use higher drug dose once they start taking drugs.

Furthermore, there is also the gateway effect which is another environmental factor. The gateway effect means once you start taking a particular drug, you find yourself using other drugs.

For instance; In 2014, a study was conducted by a New Zealand psychologist named David M. Fergusson on the effects of early exposure to cannabis.

From his study, it was revealed that the usage of cannabis before adulthood led to the increased risk of drug addiction in adult life.

However, Fergusson went further with his observations; and he concluded that neuroplasticity also played a role which is the brain's ability to evolve during a lifetime. Young brains are specifically plastic which is what leads to social and identity development.

Also, this youthful plasticity means that the neural inputs produced by the drugs will leave a greater impact. This means that the younger you are the more susceptible you get to drugs effect.

It doesn't stop with brain plasticity. Once a person becomes an adult, the prefrontal cortex of the brain is the last part to develop.

This is vital because the prefrontal cortex controls our impulsive behavior and abstract reasoning. Therefore, the prefrontal cortex is what we use to think about the consequences and benefits of our actions.

Because adolescents do not have these abilities, they are more vulnerable to taking drugs and overdosing.

The lesson here is concise. When you have an adolescent you care for, make sure you tell them the effects and risk associated with drug use, especially when they are at a vulnerable age.

Never Enough: The Neuroscience and Experience of Addiction by Judith Grisel Book Review

Drugs have numerous effects; however, all drugs have one thing in common. Whatever pleasure you get first from a drug, it is going to wear off eventually and you experience an opposite feeling of the pleasure. Due to anxiety, depression, and pain, people opt for more drug dose of their choice. However, because the body prevents the effect of the drug and it becomes less potent, the user will need more dose to feel relief. This is what leads to addiction which is often difficult to break from. However, with knowledge about the effects of drugs and the knowledge of human brain development, this can help addicts resist this addiction.

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