*Drugs: Mind, Body, and Society* 2e

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Instructor’s Manual

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**CHAPTER 9: Cannabis**

**Brief Outline of the Chapter**

* History of Cannabis
  + Seventeenth- to Nineteenth-Century America
  + Twentieth Century and Beyond
* Prevalence of Cannabis Use
* Legal and Cultural Issues Related to Cannabis
  + Legal Issues
  + Cultural Issues
* Source and Forms of Cannabis
  + Types of Cannabis Plant
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  + Types of Cannabis Products
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* Pharmacology of Cannabis
  + Pharmacokinetics of Cannabis
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* Mechanism of Action of Cannabis
* Acute Effects of Cannabis
  + Physiological Effects at Low and Moderate Doses
  + Behavioral and Psychological Effects at Low and Moderate Doses
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  + Critical Evaluation: Does Long-Term Cannabis Use Cause Cognitive Deficits?
* Medical and Therapeutic Uses of Cannabis
  + Analgesia
  + Nausea, Vomiting, and Appetite
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* Chronic Effects of Cannabis
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  + Dependence
  + Withdrawal
  + Treatment for Cannabis Dependence

**Chapter Summary**

* + **History of Cannabis**
* Cannabis has been cultivated for many thousands of years. Its use has a long tradition in many cultures as an important medical and religious substance. The first known reference to cannabis’s medicinal use was in 2737 BCE. Use spread from China and India to the Middle East. Cannabis was likely introduced to the western hemisphere in the sixteenth century through the slave trade, when Portuguese enslaved Africans and transported them to Brazil.
* English settlers planted cannabis in Jamestown in 1611. In 1619, King James I issued a royal decree that actually required every property owner in the Virginia colony to grow 100 hemp plants, due to its many beneficial uses. Throughout the nineteenth-century, marijuana was legal and widely available.
* Use increased further when Mexican immigrants came to the United States in the early twentieth century. It was also popular among jazz musicians. As the Depression deepened and the economy worsened, cannabis was a handy scapegoat for the fear and prejudice against African American musicians and against Mexican immigrants thought to be taking rare jobs away from “real” Americans.
* Harry Anslinger, the first director of the Federal Bureau of Narcotics, led the charge to convince the public that marijuana was a terrifying and dangerous drug. William Randolph Hearst helped his campaign by printing terrifying (and spurious) tales of the drug. The marijuana tax act was passed in 1937.
* Throughout the 1960s and 1970s, attitudes about marijuana eased, and the DEA strongly considered decriminalizing the drug. In 1972, the Shafer Commission found no evidence that marijuana causes physical or psychological harm.
* In the 1980s and 1990s attitudes shifted and penalties increased. Since the mid-1990s, cannabis use has increased, and many states have decriminalized the drug, approved the use of medical marijuana, or legalized it entirely.
* Take-home messages:
  + - As we’ve seen with other drugs such as opium and cocaine, early marijuana laws stemmed from fear and hostility toward foreigners rather than from the properties of the drug itself.
    - There is also a pattern of scientific committees investigating cannabis and finding that its effects don’t seem to justify its classification as an extremely dangerous, very addictive drug. Political factors play a significant role in drug laws.
  + Questions to pose:
    - How is the history of cannabis in the United States similar to that of other drugs such as cocaine and opium? How is it different?
  + Tidbits:
    - Since federal narcotics agents claimed that marijuana made people crazy enough to commit awful crimes against their will, defense attorneys would sometimes call these agents to testify. One man accused of murder claimed that he was not responsible for his crime because he had been in the same room as a bag of marijuana. He was acquitted.
* **Prevalence of Cannabis Use**
  + - Cannabis is the most commonly used illicit drug in the United States. Americans use cannabis at rates higher than which is seen in most of the rest of the world.
    - Cannabis use is rising in the United States. Over 31 million Americans report cannabis use within the past month, and over 10 million use cannabis every day or almost every day. Cannabis use differs by gender, race, and age.
    - There is an inverse relationship between cannabis use and perception of its risk among high school students.
    - Questions to pose:
      * Americans have some of the highest rates of cannabis use in the world. Why do you think that is? What is it about the United States that leads to heavier use than in other countries?
    - Tidbits:
