

Assessing the Impact of Drug Use on the Human Body

Sophie Albert*

School of Applied Psychology, University College Cork, North Mall, Cork Enterprise Centre, Cork, Ireland

Introduction

Stimulants

Stimulants are substances that activate the central nervous system, eliciting a temporary surge in alertness, focus, and vitality. This category includes caffeine, nicotine, cocaine, amphetamines, and methamphetamine. Caffeine, a mild stimulant, is prevalent in coffee, tea, energy drinks, and chocolate. Its consumption may heighten anxiety levels and accelerate heart rate. Nicotine, a potent stimulant found in tobacco, can elevate heart rate, blood pressure, and foster addiction [1]. Cocaine, an extremely addictive stimulant, induces sensations of euphoria alongside heightened heart rate and blood pressure. Prolonged use damages cardiac and vascular systems, increasing the risk of heart attacks and strokes. Amphetamines and methamphetamine, prescribed for conditions like ADHD and narcolepsy, are also subject to misuse for recreational purposes. They provoke elevated heart rate, blood pressure, and addiction, while also potentially triggering mental health issues such as paranoia and psychosis [2].

Depressants

Depressants are substances that dampen the central nervous system, inducing feelings of calmness and tranquility. This category encompasses alcohol, benzodiazepines, barbiturates, and opioids. Alcohol, legally available and widely consumed, impairs coordination, judgment, and memory, while also posing risks of liver disease, cancer, and mental health issues. Benzodiazepines and barbiturates, prescribed for anxiety, insomnia, and seizures, are susceptible to recreational misuse. They induce drowsiness, cognitive impairment, and addiction, with the potential for respiratory depression and fatal outcomes. Opioids, prescribed primarily for pain management, also face recreational abuse. They offer pain relief and sedation but carry a high risk of addiction and respiratory depression, culminating in fatal overdoses. The misuse of opioids has precipitated a significant public health crisis, known as the opioid epidemic, in the United States [3].

Hallucinogens

Hallucinogens encompass substances that distort perception, mood, and cognition. Examples include LSD, psilocybin, mescaline, and DMT, which induce hallucinations, temporal distortion, and mood alterations. These substances elicit changes in sensory perception, such as visual or auditory hallucinations. Long-term psychological effects like flashbacks and psychosis can also occur.

Cannabis

Cannabis, derived from the cannabis plant, contains THC (tetrahydrocannabinol), inducing feelings of euphoria and relaxation. Used medicinally for pain, nausea, and anxiety, it's also a recreational choice. Cannabis use can impair coordination, judgment, and memory, and may lead to respiratory and mental health issues like paranoia and anxiety [4].

Effects of chemical drugs on the human body

Effects of chemical drugs on the human body involve complex interactions. Upon ingestion, drugs enter the bloodstream,

disseminating to organs and tissues. Binding to specific receptors or enzymes triggers biological responses, influencing bodily functions positively or adversely. Metabolism breaks down drugs into inactive forms for elimination via organs like the liver and kidneys. Drug side effects range from mild (e.g., drowsiness) to severe (e.g., organ damage, addiction, or fatality), contingent on factors like dosage, duration, frequency of use, and individual susceptibility [5].

Drug-related risks hinge on various factors

The drug's potency, formulation, user's biometrics (height, weight, age, metabolism), dosage, administration method (oral, nasal, injection), and usage duration. Injecting or snorting drugs poses higher overdose risks compared to oral ingestion, elevating dangers like tetanus, infections, and vein damage. Shared injection equipment heightens risks of bloodborne infections like hepatitis B, hepatitis C, and HIV/AIDS [6].

For those who have a history or family history of mental health concerns, using drugs may raise their chance of developing these problems.

Mixing drugs— including over-the-counter or prescribed medications — can be unpredictable and dangerous.

Effects of drug use

Drug use can have adverse effects on both physical and mental health, both immediately and over time. Individuals who use drugs may experience a variety of negative outcomes, including: Participating in risky behaviors such as unprotected sex or driving while intoxicated, Behavioral changes, such as mood swings or increased hostility towards others, Difficulty sleeping or experiencing negative effects on sleep patterns, Issues with cognition or memory, impacting daily functioning, Lack of a balanced diet or decreased appetite, leading to nutritional deficiencies, Frequent illnesses like colds and flu, due to weakened immune systems, Chronic health effects, including cancer or damage to vital organs such as the liver, kidneys, heart, or blood vessels, which may vary depending on the type of drug used and its frequency, Dental problems such as cavities and gum disease, Mental health difficulties, such as depression and anxiety, Risk of infection through sharing injecting equipment, Development of addiction, leading to dependency and potential overdose, Psychosis, characterized by a loss of touch with reality, Hazardous injection techniques that can cause

*Corresponding author: Sophie Albert, School of Applied Psychology, University College Cork, North Mall, Cork Enterprise Centre, Cork, Ireland, Email: sophieal@ucc.ie

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vein damage and other health complications [7].

Drug effect on human brain

Medications exert their effects on neurons by influencing how neurotransmitters are utilized to transmit, receive, and process signals. Some drugs, such as heroin and marijuana, possess molecular structures akin to natural neurotransmitters in the body, enabling them to activate neurons and stimulate their function. However, despite mimicking the brain's natural chemicals, these pharmaceuticals do not activate neurons in the same manner as natural neurotransmitters, leading to the transmission of inaccurate messages within the neural network [8].

Other drugs, like cocaine and methamphetamine, can either trigger exceptionally high neurotransmitter release from neurons or disrupt the regular recycling of these brain chemicals by interfering with transporters. These substances have the capacity to alter critical brain regions essential for vital functioning, often contributing to the obsessive drug use characteristic of addiction.

Drug usage impacts various brain regions, including the basal ganglia, crucial for habit formation and positive motivation. This area serves as a vital node in the brain's "reward circuit," responsible for experiencing pleasure from activities such as eating, socializing, and sex. Initially, drugs overactivate this circuit, leading to euphoria. However, with repeated exposure, the circuit becomes less responsive to the drug's presence, making it increasingly difficult to derive pleasure from non-drug sources [9].

Stressful emotions, defining withdrawal after the drug high fades and driving individuals to seek drugs again, are influenced by the enlarged amygdala. As drug usage escalates, this circuit becomes more sensitive, perpetuating the cycle of addiction. Over time, individuals with addiction may rely less on drugs to achieve a high and more on them to alleviate discomfort temporarily.

Functions such as thinking, planning, problem-solving, decision-making, and exercising self-control over urges are regulated by the prefrontal cortex. Adolescents, whose brains are still developing, are particularly vulnerable, as the prefrontal cortex is the final portion of the brain to mature. When the balance between the prefrontal cortex, basal ganglia, and extended amygdala is disrupted, individuals may experience obsessive drug seeking and impaired impulse control, indicative of a substance use disorder [10].

Conclusion

The impact of drugs on the human body is diverse, contingent upon

factors such as the specific drug, dosage, method of administration, and individual physiological and psychological traits. While certain drugs serve essential medical purposes, others pose significant risks to health. Responsible drug use, coupled with adherence to medical guidance, is crucial to mitigate adverse effects.

Education and awareness play pivotal roles in preventing drug abuse and its associated harms. By understanding the dangers of drug misuse and promoting informed decision-making, individuals can safeguard themselves and others from the detrimental consequences of substance abuse. Encouraging responsible drug use practices and fostering a culture of open dialogue about drug-related risks contribute to promoting overall well-being within communities.

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Conflict of Interest

None

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