      * **Famous People Arrested for Cannabis**: In some chapters, we have listed famous people who died from using different drugs. We can’t do that in this chapter, since marijuana isn’t fatal. Instead, here is a list of celebrities who have been arrested for marijuana possession or related charges: actors Bob Denver, Macaulay Culkin, Matthew McConaughey, Robert Mitchum, Bill Murray, Haley Joel Osment, and director Oliver Stone all have marijuana arrests. Musicians Louis Armstrong, Chuck Berry, David Bowie, James Brown, Ray Charles, and three of the four Beatles were all arrested for marijuana, as were Snoop Dogg, Neil Diamond, Whitney Houston, Mick Jagger, Gene Krupa, Queen Latifah, Willie Nelson, Keith Richards, David Lee Roth, and Carlos Santana. Authors William Burroughs and Ken Kesey have been arrested for marijuana, as well as basketball star Kareem Abdul-Jabbar.
  + **Legal and Cultural Issues Related to Cannabis**
  + Although medical marijuana is legal in most states, and recreational marijuana is permitted in many, federal law states that cannabis is illegal; in fact, it is a schedule I drug.
  + Hundreds of thousands of people are arrested each year in America for cannabis possession.
    - Actual arrest rates of marijuana users are low compared to the number of users, and most of those convicted of simple possession receive a small fine and no jail time.
    - Black people are arrested and incarcerated at rates significantly higher than are white people.
* Cannabis laws in America are inconsistent. In some states, possession is a misdemeanor, punishable by up to a year in prison. In other states, use is decriminalized, which means that although the underlying law remains, the criminal or monetary penalties are reduced or removed. And in other states, legalizationof cannabismeans that criminal penalties have been removed, and the drug can be fully regulated and taxed.
* National polls show that most Americans support cannabis legalization.
  + - Men are more likely than women to approve legalization; white people and Black people more than Hispanic people; Democrats and Independents more than Republicans; and younger adults more than older adults.
  + Cannabis has made its mark in American culture, and references can be found in literature, art, music, television, and movies.
  + Take-home messages:
    - Cannabis has an enormous influence on today’s society. References to cannabis are rife in popular culture, and both its cultivation and its prevention have a significant economic effect.
  + Questions to pose:
    - Over the past few years, the percentage of the population who believes that cannabis should be legalized has skyrocketed. What factors do you think underlie this phenomenon?
    - What factors do you think should be considered when establishing cannabis’s legal status?
    - How is cannabis use portrayed in movies? How realistic is it?
  + **Source and Forms of Cannabis**
  + There are different varieties of the cannabis plant; two of the most common are *Cannabis sativa* and *Cannabis indica.* Today, most cannabis plants are hybrids.
  + Female cannabis plants produce flower clusters with a sticky psychoactive resin that catches the pollen produced by the male plants. Seeds are produced when pollen fertilizes the flowers.
    - After fertilization, the flower no longer needs the protective resin. If a female plant is not fertilized, it will continue to produce THC-containing resin.
  + Cannabinoids are substances that interact with the body’s cannabinoid receptors. Some cannabinoids come from the cannabis plant (phytocannabinoids), and others are produced naturally by the body (endocannabinoids).
  + The marijuana plant contains phytocannabinoids such as THC and CBD; the percentage of the specific phytocannabinoids varies between different strains of the plant, as well as on the growing conditions, timing of harvest, storage, and age of the plant.
    - THC is psychoactive, and CBD is antioxidant, anticonvulsant, antiinflammatory, antipsychotic, and neuroprotective.
    - Cannabis plants also contain terpenes and flavonoids, which give odor, color, and flavor to the plant, as well as producing physiological effects of their own.
  + Different forms of cannabis products can be produced from different parts of the plant, and they contain varying amounts of THC. Over the past few decades, average THC levels in cannabis have increased steadily.
  + Hemp contains only trace amounts of THC and is not psychoactive. It is a hardy, adaptable plant that is a source of fiber, fuel, and food.
  + Synthetic cannabinoids include dronabinol, a THC pill used to raise appetite and alleviate nausea and vomiting in cancer patients; and Spice, a term for a wide variety of synthetic cannabis products. Spice produces more anxiety, agitation, panic, paranoia, and psychosis than cannabis.
  + Take-home messages:
    - Phytocannabinoids are substances that come from the cannabis plant, such as THC and CBD. Endocannabinoids such as anandamide and 2AG are endogenous in the human body. Synthetic cannabinoids include Marinol and Spice.
    - Marijuana is a broad word that describes the cannabis plant. The chemical composition of cannabis depends on many factors, including the type of cannabis plant, growing conditions, timing of harvest, storage, and age of the plant. Growers can cultivate different strains to adjust for the degree of psychoactivity or therapeutic effects their users are seeking.
    - Cannabis contains many chemicals other than THC, and they all interact in ways that are not yet fully understood.
  + Questions to pose:
    - Due to selective breeding and cultivation techniques, the THC levels in cannabis have increased greatly in recent years. What are some pros and cons of this?
  + **Pharmacology of Cannabis**
  + Cannabis is most commonly smoked or eaten. It is highly fat soluble and easily crosses the blood–brain barrier.
    - To inhale, users typically use joints, pipes, bongs, or vaporizers.
    - Compared to smoking, ingesting cannabis gives a slower onset of effect, less predictability of action, less user control, and a higher risk of accidental overconsumption.
    - Cannabis has a wide range of effective doses, as well as a biphasic dose response curve.
    - Some cannabis metabolites may remain in the body for days or even weeks after use.
    - Cannabinoids not only bind to cannabinoid receptors, but to many other receptors in the body as well and can interact with these receptors in a variety of ways.
  + Take-home messages:
    - Although it seems as though ingestion would be a safer route of administration, it is actually more problematic than smoking.
  + Questions to pose:
    - Since vaporizers can be used for cannabis as well as nicotine, do you think vaporizers should be more tightly controlled? Why or why not? Do you know anyone who vapes cannabis in public, since it is largely undetectable?
* **Mechanism of Action of Cannabis**
  + Cannabis affects the body in part because it interacts with the **endocannabinoid system (ECS)**—a system of neurotransmitters, enzymes, and receptors found in all animals. The ECS is very important for maintaining homeostasis.
  + Cannabinoid receptors (CB1 and CB2) are present in all vertebrate species. These receptors are found in the basal ganglia, cerebellum, hippocampus, cortex, amygdala, eye, pancreas, testes, and uterus.
  + Endocannabinoids include anandamide and 2-AG. These fat-soluble neurotransmitters are rapidly synthesized as needed, released from the postsynaptic neuron, and bind to receptors on the presynaptic neuron, to modulate the release of other substances.
  + **Acute Effects of Cannabis**
  + Cannabis’s effects depend on many factors, including the dose; the particular strain’s potency and the ratio of THC to CBD; the user’s previous experience, expectations, and mood; and the environment in which it is used.
  + Cannabinoid receptors are found in many areas of the brain and many organs of the body.
  + Cannabis increases one’s sense of well-being, enhances sensory perception, and impairs memory and concentration. It also reduces reactivity to pain, increases heart rate, boosts appetite, modulates the immune system, and plays a role in sperm production, fertilization, and development of the fetus.
  + Cannabis has a very high therapeutic index, but nevertheless it has some potentially negative physical, psychological, and cognitive effects. Cannabis may impair judgment and coordination; elevate heart rate; and raise the risk of schizophrenia in a susceptible minority.
  + Cannabis may interact with some drugs, including blood thinners. In addition, cannabis can enhance the sleep-inducing effects of barbiturates, benzodiazepines, alcohol, and other sedatives; the hypertension and tachycardia that occur with cocaine and amphetamines; and the analgesic effects of morphine, codeine, and NSAIDs.
  + Some of the adverse consequences of cannabis use come not from the drug itself, but criminal penalties, or harm due to one’s diminished reaction time and coordination. There is no conclusive evidence that the use of cannabis is causally linked to subsequent abuse of other illicit drugs.
  + Take-home messages:
    - Cannabis’s effects are more variable than many other drugs and depend on many factors.
  + Questions to pose:
    - How would you design a study to evaluate the long-term effects of cannabis on cognition?
    - Do you think cannabis is a gateway drug? Why or why not?
  + Tidbits:
    - “The munchies” are a phenomenon in which marijuana users’ appetites increase. Cannabis seems to particularly enhance one’s craving for sweet foods. This effect, like so many others, depends on the set and setting. Many North Americans seem to be susceptible to marijuana’s appetite enhancing effects, but culturally Jamaicans consider cannabis to be an appetite suppressant.
  + **Medical and Therapeutic Uses of Cannabis**
  + Since marijuana is not legally recognized as a medicine by the federal government, even in states where medical marijuana has been legalized, physicians may not prescribe it and pharmacists may not dispense it. Instead, health care professionals can recommend marijuana to their patients.
  + Substantial evidence exists that cannabis is effective for treating chronic pain, reducing nausea and vomiting, stimulating hunger, and alleviating the stiffness and muscle spasms experienced by patients with multiple sclerosis.
  + Scientists are investigating marijuana’s effectiveness against epilepsy, glaucoma, cancer, stroke, Parkinson’s disease, Huntington’s disease, amyotrophic lateral sclerosis (ALS), Alzheimer’s disease, diabetes, irritable bowel disease, and depression.
  + Cannabis use can allow some people to minimize or eliminate their use of more harmful substance such as alcohol, benzodiazepines, or prescription analgesics.
  + Questions to pose:
    - To be accepted as a treatment in the United States, a drug must meet five criteria:

1. The drug’s chemistry must be known and reproducible
2. There must be adequate and well-controlled studies about the drug’s safety
3. There must be adequate and well-controlled studies about the drug’s efficacy
4. Qualified medical experts must accept the drug and its use
5. The scientific evidence supporting these conditions must be widely available

By these criteria, at this point, cannabis cannot as yet be classified as a medicine. Since it is given in plant form, and since the chemical composition varies from strain to strain and from plant to plant, the exact drug may not be consistent. On the other hand, Eastern medical practices (as opposed to Western medicine) are more open to the holistic properties of a plant rather than identifying one active ingredient. And indeed, the effects of taking a plant that contains hundreds of psychoactive compounds which all modify each other is different than ingesting one active ingredient.

* + - How do you take all these into consideration when weighing cannabis’s potential medical benefits? Must we totally understand all components of a plant to prescribe it?
  + **Chronic Effects of Cannabis**
  + Regular use of cannabis will cause tolerance.
  + Not all heavy chronic users go through withdrawal upon cessation of the drug, but if withdrawal symptoms occur, they are usually not severe.
  + Cannabis is less addictive than other drugs of abuse, but the drug can be addictive in some. Up to 9% of users show signs of dependence.
  + Most treatment for cannabis dependence typically involves psychological approaches.

**Challenges You May Encounter**

* Your students may have some personal experience with cannabis and may say things like “that’s not what happened to *me!”* Their experiences can make for a richer class discussion. If their experience with its effects is unique, discuss the factors that can influence a person’s experience with a drug. Students may also feel strongly about policy issues related to cannabis. Again, this is a great opportunity and can lead to a wonderful class discussion.
* Review the differences between “decriminalization” and “legalization.”

**Homework Ideas**

* + Research the cannabis laws in your state. Pick three states with similar laws (i.e., legal, mild penalties for use, harsh penalties for use, medical marijuana available, etc.) and three states with different laws, and look at how the laws are correlated with other factors (drunk driving fatalities, prescription opioid use, marijuana dependence treatment, etc.).
  + For classes that are more science-based, students can start with a labeled drawing of a sagittal section of the brain, identify the areas that are particularly affected by cannabis, and explain cannabis’s effects based on where it works in the brain.

**Critical Thinking Exercises**

* **Effect of Cannabis on Cognition**
  + Use the critical evaluation feature as a guide to a discussion about the long-term effects of cannabis on cognition. This can take the form of an in-class debate, videos the students produce, a paper, or simply an in-class discussion.

**Longer Discussion Topics**

* **Legalization of Cannabis**
  + What is your position on legalizing cannabis? Should it remain illegal, be legalized for medical use, or be decriminalized entirely? What do you think the ramifications of legalization would be? Since it is fairly easy to grow, how would it be regulated? Would you be more tempted to use the drug if it were legally available?

**Activities and Games**

* **Two Truths and a Lie**
  + Two truths and a lie is a game in which players tell two truths and one lie, and other players have to determine which statement is the lie. Have students get into groups of four, consisting of two teams of two. Team A comes up with a list of two truths and a lie about cannabis and Team B has to guess which statement is the lie. Then Team B makes the statements and Team A has to guess. Students can play 2–3 rounds. You can also have them do this activity for multiple drugs at once.
* **Pin the Drug Effect on the Person**
  + This game is described in the “Activities for Chapters 5–12” section.

**Video Clips and Other Supplemental Resources**

* Videos

* ["Marijuana: Last Week Tonight with John Oliver" (](https://www.youtube.com/watch?v=BcR_Wg42dv8)*[HBO](https://www.youtube.com/watch?v=BcR_Wg42dv8)*[, 2017)](https://www.youtube.com/watch?v=BcR_Wg42dv8)
* ["How Weed Works: THC" (*SciShow*, 2012)](https://www.youtube.com/watch?v=FsJzCdFlpyQ)
* ["2-Minute Neuroscience: THC" (*Neuroscientifically Challenged*, 2020)](https://www.youtube.com/watch?v=ISUXrjBXHsE)
* ["2-Minute Neuroscience: CBD" (*Neuroscientifically Challenged*, 2020)](https://www.youtube.com/watch?v=z6-RkAb-jqk)
* [“Josh Stanley: The Surprising Story of Medical Marijuana and Pediatric Epilepsy” (*TEDxBoulder*, 2013)](https://www.youtube.com/watch?v=ciQ4ErmhO7g)

* ["‘Clearing the Smoke’: The Benefits, Limits of Medical Marijuana" (](https://www.youtube.com/watch?v=F2Vz7DGcCy8)*[PBS NewsHour](https://www.youtube.com/watch?v=F2Vz7DGcCy8)*[, 2011)](https://www.youtube.com/watch?v=F2Vz7DGcCy8)
* Books
  + Caulkins, J.P., Kilmer, B., & Kleiman, M.A.R. (2016). *Marijuana Legalization: What Everyone Needs to Know, 2nd edition*. New York: Oxford University Press.
  + Lee, M.A. (2012). *Smoke Signals: A Social History of Marijuana—Medical, Recreational, and Scientific*. New York: Scribner.